

**ALL THAT IS AIR TURNS SOLID: THE CREATION OF A MARKET FOR SINKS
UNDER THE KYOTO PROTOCOL ON CLIMATE CHANGE**

by

MARIA GUTIERREZ

A dissertation submitted to the Graduate Faculty in Anthropology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

2007

UMI Number: 3283186

Copyright 2007 by
Gutierrez, Maria

All rights reserved.

UMI[®]

UMI Microform 3283186

Copyright 2007 by ProQuest Information and Learning Company.
All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

ProQuest Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

© 2007
MARIA GUTIERREZ
All Rights Reserved

This manuscript has been read and accepted for the Graduate Faculty in Anthropology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

María Gutiérrez

Date

Chair of Examining Committee
Prof. Marc Edelman

Date

Executive Officer

Prof. Jane Schneider

Prof. Cindi Katz

Prof. David Harvey

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

**ALL THAT IS AIR TURNS SOLID: THE CREATION OF A MARKET FOR
SINKS UNDER THE KYOTO PROTOCOL ON CLIMATE CHANGE**

by

María Gutiérrez

Adviser: Professor Marc Edelman

Countries with greenhouse gas emission reduction commitments under the Kyoto Protocol on climate change may invest in projects in developing countries that reduce or remove CO₂ and take credit for the reductions. Since vegetation absorbs CO₂ through photosynthesis, trees in one place could offset gases emitted elsewhere. For this purpose, trees are known as carbon sinks, and as such they entered the new market in emission reductions.

This dissertation analyzes this new commodity and how it works on the ground. It describes problems encountered by UN negotiators when they abstracted, isolated and quantified a process such as breathing, which takes place naturally everywhere, anyway. It details the UNFCCC negotiations, which created not only the commodity, but also the demand, the supply, and the rules governing its trade, and thus the scarcity conditions for the market to work.

Using the *filières* or commodity chain approach, this dissertation follows the commodity from producers to consumers. Based mainly on field work in Costa Rica, the only country with a nationwide system to sell offset credits from sinks, it finds that small-

scale producers are excluded from the market, even though it makes sense to include them given that they often live in environmentally vulnerable areas with limited agricultural potential. The most important commodity in a case of fictitious capital like this one is the production of credibility, provided here by certifying agencies. This case study contributes to *filières* or commodity chains analysis by drawing attention to time and risk (alongside space) as critical elements in determining who has access to a market.

My main argument is that the creation of a carbon market for sinks is a case of capital involution, as used by Goldenweiser (1936), Geertz (1963) and Katz (1998) to refer to instances where a narrow pattern persistently repeated leads to ever increasing complexity but, instead of evolving into something new, it generates increased entrapment, making the pattern more pervasive in its domination. Insofar as the new market for sinks reproduces uneven development, it results in involution and is not socially transformative.

Acknowledgements

I first want to thank the many people in Costa Rica who speculated with me about what all this meant and patiently endured my ignorance of all things rural. My gratitude and admiration go to my friends at ASCOMAFOR and other Tico peasant farmers, the ultimate and most audacious risk managers. Many thanks also to Javier Baltodano, Carmen Juanes, Isaac Rojas, and Gabriel Rivas, who immediately welcomed me and taught me so much. I also thank Antonio MacHugh, Lucio Pedroni and others at the University of Costa Rica and CATIE, particularly Zenia Salinas, for their friendship and support.

I am grateful to the UN delegates and others, who throughout the past few years have taken their time to speak in a different mode about the issues at hand. I thank in particular Thelma Krugg, John Lanchberry and David Kaimowitz.

I also want to thank my ENB colleagues, especially Emily Boyd, Lisa Schipper, Kati Kulowesi, Alexis Conrad, Miquel Muñoz, Peter Doran, Marcela Rojo, as well as Dagmar Lohan and Claudio Forner, and Anju Sharma and Benito Muller, for their continuous friendship and for sharing my unhealthy addiction to the climate process. I thank Chris Spence, the ultimate mega-team leader, for his warmth and knowledge, and Kimo Goree, who graciously invited me join his team and in so doing gave me the best access to the exotic and enclosed world of UN negotiations anyone could have.

I thank Ian Fry, from whom I learned the most about LULUCF and negotiations, but most importantly, about integrity in the midst of so much pragmatism and

politikeering. Special thanks also to Manuel Estrada, Leticia Moreno, and Román Gómez for their companionship and solidarity.

I sincerely enjoyed the whole experience of graduate school at the Anthropology Department at CUNY, and it was in no small measure due to Louise Lennihan and Ellen de Riso. I could not have been better taken care of.

I am deeply indebted to Marc Edelman, who on every count was the best advisor one could imagine. He offered the right words of encouragement and practical advice every time. My gratitude goes also to the other committee members, Jane Schneider, Cindi Katz and David Harvey, a real dream team who, together with Marc and Don Robotham, were my inspiration and support throughout. I think in the end I did it for them.

I specially thank my friends Patty Kelly and Elsa Davidson, who made me want graduate school to be eternal, but made sure it wasn't by helping me with it until the very end. My thanks also go to my friends José Kuri, Monica Manzutto, Damián Ortega, Isadora Hastings, Abraham Cruzillegas, Alejandra Carrillo, and Catherine Belloy, who were convinced that I must have finished writing the dissertation years ago and was actually preparing the Nobel prize acceptance speech.

To Sara Chavez and Elizabeth Rodriguez, for their support and love of many years.

To my parents and siblings, for pretending to believe me every time I said I was just about to finish, and particularly to my mother, without whom I couldn't have done it.

To my son Simon, for being so independent and accommodating that it makes me think he intuitively knows how enjoyable doing this is, and thus gives me hope that he will also try it one day.

To Gabriel Orozco, from whom I learned, through example, that it matters less to get the right answers than to keep trying to ask the right questions. To him I owe so much and dedicate this work.

Table of Contents

Part I. Introduction	1
1. A case of involution	
2. On time and uneven development	
3. On <i>filières</i> or commodity chains and access mapping	
4. On climate change as emblematic of ecological modernization	
4.1 Calculation of costs and benefits	
4.2 Statistical correlation and unlimited liability	
4.3 Science as policy	
4.4 New participatory practices	
5. The market becomes nature, nature becomes a market	
6. Structure and research methods	
6.1 Mapping access to the Payment for Environmental Services in Costa Rica	
6.2 Fieldwork at the UN	
Part II. The creation of a market: UNFCCC and the Kyoto Protocol	
Chapter 1. Understanding climate change	51
1.1 A brief history of the science	
1.2 The greenhouse effect: how it works	
1.3 Rising emissions	
1.4 Common but differentiated responsibilities	
1.5 The Intergovernmental Panel on Climate Change (IPCC)	
Chapter 2. Negotiating climate change: The United Nations Framework Convention on Climate Change	74
2.1 Historical background	
2.2 Towards a climate change convention	
2.3 The UNFCCC	
2.4 Players	

Chapter 3. The Kyoto Protocol	107
3.1. From Rio to Kyoto	
3.2. How it works	
3.2.1 Allocating shares	
3.2.2 Determining a time frame	
3.3 Introducing flexibility	
3.3.1 A basket of gases	
3.3.2 The EU bubble	
3.3.3 Flexible mechanisms	
3.3.3.1 Emissions Trading	
3.3.3.2 Joint Implementation	
3.3.3.3 Clean Development Mechanism	

Part III. The creation of a commodity: Carbon sinks

Chapter 4. Negotiating sinks	127
4.1. An explanatory note on sinks under the UNFCCC and the Protocol	
4.2. The scientific understanding of sinks	
4.3. Negotiating sinks	
4.3.1. Notes on the negotiation process	
4.3.2. Sinks under the UNFCCC	
4.3.3. Sinks under the Protocol	
4.3.3.1. The road to Kyoto	
4.3.3.2. The road after Kyoto:	
Collapse in The Hague (or “sinking the Protocol”)	
The Bonn Agreements and the Marakesh Accords	
4.4. Defining the decision	
4.5. The problem with sinks	
 Chapter 5. Sinks in the CDM: Creating the rules of the market	 181
5.1 Sinks or toilets?	
5.2 Negotiating sinks in the CDM	
5.3 A/R and what had to be sorted out	
5.3.1 Baselines	
5.3.2 Additionality	
5.3.3 Base year	
5.3.4 Non-permanence	
5.3.5 Leakage	
5.3.6 Social and environmental impacts	

- 5.3.7 GMOs and Invasive Alien Species
- 5.4 Small-scale sinks
- 5.5 Conclusion

Part IV. Access to the market

Chapter 6. The market for sinks: how it works	222
6.1 State of the carbon market	
6.1.1 The CDM carbon market	
6.1.2 On distribution	
6.2 The CDM project cycle for sinks	
6.2.1 The Project Design Document	
6.2.2 The Designated Operational Entities	
6.2.3 The Designated National Authority	
6.3 The cost of a project	
6.3.1 Pre-implementation costs	
6.3.2 Implementation costs	
6.3.3 Transaction costs	
6.4 Allocating risk	
6.5 Access	
6.5.1 Understanding transaction costs and in-built inequality	
6.6 The Chicago Climate Exchange	
6.7 Conclusions	
Chapter 7. Mapping access to the market on the ground: the Payment of Environmental Services in the Northeast of Costa Rica	276
7.1 Historical background	
7.1.1 The creation of a modern welfare state: the 50s and 60s	
7.1.2 Agrarian policy in the 60s and 70s	
7.1.3 The 80s: Structural adjustment	
7.2 The 90s: Greening Costa Rica	
7.2.1 Investing in the environmental “cluster”	
7.2.2 Costa Rica’s environmental organizations	
7.3 Envisaging a niche: Costa Rica’s Carbon Fund and the PES	
7.3.1 Carbon offsets and the origins of the PES	
7.3.2 The PES: how it works	
7.3.3 Access to the PES	
7.3.3.1 On distribution	

7.3.3.2 Global vs. individual
7.3.3.3 The problem with land titles
7.3.3.4 Lien on property
7.3.3.5 Procedures and costs
7.3.3.6 Knowledge and training
7.4 Conclusion

Part V. Concluding thoughts. A thousand-times-told tale.....316

Appendix..... 331

List of abbreviations..... 334

Glossary338

Bibliography.....354

Introduction

The first time I ever heard about it was in Chiapas, Mexico. In the spring of 1997 several indigenous Tzeltal farmers had received the first payment for what was a three-year agreement to offset the emissions of carbon dioxide from Formula One motor sport. The farmers' pledge was to develop and preserve a sustainable forest and agricultural system that would absorb the 5,500 tons of carbon emitted every year by the racing cars. In the process, significant areas of "cloud" forest would be preserved, and with them several rare species such as the resplendent quetzal, ocelots and howler monkeys.¹

Around the same time, seedlings from the Klinki pine -a relic from the Jurassic period found only in the remote mountains of Papua New Guinea- were being planted in central Costa Rica, as part of a plan to convert up to 6,000 hectares of pastures into farm forests that would absorb a total of 3.3 million metric tons of carbon dioxide over a period of forty years. As with the deal between the Chiapas peasant farmers and Formula One racing cars, these reductions in atmospheric carbon dioxide were intended for sale to companies that needed to reduce their greenhouse gas emissions. Like similar projects being established worldwide, the idea was to turn "carbon sequestration" by trees -as this form of emissions offset is known- into "a new crop for farmers in the tropics."²

¹ Although common in nearby areas of Central America, howler monkeys are considered rare in this part of the southeastern tropical forests of Mexico.

² See Klinki Forestry Project, United States Initiative on Joint Implementation (USIJI), June 4, 1998. Note that carbon sequestration (and also carbon capture) was often used earlier on to

That was in 1997. In 2004, when delegates to the UN Framework Convention on Climate Change (UNFCCC) finally agreed on the rules and procedures to govern the market in emission offsets from forestry, it became clear that the aforementioned projects, as they stand, would not be able to compete. The cost of validating, registering, monitoring, verifying and certifying will most likely make it prohibitively expensive for all but the largest projects and those with the simplest corporate structures to participate in the new market. Given the long-term and non-permanent nature of carbon sequestration by trees, projects have to be implemented for at least twenty years. To ensure accountability and credibility, the whole process entails many complex, time-consuming, and technically expensive steps. For these reasons, the involvement of small-scale peasant farmers in any significant number is now considered too costly and too risky. To address this bias, the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) introduced a special category of small-scale projects implemented by low-income communities. Capitalizing on this new market “niche,” the World Bank recently inaugurated a Community Development Carbon Fund to help small projects with the transaction costs. Their motto is “Carbon with a Human Face.”

The story of how this strange idea came to be and what some of its implications might be is the subject of this dissertation. In following the UN climate change negotiations as they established the operative rules for accounting emission reduction credits from carbon sequestration by trees -known as carbon sinks- and simultaneously

refer to carbon uptake by trees and vegetation. But now carbon sequestration and capture (and more precisely carbon capture and storage) refer to geological storage of carbon, while carbon sequestration by trees and vegetation is referred to as sinks.

studying the establishment of projects on the ground in Costa Rica, my goal has been to understand the creation of a market made literally “out of thin air.” Creating this market entailed not only producing the new commodity but also the demand, the supply, and the rules and institutions to regulate its trade. Because this was a very specific process, it was possible to closely follow the main actors and issues –from the policy makers in the international arena to the decision takers of the projects on the ground. Only by acquiring a sense of the structures of opportunity and constraint under which people in the international negotiations operate, generate knowledge and make decisions, is it possible to understand the many contradictions and absurdities that plague projects once they hit the ground, where in turn other structures of opportunity and constraint dominate.

The main question I seek to answer is: what is it that produced this idea and what is it that this idea serves to produce?³

A case of involution

I originally conceived the research as an opportunity to better understand capitalism and how it produces nature. Being present at the very creation of a completely new commodity and a new market was a unique occasion to see the precise ways in which markets produce inequality. As the research progressed, it became increasingly clear that the market for emission reductions from carbon sinks was a variety of involution, as understood by Goldenweiser (1936), presented by Yengoyan

³ See Harvey 1974: 268.

(2001), and used by Geertz (1963) for explaining the sawah system of agriculture in nineteenth-century Indonesia,⁴ and particularly by Katz (1998) in the specific case of capital and the production of nature. Following their lead, I take involution to refer to instances in which a pattern becomes dominant and internally more and more complex, but instead of unfolding and evolving into something different, it in-folds and becomes increasingly pervasive and convoluted. Although the process leads to continuous elaboration, the escalating complexity is not transformative but instead inhibits the development of new structures.⁵

Although Goldenweiser was writing in 1936 about patterns in the development of “primitive cultures,” the process he described reflects what I saw emerging out of this new market for carbon sinks, in terms of how capitalism transforms our relation to nature and to the land. Using as an example the decorative art of the Maori, Goldenweiser explained how even though the entire object is “pervaded” by the decoration, upon closer analysis the unit elements of the design are few. The complexity of the design is the result of a “multiplicity of spatial arrangements of one and the same unit. The pattern precludes the use of another unit or of other units, but it is not inimical to play with the unit or units. The inevitable result is progressive

⁴ The sawah system of agriculture refers to wet rice terrace cultivation.

⁵ See also Yengoyan, who explains it as follows: “a pattern becomes dominant and internally more and more complex, but [...] this complexity cannot be transformed into a different or new structure. The structural parameters of the pattern become dominant and continually yield elaborations, but each of these changes is internal to the crystallized pattern [...] which becomes virtually a straightjacket for future developments. [...] Within this crystallization the cosmic order is never transformed; *it only becomes more internally complex and also more persuasive in its domination* (Yengoyan 2001: xi; italics mine).

complication, variety within uniformity, virtuosity within monotony. This is *involution*” (Goldenweiser 1936: 103).⁶

As the making of the market for carbon sinks progressed, what I saw was precisely on the one hand enormous complexity and, on the other, a very familiar pattern being repeated. Although of course it was a new form -and in that, an incredibly ingenious one-in a very basic sense it seemed at every turn, in spite of the elaborateness, I was discovering nothing new: as capitalism reworked nature as an accumulation strategy (Katz 1998: 46), the same reproduction of inequality occurred as had resulted from the production and trade of so many other commodities.⁷ And this was done, as before, by means of the state, this time under the international United Nations community of states.⁸

I see *involution* in two senses. In the sense pointed out by Katz, it is akin to capital’s requirement of something “outside of itself” –in this case, pre-existing (Harvey 2003: 141)- to ensure continuous accumulation, expanded reproduction and

⁶ Goldenweiser used it to understand ideologies of violence as well as late Gothic art and Bach’s fugues.

⁷ Granted, this would not surprise any Marxist, and I did expect to see it happen to some degree. But I wanted to see it in concrete detail and I was amazed by the extent to which the case replicated the theories.

⁸ A lot could be said about the relationship between state and capital in this instance; how the state acted on behalf of capital yet against it, and in competition with capitals from other states, while also juggling other interests (environmental concerns and public opinion). An important point in this regard is that capital was also divided (the same way that states differed in their standing for capital interests) and that the evolution of these various relationships critically marked the process. There was a great difference for example between the position of BP or Shell, and Exxon Mobil Oil, the same way there was in that of the Clinton administration (which in many ways is the mind behind it all), and the Bush administration -to do in turn with their relation with different kinds of capital and businesses.

stability. Only that the outside is very much collapsed inside.⁹ But in reading Goldenweiser's description and attending to the details of the new market, involution applied also to the entanglement that resulted from commoditizing something like carbon sequestration from trees and vegetation, a process which happens naturally everywhere, anyway. This ensnarement affects humans' relation to nature in a more cultural sense; it is a concrete example of the production of nature both as a physical reality and in the realm of ideas.

I explain: because I am interested in how uneven development is constantly reproduced, this research focuses mostly on carbon sink projects undertaken in developing countries in exchange for emission reduction credits advanced to developed countries under the Kyoto Protocol's Clean Development Mechanism (CDM).¹⁰ Yet it also includes a brief look at the accounting of carbon sinks that industrialized countries must carry out as part of their national annual inventory of greenhouse gas emissions. The instructions and methodological directives for doing this accounting cover more than five hundred pages.¹¹ It implies accounting for emissions and removals of greenhouse gases that result from land use, land use change and forestry activities

⁹ In contrast to Rosa Luxemburg's argument on the need for capital's stability to have some field "outside of" itself that it can feed upon, the case of carbon sinks points to fields for accumulation inside of itself, assured by previous historical uneven development and the availability of labor surpluses (in this case, subsistence peasants -underutilized "latent reserves" marginal to the system). This is something closer to what Harvey calls "cannibalistic" forms of accumulation by dispossession as opposed to external.

¹⁰ To understand processes of uneven development it is not necessary to compare developed and developing countries (it would suffice to stay in a rich country in the North in any one city). But I was interested in global inequalities at the national or regional scale, or between developed and developing countries, produced by a world market.

¹¹ IPCC. 2003. Good Practice Guidance for Land Use, Land Use Change and Forestry (LULUCF). See Chapter 4.

(LULUCF), including afforestation, reforestation and deforestation, and also under certain limits possibly forest management, cropland management, grazing land management, and re-vegetation.¹² It involves, for example, calculating at a national level the carbon emissions from the conversion of forest land and grassland to wetland, settlements or other land, together with the methane emissions that have resulted from burping and farting cattle and sheep. The level of complexity that this implies will hopefully become clear in the following chapters, as I revisit the history of the negotiations and the details that had to be sorted out. I also hope to make clear how this “scientific virtuosity” and “technical hairsplitting”¹³ obscures the fundamental concern of reducing the greenhouse gas emissions that lead to climate change (the bulk of which are the result of fossil fuel use), and how it serves to create a very small number of experts, amounting to a handful for the whole world, and a highly specialized field.

Yet the Byzantine complication results from the development of a simple idea or pattern within capitalism: to abstract, single out, privatize, assign value, account and trade anything you can think of. It illustrates Goldenweiser’s comment that,

If the pattern were less narrow, or if there were no pattern, the change might have been an unfoldment. Within the narrow possibilities determined by the

¹² As defined under the UNFCCC, afforestation is “the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.” Reforestation is “the human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989” (Decision 11/CP.7). Reporting on emissions and removals from the last four activities is an option for countries where they imply a significant percentage of the greenhouse gas inventory (Protocol Article 3.4) (see Chapter 4).

¹³ Goldenweiser 1936: 103.

pattern, the change can only be an elaboration, leading, as an ultimate limit, to seemingly insane complexity (Goldenweiser 1936: 103).

It is precisely this seemingly insane complexity that the chief UK negotiator on this issue referred to in recent negotiations, when he likened himself and his colleagues to “medieval philosophers discussing angels dancing on the head of a pin.”¹⁴ And although I want to avoid taking this idea of involution too strictly, since it is too naturalistic and appears to preclude change (the last I thing I would rule out), it seems to me that it does reflect this instance of the production of nature under capitalism, exemplified by the case of a market for carbon sinks. It certainly is not a case of evolution.

Carbon sequestration appeared as a simple idea in principle. Trees and vegetation absorb carbon from the atmosphere through the process of photosynthesis. This carbon can be measured, albeit not always with great accuracy. With deforestation, the carbon is released back into the atmosphere, contributing to the greenhouse effect -as well as to loss of water retention by the soil and other processes often leading to environmental degradation. Because the problem of climate change was early on conceived “*from the point of view of the atmosphere*” (see next section, on ecological modernization), it did not matter where in the world a reduction in emissions took place. Thus trees and vegetative growth in one place could offset carbon emitted anywhere else. It also happens that areas primarily suitable for forests¹⁵ in developing

¹⁴ Personal notes, Bonn, May 2004, SB 20.

¹⁵ This refers to land most aptly and naturally suited to forest and where any other land use would require substantial amounts of inputs and transformation.

countries tend to be populated by the poorest peasant farmers, because they are isolated and often located on steep hill sides and are difficult to work, and because the soil cannot productively sustain intensive agriculture without a great amount of agricultural inputs; attempts to extract something out of this land usually lead to increased land degradation and poverty. So even though it was always recognized that carbon sequestration was just a temporary solution of limited effect,¹⁶ investing in carbon sinks appeared as a simple and inexpensive solution that addressed both the increase in greenhouse gas emissions and deforestation -two major environmental problems- at the same time.

Yet once the idea of accounting for carbon sinks in the context of a market was accepted, an interminable list of problems appeared. Already creating a market for emission permits implies serious questions of equity and moral dilemmas. It requires assigning property rights so something can be bought and sold. This in practice means assigning rights to pollute.¹⁷ How does one distribute rights to change the earth's climate for generations to come? Because climate change is the result of cumulative greenhouse gas emissions for which industrialized nations are historically responsible, it wasn't possible to start from scratch. Per capita emission rights sounds like a fair and reasonable idea in principle, and was propounded most vocally by NGOs from India

¹⁶ Even large areas of forests have relatively small effects in relation to the amount of daily carbon emissions. In 1994 the UN Conference on Trade and Development (UNCTAD) calculated that an area of forest larger than France would need to be planted every year to compensate for the existing rate of fossil fuel emissions (UNCTAD 1995: 12).

¹⁷ Although the Marrakesh Accords negotiated in 2001 state that the "Kyoto Protocol has not created or bestowed any right, title or entitlement to emissions of any kind on Parties included in Annex I" (countries with quantitative commitments under the Convention and the Protocol; see Chapter 2), this provision has more to do with a legal concern to avoid claims in the case of possible infringement if Kyoto units are regarded as property rights (see Yamin 1999).

and some other developing countries. But that would place limits on developing necessary infrastructure in areas with low-population density, such as small-island states and countries with high emigration rates.

These difficulties are compounded in the specific case of assigning rights to carbon sinks. Most basically, who owns the carbon that trees necessarily absorb in the process of photosynthesis? The answer varies even where land tenure and property rights are clear. Costa Rica has set up a system in which the carbon sequestered by trees is the property of the private owner of the land where the trees stand. Meanwhile carbon sink projects in Bolivia established on public land regard carbon sequestration as a public good (like clean air or a healthy environment) and therefore proceeds from its sale go to the state, regardless of who the forest managers are.

Moreover, since trees and vegetation absorb carbon dioxide as they grow and release it back into the atmosphere as they decay and die, how does one account for the non-permanent reductions of carbon? What if after twenty or thirty or sixty years (the time allowed for projects), once the credits have been sold and used, the plantation catches fire or succumbs to a disease, releasing the stored carbon back into the atmosphere? Who is liable for this re-emission of carbon? Because agricultural and silvicultural economic activities do not take place in a vacuum, establishing a plantation in one area may lead to deforestation in another, resulting in an increase in carbon emissions. How can one assure this does not happen, and if it does, how does one account for the possibility and deduct from the credits? Since this is part of a United Nations international environmental and sustainable development agreement which, it is mandated, should be public and transparent, the market has to be credible

and legitimate. Real offsets in emissions have to be proven to have taken place, because for every credit bought in a developing country, an equivalent amount of greenhouse gas will be emitted into the atmosphere in an industrialized one.

In order to sort out these problems of accounting and assure the credibility of the market, delegates at the UN came up with an incredibly complex set of rules for sink projects. To enter the market, project developers must submit an application which includes a carbon accounting methodology, for which they must pay upfront. Given the complexity of the rules, the transaction costs are so high that only the largest projects that already have the surplus money to invest, or those that manage to have the transaction costs covered by an NGO interested in the project for reasons other than the sale of emission reduction credits, will be able to participate. Moreover, since the definitions and rules were politically negotiated, and were intended to apply to the whole world, they hardly fit the diverse reality on the ground. A recent analysis by ENCOFOR¹⁸ of the global implications of the definitions that apply to projects showed that much of the land area eligible for the projects in developing countries is agricultural, has a high density population, is 80 percent below 1000 meters, is for the most part agriculturally productive, and 75 percent of it is in Asia (Zomer *et al.* 2005). So while you would have thought that the idea was to use the sale of emission credits to reforest poor areas of primarily forest aptitude where land degradation is a serious

¹⁸ ENCOFOR stands for “Environment and Community based Framework for designing Afforestation, Reforestation, and Devegetation Projects in the CDM: Methodology Development Case Studies.” It is a project funded by Europe-Aid “for the design of sustainable CDM forestry projects” and coordinated by the Face Foundation and the K.U. Leuven Laboratory for Forest, Nature and Landscape Research. See <http://csi.cgiar.org/encofor/forest/>

problem and economic opportunities scarce, the areas that apply are those that are already agriculturally productive and, most likely, comparatively rich.

Moreover, because the rules are so complicated and require highly specialized technical knowledge and material, only a few entities have been accredited to review them –almost all of which are based and staffed, predictably, in the richer industrialized countries (see Chapter 5). As a simple commodity chain will show, the greatest profit is likely to be made by these few accredited overseeing agencies who verify and validate the product.

What this hints at is that, in a market of fictitious capital such as the one for emission reduction credits from sinks, perhaps the most valuable commodity is the production of credibility. As Harvey says, fictitious capital is "no mere figment of the imagination. To the extent that it brings about profitable transformations of the productive apparatus, running through the whole cycle of money being transformed into commodities and back into the original money plus profits, it ceases to be fictitious and becomes realized. But to do so it always depends on a basis in expectations, which must be socially constructed" (Harvey 2001: 23). Like other forms of fictitious capital, for example the credit based on paper assets and promissory notes created by the state (see Harvey 2003: 113; see also Harvey 1999 [1982]), the Certified Emission Reduction (CER) units created under the Clean Development Mechanism of the Kyoto Protocol are based on the faith that someone will pay. In this case it will not be the government, but someone looking to offset their emissions to comply with state regulations. The social construction of these expectations is what Chapters 2 to 5 of this dissertation, focused on the international negotiations, are about. How those who uphold the social expectations that uphold the market (that is, the validating and

certifying entities that give credibility to the trade) retain the most valuable asset, is the subject of Chapters 6 and 7, focused on market access and distribution.¹⁹

It should be noted that the complexity and difficulty that characterize the market for emission reductions from sinks satisfies neither most state Parties to the Protocol, nor capital investors, nor NGOs and other observers to the climate change negotiations -all for different reasons. Repeated calls have been made to rectify it and make the market for sinks more accessible. With just a few methodologies and only one project approved so far, it is often pointed out that the complex rules and high transaction costs are not in the interest of either buyers or sellers, and they do not make the Protocol look good after so much controversy and work went into it.²⁰ Most people expect that, over time, Parties to the Protocol will make adjustments and correct this market “weakness.” Already a lot of money has been allocated by industrialized countries for “capacity building” in developing countries so they can host more projects,²¹ and several initiatives have been launched to promote sink projects whose stated aim is to contribute to sustainable development at the

¹⁹ A fundamental advantage of fictitious capital is that it breaks free from the limits placed by the spatial range of a good (Harvey 2002) –both in terms of commodity transport and labor power. Instead, it comes to depend upon credibility, which needs to be socially produced. The social process of the production of credibility that allows the circulation and profit-extraction of fictitious capital takes place in the realm of the “web of life” (Lefebvre’s “everyday life”) and proceeds dialectically with the system of capital accumulation.

²⁰ The only A/R project approved to date, involving reforestation for Guangxi watershed management in the Pearl River Basin, China was registered on November 10, 2006 (see Chapter 6).

²¹ See, for example: “CD4CDM” by UNEP/RISOE, financed by the Netherlands; the BASIC Project, for capacity building, in Brazil, China and South Africa, funded by the EU (see <http://www.basic-project.net/>); or Finland, establishing projects and funding it all themselves just to “create capacity” and allow “learning by doing” (KK, personal communication).

community level.²² Only in this way can there be a competitive market –that is, one that is credible yet with prices that are low.

This in turn points to another key problem. Perhaps the most important expression of a market is the creation of conditions of scarcity that ensure that the goods have value. Although vital, this has proved especially complicated in the case of something like carbon sequestration carried on by trees and vegetation, which, as noted earlier, happens anyway, everywhere. As will be explained in Chapter 5, a number of measures were introduced in the rules and definitions to ensure that sink credits would not “flood the credits market” (from a cap on CDM sink credits that can be used for compliance with countries’ emission reduction commitments, to the restriction to afforestation and reforestation project activities). But scarcity was also assured by making the rules complex, the modalities difficult to apply to projects, and the transaction costs high (see Chapters 5 and 6 and the Conclusion).

The problem of complex rules that ensure credibility but incur high transaction costs and exclude those who need it most does not apply only to sink projects. Energy

²² See, among others: ENCOFOR (footnote 14); *Plan Vivo*, under the Edinburgh Center for Carbon Management (ECCM); The Forest Carbon Alliance, coordinated by Forest Trends and The Katoomba Group; the World Bank’s Bio Carbon Fund; and the FORMA Project (CATIE). See also “Carbon as a Non-Timber Forest Product,” by the Lead Institute, University of Twente, Enschede, the Netherlands, funded by “the Netherlands Directorate of Development Cooperation under a programme for capacity building for climate change.” The question of capacity building is key for its role in sustainable development and to develop the market, and was identified as such under the UNFCCC, leading to numerous decisions and initiatives. Some of these, such as the European Capacity Building Initiative at Oxford, specialize in building negotiating capacity among developing country delegates. Among the more interesting undertakings are two publications: “The Diploclimatic Passport,” or “ClimPass: Climate Change Negotiations Passport for LDCs and SIDS,” written and produced by Fry (2003) and “On Behalf of My Delegation: A Survival Guide for Developing Country Delegates to the UNFCCC” by Gupta (1999). See section On the UN and The Elusive Fairness in Chapter 8. See also references to capacity building among the AOSIS group of countries, in Chapter 2.

projects under the Protocol's CDM (see Chapter 3) are also highly biased against anything that smells of social benefits. CERUPT for example, the credit-buying arm of the government of the Netherlands, rejected an energy project that involved a 10,000-farmer cooperative in India for an equal and in many ways less efficient project that involved a single private company.²³ Any consideration of real sustainable development as an "additionality" (the requirement that projects be additional to what would have happened in a "business as usual scenario") is overridden by investors' fear of risk.²⁴ These are of course the rules of the market. But when it is observed that there might be a contradiction with the goal of sustainable development inscribed in the UNFCCC and the Protocol, this concept simply gets re-defined in terms of the host country's macro-economy –which has little to do with the needs of local people.

Thus the inbuilt inequality in the creation of a market that Marx, Polanyi, and countless others have described can be seen slowly but clearly emerging as carbon sequestration went from the novel (if also controversial) concept of a payment by industries for the environmental service that peasant farmers in developing countries provide in maintaining forests, to the present state where carbon accounting and a safe investment take precedence over every other social or environmental consideration. In the process, a new enclosure in the environment was conceived, so that a new commodity could be sold at a profit. Capitalism here again recalls Goldenweiser's description of late Gothic art, whereby

“Expansive creativeness having dried up at the source, a special kind of virtuosity takes its place, a sort of technical hairsplitting. No longer capable of

²³ Personal communication with CS 2004; see also Sutter 2003.

²⁴ See Chapter 6.

genuine procreation, art here, like a seedless orange, breeds within itself, crowding its inner structure with the pale specters of unborn generations.” (Goldenweiser 1936: 103).

On time and uneven development

The new market in emission reductions can only be conceived in the context of uneven development. Its logic and justification make sense solely in a situation of geographical and politico-economic difference, and the Kyoto Protocol’s ‘flexible mechanisms’ are designed precisely to take advantage of this difference.²⁵ Cost-effectiveness is mentioned as a principle already in the Convention itself: “(...) *taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost*” (FCCC Article 3.3). The question is whether this market further deepens the differences. Proponents of Kyoto’s flexible mechanisms argued that a market-based approach would contribute to the goal of sustainable development inscribed in the Convention and the Protocol, and facilitate technology transfer to developing countries. An important objective of my research was to evaluate if, and under what conditions, this might be the case.

I therefore sought to identify the general logic and process by which uneven development is created and recreated. I found that, besides the spatial dimension of uneven development (which is generally well understood), in the case of the market for emission reduction credits from carbon sinks it was the temporal dimension that stood out. This first became clear in Costa Rica, where one of the main complaints by peasant

²⁵ See Chapter 3.

farmers had to do with time. Because trees take years to grow, land gets locked-up in waiting for the first thinning and the first cut. Even in the case of fast-growing species, money can only be made after at least ten to fifteen years. For a small landowner who depends -or hopes to depend- on income from the land to make ends meet, this period of time seems eternal. Juan López, one of the beneficiaries of the Payment for Environmental Services (PES) program established in Costa Rica, and thereby a producer of carbon credits, confided to me that very often he had to keep himself from taking the ax and chopping down “all those stupid trees.” He said he could have planted pineapple, or palm, and have gained money already five times since he established the plantation. Instead, all he got from that hectare and a half were the few hundred *colones* that the Ministry of Environment paid as part of the PES once a year –which are not even enough to cover the expense of the plantation. Although it is often the case that farmers are led to plant something that in the end does not return the investment made –either because everybody planted the same thing and there was overproduction, or because the price was good when they planted but bad when they collected- they have to keep trying and hope one day the return will be fair and worthwhile.

The point is that productive activities with long-term returns tend to be concentrated in developing countries. Because labor and rent are cheap there, adding days or months is not that much of a problem and compensates for the cost of waiting. In contrast, activities with rapid or immediate returns are almost always the specialty of rich countries. In the case of the market in emission reduction credits, the consulting, monitoring and trade itself –activities designed to never take more than a couple of months and that can be combined with other productive pursuits- are done by

companies from Europe, the United States and Japan.²⁶ So in addition to cornering the market of high returns, they corner that of immediate returns, liberalizing time and resources to find returns that are higher and more immediate still. In the meantime, producers in Costa Rica are detained in an exclusive activity in which they can only realize earnings a long time down the road. This is a temporally magnified version of “the geographical fixity that arises in the midst of geographical mobility” (Harvey 2002) and thanks to which capital is released for its further circulation and reproduction.

On *Filières* or commodity chains and access mapping

The analysis of *filières*, or commodity chains, was originally developed by the French school of industrial economy to analyze the formation of prices of a commodity in its process from raw material to finished product (see Ribot 1998).²⁷ More recently, researchers at the French Agricultural Research Center for International Development (*Centre de Coopération Internationale en Recherche Agronomique pour le Développement*, CIRAD) and the National Institute for Agricultural Research (*Institute National de la Recherche Agronomique*, INRA) studying the political economy of food systems in the United Kingdom and North

²⁶ It can of course be claimed that the time investment necessary to undertake such consulting activities is high (including higher level studies and technical preparation). Still, I would say that this kind of investment is for the most part subsidized. And although a good argument on this would require more than what I’m allowing here, I think the idea holds for how uneven development is reproduced, particularly in the case analyzed here.

²⁷ Ribot points to the use of the word *filière* in French literature since 1829 to refer to “the succession of states to go through, levels to achieve, formalities to complete, before arriving at a result.” (Ribot 1998: 307).

America have combined the *filières* method with the analysis of social relations and institutions that structure economic life and markets and their historical change. This analysis is characterized by the study of real markets (as opposed to the abstract models of the market characteristic of economic theory) with an emphasis on questions of power in the functioning of markets: its sources, its deployment and its effects. In this manner, the *filière* approach illuminates the social and cultural dynamics that shape markets, from the influence of kinship, *compadrazgo*, or religion in the formation of interest groups, to cultural forms and meanings that contribute to the trade and consumption of specific products. All this is done in a multi-sited manner, geographically locating the sites that configure a market across borders (ibid.).²⁸

The concept of *filière* is very close to that of a global commodity chain developed by Hopkins and Wallerstein (1994) and used by Gereffi and Korzeniewicz (1994) and others (Smith 2005, Gibbon 2001, others) as a network of labor and production processes whose end result is a finished commodity. The main difference between the two concepts has to do with their diverse origins and goals. While the anglophone global commodity chain approach focused on industrial commodity chains in the context of globalization and World-System Theory (Wallerstein 1974), and was developed as a theoretical framework closely related to dependency theory, the older francophone *filière* approach originated in technocratic agricultural research, and developed more as a practical tool for “down-to earth” applied research (Raikes *et*

²⁸ An excellent example of a commodity chain is given by Conroy, Murray and Rosset (1996) for the production of melon in *A Cautionary Tale: Failed U.S. Development Policy in Central America*. They show that the structure of the nontraditional agricultural export industry promoted in Central America by USAID undermines small farmers, who are squeezed between suppliers of inputs and buyers of their produce. See also Feder 1977.

al. 2000).²⁹ Besides, *filière* analysis has been influenced by an anthropological tradition dating from the 1970s and by the French regulation school (a descendent of French Marxist thinking). As a result, whereas work on global commodity chains has tended to focus on distinctions between producer-driven *versus* buyer-driven processes in the context of the world economy, *filières* analyses have more often paid attention to history and power.³⁰

An example is “Theorizing Access: Forest Profits along Senegal’s Charcoal Commodity Chain” (1998), in which Jesse Ribot develops the idea of *access mapping* which, together with the model of commodity chain or *filière*, exposes access to the benefits of the production and commercialization of charcoal in Senegal. The focus on access is most useful in the case of carbon sinks because it is precisely the lack of access to the market for sinks that results in small landowners and poor people being excluded from a potentially profitable activity. The consequences of such exclusion could be severe for poor farmers and affect their secure tenure or productive options, as the introduction of a new commodity stands to trigger competitive pressures for land and resources. Moreover, the focus on access allows for a more dialectical approach, where process is emphasized over structure. I therefore prefer thinking of access mapping over global commodity chain analysis on the grounds that access (a verb) emphasizes process and historical change, whereas the analysis of global commodity chains (a noun) hints at something more static and could tend towards reification.

²⁹ This empirical approach is important because it allows to treat even property as an empirical question (see Ribot 1998: 334-338), not to be taken for granted.

³⁰ For a more detailed comparison between the two approaches, see Raikes *et al.* 2000.

Moreover, the focus of *filières* analyses on real markets and on the employment and distributive effects of power implies in turn a concept of regulation not as a legal or administrative element, separate from the “natural” functioning of markets, but as an inherent part of these. Regulation thus explains how markets are structured both in their conditions of existence and in their internal functioning; it means thinking of “better” or “worse” regulation instead of “more” or “less” (Ribot 1998). It is precisely this understanding of regulation that will be developed here.

Because the development of the market for emission reduction credits is still at an early stage and sink projects are individually negotiated, it is not possible to clearly define costs and earnings at the different nodes of the chain for all projects. It is, however, possible to see where most of the profits relative to time invested will likely be made. The resulting skewed distribution of profits is largely a result of the high transaction costs that result from market regulation. This is hardly news. As noted in Chapter 8, overregulation is one of the most insidious problems affecting the relation between poor people and forests –limiting their access to forest markets and leading ultimately to increased marginalization and increased deforestation (see Kaimowitz 2003, and Scherr *et al.* 2005, among many others). Here once more, the definitions adopted and the rules and procedures established for the market for sinks will further contribute to the exclusion of most forest producers, except the well capitalized and those who already have land and time to spare.

Still, there are two factors that are often overlooked or are insufficiently incorporated in both commodity chain analyses and in mapping access approaches, and which are salient in the case of the market for sinks: time and risk. First, because

commodity chains and mapping access approaches each implicitly emphasizes space (the idea being to geographically locate where accumulation takes place or power is exercised, offering insight into the reproduction of uneven development, with maps and chains as quintessential spatial metaphors), the time factor often goes unaddressed. But, as noted earlier, in pursuing how access to the market for carbon sinks is gained, one aspect that stands out as determinant is time –as in time invested and turnover time. This is so in two senses, related to the two products that the market analyzed here covers: trees and emission reduction credits. In the case of trees, as noted earlier, one of the main problems is the time that trees need before they can be logged and capitalized on. When established as unmixed plantations, they “sequester” the land on which they are planted for a couple of decades at least, as practically no other productive activity may take place on the same space. Small landowners hardly have the luxury of leaving their land unproductive for such long periods. It is normally medium-size and big companies with access to credit and large tracts of land and time (allowed by additional or parallel sources of income) that can afford to establish these types of plantations. In this sense, the time necessary to capitalize on a monoculture plantation becomes a factor that by itself excludes small landowners and poor peasant farmers from this kind of activity.

But analyzing access to the market for emission reduction credits also highlights time as a discriminating factor in the sense that, as fictitious capital, it is highly dependent on financial credit and the creation of credibility. Plotted as a *filière* or commodity chain, it is not so much the income at each node of the chain that counts (how much each participant in the development of a project gets paid or gets in return), but the time that has to be allotted for each activity and the rate of return on

that investment. There is a big difference between the time devoted by project developers to the preparation and implementation of a project, and the time spent by consulting agencies in validating or certifying the project *vis-à-vis* eventual proceeds. Project developers need substantial amounts of up-front resources to cover the project until the end (which is anywhere between 20 and 60 years), or until they can sell the emission reduction credits. In contrast, established certifying agencies from developed countries will cash in on their consulting services almost immediately, freeing time and resources for further investment. For those organizations not already established and those from developing countries applying now to become certifying agencies, there is a need to invest considerable capital that they will not recover until quite far down the line. It is therefore as much a matter of how much as it is of when. In cases of fictitious capital like the one analyzed here, credit, and credibility, become key resources. And both are tightly linked to time.

Risk is the other factor that is often overlooked in commodity chains analyses and in mapping access approaches, but which clearly affects who has access to the market for sinks and how profit is made. In the case of the CDM, risk is a central feature of the mechanism and pervades all types of projects to a greater or lesser degree. Projects may fail not only technically in their implementation, but at any of the stages in the application and certification process. This risk of failure is again more insidious in sink projects than in most energy projects, given their nature, the complexity of the rules and the length of time that trees need to grow. When analyzing the sinks market, risk emerges as a key discriminator, foremost because it affects the price of credits. Since buyers exercise more power than sellers, the price of emission reduction credits for projects where the brunt of risk is mainly borne by the

buyer is lower than those where the risk is borne by the seller. That is, a seller has to assume the risk of failure to sell credits at a good price, with the price of credits increasing in tandem with the level of risk that the seller is able to assume. Clearly, risk is a critical factor determining who may access the market since most poor peasant farmers cannot afford to take the level of risk required. They lack the back-up infrastructure or reserve resources to draw on in case of failure.³¹ Focusing on how the burden of risk is shared is essential to understand markets and power, and determining who bears the brunt of risk in any particular project illuminates how inequality is reproduced.

This dissertation heeds Ribot's call for extending the analysis of commodity chains by spinning out their historical dimension, tracing out and explaining the historic origins of these arrangements (Ribot 1998: 337). It was the unique opportunity of being present in the creation of the new market for carbon sinks from the start that triggered and hopefully justifies this account. Explaining how it was that sinks were defined in the way they were and describing the negotiations behind the modalities and procedures applicable to sinks CDM projects at a moment when all the options appeared possible and before they closed (almost one by one), has been one of my main goals.

On ecological modernization

“The Kyoto Mechanisms have created an architecture and framework for market-based management of the global atmosphere.”

World Bank and IETA 2006: 1

³¹ A number of anthropological studies, for example Frank Cancian, show how poor peasant farmers specialize on hedging risk and how much this consideration affects their decisions.

What has allowed climate change to be approached the way it has is its conception as a technical problem, a question of management subject to a technological fix, independent of social institutions. Akin to Descartes's "mind in a vat" as described by Latour (1999), a most common image is that of humans undertaking a dangerous experiment with the planet –as if we were not inside the test tube (Revkin 1992). Already in 1957 Revelle and Suess wrote that "human beings are now carrying out a large-scale geophysical experiment of a kind that could not have happened in the past nor be reproduced in the future." The idea was taken up and repeated many times. For example, a report by NASA in 1986 stated that "we are conducting one giant experiment on a global scale" (quoted in Ross 1991: 211), and Margaret Thatcher, speaking to the Royal Society in London, warned that we may have "unwittingly begun a massive experiment with the system of this planet itself."³² In a more dramatic tone, the statement from the 1988 Toronto Conference on the Changing Atmosphere declared that "humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war" (see Chapter 2).

Helping to leave humans out of the picture is the use of computerized general circulation models of the atmosphere (GCM), which serve today to understand and predict climate change. These models are extremely sophisticated three-dimensional representations of the atmosphere, and include all kinds of feedback mechanisms and

³² See "Thatcher gives support to war on pollution" September 28, 1988. *The Times*, London.

ocean-atmosphere interactions.³³ But, unlike the tropical island of the seventeenth century that served as a metaphor for human-induced climate changes in the early colonial times (see Grove 1995), these models do not include human interaction (Demeritt 2001). They make it easier to conceptualize a solution not at the level of social institutions but of “resource management,” through “efficient” technologies. This is a solution based on engineering and management with no involvement of local populations.

The convenient distancing is also evident in the negotiations today, where one of the most often repeated and persuasive arguments is “seeing the problem as the atmosphere sees it.” It is this rationale that allows for equating all emissions from all countries, whether they result from fulfilling basic human needs or from unnecessary luxuries. It allows equating methane from rice cultivation in Vietnam with carbon dioxide from sport utility vehicles with the lowest efficiency standards used in US cities. At one point it also allowed for equating nuclear energy with renewables (since they are both “clean” energy sources in terms of greenhouse gas emissions), although after much discussion and negotiation, the Protocol calls for refraining from using emission reductions from nuclear facilities under the “flexible mechanisms” (they are not sustainable because disposing of nuclear waste is unresolved). It is likewise the reasoning behind accounting for sinks and emissions from land use and forestry, as if they were the same as cutting emissions at the source by phasing out fossil fuels. Overall, it is the rationale for the market approach under the Kyoto Protocol. As Ross says, the “budgetary way of looking at the world [...] is continuous with the scientific perspective of quantitatively dominating the physical world” (Ross 1991: 208). This is

³³ See Wetherald and Manabe 1975. See also Demeritt 2001.

clearly not simply another way of looking at things, but reflects the view from above of a dominant minority accustomed to assessing and managing and of instituting political projects to further regulate problems that might arise.

This management is tied to the processes of audit and accountability which have become “a now taken-for-granted process of neo-liberal government and contributing substantially to its ethos” (Strathern 2000: 3). As Strathern notes, in these processes the social complexity of outcomes is less important than the strategies that may be measured by performance indicators. In all, they constitute a specialized kind of knowledge, that is, expert knowledge, that serves as a crucial aid for government and commerce -what Weber [1948] observed as one of the objectives of modern bureaucracy (ibid.: 284).

This approach is consistent with Hajer’s (1995) and Harvey’s (1996) description of ecological modernization, the dominant policy-oriented discourse that emerged in the 1980s and which Hajer defines generally as “the discourse that recognizes the structural character of the environmental problematique but nonetheless assumes that existing political, economic and social institutions can internalize the care for the environment” (Hajer 1995: 25). In short, ecological modernization assumes economic activity is systematically harmful to the environment, and that this harm is irreversible (Harvey 1996: 377). This poses a situation of permanent ‘risk’ (see Beck 1992), threatening not only our well-being but the options of future generations. Yet this does not spell doom. On the contrary, given human ingenuity, a proactive stance and preventive regulation, it represents a major opportunity to increase economic efficiency and assure a safe future for all. Economic growth and ecological problems

are therefore intimately linked according to the utilitarian logic that “pollution prevention pays.”³⁴ Once nature, which is no longer perceived as a “free” good but a “public” good, not a global commons but a resource, is properly managed, environmental protection becomes a “positive-sum game,” a “win-win” solution. The greatest challenge to such proper management is collective action, and if only every individual, organization or country participated, life would be environmentally sound (Hajer 1995: 26).³⁵

The idea is encapsulated in the concept of sustainable development, famously defined in 1987 by the World Commission on Environment and Development’s Bruntland Report “Our Common Future” as “development that meets the needs of present generations without compromising the ability of future generations to meet their own needs.” All that can be clearly inferred about this formulation is the existence of unknown but certain limits to development. The rest –the definition of development, what needs are and how they might change over time, and so on- is left open to interpretation. This lack of definition is precisely why the concept is so useful and popular. It also disarms the opposition: as Harvey notes, nobody can possibly be in favor of unsustainability (Harvey 1996). The discussion then centers on how to balance the “three dimensions” of sustainable development: the economic, environmental and

³⁴ For just one among thousands of the examples, see UNEP’s press release headline for the GEO Year Book 2006, *An Overview of our Changing Environment*: “Cutting air pollution delivers ‘Big Bang for your Buck’” (found in www.unep.org).

³⁵ As is well known, the US has used this line of reasoning to reject the Protocol on the grounds that developing countries do not participate with reduction commitments and that therefore the Protocol is unfair and self-defeating. Australia then claimed the same because the US is not participating.

social dimension. The response can vary conveniently in scale and composition according to the argument for which it is used.

Sustainable development is central to the climate change discourse. It is inscribed as one of the principles of the Convention and is defined as one of the twin objectives of the Clean Development Mechanism. Its long-term outlook fits with the long-term consequences of climate change; its all encompassing objective can contain the many thorny ethical issues implicit in a global regime aimed at reducing unevenly distributed greenhouse gas concentrations that result from very different processes. Most importantly, it allows for the challenge to be non-threatening to existing social institutions. On the contrary, it reinforces many of them –in particular the managing role of the state and the power of capital.

Several eco-modernist techniques and ideas present in the climate change discourse have contributed to this safe containment and enhancement. Here I address four of them which touch on different aspects of the discourse and are, in my view, for better or worse, particularly open to contestation and further elaboration in the future.³⁶ These are the quantification of costs and benefits, a shift in the burden of proof in the legislative discourse, the role of science in policy-making, and new participatory practices. Although they all have been extensively analyzed elsewhere (*see references under each section*), I want to briefly highlight some relevant aspects and specific examples.

1. Calculation of costs and benefits

³⁶ By this I mean spaces from which change can be expected given different interests involved and the complexity of the issues they include.

A key characteristic of ecological modernization is the introduction of concepts that pretend to quantify environmental degradation, which are then combined with monetary units to provide cost-benefit analyses (Hajer 1995: 26).³⁷ This has allowed for calculations that compare the cost of adapting to climate change to the cost of reducing fossil fuel consumption and switching to renewable energies, leading some to argue that to a certain extent it is more convenient to assume climate change (since some of it is already inevitable) and to adapt to it, rather than to try to change the basic energetic infrastructure. This argument is ethically highly problematic (to say the least), since most of the damage is expected in the poorest countries and small island states with scant resources, while mitigation should take place in the richer industrialized ones.

But probably the most disturbing case of this kind of quantification took place when the Intergovernmental Panel on Climate Change (IPCC)³⁸ Working Group III attempted an economic valuation of climate change impacts –including human life– for the Second Assessment Report. Based on the available literature on the “value of statistical life,” the IPCC reflected the economists’ calculation that human life is valued differently in developed and developing countries, since risk of death is not valued equally between countries –mainly based on the “willingness to pay” approach. When developing country delegates reacted with indignation at the suggestion that human lives in their countries were somehow worth less than in rich

³⁷ What is interesting is that, as Gupta notes, while it is frequent and legitimate to talk about social costs of climate change, political costs are hardly ever addressed (Gupta 2001: 134).

³⁸ The IPCC is the international scientific body whose role is to assess peer-reviewed and published research on climate change in order to inform the policy-making process (see Chapter 1).

countries, the economists involved responded by saying that it is inconsistent to propose that risk of death should be valued equally between countries when assessing climate damages, when so valued when it comes to other issues (Grubb 2001: 20 and 303-308; see also Grubb 1995).³⁹ The discrepancies were such that in the end, although governments accepted the chapter, they changed the Summary for Policymakers in such a way that it implicitly criticized the underlying chapter. In angry response, the IPCC authors dissociated themselves from the Summary.

2. Statistical correlation and unlimited liability

Like the early industrial days when dirt and pollution signified wealth, the Yorkshire saying of “Where there’s muck, there’s brass”⁴⁰ might still hold –only that now the money is to be made from litigation. This has to do with a change in the legislative discourse whereby the burden of proof about environmental damage is shifted from the wronged or prosecuting party to the individual polluter (Hajer 1995: 28). Three eco-modernist ideas played a central role in this change: the idea of the environment as a public good that is not to be squandered, the precautionary principle, and the win-win framework, the latter two leading to the expectation that firms are supposed to prevent pollution since it pays to do so.⁴¹ In this situation, where the

³⁹ Grubb explains it as follows: “Economists sought to defend themselves by pointing out that the observed value of statistical life does unquestionably differ enormously between countries: it would indeed be absurd for India to try to put the same resources into modern medical services as the United States, when its people suffer many more basic threats to life and health” (Grubb 2001: 306).

⁴⁰ In Hajer 1995: 64.

⁴¹ On the precautionary principle, see Liverman 2007; Martin 1997; Hammitt 2000; O’Riordan and Cameron 1994.

responsibility to establish the proof of wrongdoing lies with the offending party, statistical probability and correlation become the basis for collective and unlimited liability (Hajer 1995: 28). And although climate change would probably make the hardest case, much has been written about its legal possibilities.⁴² Based on the international principle that countries undertake not to injure other nations by actions in their own territories, this understanding enables talk, if not action, on the potential of lawsuits under the international court, or the US Alien Tort Claims Act by small island states suing the United States and Australia (which is the world's highest per capita emitter) for not having ratified Kyoto, or to car makers and oil firms and industries in these countries. The small island state of Tuvalu, as well as Greenpeace, have explored the possibility, and even though they know well that it could be very expensive and that they stand to lose the case, it is contemplated as a pressure strategy given predictable support of the public. Other examples abound. US NGOs, for example, have filled suits against the United States for its failure, as a signatory to the UN World Heritage Convention, to protect areas such as the Waterton-Glacier Peace Park, the Sagarmatha National Park in the Himalayas, the Belize Barrier Reef, and the Huascarán National Park in Peru.⁴³ In August 2005, a US federal court ruled that two environmental groups and four US cities could sue US federal agencies which finance overseas projects that contribute to global warming.⁴⁴ The status of

⁴² See for example: "Climate change: Let the lawyers sue for you," May 31 2006. *New Straits Times*. See also Michael Christie, "Lawsuits may be next weapon in climate change fight." *Reuters*. March 6, 2002. There are many others.

⁴³ See Richard Black, "US conservation groups have begun a new legal case aimed at forcing government action on climate change." *BBC News*. 18 Feb 2006.

⁴⁴ The lawsuit was brought by Friends of the Earth, Greenpeace and the cities of Boulder, Colorado, Santa Monica, California, Oakland, California and Arcata, California, against two

‘environmental refugees’ has also been a matter of discussion. In any case, with entire small island nation states expected to disappear, it would be interesting to see how much could be claimed for the loss of a whole nation, including its land, history and culture.

3. Science as policy

Science acquires a new and powerful role with the expectation that it is to inform policy. This expectation affects the way the questions are framed, and how the problem is presented: certain matters are attended to at the expense of others; some questions are identified as political and removed from inquiry, while others are addressed as if they were merely technical and had no political implications.⁴⁵ Because science is not neutral and free floating but is very much located in a context of competing domestic interests and institutions, its work and its influence tend to reflect this context. These problems are intensified when the discussion moves to an international level. Clearly the questions that are interesting to developed countries are not the same as those interesting to developing countries, yet the latter depend on the science done in the former for the articulation of legitimate solutions. The framing and basic assumptions are also determined in this way; as Gupta notes, it could be argued that the whole approach to the problem of climate change was permeated by industrialized countries’ ideology of political realism: that the world is as it is and one

federal agencies: Overseas Private Investment Corporation and the Export-Import Bank of the United States. Apparently, this was the first time that a federal court had specifically granted legal standing for a lawsuit exclusively alleging injury from global warming (see “Court allows suit linking US aid, global warming” August 25, 2005, *Reuters News*,).

⁴⁵ See Fairhead and Leach 2003; Jasanoff and Wynne 1998; Wynne 1994; Miller and Edwards 2001; and Kwa 1994, among many others.

should focus on what is possible rather than on what should be achieved (Gupta 1997). This is one among many examples of the processes of exclusion through which industrialized countries eliminate the perspectives and positions of developing countries.

Besides, some aspects of science do not translate well into policy-making. The most obvious case is how “uncertainties” in climate change science have been used politically to question the assertion that fossil fuel burning has contributed to climate change.⁴⁶ But uncertainty is the engine of science; it is what keeps scientific inquiry alive. It is also part of a scientific culture where almost nothing is stated without qualifications, and observations and theories are only right until proven wrong.

In any case, the new role of science in coaching environmental policy has greatly reinforced the independent status of science, and its credibility depends on how neutral it is perceived to be. The public is sensitive about being influenced by special interests. Conversely, given the influence of science, the government is sensitive to the opinion of scientists and may attempt to control them (the United States under the George W. Bush administration is full of examples of this.⁴⁷) The concern with science

⁴⁶ For an account of the involvement of the Global Climate Coalition (a business coalition) on the debate over detection and attribution in the 1996 IPCC SAR, see Edwards, P. and S. Schneider. 1997. “The 1995 IPCC report: broad consensus or ‘scientific cleansing’” *Ecofable/Ecosci* I: I pp. 3-9.

⁴⁷ Just one was the controversy at NASA, reported by Andrew Revkin in *The New York Times*. (see “Climate experts says NASA tried to silence him.” January 29, 2006, and “NASA Chief backs agency openness” February 4, 2006, as well as subsequent reports and letters to the editor). What made the news noteworthy was the repeated attempts by government appointed officials to control scientists’ statements. On the importance of scientific independence, Dr. James Hansen said “Communicating with the public seems to be essential, because public concern is probably the only thing capable of overcoming the special interests that have obfuscated the topic.” For a similar case, this time in Australia, see Jo Chandler, “Greenhouse critic says views cost him his job.” February 13, 2006, *Sydney Morning Herald*.

standing for special interests is well founded, and breaches in sovereignty are often newsworthy, as business and industry may in effect form alternative ‘epistemic communities’ by paying scientists and funding research organizations.⁴⁸ These cases have sparked the creation of a number of NGOs whose mission is to disclose scientists’ connections and links as a way to assure transparency in information. There is now SinksWatch, CDMWatch and CarbonTradeWatch, in addition to ExxonSecrets and others. Environmental groups also gain legitimacy from employing established academics to prepare reports on specific issues.⁴⁹

Science then both informs policy-making and shapes public opinion. And part of this job includes establishing the levels of damage that can be endured. Thus the UNFCCC establishes as its ultimate objective to achieve “stabilization of greenhouse gas concentrations in the atmosphere *at a level that would prevent dangerous anthropogenic interference with the climate system*” (FCCC Article 2; italics mine). The IPCC, or panels of scientists at the national level, then calculate what this level

⁴⁸ See for example the case of a well-financed campaign in the US by the petroleum industry to recruit scientists who were skeptical about global warming to help convert journalists, politicians and the public to their views. In 1998, the draft plan by the industrial group proposed spending millions of dollar in a campaign against the Kyoto Protocol. It called for giving scientific dissenters “the logistical and moral support they have been lacking” and for spending \$5 million over two years to “maximize the impact of scientific views consistent with ours on Congress, the media and other key audiences.” A proposed media-relations budget of \$600,000, not counting any money for advertising, would be directed at science writers, editors, columnists and television network correspondents. Among the tasks was ‘to identify, recruit and train a team of five independent scientists to participate in media outreach.’ The plan was drafted by a group of people working for big oil companies, trade associations and conservative policy research organizations, meeting at the Washington office of the American Petroleum Institute. The document listed representatives of the Exxon Corporation, the Chevron Corporation and the Southern Comp as being involved. The plan was given to The New York Times by Phil Clapp, president of the National Environmental Trust, who said he obtained the papers from an industry official (John H. Cushman Jr. “Industrial Group to Battle Climate Treaty.” *New York Times*, Front page. April 26, 1998).

⁴⁹ See, for example, WWF’s various commissions on biodiversity, extreme weather events, and effects of climate change, or Greenpeace (2000) on coral bleaching in the Pacific.

might be. Most recent scientific literature indicated that in order to stay at safe levels there should not be an increase of more than two degrees Celsius above pre-industrial levels—a target that has been adopted by the European Union and others. But then that, according to a recent report commissioned by the UK government, might already be too high, with two degrees perhaps enough to trigger melting of the Greenland ice sheet.⁵⁰ As Myles Allen, a lecturer on atmospheric physics at Oxford University quoted in the BBC news of the report said, assessing a "safe level" of carbon dioxide in the atmosphere was "a bit like asking a doctor what's a safe number of cigarettes to smoke per day" –a metaphor that speaks of surrendering important decisions to the specialist, who can come up with a technical solution that does not imply any radical change in habitual behavior but rather certain adjustments.

4. New participatory practices

In contrast to the antagonism that characterized the relationship between environmental activists and the state in the early days of the environmental movement, eco-modernism is characterized by close collaboration between government, business and industry, and the major environmental organizations.⁵¹ Based on the idea that the environment is a comprehensive problem, requiring the participation of all (“the solution is each one of us”) new forms of participation have emerged. In the case of

⁵⁰ The report, titled “Avoiding Dangerous Climate Change,” is based on evidence presented by scientists at a conference hosted by the UK Meteorological Office one year earlier, which had two principal objectives: to ask what level of greenhouse gases in the atmosphere is too much, and what the options are for avoiding such a level. See Richard Black. “Stark warning over climate change.” *BBC News*. Monday, 30 January 2006. <http://news.bbc.co.uk/1/hi/sci/tech/4660938.stm>

⁵¹ For analyses of the relationship between NGOs and climate change, see Carpenter 2001; Gough and Shackley 2001; Paterson 1996; and Newell 2000.

climate change, the collaboration is such that NGOs have been subsumed as part of the climate change “epistemic community” –that is, the “a network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area” (Haas 1992a: 3; see also Gough and Shackley 2001; Paterson 1996).⁵² This situation has been partly explained as having to do with the nature of climate change itself and the difficulty faced by NGOs to engage the public (their ‘constituency’) in an issue whose consequences are long-term and hard to define, and whose causes are global in origin and difficult to isolate. The history of the Protocol and the US rejection of it might have also played a role in this, as more radical calls for action by NGOs were gradually replaced by support for “the only show in town” –however imperfect it seemed. The fact is that the main NGOs abandoned ethical and overtly political questions on climate change (even while they maintained them on other issues such as GMOs for example⁵³) and replaced them with support of scientific assessments, calls for precautionary action, and joint ventures with business and government to demonstrate exemplary behavior.⁵⁴

⁵² According to Haas, in the case of negotiations leading to the Montreal Protocol for example, the epistemic community played a crucial role in the timing and stringency of the regulations banning chlorofluorocarbons (CFCs). It did so by forming a consensus that influenced individuals and groups, defining the limits of acceptable action and infiltrating various decision-making channels. The epistemic community was especially successful by influencing the two major actors -the United States and the Du Pont company- and in doing so, they “changed the external environment in which policies were made by other governments and firms” (Haas 1992a: 4). Here, epistemic community somewhat resembles Kuhn’s sociological definition of paradigm -“an entire constellation of beliefs, values, techniques, and so on shared by members of a given community” which governs “not a subject matter but a group of practitioners.”

⁵³ Interestingly, this was much less the case in their positions at the national level; see Gough and Schackley 2001.

⁵⁴ Although this change has been widespread, it has not been without debate and rift among environmental NGOs. When the Global Commons Institute (GCI) objected to the IPCC

Clear attempts at forming part of this epistemic community include the positioning of NGOs as “facilitators,” commissioning reports and compiling work done at different universities around the world.

Moreover, the complexity and technicalities of the Kyoto Protocol are such that NGO representatives following the negotiations have turned into true experts. In this guise they are often consulted and contribute to policy and scientific assessments, separate from their political position as NGO representatives. As individuals, they switch places easily, alternating between the pink batch of delegates and the yellow ones of NGOs.⁵⁵ As organizations, they work closely with governments and businesses, undertaking consultancies and getting involved in projects as partners.⁵⁶ They also participate in academic and policy-informing exercises.⁵⁷ Increasingly, NGO funds come from governments and business.

Of course not all NGOs are equally invited to participate. In order to have access to the negotiations and start the process of possibly becoming part of this epistemic community, NGOs have to become “accredited observers” to the UNFCCC. For this, they have to meet several requirements. Once there, NGOs are grouped as

Working Group III’s report on the ‘statistical valuation of life,’ the Climate Action Network (CAN) criticized it for ‘upsetting the apple cart’ and possibly delaying publication of the IPCC’s Second Assessment Report (Gough and Schackley 2001: 332).

⁵⁵ Just to cite one among many examples, the Greenpeace person in charge of LULUCF issues until Buenos Aires, in particular sinks under the CDM, was with the German delegation at Montreal for COP 11/ COP-MOP 1.

⁵⁶ One example of this “subcontracting” was the organization by IUCN and FAO, in collaboration with the UNFCCC Secretariat, of two workshops to discuss rules and modalities of sinks under the CDM (see Chapter 5). On new partnerships, see how the Pew Center helped Shell become green [*add ref.*]

⁵⁷ See Greenpeace with the Dutch National Institute of Public Health and the Environment (RIVM) development of the “safe landing concept” (Gough and Shackley 2001).

either ENGOs, RINGOs, or BINGOs -Environmental NGOs, Research NGOs, and Business NGOs respectively.

The fact that there is a category of Environmental NGOs and not Development NGOs is a result of the dominance of NGOs from developed countries. Although there are signs of slow change, only two of the major NGO players, the Center for Science and Environment (CSE) and the Tata Energy Research Institute (TERI), are from developing countries (in this case, both from India); the rest are from developed countries (amongst the most prominent ENGOs are IUCN, Greenpeace, WWF, and Friends of the Earth). It reflects the definition of the problem as an environmental and not as a development one –which would have been the case had developing countries been more influential.⁵⁸ Most of the NGOs from developing countries are considered mainly research NGOs, and many of them specialize in specific areas –forestry being the most popular. This has to do with the availability of external funding in developing countries and different priorities among their publics. Among development NGOs the most vocal are humanitarian agencies (such as Christian Aid); these have increasingly gotten involved as attention has turned to adaptation to climate change, and now even Red Cross International has a climate change program. In contrast, ENGOs focus on impacts on biodiversity and natural ecosystems, tend to have a strong conservationist slant, and are more prone to propose “limits to development.” Their influence has been particularly felt in the negotiations on sinks in the CDM. There is no one group to represent the interests of “stakeholders” on the ground.

⁵⁸ The CSE has portrayed climate change as “a ‘bandwagon’ of scientists, government officials and industrialists, pursuing a wealthy countries’ agenda, yet attempting to get everyone to foot the bill” (Gough and Shackely 2001: 336).

Business and industry NGOs deserve special mention not only because they have become an integral part of the process, but also because, since 1992, they have managed to shape the way the environment and development are looked at, presenting themselves as the solution rather than the problem (Chatterjee and Finger 1994). The only mention of corporations in the final Agenda 21 text is regarding their promotion of sustainable development; there is no mention of their role in the pollution of the planet.⁵⁹

The market becomes nature, nature becomes a market

Costa Rica's Payment for Environmental Services is based on the idea that owners of forests provide services to the world that are not recognized and for which they receive no compensation. Because of this, the costs of maintenance of these natural resources are borne by private landowners or the government, with uncertain results. This is in fact presented by the government as a "market failure" –some sort of technical detail that can be fixed in order to have the machine or the system working properly. As the first government brochure on "Market Instruments to Mitigate Climate Change and Conserve Biodiversity" states:

The market failure to compensate Costa Rica for the value of its conservation and reforestation efforts and resulting benefits, such as carbon sequestration and biodiversity conservation, has inspired novel policies. These can be viewed as

⁵⁹ The history of this involvement has been the subject of various analyses. Pulver (2004) for example analyzes the split within the oil industry to explain the change in dynamics in the Protocol.

initial attempts to correct such market failures by harnessing the market to compensate Costa Rica for the environmental services it offers the world.⁶⁰

In the negative then, the market appears as a machine that sometimes malfunctions and therefore needs adjustment. But in the positive, the market is a force of nature that can be “harnessed” to “unleash” an inherent original energy that has enormous potential. This is the general metaphor used in most discussions of the Kyoto Protocol’s “flexible *mechanisms*” (again, the machine reference). Nobody stated this more clearly than President Bill Clinton when giving a speech about emissions trading, saying the plan would “create a wealth of opportunities for entrepreneurs at home, uphold our leadership abroad, and *harness the power of free markets to free our planet from an unacceptable risk*” (Passel 1997; italics mine).⁶¹

It is a perfect combination: in both cases the market is non-human, non-social. But whereas in the negative it is something over which humans have technical control, in the positive it is something over which we have no control, which is supra-human, and endowed with an enormous creative potential.

Moreover, a role reversal takes place. Where nature becomes a simple commodity, a matter of technical supervision and management, the market becomes

⁶⁰ MINAE & FUNDECOR 1998.

⁶¹ A lot more could be added on this, including on all the engineering and plumbing metaphors that go with the technological approach. On the machine metaphor, the Earth has been routinely likened to a spaceship and, more mundanely, to a car, as when a US Senator pointed that, “when we have a car problem, we take the car to a repair shop or fix it ourselves using the operator’s manual. For the global environment, however, there are no mechanics or manuals.” So we must “obtain the knowledge we need to train the mechanics and write the manual before this global machinery is irreversibly damaged” (quoted in Pielke 2005: 550). See also the control panel metaphor –such that it is possible to stabilize atmospheric concentrations so there’s no more than a two percent temperature increase (also in Pielke 2005: 550).

nature. Note that *the* market has also become singular, paralleling the way Raymond Williams (1983 [1976]) describes the transformation of the word *nature*. Williams explains that the emergence of *Nature* in the abstract singular form is historically and structurally related to the emergence of *a God* from *the gods* or *a god*, with the acquired meaning of “the inherent force which directs either the world or human beings or both” (ibid.: 219). It is a single prime force, a universal directing power. Like the market. And like nature, the market is green.⁶²

This role reversal is clear in the approach to climate change and is perhaps what, more than anything, makes this case unique: the Kyoto Protocol is not about ‘regulating’ or controlling a global environmental problem. It is about regulating or controlling the market. If one were to take a step back and recall that the problem is about stabilizing atmospheric concentrations of greenhouse gases at a certain level to avoid the unknown effects of a permanent change in the climate system, one would expect the negotiations to address the source of emissions. One would then anticipate talk of cutting subsidies for fossil fuels, or putting controls on aviation and maritime transportation for example. Other environmental treaties have done something along those lines: the Montreal Protocol for example phased out ozone-depleting substances in developed countries, and legislation on acid rain directly regulates emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), and ammonia (NH₃) (see Hajer 1995).⁶³

⁶² The same thing has happened with “the environment.” As Haila (2005) notes, the environment as a totality, in singular, is a recent invention. Instead I, like Harvey and Haila, take it that the relationships between societies and their surroundings -their environments- cannot be understood in general, but only in specific (Haila 2005: 24).

⁶³ Of course, these two environmental problems were easier to address and responded to certain contingent conditions (see Chapter 2).

Yet the text of the Kyoto Protocol and the subsequent decisions that make it operational have rising emissions merely as a background. Instead, the lion's share of the negotiations is taken up by attempts at controlling the market, setting the rules of the game such as how much one can trade, what can be traded for what, what the penalties are for not complying, how to send the right “market signals,”⁶⁴ and avoiding “perverse incentives.”⁶⁵ Not only is there nowhere text addressing subsidies for reducing fossil fuels or emissions from aviation and maritime transport,⁶⁶ but instead there are several articles dealing with “impacts of response measures” –that is, the negative economic impact in energy exporting countries (mainly OPEC’s eleven members) of a reduced demand in fossil fuels.⁶⁷ In contrast, as Farhana Yamin noted, only two percent of all decisions by the UNFCCC in a ten-year period have focused specifically on sustainable development.⁶⁸

⁶⁴ This was a great preoccupation at COP 11 and first COP/MOP in Montreal in December 2005, where improvements to the CDM –including the possible restructuring of its Executive Board- was one of the key issues on the agenda.

⁶⁵ On this last question of avoiding “perverse incentives” there are various cases. The most interesting of these is perhaps the question of awarding credits under the CDM for the destruction of HFC-23, which is a by-product of the production of HCFC-22, an ozone depleting substance regulated under the Montreal Protocol. The problem is that the global warming potential of HFC-23 is so high (more than 11,000 times that of carbon dioxide), and the cost of destroying it so low, that it is possible to make business by artificially producing HFC-23 to sell credits, in which case there is an incentive to continue producing HCFC-22 against Montreal Protocol regulations. This is a simplified account of the problem and there are a number of details that further complicate the question. See Chapter 3 (see also FCCC/SBSTA/2005/INF.8).

⁶⁶ These have been effectively blocked by the OPEC group of countries and others, and so the agenda item keeps being pushed forward to the next meeting.

⁶⁷ See Article 4.8 and 4.10 of the Convention, and articles 2.3 and 3.14 of the Protocol.

⁶⁸ Personal notes from Chatham House conference, June/July 2006. Similarly, Pielke (2005) draws attention to the fact that today the Kyoto Protocol is more discussed in terms of its

Structure and chapters

How all of this came to be and some of its foreseeable implications are the subject of the following chapters. Part I, on the creation of a market, consists of the history of climate change as an issue, the UNFCCC and the Kyoto Protocol. Chapter 1 thus starts with a description of the greenhouse effect and human-induced climate change: what it is, how it was discovered, and how it moved from a scientific question to a political issue. This is followed in Chapter 2 by the history of the climate change negotiations leading to the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) and eventually to the Kyoto Protocol. Chapter 3 explains the Kyoto Protocol's "flexible mechanisms," in particular the Clean Development Mechanism (CDM), the only one of the three mechanisms that involves investment by industrialized countries with reduction commitments (so-called Annex I Parties) in a developing country (non-Annex I), in exchange for emission reduction credits.

In Part II, on the creation of a commodity, Chapter 4 details the history of the negotiations on sinks and what is known as land use, land use change and forestry (LULUCF).⁶⁹ Chapter 5 then relates the creation of the rules for the market under the CDM and the issues that had to be sorted out to come up with a tradable commodity.

significance for international relations and diplomacy (especially between the United States and Europe) than for its ability to address climate change (Pielke 2005: 551).

⁶⁹ Under the Protocol, LULUCF activities are allowed to count towards meeting Annex I Parties' reduction commitments –that is, not only emissions from fossil fuels are counted, but also changes in land use that result in carbon removals or emissions (from forest, cropland and grassland management for example). These are different from carbon sinks projects undertaken in developing countries under the Clean Development Mechanism (CDM), because different rules apply to each. See Chapter 4.

Finally, Part III describes access to this new market on the ground. Chapter 6 first reviews the state of the market in general and, using the *filière* approach, explains access to the market for carbon sinks given the rules and procedures established for sinks projects. Chapter 7 then describes Costa Rica's Payment for Environmental Services (PES) program, under which small and medium landowners sell their right to sequester carbon to the state, which then sells the carbon offsets as credit to foreign companies with reduction commitments. The chapter shows how the PES in many ways parallels the market for carbon sinks under the UNFCCC, in that small-scale landowners and poor peasants are not only further excluded from the new market but, potentially, are at risk of losing their land. The conclusion discusses the implications of this study for understanding the production of nature under capitalism and the reproduction of inequality.

Mapping access to the Payment for Environmental Services (PES) in Costa Rica:

Research Methods

In order to map access to the PES using the conceptual tools of *filière* or commodity chain analysis, I undertook a study of land tenure in the Northeast of Costa Rica, between the San Juan river and La Selva biological station. I chose this area because it is where most of the PES have been granted. It is also one of Costa Rica's few remaining lowland tropical forests, and a relatively recent area of frontier colonization by poor peasant farmers. As such it is also rapidly being cleared or degraded by unsustainable logging practices. The area is also the site of a long-term proposal for the creation of a biological corridor to assure the protection of the Great Green Macaw and its rainforest environment. There is plenty of scientific data on the

area, as well as some basic information on social composition and economic activities.

The land tenure study included:

- a) The mapping of all properties that have received the payment for environmental services (PES) in that area since 1997 (in some cases 1995), as well as others not in the program but that have requested logging permissions.⁷⁰ For each property, I recorded the name of the owner or company, legal representative, telephone, address, occupation, total area of the property, area under the PES program, the kind of payment,⁷¹ forestry engineer in charge, date of entry into program and amount received to date. More than one hundred properties were thus documented in order to see the distribution of resources from the program. This made it possible to compare, for example, landholders who live in the urban centers and who have occupations in sectors other than the agrarian, with those living in the area and who describe themselves as peasant farmers.
- b) The maps also include areas belonging to the *Institute for Agrarian Development* (IDA) as part of an older but ongoing land redistribution program. These are occupied by small landholders (usually the poorest

⁷⁰ The maps were made using xeroxed copies of so-called “cartographic” maps (in Spanish, “mapas cartográficos”) on translucent paper. The exact location of the property on these cartographic maps is one of the requisites to apply for the PSE program, so I reviewed every file in two regional offices of the Ministry of Environment (Conservation Areas) and copied the property unto my translucent maps. Since the last agronomic census undertaken in Costa Rica is from 1984, these files represented the most up-to-date and relatively accessible source of information on land tenure (they also have the number of the property in the National Register and the *Plano catastrado*.)

⁷¹ Whether payment for plantation, conservation or management of forests.

farmers and peasants) who in most cases do not have legal title to the property –which precludes their access to the PES program (for the first fifteen years after the land is distributed it officially remains in IDA’s hands). For each area or settlement I retrieved information on total acreage, number of families, date of purchase, and the name of the former owner and of the estate. Some of these areas originally had their own forest reserves, but many forested hectares –if not most- have gradually disappeared.⁷²

- c) On the same maps, I incorporated the location of all reserves and protected areas, biological stations, and ecologically-sensitive sites, as well as administrative divisions. Because the maps include physical geographical information (rivers, altitude, roads, and so on), they are informative even to someone not familiar with the area. The same maps and scale are used for studies of land-use and land-aptitude, allowing me to juxtapose further information, compare cases and to share results with others in Costa Rica and elsewhere.
- d) The maps were then digitized at the Department of Geography of the University of Costa Rica using *MapInfo*, with links to the associated data in *Excel* tables.

To complement this, I conducted forty-one structured interviews with various stakeholders in Costa Rica, from peasant farmers to directors of environmental and agrarian government agencies and non-governmental organizations, as well as

⁷² I copied the IDA maps from the regional IDA office in Sarapiquí, and revised and completed the information in the central office of the IDA in San José. I used the same system to copy the IDA areas as the PES, so everything appears in the same corresponding map.

innumerable other non-formal consultations.⁷³ Many of the latter took place as I participated in meetings of all sorts, from the Costa Rican National Peasant Forestry Congress to the local *asentamiento* (IDA's settlements) meeting on the improvement of the water reservoir and sewer system.

Moreover, I spent several days in the archive of the National Assembly in San José reviewing the eleven volumes about the most recent Forestry Law. This is a fascinating source for understanding the context in which the law was created and locating the main actors –as well as discovering who was left out. The volumes are a transcription of all the discussions and speeches from August 1990 to 1996, when the law was passed.

While in Costa Rica, I also participated in a week-long international course on “Climate Change Projects in the Forestry and Energy Sector: Development Opportunities for Latin American Countries,” organized by the United Nations Development Program (UNDP) and the Center for Tropical Agronomic Research and Training (CATIE). The course was conceived for representatives of government and organizations in charge of climate change programs and included the design of actual projects. It was an ideal opportunity to discuss the issues with representatives from local climate change government offices from most of Latin America, including Nicaragua, El Salvador, Honduras, Panama, Cuba, Brazil, Chile, Argentina, and Uruguay. Some of them then went as part of their country's delegation to the UN climate change meetings, thanks to which we have kept in touch.

⁷³ This refers only to the interviews done in Costa Rica between 2000 and 2001. It does not include the interviews, both formal and informal, done at UN climate change meetings and others done elsewhere.

Fieldwork at the UNFCCC

I have attended all meetings of the UNFCCC Conference of the Parties (COP) and the Kyoto Protocol's Conference of the Parties serving as the Meeting of the Parties (COP/MOP) since 2000 except for two (COP 8 in New Delhi and COP 10 in Buenos Aires), as well as most UNFCCC Subsidiary Body meetings, IPCC meetings, and many UNFCCC workshops.⁷⁴ I have also attended a number of forestry meetings, covering the fourth session of the UN Forum on Forest (UNFF 4) and a preparatory workshop on decentralization in forestry in Interlaken, Switzerland.

I was there as part of the Earth Negotiations Bulletin (ENB) team, for which I have been a writer and editor since 2003. ENB is the main product of the International Institute for Sustainable Development-Reporting Services (IISD-RS), and consists usually of a one-page, two-sided publication that is distributed each morning to participants at UN negotiations with a full but concise report of the negotiations. Besides the hard copy, ENB is also available for free in electronic format (at the IISD Reporting Services' website "Linkages"⁷⁵) and distributed by email to a large international audience. IISD-RS has an established reputation for providing an independent and objective report of the UN negotiations on environment and sustainable development, and is widely considered an essential source of information for government officials, UN staff, policymakers, NGOs, IGOs, business, industry and academia interested in the outcome of negotiations. Its mission is to ensure

⁷⁴ Among others, on emission scenarios, on the five-year programme of work on adaptation under the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA), and on regional adaptation in Africa.

⁷⁵ Linkages Update, with information on international environmental and development negotiations and issues, reaches an estimated audience of 45,000 people. See <http://www.iisd.ca>

transparency and wide-access to the negotiations on environment and sustainable development under the UN. Besides a small permanent and part-time staff, it relies on sixty consultants from thirty-two countries, most of whom are Ph.D.s, Ph.D. candidates or lawyers specializing in multilateral environmental agreements and international environment and development relations. It maintains offices in Geneva, Switzerland, and near the UN headquarters in New York. It is funded by donor countries and intergovernmental organizations and specialized agencies of the UN. Because ENB is not an NGO, ENB writers are given the same badge as members of the UN Secretariat, which allows them right of entry to all open (and sometimes not so open) consultations.⁷⁶ I have therefore had an extremely privileged access to the climate change negotiations, and was able to observe the negotiations first-hand and record countries' positions -in particular those on carbon sinks and all matters related to LULUCF, as well as adaptation. I have also come to know many of the delegates, UNFCCC Secretariat staff, and others involved in the process. Much of the information included in this dissertation comes from this direct observation and from a number of formal and many informal interviews with participants.

⁷⁶ ENB writers are registered as “consultants.”

Chapter 1

Understanding Climate Change

A couple of years ago, a farmer riding his tractor in Soria, Spain, found a 35.27-pound bloc of ice that had fallen from the sky on a clear day.⁷⁷ Another ice meteor was found in Brazil, this one weighing 440 pounds. These “megacryometeors” are formed as one level of the atmosphere gets colder and the other gets hotter. Although they have been known to rip holes through houses and smash car windshields, only a fifth of them are ever found. They are one of the not-so subtle or gradual effects of climate change.

Another not-so subtle effect was described in *The New York Times* on July 20, 2001, under the heading “Tuvalu: Country Ready to Pack Up.” The island was hoping to resettle its entire population of 11,000 people as rising sea levels threatened to engulf their homes –something they expect to happen in just 50 years. The government had asked New Zealand and Australia to provide them with shelter. New Zealand had apparently accepted, but there were no guarantees from Australia.⁷⁸

You're getting warmer....

⁷⁷ “Scientist Says Ice Meteors a Sign of Climate Change” October 1, 2002. *Reuters News*, Emma Ross-Thomas.

⁷⁸ “Tuvalu: Country Ready to Pack Up” July 20, 2001. *The New York Times*, World Business Briefing, page W1.

Since the late nineteenth century the average surface temperature of the earth has increased by $0.6^{\circ}\text{C} \pm 0.2^{\circ}\text{C}$.⁷⁹ The 1990s was the warmest decade since records began being kept in 1861, and of all the nine warmest years occurred in that decade. With the exception of 1997-1998, when El Niño produced exceptionally high temperatures, each year has broken the previous year's record.⁸⁰ Overall, the increase in surface temperatures in the twentieth century is thought to be greater than for any other century in the last ten thousand years.

At the same time, according to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), precipitation has increased 5 to 10 percent over the century in most land areas and become heavier in the mid and high latitudes, while the frequency and intensity of drought in parts of Africa and Asia has also increased; El Niño events have become more frequent, persistent and intense compared to the last 100 years, further contributing to increased coral reef bleaching. Moreover, ocean temperatures and sea levels have risen at an average rate of 1 to 2mm. during the twentieth century. There has been a worldwide retreat of mountain glaciers, snow cover has decreased by 10 percent, and the Arctic sea-ice has thinned by 40 percent and decreased its extent by 10 to 15 percent since the late 1950s. Also in the last 40 years the growing season has lengthened by one to four days per decade

⁷⁹ The figures and data in this section come from the 2001 IPCC's Third Assessment Report (TAR). Preliminary reports from the Fourth Assessment Report (4AR), to be released in November 2007, make the link between observed climate changes and anthropogenic emissions significantly stronger and clearer. See <http://www.ipcc.ch/index.html>

⁸⁰ The high temperatures recorded in 2002 and most likely throughout 2003 have to do with the onset of El Niño –just like the record-high temperatures in 1997 and 1998. This is because oceans absorb (or sequester) more carbon when cool. As equatorial Pacific sea-surface warms, causing the onset of El Niño, oceans absorb less carbon, leading to a rise in both global temperatures and CO₂ concentrations.

in the northern latitudes, plant and animal ranges have shifted upward (both towards the poles and up in elevation), and there is earlier breeding, flowering and migration.

It is the combination of these factors, the collective picture, that makes scientists confident that what they are observing is the result of a global warming.

This chapter sets out to provide the background for understanding the problem of climate change, and how it went from a scientific issue to a political one. After a brief history of the findings that led to the discovery of global warming, the chapter explains how the greenhouse effect works. This is followed by an account of how emissions have risen and where, including some basic data on projections for future emissions in different countries. The chapter then ends with a description of the IPCC, the internationally recognized body of experts in charge of assessing what we know of climate change.

A brief history of the science of climate change⁸¹

The term “hothouse effect” was first used in 1827 by French mathematician Baron Jean Baptiste Joseph Fourier in what is generally taken to be the earliest argument about the role of the atmosphere in determining the earth’s surface temperature, distinct from the heat of the sun and that of the earth’s core. He compared the atmosphere to a “glass vessel” in that it lets sunlight in, but keeps the

⁸¹ Many accounts now exist of the discovery of global warming. See for example, Fleming 1998; Weart 2003.

resulting warmth from leaving. The idea was taken up in the 1850s by British scientist John Tyndall, who went ahead to measure the heat-trapping properties of the atmospheric components. Tyndall discovered that the two gases that compose 99 percent of the atmosphere –nitrogen and oxygen- have no trapping ability. It is the remaining 1 percent of water vapor, carbon dioxide (CO₂), methane (CH₄), and the other trace gases that keep the planet warm. Without them the planet would be 59° F colder.⁸²

These theories established the basic physics of the earth's heat-trapping effect. Yet the idea that human activities were changing the composition of the atmosphere and therefore affecting the climate came only when the industrial revolution was at full steam. In an 1896 essay in the *London, Edinburgh, and Dublin Philosophical Magazine*, Swedish chemist Svante Arrhenius theorized that burning coal, charcoal and wood would release millions of tons of carbon dioxide into the air, causing “a change in the transparency of the atmosphere” that would, in turn, lead to a warming climate. In an often-quoted statement, Arrhenius wrote, “We are evaporating our coal mines into the air.” He also wrote, optimistically, that “we may hope to enjoy ages with more equitable and better climates.”⁸³

This idea of human-induced climate change received continued interest and scientists undertook several experiments in the following years. In 1938 George Callender, a British coal engineer, published the results of temperature readings taken over several decades from dozens of weather stations and from sea captains who

⁸² In a 1863 article entitled “On Radiation Through the Earth's Atmosphere,” Tyndall calculated that water vapor holds about 16,000 times as much heat as does oxygen and nitrogen, the main components of the atmosphere (Paterson 1996: 17).

⁸³ Arrhenius would later be awarded one of the first Nobel prizes in chemistry for his work on ionization. See Arrhenius 1896.

brought up buckets of sea water to take its temperature. The averaged results showed a steady rising trend, which he ascribed to increased concentrations of carbon dioxide in the air. But then the northern hemisphere went through a prolonged cold period, and Callender's ideas were largely forgotten.

The International Geophysical Year and the Keeling Curve

By the middle of the twentieth century, then, scientists were well aware of the increase in heat-trapping gases being released into the air. Like Arrhenius, most of them, including Callender, thought this was a lucky event that could make the world a more comfortable place. Given basic laws of gas exchange, they also assumed that any excess carbon dioxide was being harmlessly absorbed back into the oceans, where it would remain locked safely in sediments in the sea floor.

This assumption was shaken in 1957 when Roger Revelle and Hans Suess, from the Scripps Institute of Oceanography in La Jolla, California, published the results of their analysis of the chemistry of seawater. Their study showed the oceans' limited capacity to absorb carbon dioxide. The assumption broke down even further when readings at the top of the Mauna Loa volcano in Hawaii in 1958 revealed increasing amounts of carbon dioxide in the atmosphere.

These experiments were all part of the first and most ambitious project in the history of the earth science until then: the 1958 International Geophysical Year. With hundreds of geologists, chemists, climatologists and other specialists from more than seventy countries involved, this was the first all-round check-up of the Earth, when for eighteen months, everything measurable around the world was measured.

The Mauna Loa readings were made with a new instrument called a manometer, developed by Charles David Keeling. For two years, Keeling had gone around California taking samples of air and measuring the concentrations of atmospheric CO₂. His instrument was the first to detect concentrations on the order of one part per million (ppm), and he found that his flasks of air contained, on average, 315 ppm of CO₂. This was already an increase of 13 percent above pre-industrial levels.

The manometers could record the biosphere “breathing” (Revkin 1992: 93). They depicted concentrations of CO₂ falling in spring and summer as new growth from trees and plants “sequestered” carbon, and rising in the winter when leaves fell and fruit decayed, releasing the carbon back into the air. Keeling kept the instruments reading this breathing for over three decades. When added together, the pattern of yearly soft increases and decreases of CO₂ crept slowly but steadily up -every year the concentrations were a little higher than the year before. This climbing snake shape is known as the Keeling Curve.

Still, with temperatures seemingly stable -and actually falling until the mid 1970s- concern remained for the most part theoretical. Although the World Climate Conference in 1979 concluded that climate change was a real threat,⁸⁴ and several scientific meetings during the following decade confirmed this assessment, the problem generated little public interest.

⁸⁴ “[T]he Conference finds that it is now urgently necessary for the nations of the world ... to foresee and to prevent potential man-made changes in the climate that might be adverse to the well-being of humanity” (quoted in Gupta 2001: 12).

This all clearly changed by 1988, when record-high temperatures scorched crops from China to Canada, and national parks in France and the United States went up in flames. While an estimated 10,000 “excess” deaths were linked to heat stress in the United States, 25 million people were left homeless in Bangladesh when 80 percent of the country was inundated in late August. This was Bangladesh’s fifth such flood in eight years. It resulted, in time, in the migration of 10 million Bangladeshis to India.⁸⁵

That same year, in two separate studies, scientists at the University of East Anglia in England and at NASA’s Goddard Institute for Space Studies reported that the global average temperature of the planet had risen 0.5°C (1°F) in the last hundred years. Although the rise was still within natural variation, the speed at which it happened was without precedent in the last 10,000 years. And it matched the steadily rising shape of the Keeling curve.

The greenhouse effect: how it works⁸⁶

The Earth’s surface absorbs radiation from the Sun, which enters as visible light. Since dark colors absorb a lot of light, the oceans, plants and soil warm up and redistribute the energy via atmospheric and oceanic circulation. This radiation is then re-emitted back as heat, at longer –infrared- wavelengths (because it occurs at the

⁸⁵ IPCC TAR 2001. Working Group II, Chapter 11. Also Christianson 1999: 197. That was a year when, even US President Bush said that “the earth spoke back” (Ross 1991: 205).

⁸⁶ For one of the most complete and authoritative reviews from one of the world’s leading climate scientists, see Houghton 2004 [1994]. For a most readable version, see Revkin 1992; for a simple, informed and well-written introduction, see Spence 2005.

invisible –the infrared- part of the spectrum). It is equivalent to a rock in a campfire: heated by the flames, it is still hot long after the fire is out. The heat that radiates from the rock the morning after is infrared radiation (see Revkin 1992: 63).

This infrared radiation is trapped on its way out by the so-called greenhouse gases. While the molecules of these gases are not sensitive to energy transmitted as visible light (it passes right through them), they are very sensitive to infrared radiation, which they absorb and re-emit, warming the atmosphere close to the Earth. This is an extremely well documented and robust effect, straightforwardly measured in laboratories and by earth-orbiting satellites.

As noted earlier, the two most common gases in the atmosphere, oxygen and nitrogen, have no heat-trapping capacity, so that 99 percent of the atmosphere has no insulating properties. It is water vapor, carbon dioxide, methane, and a few other gases, measured in parts per million, that make this planet warm. They are called trace gases because they exist only as a trace: water vapor for example constitutes 1 percent of the atmosphere; CO₂ a mere 0.35 percent. Yet without them, instead of the comfortable average of 15°C (59°F), the planet would be –18°C (0°F) –something closer to Mars.

The minuscule amounts of these gases relative to their warming capacity makes evident their potency: a small change in their concentration can lead to big changes in the Earth's climate. Now it seems that we will be doubling their amounts in a matter of decades.

Feedback effects and consistent relations

As Revkin (1992) notes, the earth's atmosphere is something of a paradox: it is in constant flux, yet remarkably predictable: warm air rises, water evaporates, condenses into clouds, and falls as rain or snow; and then there are the seasons. Yet the weather is impossible to predict more than two weeks ahead.

The climate is different. Although it is hard or even impossible to know with precision the details, certain scientific fundamentals are beyond dispute. There is no dispute for example that greenhouse gases trap heat near the earth's surface. Also undisputed is the fact that concentrations of these gases are rising due primarily to burning fossil fuels and other human activities; that this rise is likely to lead to overall warming of the earth's temperature; and that the rise will come with significant variations at the regional level. Beyond these fundamentals, the question becomes less precise because of the incredible complexity and the enormous number of variables that influence the global atmospheric system –from natural feedbacks to outside influences, both natural and human.

To have a sense of the dynamics and feedback effects, take the simplest example: water vapor and CO₂. Although water vapor is by far the dominant greenhouse gas in terms of direct trapping of outgoing infrared radiation, a decrease in CO₂ will reduce the atmosphere's ability to hold water vapor, which will in turn lead to a drop in temperature. In other words, as the climate warms because of an increase in CO₂, the holding capacity of water vapor increases; as it cools, it decreases. This is similar to what happens in very humid weather patterns, or when cloud cover suppresses nighttime cooling. Thus, water vapor acts as a 'positive feedback' gas, that is, it amplifies the warming effect caused originally by CO₂ (Mahlman 2000: 31).

The consistent relation between carbon dioxide in the air and the average temperature of the planet was confirmed when mile-long cylinders were drilled and extracted from glaciers in Antarctica. The frozen water sections showed a remarkable record of atmospheric carbon dioxide and temperatures going back 160,000 years: as temperatures dropped to 5°C (9°F) during an ice age, carbon dioxide levels dropped to ca. 190 ppm. When temperatures rose during warm interglacial times, CO₂ levels rose to 280 ppm.

Yet, while the concentration of CO₂ fluctuated between these two amounts during those 160,000 years, it never rose much higher. That came only with the Industrial Revolution and the burning of fossil fuels. Already before the end of the nineteenth century, atmospheric concentrations of CO₂ were close to 300 ppm. And they have kept steadily rising, to the actual level of 372.9 ppm.

Rising emissions

It is by now well established that the atmospheric concentration of CO₂ remained at 280 ppm in the years between 1000 and 1750, but then went from there to 368 ppm in 2000 (31 ±4 percent), and kept rising to 372.9 ppm two years later for a total of 6.44 billion tons of carbon in 2002. This represents an increase of 18 percent just from 1960 to 2002.⁸⁷

Concentrations of methane (CH₄), which is 20-30 times more efficient at trapping heat than CO₂, have increased about 150 percent since 1750. That is more than double the highest level in 160,000 years. Methane is generated naturally by bacterial decomposition when there is no oxygen. It is common in landfills, rice

⁸⁷ See Sheehan 2003.

paddies, and the guts of cattle and termites. Its explosive increase has to do with the explosion of human population, which has brought with it an explosion of livestock (1.3 billion head in the world in 1982). Cattle belch methane about twice a minute. Emissions also result from coal and oil drilling: it is the gas that burns in the flares above oil rigs. Methane concentrations may be released as soil warms up and permafrost thaws in the Arctic tundra. A problem with this gas is that it is locked up in cold sediments in the floor of the sea that could be released with higher global temperatures, creating a positive feedback and making real the worst-case scenario (see Leggett 2001).

On the rate of change

It is, as Revkin says, like a watch that gains a few seconds every month. The increase is imperceptible day by day, yet the cumulative effect is significant.

Unfortunately, the climate system does not follow a simple linear, progressive pattern. Because the deep oceans have a large heat capacity, and ice sheets are dynamically adjustable, the climate system can respond to changes on a long time-scale, in the range of decades to centuries. In other words, changes in the climate system can take many years to become evident. Yet many scientists talk of reaching a “threshold” that would change the inertia of the system and radically alter it in an irreversible way. That same adaptability of oceans and ice sheets would be a problem once changes are underway. It will be very hard to quickly return to “normal” mode.

Regarding things happening suddenly, as opposed to gradually, it is instructive to remember the discovery in 1985 of the hole in the ozone layer. Scientists knew well before then that chlorofluorocarbons (CFCs) would deplete the ozone shield, but

expected this to take place gradually –on the order of 2 percent over the next hundred years. Nobody anticipated that clouds of ice crystals and a spinning vortex of winds in the poles would suddenly create a real hole. Although the hole appeared annually in satellite scans of Antarctica, it was rejected by the computer as a strange instrument error.

Once discovered, the hole was perceived in the atmosphere above the North Pole. The ozone layer diminished even in the mid-latitudes. More importantly, it was all accelerating twice as fast as anticipated. Because it can take many years for the CFC molecules to travel to the stratosphere where the ozone shield is found, the hole we see today is the result of CFCs pumped years ago. In the meantime, additional millions of tons of these chemicals have been released. Their effect is yet to be felt (Revkin 1992: 113-115).⁸⁸

In little over a century, humans have added some 850 billion tons of CO₂ to the earth's atmosphere. The whole atmosphere weighs around five million billion tons, and it does not take that much carbon dioxide to warm the climate (ibid: 90). Between 1870 and 1970 burning fossil fuels added 400 billion tons of CO₂ –only to add another 400 billion in the next 19 years. Sixty million tons are added every year. This acceleration is the biggest problem.

On reaching a threshold, José Lutzenberger, Brazil's first Secretary of the Environment, put it succinctly: "A complicated system can take a lot of abuse, but you get to a point where suddenly things fall apart. It's like pushing a ruler toward the edge of

⁸⁸ In 2006 the hole in the ozone layer reached record size.

the table. Nothing happens, nothing happens, nothing happens. Then, suddenly, the ruler falls to the floor” (quoted in Revkin 1992: 23).

Common but differentiated responsibilities

Accounting for cumulative carbon emissions over the last hundred years (from 1900 to 1999), shows that industrialized countries, with 20 percent of the world’s population, are responsible for 63 percent of net carbon emissions from fossil fuels and land use changes. North America accounts for 25 percent and Europe for 21 percent approximately. The rest, more or less 140 developing countries, account for a combined 37 percent. Of these, China is responsible for 7 percent and India for 2 percent. They are home to 40 percent of the world’s population.⁸⁹

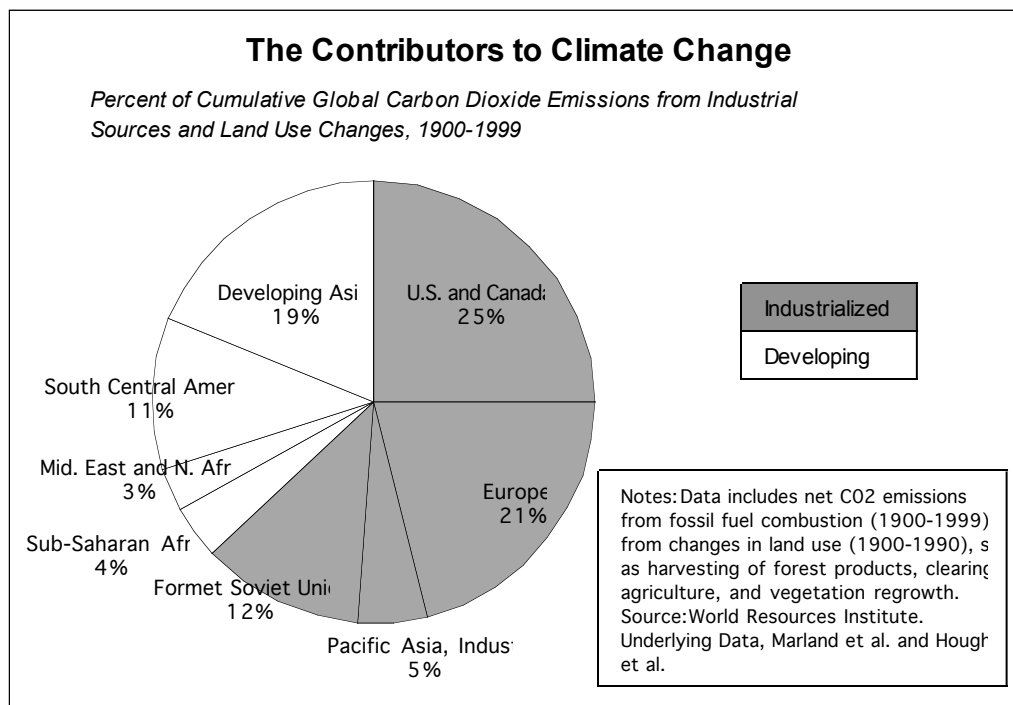
As for present-day carbon emissions, the vast majority comes from twenty countries (all of which, except for four, are rich industrialized nations),⁹⁰ while 135 small and poor countries contribute to less than 5 percent of the total. The United States, with approximately 8 percent* of the world’s population, accounts for 25 percent of the global total, and the emissions from the electric power sector alone in that country are higher than the combined annual emissions of Argentina, Brazil, Indonesia, Mexico, South Africa and South Korea. Together, China’s and India’s emissions amount to three-fifths of those of the United States.⁹¹ In per capita terms, a

⁸⁹ See Baumert and Kete 2001. See also UNFCCC and IEA data.

⁹⁰ The four developing countries are China (responsible for 7 percent of the total 1999 fossil fuel carbon emissions), India (2 percent), South Africa (1.2 percent) and Mexico (1 percent).

⁹¹ International Energy Annual 1999. Energy Information Administration (Table H-1: World Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels). Online at: <http://www.eia.doe.gov/emeu/iea>.

person in the United States emits 5.6 tons of carbon on average –that is, 20 times the average of an Indian and 10 times that of a Chinese.

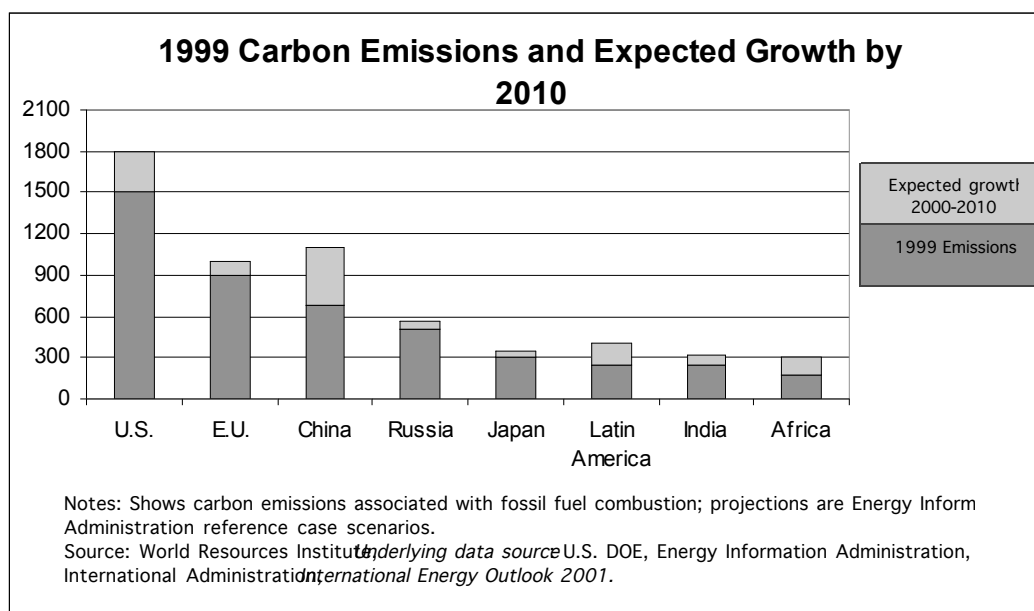


Future emissions are notoriously tricky to calculate, since they imply dubious projections of growth and for the most part business-as-usual scenarios. But a rough estimate can be given based on countries' own projections. The US government under the George W. Bush Administration, for example, forecasts a 35 percent increase in emission levels by 2020 (including a 25 percent increase in the consumption of coal - which is the highest carbon fuel).⁹² This is 20 percent more than that expected at that time for China, the second largest emitter.⁹³ Despite faster growth of emissions in

⁹² *Annual Energy Outlook 2001*, Washington D.C: EIA 2000. (online at: [http://tonto.eia.doe.gov/FTP/ROOT/forecasting/0383\(2001\).pdf](http://tonto.eia.doe.gov/FTP/ROOT/forecasting/0383(2001).pdf) (May 2001).

⁹³ In Japan, the European Union and Russia, the expected growth of emissions is comparatively small (see Chapter 2 for more on these countries' national circumstances).

developing countries relative to industrialized countries, it is expected that India and China will together add 570 million tons of carbon emissions from fossil fuel combustion by 2010. This is still four-fifths of the US total, even though China and India will account for more than 2.2 billion people –eight times the population of the United States.⁹⁴



These figures clearly suggest serious equity and moral issues that have been difficult to address. They were recognized early on in one of the most important principles subscribed by all countries under Article 3.1 of the 1992 UN Framework Convention in Climate Change: that all countries should take action to protect the climate system “in accordance with their common but differentiated responsibilities and respective capabilities.”⁹⁵

⁹⁴ *International Energy Outlook 2001*. Energy Information Administration, International Administration, U.S. Department of Energy. (See also *World Resources Institute*).

⁹⁵ See Liverman 2007.

The Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), is the authority in charge of assessing what we know to date about climate change based on the most widely accepted scientific, technical and socio-economic information available.⁹⁶ Sources are mostly peer-reviewed journals, but include also industry literature and traditional practices.⁹⁷ Approximately 1,000 experts from 120 countries have been involved in drafting and revising the IPCC reports, in addition to the 2,500 who participate in the review process. The IPCC meets once a year in plenary sessions conducted in the six languages of the UN and is attended by hundreds of participants.⁹⁸ The IPCC is said to be “probably the most extensive and carefully constructed intergovernmental advisory process ever known in international relations” (Grubb 1999: 4).

The experts that compose it are nominated by governments based on their scientific qualifications and published record.⁹⁹ They are divided in three working groups headed by two co-chairs -one from a developed country and one from a developing one- and a technical support unit. Working Group I (Science) deals with the scientific aspects of climate change; Working Group II (Impacts and Adaptation)

⁹⁶ For the origins and context of the IPCC, see Agrawala 1998.

⁹⁷ See IPCC website, at <http://www.ipcc.ch/about/about.htm>

⁹⁸ It is financed by voluntary contributions from member countries (including for travel expenses of experts from developing countries) and to a small degree from the UNFCCC. The WMO and UNEP, IPCC’s parent organizations, provide staff and financial support. It is open to all members of the UNEP and the WMO.

⁹⁹ According to the IPCC presentation brochure, international organizations also nominate candidates.

looks at the vulnerability of both human and natural systems and their possibilities of adapting to climate change; Working Group III (Mitigation) addresses the options for limiting emissions and mitigating climate change –including costs and benefits of actions and socio-economic issues. Their technical support units are in the US, the UK and Netherlands respectively. Besides the three working groups there is also the Task Force on National Greenhouse Gases Inventories based in Japan. The Vice-Chairs of the three working groups, together with Co-Chairs, three Vice-Chairs and the Co-Chair of the Task Force on inventories, constitute the IPCC Bureau, which is headed by the IPCC Chair.

Clearly, the leading positions are highly political. Around the time of the Third Assessment Report, in 2001, the United States pressed hard to remove the Chair of the IPCC, US Prof. Robert Watson. Behind this move was heavy lobbying from the US energy industry and some Republican elected officials (Revkin, April 3, 2001). Watson was one of the most respected atmospheric scientists working on climate change and had successfully chaired the IPCC for six years. While at NASA, he had headed the team that proved the link between CFCs and ozone depletion in the Antarctic (see Leggett 2001: 7). He was also an outspoken advocate for action to curb global warming. In what is a clear sign of the shape things took as negotiations on climate change progressed, Watson was replaced by Indian Rajendra Pachauri, not a scientist but an engineer and economist, with little grounding in atmospheric science. Though criticized by some, this move fit a treaty that was less and less a matter of a safe environment, and more about ‘sound’ economics and technical management.

The IPCC does not undertake research of its own, but evaluates existing peer-reviewed published research and comes up with a policy-oriented consensus view.

When writing the reports, policy-makers are consulted to identify key policy-relevant issues. Once finished, reports go through two review processes: one from experts and specialists in the field, and a second one from governments. Because the reports will be accepted as the official knowledge, the actual wording is intensely debated and negotiated. This has often been a matter of criticism and debate.¹⁰⁰ Critics and skeptics also argue that the IPCC reports are not scientific because they present consensus views (see Boehmer-Christiansen 1993). The final reports, however, remain the responsibility of the lead authors.

Although the IPCC was recognized early on to be excessively dominated by developed countries, with just a few scientists from India, China and Brazil playing a role, efforts are continuously made to give the IPCC a more balanced geographical representation. The IPCC also tries to incorporate a range of scientific, technical and socio-economic views and expertise, and calls are made on every occasion, and in particular at the UNFCCC meetings, for governments to nominate experts and for scientists from developing countries and social scientists, besides economists, to get involved.¹⁰¹

Despite these efforts at balance, scientists from industrialized countries dominate the discussions. No doubt this is a reflection of inequalities in the world at large, but the implications are important -particularly when they touch on equity and other social aspects. The influence the IPCC exerts on the process and the aura of authority make it highly contested ground. Developing countries have been suspicious

¹⁰⁰ See Grubb 2001; Gupta 2001.

¹⁰¹ At COP-6 in The Hague in 2000 for example, the IPCC Chair at the time, Prof. Robert Watson, emphasized in his address to Plenary that they “needed anthropologists” and made a call for governments and organizations to nominate or suggest some. Personal observation.

of it back from early convention negotiation days. At the second meeting of the Intergovernmental Negotiating Committee (INC 2) (the body in charge of negotiating the text of the UNFCCC) in Geneva in June 1991, the Secretariat had used as topic headings the same elements listed in the IPCC legal mechanisms report but then had to withdraw the document. The reason was developing countries' objection that it gave too much weight to the IPCC's work thereby prejudging the structure of the Convention (Bodansky 1993: 485). This suspicion also surfaced when the question of who should organize and conduct the negotiations came up. Throughout 1989 and the beginning of 1990, it was assumed that it would be a negotiating committee under the joint auspices of the World Meteorological Organization (WMO) and the UN Environment Programme (UNEP). Accordingly, these two organizations took the lead in the initial preparations for negotiations. But as developing countries got more actively involved, the option of a special conference authority under the UN General Assembly came to prevail. As Bodansky notes,

western countries tended to support the former option, while many developing countries, who felt excluded from the IPCC, preferred the second option. Developing countries approached climate change as a development and not merely environmental issue, and as such a political and not just technical issue. Consequently, they felt it should be addressed under a political body such as the UN General Assembly, and not under technical agencies such as WMO and UNEP. This led to the adoption of resolution 45/212 and the establishment of an *ad hoc* secretariat" (Bodansky 1993: 4774).

Criticism by some developing countries, notably Brazil and Mexico, regarding the lack of representation by developing countries in the IPCC, led to the creation in 1989 of the Special Committee on the Participation of Developing Countries. In 1990

Brazil, almost preventing the adoption of the IPCC First Assessment Report, introduced a note to the preface stating “It should be noted that the Report reflects the technical assessment of experts rather than government positions, particularly those governments that could not participate in all Working Groups of the IPCC” (IPCC FAR 1990). This is seen as a preview of later North-South debates in the negotiations (see Bodansky 1993: 470).

Still, the three Assessment Reports published by the IPCC, in 1990, 1996 and 2001, have all had a powerful political impact. The first one called to start the negotiations that would later become the UNFCCC.¹⁰² The second one became the basis for negotiations in Kyoto. The third one provided the impetus for the ratification of the Protocol in a majority of countries and eventually its adoption. And now the fourth one, coming up in 2007, is scheduled just in time to coincide with negotiations on a revision to the Protocol and the UNFCCC (see Chapter 8).

IPCC Findings: The Assessment Reports

Even after significant watering down from intense negotiations, each assessment report of the IPCC has stated more emphatically and in less ambiguous terms that the world’s climate was changing, and most importantly, that the change is consistent with increased concentrations of greenhouse gases from human

¹⁰² The figures for the First Assessment Report (FAR) and the accompanying scenarios were variously received: while John Houghton, the British scientist who chaired the report, was invited to present the finding in the UK cabinet and in various developing countries, the United States officially protested to the British Foreign office when the conclusions were published in book format before final approval by the whole IPCC (Benton 1994: 177).

activities.¹⁰³ This had been the main dispute over the years and the one that had serious political consequences.¹⁰⁴ Once established in the Second Assessment Report that ‘the balance of the evidence suggests there is a discernible human influence on global climate,’ (IPCC SAR 1996) the problem ceased to be merely scientific and, for the first time appeared in the front pages of the leading newspapers in the US.

The most influential -and therefore controversial- section is the one prepared by Working Group I on Science. Already the First Assessment Report (FAR) in 1990 clearly stated that rising concentrations of greenhouse gases were consistent with increased global average temperatures and, if left unchecked, could lead temperatures to rise further at around 0.3°C ($\pm 15\%$) per decade –a rate not seen in the past 10,000 years at least. At the time, that warming was seen as possibly still within natural climate variability and could not be clearly attributed to human activity. But as research continued and climate modeling improved, the projections of increases in globally average temperatures over the period 1990 to 2100 themselves increased to 1.0° to 3.5°C in the Second Assessment Report (SAR), and further to 1.4° to 5.8°C in Third Assessment Report (TAR). To get a sense of what this might mean, it helps to know that the difference in global temperatures between now and the last ice age is between 4 to 7°C.

¹⁰³ The Second Assessment Report stated that “the observed warming trend is unlikely to be entirely natural in origin,” and the Third Assessment Report that “[T]here is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.”

¹⁰⁴ The technical summary of Working Group I in the Third Assessment Report (2001) reads in the first section, “Is the earth’s climate changing? The answer is unequivocally ‘Yes’.” See Albritton, D.L. and Meira Filho, L.G. *et al.* 2001. Technical Summary: A report accepted by Working Group I of the IPCC but not approved in detail. 2003. (The subtitle further reads: “‘Acceptance’ of IPCC reports at a Session of the Working Group or Panel signifies that the material has not been subject to line by line discussion and agreement, but nevertheless presents a comprehensive, objective and balanced view of the subject matter.”)

In sum

It is worth recalling the convention that truth emerges from nature through science, while power is negotiated in the realm of politics (Robinson and Shaw 2004). What is interesting about the IPCC is that it is not even necessary to engage in this distinction, given its dual nature: a scientific body where the final assessments are to a certain extent politically negotiated. According to Robert Watson, the negotiated nature of the IPCC reports –which combines scientific credibility and political approval- strengthens the international treaty-making process, making it “a more efficient and unified experience” (Robinson and Shaw 2004: 146). In Watson’s view, “The SPM [Summary for Policy Makers] provides a framework for nations to negotiate their particular concerns, reactions and interpretations of the same scientific information in an open forum” (ibid.). While there is truth to this and many government officials would agree, the role of a network of experts and professionals such as the IPCC has continued to be a matter of contention. Given developing countries’ limited resources for conducting research, negotiators often have to rely on foreign researchers. Scientific controversies have highlighted how (foreign) researchers select certain research questions, theories, methods, and assumptions that are apt to favor industrialized countries’ interests. This has tended to make developing countries’ negotiators suspicious of the foreign research results. Although the network of this epistemic community is widespread, it is also locally positioned in a context of competing domestic interests and institutions. The power it gains from devising policy options is necessarily connected to a particular state’s situation. As noted by Gupta (1997) and mentioned already in the Introduction, the whole approach to the

problem of climate change was dominated by industrialized countries' ideology of political realism and pragmatism: that the world is as it is and one should focus on what is possible instead of getting sidetracked on what should be done. This in many ways already serves to exclude developing countries' positions. And as Gupta makes clear, "[T]o the extent that developing countries will always be behind in the research on problems signaled by industrialized countries, there will be a structural imbalance in knowledge which will affect the negotiation process" (Gupta 1997: viii). It is to this negotiation process that the following chapter turns.

Chapter 2

Negotiating climate change: the UNFCCC

In 1972, at the time of the United Nations Conference on the Human Environment in Stockholm, there were a few dozen multilateral treaties that dealt with environmental issues. Twenty years later there were more than nine hundred international legal instruments, either directly aimed at environmental protection or dealing with it in an important way. Many of them were binding.¹⁰⁵

Today, a sign of our times is not only the proliferation of binding multilateral environmental agreements, but their nature, which may include, as the Kyoto Protocol does, market mechanisms to trade in environmental problems. This chapter sets out to describe the history of the negotiations that gave rise to the UN Framework Convention on Climate Change in 1992, and which set the principles for the Kyoto Protocol. A first section therefore outlines the context and episodes that gave rise to international environmental policy. This is followed by an account of the negotiation process leading to the adoption of the UN Framework Convention on Climate Change (UNFCCC), and then by a brief description of what the UNFCCC contains, in particular on Principles. The chapter ends with a brief overview of the main groups and players in the negotiations.

Historical background: The rise of international environmental policy

The explosion in environmental treaties has to do with the birth and growth of the modern environmental movement in the industrialized countries starting in the

¹⁰⁵ See Jacobson and Weiss 1997; see also Thomas 1992.

mid- 1960s and early 1970s. The first environmental ministries within governments, dealing mostly with pollution problems, were established at this time, largely as a result of the UN Conference on the Human Environment in Stockholm in 1972. Extensive national environmental legislation followed. Several of the more radical and publicly active environmental organizations in the United States were also founded then (such as the Environmental Defense Fund (1967) and the Natural Resources Defense Council (1970)), while the more traditional and established ones (Sierra Club and the National Audubon Society) saw their numbers surge. Groups like the World Wildlife Fund, Greenpeace and Friends of the Earth, with closely linked national organizations and chapters in various countries, became the first pressure groups to engage in action in the international arena. This fast-growing and expansive enterprise came together in the United States on April 22 1970 for the first “Earth Day,” with the participation of 20 million people. Coverage of the environment in the press went from eighth among fourteen major issues in 1960, to top domestic issue in 1973.¹⁰⁶ It was the same in France, Germany, the Netherlands, UK and throughout the developed world, including Japan and New Zealand (Benton 1994; Thomas 1992).

However, with the exception of movements against nuclear power, which were often transnational, the leading concerns were mostly local and regional in character. They had to do with toxic and chemical pollution, such as pesticide use, urban air pollution and waste dumping.¹⁰⁷ They were also for the most part considered

¹⁰⁶ Springer and Constantini 1974, in Benton 1994: 21.

¹⁰⁷ The publication in the US in 1963 of *Silent Spring*, by Rachel Carson, was a major event and is always cited as a wake up call and trigger.

in isolation and subject to technical fixes (as in the case of the “high chimney policy” to disperse stack emissions in the UK (see Thomas 1992)), with little attention to their secondary effects or interrelations. Likewise, international agreements addressed for the most part particular cases, such as migratory bird species and ocean pollution concerns (Grubb *et al.* 1993).

This all started to change in 1967 after the well-publicized spill of 100,000 tons of crude oil in the English Channel as a result of the Torrey Canyon tanker accident, which set the precedent for disaster-prompted environmental negotiations in the world of international relations. Affecting both England and France, the Torrey Canyon spill made clear the gaps in international law to deal with such calamities, and three treaties were negotiated in quick succession distributing responsibility and establishing a compensation fund. Several states also introduced national regulations on dumping wastes in the sea, and the North Sea and northeast Atlantic and Scandinavian states set up regional cooperation agreements in cases of oil spill emergencies. All this activity culminated in the Oslo Convention of 1972 limiting and regulating ocean dumping, which includes regular meetings of the parties to update on information and tasks.¹⁰⁸

As regulating domestic policies became law in one country, attempts were made to extend the regulations to other countries to stave off competition from unregulated contenders -a clear indication that environmental concerns are economic concerns. This is an important reason why international treaties come into being. International conferences are also a cheap but highly visible way to deal with complicated environmental matters in the face of intense public concern (Brenton

¹⁰⁸ This pattern of action is now common to most international environmental negotiations.

1994). Thus, increasingly, the need for an overarching and inclusive international meeting on the environment became clearer.

The first concrete proposal was formally placed before the UN General Assembly in 1968 by Sweden, which attempted to bring attention to its problem of acid rain caused by industries elsewhere in Europe. After two years of preparations and 100,000 pages of preparatory documents, with attendance by all member countries and all UN agencies, the UN Conference on the Human Environment was held in Stockholm in 1972. Although it is still debated whether its effects have been more symbolic than substantial -with the notable exception of the creation of the UN Environmental Programme (UNEP), based in Nairobi, Kenya- the Stockholm conference did much to establish the regime of international environment negotiations. Most importantly, as a conference on the whole “human environment,” which included the participation of representatives from 113 countries and 400 NGOs and IGOs, it exposed clearly the gulf between rich and poor countries on questions of environment and the impossibility of discussing environment without reference to development (see Grubb et al. 1993: 4-5).

Towards a climate change convention: from a scientific question to a political issue

The climate change issue has also developed rapidly in the course of the past two decades.¹⁰⁹ As recently as 1985, when a major international scientific workshop

¹⁰⁹ The best account of this process and of the making of the UNFCCC is given by Bodansky 1993.

was convened in Villach, Austria, the US participants went without specific instructions. Three years later the IPCC was established, largely at the insistence of the United States, which chaired a major working group within it. And four years after that, in 1992, the UN Framework Convention on Climate Change (UNFCCC) was adopted and signed (Bodansky 1993: 458).

Although at the time many people expressed disappointment in the lack of targets and timetables for reducing emissions, the adoption of the UNFCCC can only be seen as a remarkable achievement given the stakes and complexity of the issue. First, the emissions that lead to climate change touch on every aspect of the world's economy and pretty much every aspect of human activity. They involve every sector, including energy, industry, agriculture, transport, construction and forestry, in both developed and developing countries. Second, although now we know much more about what to expect, the effect of an increase in concentrations of greenhouse gases was not very clear then, either in terms of magnitude or local effects. Moreover, the projections are made for the next fifty and one hundred or more years, which easily disguises the urgency of the problem. Third, negotiations involved 151 states -that is virtually every nation in the world, with their extremely divergent positions and circumstances. This includes large, rich countries that depend solely on the production of fossil fuels, as well as small islands states at risk of disappearing. And although it is often repeated that everybody loses in the end, for some countries the doubt remained that the cure would be worse than the disease as winters become more mild and more land for agriculture becomes available in Northern latitudes. Lastly, the world-wide reach of the negotiations meant that it was not just about seeking agreement between countries in the industrialized North, or between those and the

developing South, or just within the South, but amongst all. In other international negotiations, such as the Vienna Ozone Convention, the involvement of developing countries had taken place in a second step, once the initial agreements had been accepted. But in the case of climate change, important developing countries such as Brazil, India, China and Saudi Arabia were heavily involved almost from the beginning alongside the small island states and the least developed countries, not just disagreeing generally with the North but also, unsurprisingly, among themselves (Bodansky 1993: 478).

The negotiation process

In 1979 the first World Climate Conference, held in Geneva, Switzerland, had concluded that climate change was a real threat to humankind, and set up the World Climate Research Program with the purpose of stimulating and focusing further research. Almost ten years after that, at the end of 1988, the process to negotiate an international climate change treaty was officially started when the United Nations General Assembly, at the request of the government of Malta, with the support of many other countries, adopted resolution 43/53, “Protection of the global climate for present and future generations of mankind.”¹¹⁰

By then there was already an active international scientific community dedicated to the study of the biosphere and human influences upon it, making use of the

¹¹⁰ The original Maltese request referred to climate as “the common *heritage* of mankind” –a concept that had been previously applied to mineral resources in the seabed and to the moon (in “Agreement Governing the Activities of States on the Moon and Other Celestial Bodies,” December 5, 1979. UN G.A. Res. 34/68. UN Doc. A/34/664.) But many countries opposed the reference in the context of climate and the final resolution refers instead to “common *concern* of mankind” (G.A. Res. 43/53) (italics mine).

network of monitoring stations established as part of the 1957 International Geophysical Year (see Chapter 1), and collaborating under the World Meteorological Organization (WMO).

Throughout the 1960s and 1970s the monitoring stations had conclusively proven that concentrations of CO₂ had been steadily increasing. Then, in the 1980s, atmospheric chemists started measuring as well the heat-trapping capacities of other trace gases -such as methane, nitrous oxide, and CFCs- and discovering that their warming effect was roughly equal to the effect of CO₂, thus magnifying the problem. With the advent of super computers capable of complex and more realistic general circulation models, the credibility of climate change predictions further increased. Despite the limitations and uncertainties in the models, consensus emerged among scientists that the predictions justified precautionary action by governments.

The emerging consensus coincided with the period, starting in 1975, when global average temperatures started to steadily increase, after they had settled and even dropped slightly following a steep and steady rise in the first four decades of the century. In the 1980s every year seemed to be breaking the record. The scientific understanding that had started to coalesce around the idea of global climate change as a result of greenhouse gas emissions in the mid `70s was thus well-established by the late 1980s.

This was reflected in a number of meetings and workshops that marked the end to the first, purely scientific phase on climate change. They were the so-called “Villach-Bellagio” workshops, held under WMO and UNEP auspices in Villach (Austria) and Bellagio (Italy) between 1985 and 1987. In what the Wall Street Journal

described as “an audacious piece of international policy entrepreneurship” (see Benton 1994: 165), the Villach conference statement recommended that since “the understanding of the greenhouse question is sufficiently developed, scientists and policy makers should begin an active collaboration to explore the effectiveness of alternative policies and adjustments” (see Bodansky 1993: 460).

And yet, besides the part played by scientists in actively raising public awareness of the issue and engaging policy makers,¹¹¹ other factors were needed for climate change to gain the momentum it did. These were, first, the discovery of the ozone hole and the subsequent approval of the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. Signed initially by 24 countries which committed themselves to an eventual phase-out of chlorofluorocarbons (CFCs), the Montreal Protocol was a remarkable achievement and became a most important influence for all atmospheric pollution negotiations, including climate change. At the time of its signing, it still was not clear what the causes and effects of ozone depletion were. Scientific confirmation that industrial CFCs were responsible came only in early 1988. As a consequence, the ‘precautionary principle’ employed to make a case for the Montreal Protocol emerged as a solid and compelling rationale that was hard to refute when negotiators turned to climate change (Benton 1994: 165).¹¹² Also in 1987, the World Commission on Environment and Development published “Our common

¹¹¹ See Haas 1992 on the role of epistemic communities.

¹¹² The definition of the problem as a North/South issue was also evident in the ozone treaty negotiations. In that case, the developing countries resisted the US proposals and were slow to take a position. As with climate change negotiations, they objected to retarding economic growth as they industrialized by, for example, restricting their access to air conditioning and refrigeration (Haas 1992: 207). Still, cooperation in relation to climate change will be much harder to achieve than in the case leading to the Montreal Protocol on ozone depletion because the total economic costs of abatement are much higher.

future,” also known as the Brundtland Report, which advanced the concept of sustainable development and received wide exposure.

A second factor boosting popular support for addressing climate change was the 1988 summer heat wave and the severe drought in the South and Midwest of the United States, which prompted Senator Tim Wirth, Democrat from Colorado, to call a hearing on global warming on June 23. Wirth had previously called the National Weather Service to make sure the date of the hearing would be a hot one, and it was 101° F.¹¹³ James E. Hansen, the director of NASA’s Goddard Institute of Space Studies, told the committee that it was 99 percent certain that the warming trend was not a result of natural variation but of the increase in human-made gases. *The New York Times* put the story on its front page, and quoted Hansen saying: “It is time to stop waffling so much and say that the evidence is pretty strong that the greenhouse effect is here.” A sign that climate change had emerged as a political issue is that even the first President Bush had to address it in his election campaign.¹¹⁴

Most importantly, all of this coincided with a period of economic prosperity in the majority of industrialized countries and widespread support for environmental protection. The incorporation of the former Eastern Bloc in Europe and of many developing countries into the global economy seemed to presage increased international co-operation and regional integration. This was also seen as necessary to

¹¹³ See “Struggling to Scare a Contented World,” Andrew C. Revkin, September 28, 1997. *New York Times*, Pg. 5.

¹¹⁴ Bush’s words were “Those who think we’re powerless to do anything about the ‘greenhouse effect’ are forgetting about the ‘White House effect’. As President, I intend to do something about it” (see Weiner 1990).

compensate for the perceived loss of sovereign state control as economies opened up to the “free” global market (Yamin and Depledge 2004: 6).

Accordingly, in 1988, at the request of governments, UNEP and WMO established the Intergovernmental Panel on Climate Change (IPCC) with the mandate to “provide internationally coordinated assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies.” A governmental initiative (mainly of the United States), the IPCC was meant to reassert control on an increasingly political issue at a time of proliferating reports and environmental activism through the creation of an international government-sanctioned authoritative and balanced source of information of the state of knowledge. Although dominated by developed countries who occupied most of the leadership positions, some scientists and policy-makers also recognized the importance of creating a scientific body that incorporated to the extent possible the views of scientists from the South if these countries were going to get involved in good faith.¹¹⁵ Eventually, pressure from developing countries resulted in a somewhat more balanced representation (see Chapter 1).

That same year, upon invitation by Canada, more than 340 scientists, government officials, industry representatives and environmentalists from 46 countries met in Toronto at the “World Conference on the Changing Atmosphere: Implications for Global Security” to discuss the possibilities of a reduction in carbon dioxide emissions. This was the first time that talk turned to preventive action, and the

¹¹⁵ See Professor Bert Bolin’s (first chairman of the IPCC) comment in this regard (in Bodansky 1993: 464, footnote 82).

conference ended with a final statement calling for a 20 percent reduction in global CO₂ emissions in relation to 1988 by 2005 (a global goal which included a rise in emissions in developing countries; see Bodansky 1993: 462). The 20 percent target (known as the “Toronto target”) was based not on economic calculations of any sort, but was taken from the Montreal Protocol on a political calculation of what would seem doable and not dismissable as impossible by governments –even though it was already clear that that would not be enough to stabilize the concentration of CO₂ in the atmosphere.

In setting the objective as a near-future reduction in the volume of emissions, the Toronto conference was to have a lasting effect on subsequent negotiations. This approach was used a decade later to oppose the Kyoto Protocol on the basis that it did not include a long-term strategy or consider mitigation costs (Anderson 2000: 6). But its legacy includes also the recognition that the “main responsibility” to take abatement measures lies with industrialized countries, and that these measures include transfers of financial resources and technology to developing countries.

For these reasons, the Toronto conference is regarded “as the high water mark of policy declarations on global warming” (Bodansky 1993: 462). Because it was not officially governmental in nature, the conference statement was not a negotiated document. More significantly, it was also perhaps the last instance (together with the Noordwijk conference a year later) when the discussion was dominated by environmental agencies and ministries, before other ministries –particularly the

economic, finance and energy agencies- took their place.¹¹⁶ Only the United States, at odds with the rest of the Western countries, approached the issue from a domestic policy perspective from the beginning –something particularly evident in its emphasis on the costs of response measures and its aversion to reduction targets and timetables. This had to do with the fact that the coordination of all international environmental issues after 1987 in the United States was undertaken by a working group of the White House Domestic Policy Council, where the EPA had to share the work with the Departments of Energy, Interior, and Commerce, the Office of Management and Budget, and the Council of Economic Advisers (to the clear disadvantage of the environmental viewpoint) (Bodansky 1993: 464).¹¹⁷

Other international conferences followed in 1989, along with workshops and meetings by the IPCC working groups. Among these there was one held in New Delhi in early 1989 to address climate change, this time from the perspective of developing countries, emphasizing the North-South dimensions of the problem. There was also a summit in The Hague, attended by 17 heads of state (but not the United States nor the Soviet Union, which were not invited), jointly sponsored by the Netherlands, France and Norway, calling for “new institutional authority” to address climate change and

¹¹⁶ In step with the change of constituencies attending the meetings, the issue moved increasingly towards an intergovernmental arena where the statements and commitments were gradually more cautious.

¹¹⁷ The move was apparently the result of dissatisfaction at the EPA’s and State Department’s role in the Montreal Protocol negotiations, which the White House felt had been too aggressive and without consultation from other affected agencies. In late 1989, high-level interagency coordination was transferred to the Working Group on Climate Change of the Domestic Policy Council, chaired by the President’s Science Adviser.

for an ‘Atmospheric Fund’ to help developing countries.¹¹⁸ Climate change was also addressed that year at the G-7 Economic Summit in Paris, the US-Soviet summit in Malta, and the Non-Aligned Movement meeting in Belgrade, among others.

The issue reached the highest political agenda in November, when Netherlands Prime Minister Ruud Lubbers called heads of state to a Ministerial conference in Noordwijk. Although economic considerations were increasingly brought up, climate change was still predominantly an environmental concern, and those in attendance were mostly environmental ministers.¹¹⁹ The political declaration that resulted from Noordwijk, signed by environmental ministers from 67 countries (roughly divided between developed and developing), clearly stated that industrialized countries had the responsibility to lead action to reduce their level of emissions, and to assist countries ‘financially and otherwise’ to adopt policies and measures ‘with due regard to their development requirements and within the limits of their financial and technical capabilities,’ ‘taking into account the need of developing countries to have sustainable development’ (Article 7, Noordwijk Declaration on Climate Change 1989). The declaration even set a forest growth target of 12 million hectares per year by 2000. This target was meant mainly for developing countries,

¹¹⁸ The call for “new institutional authority” involving non-unanimous decision making was in effect a partial renunciation of sovereignty –a radical proposition that suggested the seriousness with which the issue was taken by some heads of state (Bodansky 1993: 466).

¹¹⁹ A most revealing sign of this change is Saudi Arabia’s statement at the Noordwijk conference, characterizing global warming “as a life or death issue for considerable areas of the earth,” and recognizing that there is “no argument” that the “main culprit” is carbon dioxide, because of which the need to move to non-greenhouse gas emission energy production and consumption systems and to stabilize and reduce emissions of greenhouse gases. (Bodansky 1993: 467). This is perfectly at odds with Saudi Arabia’s position since 1990, which has been consistent in stressing the uncertainties in science and persistently opposing any move forward on targets and timetables (and accused every time of doing everything possible to block the negotiations).

whose resistance to adopting emission reduction commitments was still not so strong, possibly for the same reason that others were more radical in their pronouncements –that is, that the delegates negotiating came mostly from environmental ministries and not from development or foreign affairs departments (Bodansky 1993: 468).

But in spite of the forceful statements, differences among developed countries became apparent in Noordwijk, with the United States, Japan and the Soviet Union opposing the adoption of quantitative targets or timetables to stabilize emissions. This opposition would not be overcome until the adoption of the Kyoto Protocol eight years later (at this moment only the United States continues to reject them, even though the Clinton administration supported them). Positions were actually hardened in the following meetings. In particular, while the United States insisted on “national programs and strategies,” many countries adopted national targets and timetables unilaterally. By the time of the Second World Climate Conference in 1990, the European Community (EC) had agreed on an EC-wide goal of stabilizing emissions at 1990 by 2000.

The Second World Climate Conference called, in a Ministerial Declaration, for “negotiations on a framework convention on climate change to begin without delay.” This call was an endorsement of the IPCC First Assessment Report (FAR), issued a few months earlier. The work of more than 400 scientists, the IPCC FAR was a clear and authoritative statement intended for policy makers, warning that although there were uncertainties, human activities were leading to increased concentrations of CO₂ in the atmosphere and, unless emissions were substantially cut back, the climate could be subject to warming unprecedented in human history. The IPCC FAR

mentioned as well that given the complexity of the climate system, surprises could not be ruled out, and that much more rapid warming was a possibility.

The Second World Climate Conference is also noteworthy because it was the first time that the developing countries participated fully as equal partners in the discussions, making it clear that climate change could not be discussed as an environmental question alone, but that it was also a development issue. This greater involvement also brought up differences among developing countries, particularly between oil producing countries (which increasingly questioned the science and the need for response measures), and small island states. As a result, the latter organized themselves at the conference into the Association for Small Island States (AOSIS). Despite their lack of power in the world's economy, this association would play an important role in the negotiations to come (see Chapter 3).

On December 21 1990, the UN General Assembly adopted resolution 45/212, launching negotiations on a climate change convention led by an Intergovernmental Negotiating Committee (INC), to be completed in time for the UN Conference on Environment and Development (UNCED) in Rio de Janeiro (also known as the Earth Summit) in early June 1992.

Between 1990 and 1992 most developed countries and the EC as a collective announced domestic targets to reduce emissions of greenhouse gases, often based on the "Toronto target" or the Noordwijk Declaration on stabilization of CO₂ emissions at 1990 levels by 2000. Many of these targets were quite ambitious.¹²⁰ By mid 1992, twenty-four of the twenty-six members of the OECD had adopted national targets. Only the United States and Turkey had not.

¹²⁰ See Yamin and Depledge 2004, Appendix 3, on specific commitments.

Although deadlock appeared at the fifth session of the INC in February 1992, the domestic national targets adopted by the majority of OECD countries, a supplementary report by the IPCC, and the political momentum of the 1992 Earth Summit in Rio de Janeiro carried the deal forward to a resumed INC fifth session in May. With Rio a few weeks ahead, the INC Chairman pieced together a number of mismatched positions and texts spelling out the key objectives and principles, procedures, and initial commitments of a climate change agreement. Thus, in fifteen months, the final text to the Convention was completed.

The UN Framework Convention on Climate Change (UNFCCC)

The text of the treaty was opened for signature on June 4 1992 during the Earth Summit in Rio de Janeiro (officially the UN Conference on Environment and Development (UNCED)), together with four other major international instruments for environmental protection.¹²¹ It was signed there and then by 154 states and the European Community, including the United States. To date, 189 countries have ratified the Convention. This means all the countries in the world except for six (the exceptions are Andorra, Brunei Darussalam, the Holy See, Iraq, Somalia and East Timor). As such it has one of the highest participation rates of any multilateral environmental agreement.

¹²¹ These were: the Convention on Biological Diversity (CBD); The Rio Declarations on Environment and Development; The Non-Legally Binding Statement of Principles on Forests; and Agenda 21 –which gave rise to the Convention to Combat Desertification (CCD) in 1994 and to the Agreement on Straddling and Highly Migratory Fish Stocks in 1995.

The text defines the overall objective of the regime, and establishes principles, general rules of procedure and the institutional machinery of the Convention. It is the basis on which the Kyoto Protocol rests.

As its ultimate objective, which also applies to the Protocol, the Convention identifies:

“to achieve [...] stabilization of greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”

What “dangerous anthropogenic interference,” the “time frame to allow ecosystems to adapt naturally” and the rest actually mean remains predictably and pragmatically undefined.

Several articles specify the essential institutions governing the Convention. The Conference of the Parties (COP) is the “supreme body” of the regime, charged with sorting all issues not resolved in the interim of meetings and the only body that can adopt decisions as to what, when and how things happen. The first meeting of the COP was set to take place within a year of entry into force of the Convention and every year thereafter unless decided by the COP itself. Two parallel subsidiary bodies -both composed of government representatives- were also set up to assist the COP: The Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI). SBSTA was to “provide the Conference of the Parties and, as appropriate, its other subsidiary bodies, with timely information

and advice on scientific and technological matters.” SBI would “assist the Conference of the Parties in the assessment and review” of actions being taken to implement the Convention. A permanent Secretariat, based in Bonn, was charged with the daily running of the Convention, including preparation and transmission of reports and organization of the meetings. SBI subsequently assumed the responsibility to oversee the Secretariat’s role in reviewing Parties’ National Communications, which includes making country visits.

The text also specifies commitments for all Parties, dividing them into those included in Annex I and Annex II of the Convention, and those non-Annex I Parties. Annex I Parties, which are OECD countries and those with “economies in transition” (EITs), have the specific “aim” to return emissions to 1990 levels by 2000. Annex II, which lists OECD countries only, must provide financial assistance to developing countries and promote technology transfer to both developing countries and EITs. Non-Annex I Parties are all the rest, mostly developing countries, which assume general commitments -most significantly reporting obligations.

But in terms of the issue at stake -reducing greenhouse gas emissions and increasing the sinks that store carbon dioxide- the UNFCCC was to many people a grand disappointment. From the beginning, the United States firmly opposed any fixed targets even though the Europeans, backed by most developing countries, the scientific community and NGOs, pressed for early action and strong cuts.¹²² The United Kingdom offered to write a compromise text in a language that would express

¹²² See quote by Admiral James D. Watkins, Secretary of Energy, from a speech in Washington in 1990 defending the Bush’s National Energy Strategy as a policy reflecting the wishes of Americans: “They really do believe the Bill of Rights gave them unleaded regular for \$1.06 a gallon, and they better get it or, by God, they’ll get the bums out of office” (in Revkin 1992: 120).

commitments but no quantifiable targets. The final wording is so ambiguous that it is hard to know what it actually says (see UNFCCC Articles 4.2a and b). The result is a toothless treaty that calls for voluntary action but which in fact led to no reductions at all (emissions increased, as they have continuously until now), although it did set a precedent for future negotiations.¹²³

Principles

Precisely as a problem of precedents, a serious matter of contention was the inclusion of principles -a term that in the language of law has the very precise and legally-binding meaning of values that guide future decisions. Developing countries, which are typically at a disadvantage in the negotiations and distrust the more powerful countries based on shared experience, wanted to see principles declared that would establish the rules of the game in advance. The developed countries, preferring a case-by-case approach without constraints of precedent, resisted for the most part their inclusion. Principles such as the “polluter pays” principle, or the “common but differentiated responsibilities,” were hotly debated. In the end, in a manner that is characteristic of how the final documents of such nature are shaped, the word ‘principles’ was removed from each of the principles in Article 3 of the Convention and put in the title. In a subsequent meeting, at the request of the US delegation, a footnote was added that stated that titles were merely there to assist the reader. This was meant to preclude any notion of abiding standards. The avoidance of the word principles was later carried over into the Kyoto Protocol (Gupta 2001: 59).

¹²³ See Mintzer and Leonard 1994.

Still, five sets of principles were adopted, which ‘shall’ guide countries’

actions. These are:

- (a) that parties be guided by ‘equity and in accordance with [States’] common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead’;
- (b) that the specific needs and special circumstances of developing country Parties –especially those that are particularly vulnerable to climate change (this includes both low-lying island states and the primary fossil fuel exporters)- be taken into account;
- (c) that the need for ‘precautionary measures in the absence of full scientific certainty’ (also known as the “precautionary principle”) be recognized, but that the policies and measures ‘should be cost-effective so as to ensure global benefits at the lowest possible cost’; they should be ‘comprehensive,’ and ‘cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors’; these efforts may be collectively carried out
- (d) that countries have a right to sustainable development and that ‘economic development is essential for adopting measures to address climate change’; and
- (e) that parties ‘should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth (...) particularly developing country parties’, and that measures not be used as ‘a disguised restriction on international trade’ (Article 3. 1-5, UNFCCC).

Two of these principles would prove to be particularly problematic in the years to come. The first one is regarding the need for developed countries to take the lead. As Grubb notes, although there was wide agreement on this principle at the time, the reason why this should be so was less widely shared. Developing countries and many others maintained that the main problem stemmed from accumulating greenhouse gases in the atmosphere, for which industrialized countries were responsible. This amounted to a “historical debt” by these countries, and the idea that they had ‘monopolized the available environmental space of the planet’ (Grubb 1999: 38). In contrast, the United States argued that current generations should not be held accountable for past emissions, and that the need for developed countries to take the lead is only due to their greater capacity to do so. This is still the argument made by the United States when insisting that developing countries should take up commitments to reduce emissions. It is a question that will come up whenever protecting the climate system ‘on the basis of equity’ is discussed.

The second one was the requirement to help meet the ‘specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the implementation of response measures.’ In the text, this included countries that are particularly vulnerable to climate change, as well as ‘countries whose economies are highly dependent on income generated from the production, processing and export and/or consumption of fossil fuels and associated energy-intensive products.’ Although what follows says that the COP ‘may take actions, as appropriate, with respect to this paragraph,’ this agenda item on ‘response measures’ was carried over into the Protocol, and has proven surprisingly pervasive in the

negotiations. It has continually divided developing countries, whose strength derives mainly from their unity under the G-77 group. It surfaced clearly already at COP-1 in Berlin, where, according to Grubb, “the resulting politics in the G-77 were not pretty; one can imagine the kind of response that Bangladesh or the East African states were inclined to give to OPEC pleas of impending poverty” (Grubb 1999: 49). And it has resurfaced again and again.¹²⁴

The Convention text also includes, in five sentences, a reference to Protocols that may be adopted by the Conference of the Parties. It states these should be self-contained instruments that bear only on those Parties committing to them. As Grubb notes, this is an acknowledgement that the decisive step was still to be taken, and the Parties could see it coming in the near future (Grubb 1999: 43).

Although, as noted earlier, the Convention was found at fault for its lack of binding commitments to reduce emissions, it did establish the basic international legal framework to address climate change as a serious issue. It established some basic principles agreeable to all countries, particularly the principle of common but differentiated responsibilities that implies that it is the responsibility of industrialized countries to lead in action. It also set in place a system for reporting and reviewing information on emissions, and mandated it be open to public scrutiny. Significantly, it

¹²⁴ It is striking to see how this has been carried on for such a long time. For example, in the twentieth session of the Subsidiary Bodies meeting in Bonn in June 2004, Saudi Arabia, which has been blocking advances on policies and measures (P&Ms) for years, spoke “on behalf of the G-77 and China.” Opposed by the EU, Japan, Australia, the US and most other Parties, the Saudi delegate insisted on making particular reference to the adverse impacts of response measures. When he asked for time for consultation, the other members of the G-77 and China with whom he consulted were Iran, Kuwait, and Nigeria. Although most developing countries would object to the reference –in particular AOSIS members, who are part of the G-77- no other developing country was there to dissent (personal observation).

did all this always qualified by the stated precedence of economic growth, free trade, and development.¹²⁵ How this was carried over and took life in the Kyoto Protocol is the subject of the next chapter.

The main groups and players

The most basic opposition occurs between developed and developing countries. In 1990, when negotiations first started, OECD countries were responsible for more than half of the total global CO₂ emissions from fossil fuels. This, together with the 20 percent coming from central and eastern European countries in the former USSR, meant that a quarter of the world's population accounted for more than three-quarters of fossil fuel emissions and more than half the total of global greenhouse gas emissions. As noted in Chapter 1, per capita emissions are on average over ten times greater in developed countries than in developing ones –and more so in Africa and the Indian subcontinent.

This difference is also reflected as a clear difference of perspective. As Gupta (1997) notes, developed countries tend to view climate change as a global, environmental problem per se, subject to technical solutions. In contrast, developing countries perceive it as part of a larger historical, systematic and ideological problem to do with distribution. As such, it is not global (there is no objective definition for this), but it is rather a problem largely of industrialized countries -caused by them and therefore for the most part their responsibility. So while developed countries focus on

¹²⁵ It all seemed in accordance to US President George Bush's infamous declaration upon arriving at Rio that "the American way of life will not be compromised."

cost-minimization, developing countries –which are more vulnerable- tend to focus on risk-minimization.

In fact, at the beginning of the negotiation process, climate change was seen by many developing countries as an issue whose primary significance derived from its conceivable potential to re-articulate the demands for a New International Economic Order and to press for the financial aid and technology transfer that had been denied to them in other fora (Gupta 1997). Almost all developing countries sent delegates to the first rounds of meetings, and eventually Kyoto broke records of attendance. But as soon as it became clear that very little additional money was going to be provided, and that participation in the new market under the Protocol was going to be limited by the stringent regulations affecting most projects, interest for the most part faded. Still today the argument is usually one between developing countries' prerogative of sustained economic growth and lack of resources and the insistence that industrialized countries must act first according to their historic responsibility on one hand, and the insistence of some developed countries, in particular the United States, that all countries should undertake commitments based on the expected increase in emissions given estimates of population growth.

Besides this broad categorization, under the UN countries unite in political negotiating coalitions according to common interests and geographic, economic and cultural similarities, and it is these groups that allow for a better understanding of the negotiation process. These coalitions are necessary for more than 180 Parties to negotiate the complex technical and political issues dealt with under the UNFCCC and the Protocol. They are specially important for small countries who have little power and resources to keep up with the negotiations on their own. But they do

become another arena in which to deal with power relations. And although political coalitions derive strength from their numbers, arriving at cohesive positions takes time and energy which in a way reduces their ability to influence the negotiations.¹²⁶

Although countries have sometimes switched positions and groups on specific issues, since the negotiations started in 1990 the key groups and players have been:

- The European Union.

As a political grouping, the EU is the most cohesive coalition in the negotiations. It is comprised of 15 member states and the European Community (represented by the European Commission) and since April 2003, the accession states from central and eastern Europe. They all speak with one voice, which is that of the rotating EU Presidency (except when someone has particular expertise on a given issue) and seldom make statements individually.¹²⁷ With a political culture more attuned than the United States to international and environmental responsibility (in particular in the North) and accustomed to government regulation, the EU has played a leading role launching and pushing forward the climate change negotiations. Because they are also net energy importers, the Union has assumed a leadership role in climate change

¹²⁶ Besides the negotiating blocs, there are within standard practice under the UN system, five recognized “regional groups”: Africa, Asia (including the Pacific), Central and Eastern Europe, Latin America and the Caribbean (known as GRULAC: Group of Latin American and the Caribbean), and Western Europe and others (which include Australia, Canada, New Zealand and the US). In the case of the climate change negotiations, these divisions serve mostly as the basis for electing members of the Bureau and other specialized bodies, such as the CDM Executive Board.

¹²⁷ The EU Presidency rotates every six-months, and receives support from the European Commission and the forthcoming presidency –a trio known as the “Troika.” For a more detailed explanation on the EU’s institutions and policy-making process, see Yamin and Depledge 2004: 16-18. See also *Climate Policy*, 2003. Special Issue: EU –Implementation challenges. Volume 3(1). Several observers have noted the problems associated with this quick succession of Presidencies, one of them commenting sardonically on the need for capacity building among the European delegations (from personal observation and informal interviews).

moved by the perceived benefits of improved energy efficiency and technological leadership (Grubb 1999: 30; see also the 1993 European Commission White Paper on Competitiveness and Employment, Luxembourg: EC). At Kyoto the EU originally proposed a 15 percent cut in emissions and opposed the unrestricted use of the flexible mechanisms and of credits from LULUCF activities. In particular, it represented the main opposition to the United States before it withdrew, in terms of the latter's insistence on no limits on emission trading, arguing instead that a major percentage of the emission reduction must be accomplished by domestic sources.

The EU aims to make important emissions reductions through a set of common or coordinated measures, and has established an internal market for emission reductions known as the EU Emissions Trading System (ETS) (see Chapter 6). It shares its own target internally on the basis of the EU itself as a party.¹²⁸ But doing so is not easy, and negotiations inside the EU parallel those outside the group: there is even a North/South dimension to the problem, separating the more developed northern European States from their southern counterparts, whose emission commitments represent an increase relative to 1990 levels, and which is compensated by higher emission reduction commitments from other member States in order to achieve the EU target (see Chapter 3, on the EU bubble). Germany, the UK and France, responsible for the highest greenhouse gas emissions, dominate the internal politics of the group.

¹²⁸ An early attempt to impose a community wide carbon/energy tax failed, killed by European energy-intensive industries who made the tax conditional upon the adoption of similar measures by industrial competitors such as Japan and United States, in addition to "some of the fiercest lobbying ever seen against an EU proposal by the fossil fuel industries" (Newell 1997: 40; see also Newell and Paterson 1998).

- JUSSCANNZ and the “Umbrella group”.

The “Umbrella group” is a loose coalition of non-EU developed countries characterized by an interest in the broad use of flexibility mechanisms (that is, the three market mechanisms under the Protocol: emission trading, Joint Implementation, and the Clean Development Mechanism) and, for varying reasons, by greater difficulty in reducing emissions below 1990 compared to the EU. It evolved from the JUSSCANZ group, a long-standing coalition active throughout the UN (with certain variations in membership), which comprises Japan, the United States, Switzerland, Canada, Australia, Norway and New Zealand (JUSSCANNZ).¹²⁹ The current membership of the Umbrella group includes Australia, Canada, Iceland, New Zealand, Norway, the Russian Federation, Ukraine and the United States, and although they rarely make statements together, they share information and meet once or twice during negotiating sessions.

Some of these countries have played a key role in what Young (1997) calls “entrepreneurial leadership” in promoting emissions trading, particularly the United States. An important initiative was Japan’s investment in about twenty Russian power plants and factories, in what became the first greenhouse gas emissions swap.¹³⁰ This was the first instance of two countries reaching an agreement for Joint Implementation. Japan’s Trade Ministry was allocated nearly \$20 million in the budget to help Japanese firms carry out feasibility studies prior to implementation. As part of their interest in the flexible mechanisms and attention to cost-effectiveness, the

¹²⁹ Emissions in all of these countries had risen since 1990 for different reasons.

¹³⁰ “Japan and Russia Conclude Landmark Greenhouse Gas Swap” April 19, 1998. *Reuters News Service*.

members of the JUSSCANNZ group also hold a common position in support of a wide range of LULUCF activities under the Protocol.

There are, however, important differences between the members of the group based on their national circumstances, with Iceland, Japan, New Zealand and Norway characterized by low per capita emissions and high levels of energy efficiency.¹³¹ There are also important differences between the environmental culture and approach to international issues of Iceland, Norway and Canada, from that of the United States, Australia and Japan for example.¹³² As such, their solidarity has been seriously tried several times, and members have dissociated themselves from the group's statements on a couple of occasions.¹³³ With the United States' withdrawal from the Kyoto Protocol, several members of the Umbrella Group, particularly the Russian Federation, but also Canada and Japan, were able to secure an advantageous deal from the EU. These countries, together with Australia, made things very hard at COP 7 in Marrakech. Still, with large concessions won, they eventually agreed and the Protocol went ahead without the United States.

- Group of 77 and China (G-77/China)

¹³¹ Japan has one of the world's most energy efficient economies (especially in its industrial sector) and most developed technology sectors, and is wholly dependent on imported fossil fuels. New Zealand and Norway are low per capita emitters due to their hydro-dominated economies. This makes it harder for them to reduce emissions than it is for the historically coal-based EU economies (Grubb 1999: 33).

¹³² Although Canada and the United States share a highly energy-intensive economy and growing populations, Canada has a long tradition of involvement in international environmental issues.

¹³³ In particular at COP 7 on acceptance of the Marrakech Accords and on compliance.

Developing countries work mostly through the G-77 to develop common positions on emissions-reduction commitments and financial and technological transfers. However, they have widely differing interests: China and India for example have enormous coal resources on which they depend for economic development; the once-called Asian “tigers” (in particular South Korea) are concerned about being the next in line for setting emissions-reduction targets; and African countries are generally concerned about vulnerability and impacts. Other countries with large forestry sectors such as Brazil and Indonesia are concerned about the implications of treating forests as carbon sinks. And so on. These divisions, in addition to those outlined above (fossil fuel producing vs. small island states, etc.), weaken the G-77 plus China considerably as a group.

- “Countries with economies in transition” (EITs)

Included here are the industrialized countries of Central and Eastern Europe and the former Soviet Union. Sometimes referred to as the Central Group 11, it is composed of eleven central and eastern European countries with emissions reductions targets under the Protocol and common views on some issues. They are Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.¹³⁴ Thanks to economic restructuring after the fall of the USSR, these countries will probably manage to keep their emissions overall below 1990 levels through 2000, but afterwards their emissions are expected to rise. This poses the problem of “hot air”: reductions that were already made or would be made anyway as industries modernize, and therefore not the result of mitigation

¹³⁴ Some of these countries are now part of the EU.

commitments under the Protocol. For a long time the problem of “hot air” was a serious matter of debate resulting in several clauses being inserted into negotiations to avoid them. Now it is mostly a matter of will whether countries will face adverse publicity for selling these spurious credits or whether the credits sold will be treated as the result of real, additional emission reductions.

- The Alliance of Small Island States.

The AOSIS played a prominent role in securing support for the Convention, more dynamic and influential than is normally possible for such tiny countries. They are particularly vulnerable to sea level rising and therefore support rapid action to reduce emissions. Because of their lack of resources and capacity, they are often supported by environmental NGOs from industrialized countries in a strategic alliance to push for stronger action, both through capacity building and through direct representation in the negotiations. The UK Foundation for International Environmental Law and Development (FIELD) has been particularly active in this relation. As a result, AOSIS representatives are often better prepared and have better developed positions than other richer developing countries.

- The Organization of Petroleum Producing Countries (OPEC).

Concerned mostly about the impact on their economies if other countries reduce their use of oil, Saudi Arabia, Kuwait and others have been leading the argument about scientific uncertainty and urging –when not forcing- a slower pace for the negotiations. There is a good collection of anecdotes and jokes about the strategies they use to delay any possible agreements. They are so persistent that some Parties

even made a proposal to have countries be accountable for their own emissions for a specific period, say after 1990 or 1998 -during negotiations. Given the threat to their fossil fuel-dependent economies, their representatives are often highly qualified lawyers who are deft at using the rules of procedure to holdup the process or to insert references to their vulnerable economies. Like the alliance between environmental NGOs and AOSIS, the OPEC group has close ties to US oil companies, to the point where company representatives may sometimes write their interventions and assist them in preparing their position papers.

- ENGOS, BINGOs and RINGOs

Environmental NGOs (ENGOS) have been active from the beginning -though the story of their participation has to be reviewed with the one of business and industry (see Introduction). The majority of green groups and NGOs are from developed countries.¹³⁵ Business and Industry NGOs (BINGOs) have also played a critical role. The first business groups to attend the climate talks as observers represented energy-intensive firms concerned about the negative implications of limiting greenhouse gas emissions. More recently, other business sectors have become active in the process, including the insurance sector and clean energy firms, which see market opportunities. The role of the insurance sector is expected to be particularly important. From about 1993 on insurance companies have become involved in political debates on global warming, concerned about the effects of large-scale payouts caused by weather-related disasters, which could lead to serious risks of

¹³⁵ See Carpenter 2001; Gough and Shackley 2001; Newell 2000; Paterson 1996; and Rowlands 1995. See also Introduction.

collapse for the business.¹³⁶ So not all businesses are opposed to the Protocol.

Some of the most important industries and corporations (including B.P. Amoco, Shell and Mobil Oil) have come together to play a more active role and their influence has been clearly felt (see Chapter 6 on the “capture theory of regulation.”). But then there is also the question of image and the many accusations of “green washing.”¹³⁷

Business and industry deserve special mention because not only they have become an integral part of the process, but also since 1992 they have managed to shape the way the environment and development are looked at.¹³⁸ Led by the World Business Council for Sustainable Development (WBCSD), a coalition of more than 180 international companies with a stated “shared commitment to sustainable development through economic growth, ecological balance and social progress,”¹³⁹ they have presented themselves as the solution rather than the problem. The fact that the crisis was portrayed as a North-South issue also played right into the hands of business interests since it further questioned the delegitimated image of governmental actors. In the end, the only mention of corporations in the final Agenda 21 text is regarding their promotion of sustainable development; there is no mention of their role in the pollution of the planet. This earned the WBCSD the nickname of “Sustainable Council for Business Development” (ibid. 105).

¹³⁶ Insurance companies provide about 22 percent of investment in stock markets; they underwrite commercial development and are clearly an important factor in the global economy as a whole. See Newell and Paterson 1998.

¹³⁷ As noted in the Introduction, a number of organizations have been established solely to track greenwashing in regards to climate change and the Protocol. Examples include SinksWatch, CDMWatch and CarbonTradeWatch.

¹³⁸ For a sharp critique, see Chatterjee and Finger 1994.

¹³⁹ See <http://www.wbcSD.ch>

In spite of the crucial role they play, research NGOs (RINGOs) have been slower to organize and do not present a coherent front as ENGOs and BINGOs do. However, a number of them are very influential (see references in footnote 135).

- Local authorities

This group is primarily represented by the International Council for Local Environmental Initiatives (ICLEI). Many cities and states around the world have launched climate change plans that are more ambitious than those of national governments, in particular in the United States. Urban governments are clearly crucial given their role in energy utilities, road construction, public transport and other emissions-producing activities of the public sector. There are many examples of this and they are increasingly taking center stage.

Chapter 3

The Kyoto Protocol: how it works

The Kyoto Protocol has been widely hailed as the greatest achievement of modern environmental diplomacy. With a total of 156 Parties, the Protocol is said to represent “a pinnacle of trends towards globalization in economic and environmental policy” (Grubb 1999: xxxiii).¹⁴⁰ Others, however, have famously dismissed it as “fundamentally flawed,” as US President George W. Bush said when he announced his decision not to seek the Protocol’s ratification. Still, if there is one thing on which there is consensus, it is on its complexity. Stuart Eizenstat, chief US negotiator at Kyoto, referred to it as the most complex issue apart from disarmament (see Ott 2001: 258). Grubb noted that “Grappling with the more fundamental economic issues raised by climate change can feel like trying to understand modern cosmology with the tools of Newtonian mechanics” (Grubb 1999: 323). Every aspect of it was a challenge.

This chapter summarizes the basic elements of the Protocol and points to some of the contradictions it entails. After a brief introduction describing the road that led to its adoption, the chapter outlines the basic structure on which the Protocol rests, explaining how shares are allocated, the time frame of operation, and the main players in the negotiations. Because the aim of the section is to explain the creation of a market for emission reductions, special attention is paid to the introduction of flexibility in the system. This flexibility has two forms. One is explicit flexibility in the three institutionally established market mechanisms: Emissions Trading, Joint

¹⁴⁰ All the countries in the world except for six have ratified the UNFCCC (see Chapter 2); of these, 80 percent are also Parties to the Protocol.

Implementation, and the Clean Development Mechanism. The other is not explicit but is inherent in the rules of what counts as a reduction and how it is to be achieved. This more tacit flexibility includes the sharing of emission reduction commitments by the member countries of the European Union (known as “the EU bubble”), the inclusion of a “basket of gases” made equivalent as sources of emissions, and the accounting of removals from land use, land use change and forestry (LULUCF).¹⁴¹ Of these, LULUCF, which is in many ways the ultimate flexible mechanism, is the subject of a more detailed discussion in the following chapters.

Kyoto

The 1997 Kyoto meeting was a phenomenal event, attended by almost 10,000 people, including the Vice-President of the United States, Al Gore, the UK Deputy Prime Minister, and many heads of state. The US official delegation alone was almost one hundred people. It was the biggest and most high profile international event on the environment since the Rio Earth Summit in 1992.

But the mood had dramatically changed since Rio. As Yamin and Depledge (2004) note, instead of the optimism and anticipation of economic growth that prevailed in 1992, many developing and developed countries at the end of 1997 had already started to suffer the effects of the global free market. The financial crisis in Asia and in Argentina had hit hard. It was a time of economic recession in many OECD countries and depression in many of the rest, as globalization delivered few and skewed gains and international institutions seemed to be ineffective at best. In

¹⁴¹ The inclusion of “hot air” from central and eastern European countries with economies in transition (EITs) could also be said to be among the implicit flexible mechanisms.

this context of economic vulnerability, the idea of international solidarity and aid to developing countries was not popular.

In addition, as Grubb points out (1999: 61), the meeting at Kyoto was not about raising awareness or establishing principles but about undertaking binding commitments, in the recognition that previous voluntary measures and aims had not resulted in much. This involved defining, distributing and monitoring greenhouse gas emission reduction commitments in a manner that over one hundred eighty Parties with extremely divergent interests would agree to. The enormous complexity of this task is hard to grasp.¹⁴²

From Rio to Kyoto

Under international law, any international agreement needs to be ratified by a minimum number of countries' domestic legislatures in order to enter into force and have legal authority. Only by this mean can agreement acquire the status of a legal commitment by the ratifying countries.

With over 50 ratifications, the UNFCCC entered into force in March 1994. A year later, as mandated, the first COP met in Berlin, among other things, to "review the adequacy" of Annex I Parties' commitments. These were predictably found to be not adequate. A round of negotiations on "a protocol or other legal instrument" was consequently launched as part of the "Berlin Mandate," conducted by the *Ad Hoc* Group on the Berlin Mandate (AGBM). In 1996 COP-2 took place in Geneva at the time of the IPCC's Second Assessment Report. Given the IPCC's conclusions noting

¹⁴² And still, the inertia was set and, as a seasoned observer noted, once these processes are initiated, they are remarkably hard to kill (personal communication from CBD functionary).

“a discernible human influence on global climate” (see Chapter 1), this coincidence gave the process a renewed boost, even if the Geneva Ministerial Declaration endorsing the IPCC’s findings was not formally adopted. But then, the following year at COP-3, in Kyoto in December 1997, after 8 meetings of the AGBN, round-the-clock negotiating sessions, many “calls to capital” for further instructions, and a final marathon session that started on 11 December at 1 am and ended at 1 pm, 36 hours after the official deadline, the Kyoto Protocol was adopted.¹⁴³

How it Works

Only countries with emission reduction targets have “quantified emission limitation and reduction commitments,” known as QELRCs, calculated and quantified as “assigned amounts.”¹⁴⁴ The total amount of emissions that each country with QELRCs can release over 2008-2012 (the first commitment period) must not exceed its assigned amount.¹⁴⁵ The QELRCs cover emissions of six greenhouse gases listed in Annex A of the Protocol, measured according to their Global Warming Potential (GWP), expressed in terms of Carbon Dioxide Equivalent (CO₂e). Because Parties

¹⁴³ For a report of the meeting, see Earth Negotiations Bulletin. 1997. *Report of the Third Conference of the Parties to the UNFCCC: 1-11 December 1997*. Volume 12, no. 79. An excellent and highly enjoyable account of the Protocol, including the negotiation process, its background and implications is given by Grubb 1999. On the early politics of emissions and negotiations, see Agarwal and Narain 1990.

¹⁴⁴ The word “target” does not appear in the Protocol given sensitivities in the United States to anything that recalled binding commitments (Yamin and Depledge 2004: 120). Likewise, “budget” or “cap and trade” references used by the United States, with property rights connotations or which raised issues of equity to do with historic emission levels, were removed at the insistence of developing countries.

¹⁴⁵ That is, these are restrictions on their level of emissions, based on voluntarily adopted targets that collectively amount to a five percent reduction relative to emissions in 1990.

with QELRCs have to account for emissions and removals from the LULUCF sector, any removal by LULUCF activities can be subtracted from the Party's reduction target. These are known and inscribed as Removal Units (RMUs). A total of thirty-nine countries (mainly the advanced industrialized countries and members of the OECD) have QELRCs, and they are listed in Annex B of the Protocol with their respective targets. They are also referred to as Annex I countries because they are listed in Annex I of the Convention.¹⁴⁶ As explained in Protocol Article 3(1), Parties

shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts calculated pursuant to their quantified emission limitation and reduction commitment inscribed in Annex B with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008-2012.

Three kinds of mechanisms allow Parties with reduction commitments to achieve their targets by undertaking, financing, or purchasing emissions reductions generated elsewhere. The three mechanisms, known as the flexible mechanisms, are emissions trading, joint implementation, and the Clean Development Mechanism (CDM) (see below). An emission reduction under any of these mechanisms generates a specific kind of unit that may be added to or subtracted from a Party's assigned amount. The possibilities are: assigned amount units (AAUs), generated under emissions trading; emission reduction units (ERUs) under joint implementation; and

¹⁴⁶ All countries in Annex I of the Convention are listed with their reduction commitments in Annex B of the Protocol, except for Turkey and Belarus, who had not ratified the Convention in 1997, when the Kyoto Protocol was agreed. Still, when speaking of commitments under the Protocol, reference to Annex I is more common, as it is contrasted with the rest, non-Annex I Parties.

certified emission reductions (CERs), under the CDM. All of these units, together with RMUs, are fungible.¹⁴⁷ If a Party exceeds its reduction target by cutting back on its emissions more than the amount specified in its QELRCs, it may use its excess units as carry over to the next commitment period.¹⁴⁸

Allocating shares

*“Making the priceless valuable”*¹⁴⁹

One of the most interesting questions to be posed in any study about the creation of a market like carbon emission reductions is that of the allocation of rights and resources. How does one distribute the right to emit? Does each human being – wherever in the world they may be – have the same right to emit? This is attractive and reasonable as a philosophical principle. It is what some countries such as India and China and others in Africa and elsewhere proposed to have implemented. But, what happens to an independent island state with a small population, such as Micronesia? Accounting for rights to emit on a per capita basis might limit the ability of such a state to build roads and infrastructure. This was made clear in one of the side-events at COP 6 in The Hague in 2000, when the presentation by a well-known Indian NGO

¹⁴⁷ They have different names so they can be traced in the International Transaction Log, kept by the UNFCCC secretariat.

¹⁴⁸ This is known as “banking,” and not all units are bankable because developing countries argued at Marrakesh (COP 7) that it could provide a disincentive to reduce emissions at source and give Annex I Parties accumulated budgets for the future. RMUs for example are expressly not bankable, and CERs and ERUs can be carried-over only up to a limit of 2.5 percent of a Party’s assigned amount. The problem is that, since all credits are fungible, it is possible for a country to use the non-bankable credits for complying, and the rest as carry-over.

¹⁴⁹ Title of a conference organized by the Katoomba Group on jumpstarting environmental markets.

representative arguing for the equal rights emission approach was criticized by a delegate from a small island state. Strong opposition to this approach comes as well from countries such as Saudi Arabia and Kuwait, with high emigration rates and whose GNP depends almost exclusively on fossil fuels (Rahman and Roncerel 1994: 262).¹⁵⁰

Among the different viewpoints and rationales on what is a fair allocation and distribution of rights are:

- 1) the “polluter pays principle,” which can refer to either current or historically accumulated emissions -and even future ones, as in the US insistence on targets for developing countries with strong projections of growth;
- 2) the “equal entitlements approach,” based on the belief that all individuals have an equal right to “the atmospheric commons” and that therefore emission permits should be allocated on a per capita basis (as mentioned earlier, an idea supported by many developing countries and particularly promoted by some NGOs and objected to by some representatives of small island states and others);¹⁵¹

¹⁵⁰ Although there was for a while a lot of debate on the equal rights emission approach, this option was never seriously discussed in the negotiations -in part because it worked against the developed countries and in favor of some developing ones, and because it implied huge changes which, as Grubb says, were “far greater than countries were willing to contemplate” (Grubb 1999: 71).

¹⁵¹ Another interesting matter is that related to the population and limits to growth argument - the political nature of which was highlighted clearly in the climate change negotiations. During a meeting of NGOs at the time of the Third *Intergovernmental Negotiating Committee for a Framework Convention on Climate Change* (INC) in 1991 in Nairobi, southern NGOs responded to a concern voiced by a Northern NGO that the population problem was essentially in the North, because a single person born there consumes more on average than three or four in the poor countries of the South (Rahman and Roncerel 1994: 263). Even now, the United States has used the population growth claim as a basis to reject the Protocol, alleging that it is biased for expecting the industrialized countries to assume all the burden when countries such as Brazil, China and India do nothing (but forgetting to mention that what is now being ratified is only a first phase of commitments that correspond to historical responsibility for emissions).

3) the “willingness to pay” logic (derived from welfare economics), whereby based on their situation, each party is responsible for a “comparable” burden;

4) the position that the distributional implications of any agreement be taken into account (based on John Rawls, 1973, *A Theory of Justice*); and

5) the conservative argument that present emitters have established, by way of common law right, the right to continue to use the atmosphere as they do (see Paterson 1996: 3).

Overall, the Kyoto Protocol adopted the “polluter pays principle” on the basis of historically accumulated emissions (sometimes called the “grandfathering principle” –though the United States has consistently opposed this principle.) This means that for the first commitment period (2008-2012), only industrialized countries that figure in Annex I to the Convention have commitments to reduce their emissions. The commitments are however based on voluntary targets, averaging 5.2 percent in reductions from what was emitted in 1990. So a certain “willingness to pay” logic has also been incorporated.¹⁵²

But the specific country commitments were in the end mainly the result of heavy political wrangling and momentum. While the EU pushed for a flat reduction of minus 10 to 15 percent below 1990 levels, the United States and Japan proposed reductions of 0 to minus 5 percent, contingent on the level of flexibility allowed.¹⁵³ Some countries strategically pegged their numbers to those of others, as was the case

¹⁵² These principles and rules might change as we enter unto the second commitment period and, as is hoped, developing countries undertake voluntary commitments of some sort to reduce their emissions.

¹⁵³ As explained in Chapter 4, the United States calculated that the inclusion of sinks would enable it to add three percentage points, so while committing to a 5 percent reduction, they in fact only had to achieve a 2 percent reduction from 1990 levels to achieve the target.

with some EIT countries aspiring to EU or OECD membership. Canada had to remain aligned with the other G-7 countries and, like Japan, accepted higher commitments than it thought viable. Australia instead felt no such obligations and resisted everything but a large allowance. As Grubb (1999: 116) says:

The numbers can only be understood as the outcome of a highly political process arising from the clash between competing numerical aims, structural visions, and root conceptions of political imperative –all combined with the personal and political dynamics of the final days at Kyoto.

Determining the time frame

Once countries jointly agree in an international treaty to binding commitments to cut back greenhouse gas emissions by a certain date in the future, what should the timetable to do so be? Given countries' different contributions to the problem and different histories of energy use, what should be the reference from which to start counting? What would be a fair deadline for all to demonstrate progress and comply?

Already the idea of taking a specific year as a reference was a carry-over from the 1992 Framework Convention, inscribed in the “grandfathering principle,” whereby responsibility lay in historic contributions to the accumulation of greenhouse gases in the atmosphere. The reference year used in the Convention was 1990 because it was the year when, in endorsing the IPCC's First Assessment Report, the international community had formally recognized for the first time that climate change was a problem that had to be dealt with. The choice of 1990 as a baseline favored some countries and injured others: it didn't recognize Japan's and France's move towards reduced emissions before 1990, from more efficient energy

use and nuclear power substitution programs respectively. Conversely, the fall of the Soviet Union and the transition from centrally planned economies to a market economy left many countries in Eastern Europe already with a 20 to 35 percent lower level of emissions in 1995 than in 1990 –and up to 50 percent in the Baltics and Ukraine. Even in Russia, where restructuring was slow (partly because of continued subsidies and non-payment of domestic energy production; see Grubb 2001: 83), 1994 emission levels were 30 percent below those in 1990. This trend had more or less stabilized by 1995, and emissions in many states of eastern and central Europe had started to show an increase again in 1996. Still, with emissions trading in place, this meant there was a bundle of free credits that were not the result of deliberate cutbacks in emissions but a mere matter of economic restructuring. As noted above, this came to be known as the problem of “hot air,” and it has hardly been resolved.¹⁵⁴ But these were all part of the trade-backs in the negotiations, and in the end, the baseline year of 1990 was maintained to avoid rewarding countries who had done nothing to limit emissions since the Convention process was begun (Grubb 2001: 72).¹⁵⁵

As to by when, the 1992 Framework Convention centered on reductions by a specific target year. Yet emissions fluctuate from year to year, depending on the weather and economic cycles. An average over several years made more sense, but how many and when? Three years seemed too short to even out variations; four

¹⁵⁴ Fear of repercussions affecting the public image of buyers has tempered so far the sale of hot air: many countries are shying away from buying what are commonly perceived as fake credits. However, this might change as the commitment deadline nears in 2012.

¹⁵⁵ Still, some eastern European countries were allowed to declare a base year other than 1990 (Protocol article 3.5), and 1995 was established as the base year for the three “trace industrial gases”: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) (Protocol article 3.8).

years would coincide with the United States political cycle. Moreover, the deadline had to be far enough in time to allow countries to adopt the changes but not so far that it escaped electoral cycles and industry planning. The European Union, AOSIS and others pushed for early action, but the United States, with a recalcitrant Senate and heavy industry lobbying, knew it would be impossible to implement the necessary political and institutional adjustments any time soon. The United States therefore proposed a series of budget periods starting in 2010 and the possibility of “banking” and borrowing unused credits from future commitment periods. Although the idea of borrowing from the future was rejected, the proposal of several commitment periods and the possibility of banking were retained. The final compromise date was set for a first commitment period between 2008 and 2012, and a clause was inserted whereby “demonstrable progress” had to be made by 2005.¹⁵⁶

Introducing flexibility

The basket of gases

Although CO₂ is the main and most widespread greenhouse gas, methane (CH₄) and nitrous oxide (N₂O), as well as so-called trace industrial gases (Hydrofluorocarbons (HFCs), Perfluorocarbons (PCFs) and Sulphur hexafluoride (SF₆)) have important and pervasive impacts on climate change. The first three gases had in fact been considered together for a long time. The latter three received increased attention given their very long atmospheric lifetimes and rising emissions.

¹⁵⁶ A telling example of the difficulty of negotiations was the initial opposition by developing countries to this extended period partly because of a misunderstanding in the US’s use of the words “budget period,” with its monetary references. See Grubb 2001: 69.

During the negotiations, Parties generally agreed that all greenhouse gases not covered elsewhere should be included. A precedent already existed under the Montreal Protocol, which considers a “basket” of gases measured according to their “ozone depleting potential.” The United States argued, under its “comprehensive approach,” that including the aggregate level of the six greenhouse gases, measured according to their global warming potential (GWP), had both economic and environmental benefits.¹⁵⁷ Instead, concerned about the technical difficulties and any advantages this might give the United States, the EU favored a basket of only the first three greenhouse gases, with the three industrial trace gases regulated separately. Japan and AOSIS proposed regulating them all separately.¹⁵⁸

The problem is that calculation of the GWP for the six greenhouse gases is not precise. Besides, the industrial trace gases have extremely long atmospheric lifetimes, going from between 1.5 and 264 years for HFCs, to between 2,600 and 50,000 years in the case of PCFs, and 3,200 years for SF₆. But GWP is calculated on the basis of one hundred years. Another problem is that calculating emissions from the various gases varies considerably between countries and sources. In the

¹⁵⁷ Global warming potential is an index describing the radiative characteristics of different greenhouse gases based on the combined effect of the time that they remain in the atmosphere and their effectiveness in absorbing outgoing infrared radiation, relative to carbon dioxide (IPCC 2001, TAR Synthesis Report: 155).

¹⁵⁸ Amongst developed countries, only Japan initially opposed the inclusion of a basket of greenhouse gases, since carbon dioxide in Japan accounts for more than 94 percent of these. In comparison, in the US and most of Europe, non-fossil fuel CO₂ emissions account for 15-20 percent, and reach up to 50 percent in some developing countries. Besides, the growth in CFC replacements in Japan as a result of regulations under the Montreal Protocol also meant that the inclusion of the three industrial trace gases, HFC, PFC and SF₆, was to Japan’s disadvantage (Grubb 1999: 75).

case of methane and nitrous oxide from agriculture, the differences between their estimates can run as high as 50 percent (Grubb 1999: 74).

Still, the efficiency argument was hard to resist, in particular since the inclusion of different greenhouse gases together in a “basket” made it easier to adopt stronger emission targets than if only carbon dioxide were considered - especially so in the case of methane, a gas that is easier to control and the emissions of which were already declining in several industrialized countries.¹⁵⁹ The ethical problem of equating “survival emissions” from methane that result from subsistence agriculture for example, with all other non-vital ones, was only raised during the negotiations by some developing countries (Gupta 2001). But the apparently pragmatic allure of the approach meant that it was hardly discussed and was soon widely accepted as common sense.¹⁶⁰

The “EU bubble”

Another intrinsic element of flexibility was introduced with the sharing of reduction commitments by the countries under the European Union. As a collective, supranational institution, and party to the UNFCCC, the European Union had adopted a collective emission reduction target of 10 percent, which, given the European common market and common laws, was to be shared by the EU member

¹⁵⁹ They had grown in the United States, Canada, Norway, and Greece in 1995-96 relative to 1990.

¹⁶⁰ The problem with imprecision in calculating the GWP potential was resolved with the political decision to adopt 1995 GWP values provided by the IPCC in its Second Assessment Report, which are based on the greenhouse effect of the different gases over a 100-year time horizon. In addition to these, other time horizons may be used by Parties for information purposes only (Decision 2/CP.3)

countries. At the time of the negotiations, in 1996-1997, emissions had declined in Germany and in the UK relative to 1990 levels.¹⁶¹ But they had increased in most countries of the EU, other than in France, where they had remained stable. When the allocation of reduction targets for each member country was completed there was a huge variation in the distribution, with decreases of 25 percent for some countries such as Germany, Denmark and Austria, and an allowance on emission increases relative to 1990 for the poorer states, which went up to a 40 percent increase in emissions for Portugal. Strategically, although this presented complications for convincing some developing countries to engage in reduction commitments,¹⁶² the United States backed this as “zero-cost emission trade,” and in so doing, obliged the EU to accept emissions trading (Grubb 1999: 86). In other words, while the EU conceived of the bubble as a non-market allocation, the United States saw it as trade, and by reframing the language in this way, disarmed the EU of reasons to reject emissions trading.

The flexible mechanisms

As noted earlier, the Protocol created three linked flexible mechanisms to help Parties achieve their reduction commitments. These are:

¹⁶¹ These reductions were largely to do with factors other than climate change policy: in the case of Germany it was the integration of the former Democratic Republic of Germany, and in the UK the so-called “dash for gas” which went alongside electricity privatization (Grubb 1999: 81).

¹⁶² At that time, with a 40 percent increase allowance in emissions relative to 1990 for Portugal and allowances for Spain and others, the adoption of emission reduction targets for large developing countries needed more argument and convincing. Part of the problem was that the EU had been pushing for a flat emission reduction target for all countries, and was unable to secure it even for itself. In the end, countries adopted wide ranging reduction targets that responded less to any reality and more to political bargaining and will during the Protocol negotiations at Kyoto.

1) Emissions trading, which allows for trading of assigned amount units (AAUs) between Annex I countries (or more precisely, between Annex B countries with reduction commitments). Because trading in emissions may be highly profitable, and given that enforcement of compliance under an international environmental regime could be weak, countries agreed to maintain in their inventories a certain level of credits as a reserve (called the Commitment Period Reserve). To ensure that breaches are minimized, all trading is recorded in the International Transaction Log kept by the UNFCCC secretariat.

2) Joint Implementation allows for receiving credits from an emission reduction project in another Annex I country. It applies mainly to projects implemented in one of the countries with economies in transition (EITs) in Eastern Europe, and results in Emission Reduction Units (ERUs). Because both Parties involved –the host country and the buyer of credits- have reduction commitments, the rules applied are less complicated than for CDM projects, where the host country has no reduction commitments.

3) Clean Development Mechanism (CDM), also called “the Kyoto surprise,” allows for Annex I countries to invest in an emission reduction project in a non-Annex I country and use the resulting credits to meet their commitments.¹⁶³ The credits acquired under the CDM are called Certified Emissions Reductions (CERs). As stated in Protocol article 12,

¹⁶³ This actually refers either to the Annex I countries themselves, or to private or public entities within those countries.

The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their commitments under Article 3.

This is the only mechanism with a world reach and its stated primary purpose is that of contributing to sustainable development in developing countries. As such, the CDM is supposed to orient the future development of the less industrialized countries down a more sustainable path, and to prepare developing countries to contribute to mitigation without undertaking binding commitments. However, because the market offer is potentially unlimited and developing countries have no reduction commitments, both seller and buyer have an incentive to inflate the emission reductions achieved. It was the most innovative creation to come out of Kyoto and the most complex one.

The history of how the CDM came about is worth recounting. Shortly after the 1992 Earth Summit a number of countries had started to experiment with an early form of joint implementation, in particular after the Berlin Mandate established a pilot phase for these so-called Activities Implemented Jointly (AIJ). Most notable was the United States, which formed the US Initiative on Joint Implementation (USIJI), and financed twenty-five projects representing a total investment of \$450 million (Grubb 1999: 101). The majority of these projects were in Latin America and involved sinks (see Chapter 7). Other pilot projects were financed by the Netherlands, Norway, Germany, France, and Japan. This was also the time when the World Bank created the prototype Global Carbon Fund to

provide funding for initial project costs. AIJ projects were still pursued after Kyoto, and by 1998 there were more than one hundred approved. And although several developing countries were in favor of the idea, the G-77 and China as a bloc opposed it, mainly on the basis of principle. They suspected this would be a way for industrialized countries to buy their way into compliance, without taking action at home. Many also feared that the easiest emission reduction projects would be taken up by Annex I countries, so that when in the future they were faced with reduction commitments, only the more expensive options would be left. These fears were aggravated when contemplating sinks, which appeared as industrialized countries occupying land in developing countries and taking it away from agriculture or other productive activities while continuing their emissions of greenhouse gases, all of which prompted accusations from some quarters of “carbon colonialism.”

Meanwhile, in a totally different context, Brazil tabled a proposal for a Clean Development Fund whereby Annex I countries which were found in default of their reduction commitments would pay a penalty that would be used to support projects in developing countries. The idea of a financial penalty for non-compliance was unacceptable to Annex I countries, in particular to the United States, but the G-77, though still unsure about the details of the proposal, supported it. Then, as Grubb says, “a remarkable twist on the proposal had occurred to one or two key people” (Grubb 1999: 102).¹⁶⁴ It involved undertaking a project in a developing country for the equivalent amount of carbon in default. The United States delegation, seeing the similarities of this approach to joint implementation, which they had for years tried to have accepted, went quickly down to Brazil. They came

¹⁶⁴ Among these was clearly the head of the Brazilian delegation.

back, and the proposal that was once *a penalty for not complying* had become *investment contributing to compliance* and, as such, “the idea of a penalty on governments was transformed into a mechanism for investment by companies” (Grubb 1999: 103). A levy of 2 percent of the number of CERs issued for every project is to go to an adaptation fund for vulnerable countries. Projects undertaken in the Least Developed Countries (LDCs) as well as small-scale projects are exempt from this levy. To ensure transparency and accountability, the whole mechanism is subject to control by the CDM Executive Board, which in turn responds to the COP/MOP. And so the joint implementation that developing countries had fiercely resisted was suddenly, in the last hours of Kyoto, the one mechanism for their participation and what the US had always wanted to expand the range of opportunities for mitigation.¹⁶⁵

In sum

There is not one simple way to explain how the Kyoto Protocol with its flexible mechanisms came to be. Clearly, political and economic reasons go far in explaining how the final result resembles closely the US proposal. But it is also true that the more the United States pressured developing countries, the more resistance it generated, so that in the end there was no agreement at all on future reduction commitments on their part.¹⁶⁶ It is also true that the US industry, with all its might,

¹⁶⁵ Humphreys et al. (1998) call it “the original flexibility mechanism,” meaning the acceptable version of the original Joint Implementation not accepted by developing countries.

¹⁶⁶ The lack of an article addressing developing countries’ reduction commitments is probably the only significant issue where the United States did not achieve its purpose. Almost everything else in the Protocol was envisaged in the US negotiating position. The basic

opposed the process, and still the process went through.¹⁶⁷ In this respect, Grubb draws attention to the fact that, for all the talk of the state's dismissal, the Protocol was very much a creation of nation-states. In the face of opposition by industry on reduction commitments on the one hand, and by NGOs on market mechanisms on the other, governments struck a deal against all odds.

Still, from the reduction numbers agreed upon to the CDM, it was all very much a surprise, impossible to predict only weeks ahead. Besides the political and economic realities, and the hegemony of efficiency as a value in and of itself among the political class negotiating the Protocol, there was a lot of personal creativity, vision and strategic maneuvering. This was evident from the Brazilian proposal and twist, to the political savvy of Chairman Raúl Estrada, who more than once brought the gavel down on political heavyweights like India, China and the EU as they raised their flags to oppose the adoption of one or another paragraph, like when adopting the article on emissions trading (see Grubb 1999: 96). Reportedly, Estrada also ignored requests from the floor when the time to adopt the whole Protocol came, stating a rotund "it is so decided" and gaveling down before OPEC had the chance to object. Only this way could there have been an agreement.

structure of the Protocol is thus very much a creation of the United States, in particular of the Clinton administration. This is another great irony of the process: that the main proponent and architect of the Protocol became its strongest and most daunting opponent. Yet the turn around and dismissal of the process by this most powerful player enhanced cohesion and determination among the rest of the players to ratify the Protocol, almost as a matter of pride.

¹⁶⁷ Grubb (1999: 112) notes that they threw probably \$100 million into fighting it. Some people have pointed out that other industries, in particular the insurance industry, were in favor of a deal (see, for example, Newell and Paterson 1998). It is arguably a split among industry, and the allegiances of that faction with those in government, that allowed the Protocol to go through. One US administration later and different allegiances, the Protocol was rejected.

On a more theoretical note, it is possible to see that, given this approach to the problem of climate change, the seeds were sown for what I refer to as capital involution. A simple idea in principle, that of creating commodities out of nature and a market to trade them, became a pattern that at every repetition and turn would get more and more elaborate and more rigid and ensnared. The history of defining and accounting for sinks –the ultimate flexible mechanism- which followed from the package of decisions adopted at Kyoto, is a good example of this ensnarling. The next chapters are an attempt to trace this process of involution.

Chapter 4

Negotiating sinks

When Parties agreed at Kyoto to a Protocol committing industrialized countries to reduce their greenhouse gas emissions to a percentage of what they emitted in 1990 by the period 2008-2012, they decided to allow accounting for the sources and removals of carbon dioxide by trees and vegetation under a category known as Land Use, Land Use Change and Forestry (LULUCF). In counting towards their reduction targets, industrialized countries would have to add but could also subtract the tons of carbon removed from the atmosphere by these terrestrial ‘sinks’ from the tons of carbon emitted by all other sources. This was done in the spirit of pragmatism, as part of the “comprehensive approach” to climate change, justified by cost-effectiveness and efficiency. Yet it is clear now that the inclusion of sinks was everything but straightforward or practical. When the time came to define the modalities and rules for how this would be done, three years after Kyoto, the inability to agree on what exactly to count as a removal by a sink and how many of these could be used to cancel out emissions led to the total breakdown of the climate change negotiations.

To salvage the Protocol and allow countries to move forward, a “negotiating package” was put together six months later. For the purpose of meeting a country’s national reduction commitments, the so-called “Bonn Agreements for the Implementation of the Buenos Aires Plan of Action” included a decision to allow accounting for forest management, cropland management, grazing land management and revegetation. A cap for each country was established on forest management -

although, at the request of Russia, this cap may be reconsidered. A deal was also struck to exclude avoided deforestation from the CDM and allow only afforestation and reforestation project activities. A limit was placed on the amount of emission reductions an Annex I country could claim from these projects under the CDM, amounting to a maximum of 1 percent of the country's base year emissions for each of the five years of the commitment period (or roughly 20 percent of the country's target -see Aukland *et al.* 2002). Governing all these decisions, a number of principles were agreed upon, with the goal of deterring abuses from LULUCF accounting activities. These principles included, among others, the need to exclude the mere presence of carbon stocks from the accounting, and the need to contribute to the conservation of biodiversity and the sustainable use of natural resources. So even though in effect the decision brought down the reduction commitments agreed to at Kyoto from 5 percent to possibly 2.5 percent compared to 1990 levels if all provisions were used,¹⁶⁸ and even though the United States –the largest emitter and strongest supporter of sinks- had by then withdrawn from the Protocol, the matter of which sinks to include, and up to what limit, was settled in principle.

But the technical details and unresolved questions appeared more daunting the more negotiators got into it. Some of the basic questions that had to be resolved included: How does one define a forest in a way that applies to all countries and contexts? Even the common definition of forests has changed in the last few years, having evolved from notions that included the idea of climax, to references to ecosystem, and most recently images of an “erratic, shifting mosaic of trees.” But then what about savannas and woodlands? And short shrubs, mangroves, or

¹⁶⁸ See Gillon 2001; see also Ott 2001.

marshland? And forest transitions? And similarly, how does one define afforestation, reforestation and deforestation? Other equally tricky questions were: What makes the removal ‘human-induced’? How does one set apart natural regeneration or fertilization from other natural processes or past practices? What happens when the carbon reverts back to the atmosphere as a result of forest fires, pests and other natural disturbances? Will setting aside land as carbon stock result in other areas being affected from the displacement of previous activities? How does one interpret ‘since 1990’? Is it fair to use the same baselines for all countries? How does one verify and ensure accuracy? Clearly these questions were hardly just technical. In fact, any call to distinguish between political and technical issues on LULUCF matters was quickly considered politically motivated.¹⁶⁹

Many of these questions have now been resolved through a mix of legal and accounting niceties. Some of them have not been settled, and will still be discussed several years down the road. But there is one thing on which everybody agrees: that the matter of sinks under the Protocol and the final language on LULUCF is “complex, disjointed and inaccessible” (Yamin 1998: 119). The best way to understand it is to attend to the history of the negotiations in detail. This is what this chapter is about. After a brief summary of the carbon cycle and some notes on the negotiation process, the first section goes into the history of the negotiations, starting with the inclusion of sinks under the UN Framework Convention on Climate Change (UNFCCC) and their ensuing incorporation under the Protocol. There is then a section exploring some of the problems that had to be resolved in defining sinks before

¹⁶⁹ See ENB COP 5 at www.iisd.ca/climate/

negotiations could advance further, and the resolution of some of these problems in the negotiations. The chapter thus recounts the incorporation of sinks within the Protocol, a process that has been called by a seasoned observer and negotiator as “one of the less inspiring examples of the development of international environmental law” (Fry 2002: 159).

An explanatory note on sinks under the UNFCCC and the Protocol

Under the UNFCCC, all countries are expected to count their emissions and removals from land use change and forestry in their national inventories. Under the Kyoto Protocol, industrialized countries with binding commitments (known as Annex I countries) may count towards their reduction target the emissions and removals from certain land use, land use change and forestry (LULUCF) activities.¹⁷⁰ These provisions are covered in Protocol Article 3.3, 3.4, and 3.7.

Under Article 3.3, in meeting their reduction commitments in the first commitment period (2008-2012), Annex I countries shall take into account the removals from afforestation and reforestation, and the emissions from deforestation (ARD).¹⁷¹ Under Article 3.4 (referred to as “additional activities”) these countries may also count emissions and removals from “additional categories of human-induced activities in agricultural soils in the land-use change and forestry sector” in the first commitment period if such activities have taken place since 1990. Otherwise, they will apply only in future commitment periods. These additional activities are:

¹⁷⁰ The reduction target for most parties is a percentage of what their emissions were in 1990 - called the base year or baseline -except for Bulgaria (whose base year is 1998), Hungary (1985-87), Poland (1988), Romania (1989), and Slovenia (1986).

¹⁷¹ Article 3.3 is often short handed as “ARD” for afforestation, reforestation and deforestation.

forest management, cropland management, grazing land management, and re-vegetation. Article 3.7, which applies mainly to Australia, is a special provision that allows a country to deduct from its emissions in 1990 those that resulted from land use change and forestry.¹⁷²

Besides, removals from sinks that may count towards a Party's reductions commitments can also be the result of "project-based activities" under the two "flexible mechanisms" created by the Protocol: Joint Implementation, and the Clean Development Mechanism (CDM). Joint Implementation refers to projects undertaken jointly by two Annex I countries. These are usually projects financed by one of the richer industrialized countries in a central or eastern European one, where the cost of reducing emissions is considerably lower (see Chapter 3).

All other projects undertaken in developing countries fall under the CDM. These projects have special provisions because developing countries have no binding commitments to reduce their emissions under the Protocol, and as part of a market mechanism, a reduction in the host country allows for an emission in the buyer country. Moreover, the purpose of this mechanism is, besides mitigating climate change, to assist developing countries in achieving sustainable development. Given the complexities and particularities of including carbon stored in trees in an accounting system (such as non-permanence, the risk of leakage and others -explained below), in the land use change and forestry sector only afforestation and reforestation projects are allowed in the first commitment period. Moreover, to limit the credits

¹⁷² In all other cases, when they establish their base year emissions in 1990, countries count only emissions from sectors other than LULUCF –without removals. But to meet their targets at the end of the commitment period, they count emissions minus removals from LULUCF (the so-called "gross-net" approach).

from projects in developing countries and ensure that there are meaningful reductions of emissions at the source in industrialized countries, there is a ceiling determining the maximum number of credits that can be gained.¹⁷³

The Scientific Understanding Of Sinks¹⁷⁴

Carbon is present in the universe in more compounds than all other elements combined. From the most massive stars to the smallest creatures, it is the central element in most compounds of which organisms are composed. It alone accounts for 18 percent of a human's body weight. And it is this same carbon that is used in archaeology and geology, as radioactive element Carbon 14, to determine the age of objects and natural remains. Combined with silicon in the 1940s, it produced the computer semiconductors that revolutionized global communications (Christianson 1999: 30).

Of the approximately 400 Gigatonnes¹⁷⁵ of carbon (Gt C) that have been released into the atmosphere in the past 200 years from fossil fuel burning and land use change, only about half has remained in the atmosphere. The other half has been absorbed back by the Earth in what are known as carbon reservoirs or 'stocks'-mainly carbon minerals in rocks, carbon stored in the oceans, organic matter in the soil, and

¹⁷³ See Introduction and Conclusion on the creation of scarcity.

¹⁷⁴ For a clear and concise summary of the carbon cycle and sinks, see Gillon 2001 (Gillon was formerly a physical sciences editor at Nature magazine).

¹⁷⁵ One Gigatonne (Gt) = 1000 million tons.

living vegetation. Insofar as they "drain away" atmospheric carbon, these are known, in the words of the UNFCCC, by "the unglamorous term of sinks."¹⁷⁶

This draining is part of the global carbon cycle, a process that started with the emergence of life on earth and the conversion of carbon dioxide from the atmosphere and the oceans into innumerable organic and inorganic compounds on land and in the sea (IPCC 2000: 29). Over millions of years different ecosystems evolved to establish patterns of carbon flows through the global environmental system. This natural exchange of carbon between the atmosphere, the oceans and terrestrial and freshwater systems varies from one place to another and between seasons, years, decades and centuries. While carbon in rocks and sediments takes thousands of years or more to settle, the rate of absorption and release of carbon from oceans, soils and vegetation is in the range of a century or less, in line with short- and medium-term fluctuations in the climate.¹⁷⁷

Oceans contain about fifty times more carbon than the atmosphere in the form of mostly dissolved inorganic carbon created when microorganisms and other forms

¹⁷⁶ See <http://www.unfccc.int> under "What can be done?" and "Expanding Forests." October 2004. The IPCC defines sinks as "any process or mechanism which removes a greenhouse gas, an aerosol, or a precursor of a greenhouse gas from the atmosphere. A given pool (reservoir) can be a sink for atmospheric carbon if, during a given time interval, more carbon is flowing into it than is flowing out" (IPCC 2000, Special Report on LULUCF, Appendix III, Pg. 20). In that sense, sinks is more of a verb than a noun (in that it indicates an action), since it refers to carbon reservoirs that are accumulating carbon from the atmosphere faster than they are releasing it. If, instead, the reservoir starts releasing carbon faster than accumulating it, the same reservoir becomes a 'source.' This is the case of fossil fuel reserves, depleting thousands of times faster than the geological process at which they form.

¹⁷⁷ According to the IPCC report on LULUCF, from 1850 to 1998 approximately 270 (± 30) Gt C were emitted into the atmosphere from fossil fuel burning and cement production, and 136 (± 55) Gt C from land use change, mostly from forest ecosystems. More than half of the total of these (ca. 230 (± 60) Gt C) have been taken up by oceans and terrestrial ecosystems in approximately equal amounts, leaving about 43 percent retained in the atmosphere. Thus oceans and terrestrial ecosystems have been, on balance, a comparatively small net source of carbon during this period (IPCC 2000: 29).

of higher life that consume phytoplankton die and settle deep down in the ocean waters. There, carbon is stored for relatively long periods –that is, until the oceans turn over. This turn over happens slowly but constantly, in cycles of about 1000 years. Surface waters, where most of the carbon from the atmosphere is dissolved, move downwards (mainly in the North Atlantic and Southern Oceans), and in so doing carry dissolved carbon dioxide to the deep. Because carbon dioxide from the atmosphere dissolves near the surface of the oceans, the greater the concentration of carbon in the atmosphere, the greater its concentration in surface waters –to a limit, when these water become saturated.

This two-fold process of carbon uptake –through microscopic marine plants or phytoplankton, and through the mixing between surface and deep waters- is how 75 percent of the carbon released from human activities has been stored. Yet, as noted, this uptake of atmospheric carbon is limited by the solubility of CO₂ in seawater (IPCC 2000: 31), and by the slow rate of water turn over compared to the rapid increase in anthropogenic emissions. This ‘sluggishness’ makes oceans a ‘buffer’ against climate change.

In contrast, although terrestrial vegetation and soils contain only three and one half times as much carbon as the atmosphere, their exchanges are much more dynamic, and it is the terrestrial biosphere that largely drives inter-annual variations. These exchanges of carbon between land and the atmosphere depend mainly on the balance between carbon uptake through photosynthesis and plant growth, and carbon release through respiration of plants and microbes in the soil and decay. Through the process of photosynthesis plants absorb carbon dioxide from the atmosphere, and with water, turn it into glucose and oxygen to grow (as noted in the UNFCCC website, the

proof for any skeptic of the potential of solar power¹⁷⁸). Some of this carbon is released back into the atmosphere through the complementary process of respiration, as plants break down organic compounds to derive energy. The rate of absorption continues until plants reach maturity, and then it more or less stabilizes. Once plants decay, burn or are cut, carbon is released back to the atmosphere.

Thus, the dynamics of the terrestrial ecosystem are influenced by a variety of biogeochemical cycles, in particular the carbon cycle, the nutrient cycles and the circulation of water –all of which are constantly modified by direct human activities as well as indirectly by climate changes. This way, changes in climate and climate variability have an effect on the uptake and release of CO₂ from vegetation and soils, and vice versa.

This more dynamic system results in greater fluctuations in the rate of absorption, which varies even from year to year. So that while oceans appear to be absorbing carbon at a relatively constant rate of around 2 GtC/yr, carbon uptake by land can go from being negligible as it was in the 1980s, to averaging between 1 and 2 GtC/yr in the 1990s (IPCC TAR 2001). These fluctuations in the rate of absorption by land may be associated with El Niño events every four to seven years, when warm and dry weather makes forests act as net emission sources. Then, in the intervening years, cool and wet weather makes forests become sinks again. Recent El Niño events (1983, 1987 and 1998) for example, were correlated with high atmospheric CO₂ growth and a lower than normal uptake of CO₂ by oceans and terrestrial

¹⁷⁸ See www.unfccc.int

ecosystems.¹⁷⁹ Then, between 1991 and 1993, the trend was reversed (IPCC 2000: 32).

Overall, the IPCC Special Report on LULUCF calculates that between 1980 and 1998 terrestrial ecosystems have served as a small net sink for carbon dioxide. This was so despite the fact that deforestation and changes in land-use during this period, mainly in the tropics, were responsible for around 1.6 and 1.7 Gt C emitted per year. The reasons for this balance are not clear, but include natural regrowth, indirect effects of human activities such as atmospheric CO₂ fertilization and nutrient deposition, and climate change itself, both natural and human-induced (IPCC 2000).

This uptake of atmospheric carbon by forest ecosystems is likely to continue for a number of decades as an indirect result of human activities. However, precisely because of climate change, the sink capacity of forest ecosystems may diminish to the point where forests become a source of CO₂. This is due to possible limitations in the capacity of ecosystems for additional uptake given nutrients and other biophysical factors, and limitations in the rate of photosynthesis of some plants, which may instead increase heterotrophic respiration as a result of higher temperatures. Some recent studies have further pointed out that the sink capacity of terrestrial systems may be much more limited than was previously thought. Instead of decades and centuries storing carbon, trees in the Amazon seem to be quickly transferring carbon to rivers where just after five years much of it is released back into the atmosphere

¹⁷⁹ This is so even as changes in ocean circulation that result from El Niño prevent offgassing from deep waters, and thereby increase the sink capacity of oceans (see Gillon 2001).

(Mayorga 2005).¹⁸⁰ This loss of carbon dioxide to the atmosphere will likely be amplified by the general ecosystem degradation expected from climate change effects (IPCC 2000: 1.3.3).

Similarly, the biological uptake of carbon by oceans will probably increase in the near future as sea surface temperature and chemical changes lead to an increased growth of marine plants and algae. However, this increase would be offset by a further slow down of the downward movement of carbon-rich surface waters under a warmer climate.

It is crucial to note that, on the whole then, most researchers expect the sink capacity of both land and oceans to diminish. For land sinks, this may be a matter of a few decades, and some believe that terrestrial systems may disappear as sinks as early as 2050 and then turn into a source. This would increase exponentially the overall effects of climate change. In any case, it is clear that as long as carbon dioxide emissions continue at their current level, sinks will probably never lead to a decrease in atmospheric carbon dioxide (Gillon 2001). In the meantime, all possibilities are explored, including fertilizing the oceans with iron ore to promote the growth of phytoplankton that absorb carbon dioxide from the atmosphere.¹⁸¹

¹⁸⁰ Note the plumbing metaphors: rivers are explained as ‘pipes’ carrying some of the carbon stored in the Amazon basin to the Atlantic –another important ‘sink’ of carbon. Trees are also referred to as “biological scrubbers.”

¹⁸¹ A couple of companies in the United States have started experimenting in this area and acquiring the patents, with the hope that they may one day sell the emissions reductions (one of the companies, Planktos Foundation, uses the *Ragland*, a historic wooden boat owned by rock star Neil Young.) And although ocean researchers warn that such schemes could disrupt marine ecology, there is no international law against ocean fertilizing (Schiermeier 2003). The case recalls cloud seeding in the 60s and 70s.

Negotiating sinks

With the exception of tropical forests, the carbon stock is much more prevalent in soils than in vegetation. The soil of boreal forests for example contains five times more carbon stock than its vegetation, and in the case of temperate grasslands the carbon stock ratio is 32 times more in soils relative to that in vegetation (IPCC 2000: 31). This has been advanced by some as an advantage of carbon sequestration by sinks to mitigate climate change, in the sense that in counting mainly trees, the actual carbon uptake is in fact larger than what is accounted for (see Fearnside 2001).¹⁸² Others, however, point to the reversibility of the carbon uptake capacity of sinks and the complex and delicate feedback mechanisms that regulate it to argue against their usefulness in achieving quantified emission reductions objectives.

The inclusion of sinks in the Protocol has been a most divisive issue, breaking alliances or weakening joint positions among otherwise negotiating partners and sharply splitting the environmental movement (Fearnside 2001). These differences were such that, together with limits to the flexible mechanisms, they led to the official breakdown of COP negotiations in The Hague in 2000.¹⁸³ What follows recounts the

¹⁸² As Fearnside (2001) states, “More carbon can be maintained in the forests than the amount of carbon credit granted. In this way, even if the carbon in the forests is temporary, at some point a net benefit exists for the climate from having the forest project instead of a smaller reduction in fossil-fuel emissions” (Fearnside 2001: 3).

¹⁸³ In the words of Jurgen Trittin, German Environmental Minister, “The refusal of some industrialized nations to give climate protection priority at home caused the failure. It also failed because industrialized countries wanted to count too much of their natural forests as sources of human-made reduction, rather than actually cutting greenhouse gases” (quoted in

negotiating process –a process which, according to an experienced observer and participant, was “typified by confusion, manipulated science, obfuscation and poor decision making” (Fry 2002: 159).

Notes on the negotiation process

Before going into the history of the negotiations, there are two key aspects of the climate change regime that help to understand how sinks came to be included in the Protocol. One is that the decision of what counts is first *negotiated* by Parties at UNFCCC meetings, then converted into legal language in the drafting process, and only later is science called upon, via the Intergovernmental Panel on Climate Change (IPCC), to define and elaborate on the means to make the decision operational. That is, there is first a politically negotiated decision, then a consensual legal rule, and then a scientifically-based definition -three different languages and thought processes, governed by different concerns, building one upon the other, rather disjointedly. The political decision results from and reflects power relations. In order to make this decision agreeable to all (part of an international treaty agreed to by consensus), this political outcome has to be translated into treaty language –that is, legal text made up of an uneven combination of very ambiguous and very precise text. And out of these the scientific clarification is supposed to come up with fair, neutral and simple definitions applicable to all.

Arriving at consensus decisions at the UN therefore requires the combined work of politicians, who lack technical knowledge, and specialists and technocrats,

Agarwal *et al.* 2001: 255) (See also Grubb and Yamin 2001, Ott 2001, and several others on COP 6).

who lack a political mandate. Given time and size constraints (the fact that there are more than 180 Parties, divided in groups, speaking different languages), this combined work has to be finely tuned, and the way one process feeds into the other is key to achieving agreement and is part of the UN rules of procedure.

Thus the decision that sinks could be used by a country to meet its commitments under the Protocol was made as part of a negotiating package at Kyoto in December 1997 in the overall context of negotiations on emissions reduction commitments. In the drafting process sinks were included as those “*resulting from direct human-induced land use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990*” under Protocol Article 3.3, and as “*additional human-induced activities (...) in the agricultural soils and the land-use change and forestry categories*” under Protocol Article 3.4.

It was then up to the IPCC to decipher the compromise text and come up with a set of definitions for those activities which had already been decided. These had to be applicable to all Parties, simple, subject to verifiable accounting and measures, based on existing and readily available data, and consistent with the aims of the UNFCCC and the Protocol (IPCC 2000 [SPM]: vii). Although the writing of the IPCC’s Special Report on LULUCF was not devoid of political wrangling –on the contrary, the text was as difficult to negotiate as many other items under the Protocol and its status as an impartial piece of scientific writing remains controversial (see below)- it was still a matter of defining and giving sinks scientific credibility. This had to be done in such a way as to accommodate a political decision that had little to do with workable science and more to do with trade-offs between different States’ perceived interests in competition with each other, and which was further transcribed

in legal text couched in ambiguity in order to make it palatable to all. Critical questions that the IPCC had to resolve included how to distinguish *direct human-induced* from indirect human-induced activities and natural environmental variability affecting carbon uptake and release; the implications of different definitions or sets of definitions; and differentiating between direct human activities before 1990 and after 1990. At least one of these questions –that relating to distinguishing between direct human-induced, and indirect and natural effects, also known as “factoring out”- was simply not resolved (see section on The problem with sinks).

Yet once back at the negotiating table, the IPCC’s findings are not necessarily taken into account. This is so in spite of the fact that many of the delegates approving and authorizing the IPCC texts are also those negotiating the decisions at the COPs. At COP 6 in The Hague, for example, countries made precious little use of the IPCC Special Report on LULUCF, as demonstrated by the size of the caps that some of them proposed, and the complete lack of sense of the implications of their proposals for reporting and compliance procedures. As Grubb and Yamin (2001) note, the final negotiations came down to “pure ‘horsetrading’” and any relevant technical information was only used to further reinforce original positions.

A second related aspect about sinks is that they are mainly a negotiating tool in the wider context of overall emissions reduction commitments. For the largest emitters and several other countries with important forestry or extensive agricultural sectors (the United States, Australia, and Canada, as well as Russia, Norway and New Zealand for example), including sinks in overall accounting allowed them to assume the commitment to cut emissions much more easily. For the United States, including broadly defined sinks in the accounting meant that its reduction target went down

from 7 percent to 4 percent (CSE 1999: 72). Sinks were thus the ultimate flexible mechanism. And these countries negotiated accordingly (see below).

But sinks were also of interest to many Latin American countries and some African ones, which saw them as a potential source of income in a sector where foreign investment is scarce, and where the challenge is compounded by international pressure for forest conservation. For some poor African countries, whose emissions from fossil fuel burning account for less than 2 percent of the global total, they represented the only opportunity to participate in the Kyoto market (see Goetze 1999).

And precisely because they meant so much for some of the largest emitters, countries like the small island states with no reduction commitments but with serious concerns for the effects of climate change sometimes used sinks as a bargaining chip to press for more substantive action on other issues, such as emissions from aviation and maritime transport. A representative of the Alliance of Small Island States (AOSIS) referred informally to sinks as “*the only leverage we have*” (personal communication).

In fact, sinks were used as a negotiating token when at COP 6 in The Hague, in a last minute attempt to save the negotiations, the United States offered the EU to settle for no sinks under the CDM if they were allowed under Protocol Article 3.4 (additional LULUCF activities) -even if in doing so, the United States was betraying its Latin American partners (Fry 2002: 167; CSE 2001: 256). And today, as Parties carefully initiate talks on the second commitment period as mandated in Protocol

Article 9.2 (review of the protocol), some delegates will refuse to talk about sinks until the rest is also on the table.¹⁸⁴

Yet in many ways this bargaining chip grew out of proportion as people started the work of trying to delimit and make carbon sequestration from land use change quantifiable and verifiable. There is the widely held sense (based on many personal interviews and casual comments) that very few people had any idea what they were getting into. In the words of Fry, “[it] was like walking through a jungle full of legal pitfalls, blind passages and tangled vines ready to trip the unwary venturer at every step” (Fry 2002: 159). Simply, some of the technical challenges are insurmountable. Something as fundamental as clearly distinguishing direct human-induced changes from indirect and natural ones –something which, as Jenny Wong, from the UNFCCC Secretariat, said, “will haunt us forever”- cannot be resolved scientifically, and will have to go back to the negotiating table to find a political solution.

These two aspects of the making of the climate change regime result in significant disjunctures, holes and contradictions. Some of them are patched along the way as negotiations continue and as practice becomes custom. But they mean that the best way to understand how sinks came to be included in the Protocol is to revisit the negotiation process and not to expect much coherence in the final outcome.

Sinks under the UNFCCC

¹⁸⁴ Personal communication with non-Annex I country delegates. Bonn, May 2005 (SB 22).

Together with emissions trading, carbon sinks appeared very early on under the “comprehensive approach” to climate change. Even before negotiations started for the convention, the US government had included them as “negative emissions” in “Concept Papers” prepared for the IPCC Response Strategy Working Group in December 1989 (Bodansky 1993: 517).¹⁸⁵ The United States also presented them in a high-level government seminar held during the IPCC meetings in Washington in 1990 (Grubb 1999: 77).

The “comprehensive approach” entailed collectively accounting for removals as well as emissions of different greenhouse gases and measuring them according to a single metric –that of their global warming potential (GWP).¹⁸⁶ Until the United States brought it up in 1989, sources and sinks had been considered separately. Both the Toronto and the Noordwijk Conferences had focused on carbon dioxide emissions from the energy and transport sector. Only the Noordwijk Declaration had additionally called for a separate global target for forest growth of 12 million hectares per year by the beginning of 2000, but this target was soon deemed politically unviable given that any timetable or target for forest sinks was expected to affect mostly developing countries (Bodansky 1993: 520; see Chapter 1). In fact, no international environmental treaty –not the UN Forum on Forests (UNFF), nor the Convention on Biological Diversity (CBD) or the Convention to Combat Desertification (CCD)- includes a mandate to increase forest cover or reduce

¹⁸⁵ U.S. Concept Paper: Comprehensive Greenhouse Gas Approach to Addressing Climate Change. December 29, 1989 (unpublished). See Bodansky 1993: 517.

¹⁸⁶ As noted earlier, global warming potential (GWP) is an index used to approximate “the time-integrated warming effect of a unit mass of a given greenhouse gas in today’s atmosphere, relative to that of carbon dioxide” (IPCC 2001, TAR Synthesis Report: 155)]. See Chapter 3.

deforestation, as this is considered a “sovereignty issue” impinging on a country’s right of use of its natural resources. Developing countries, in particular Brazil, have been very successful at making this clear, and of all the international environmental instruments to come out of the “Earth Summit” in Rio de Janeiro in 1992, the UNFF is the one that most clearly has gone nowhere.¹⁸⁷

The US position on sinks was also influenced by studies by Battelle, an environmental management firm that promoted the use of sinks and changes in land management practices (such as zero-tillage farming and erosion control) as quick technological fixes which could provide affordable and efficient means to offset emissions by enhancing the carbon storage capacity of soils (Lanchberry, personal communication). Accordingly, the US proposal was for full carbon accounting.

Besides the United States, the “comprehensive approach” to climate change was supported in the negotiations by Canada, Australia and New Zealand (the CANZ group), as well as the majority of the Nordic countries and those under OPEC. Most everybody else also approved of the approach in theory. Its clear advantage was that it allowed countries to choose the most cost-effective emission reductions.

Instead, the discussions focused on whether to count *gross* greenhouse gas emissions, that is emissions from all greenhouse gas sources without removals (or emissions) from sinks, or whether to use *net* emissions, which count removals (or emissions) by sinks in the calculation of total emissions. Again, the United States, CANZ, OPEC and Finland, together with Brazil, supported the net emissions

¹⁸⁷ For a critical review of the various international environmental treaties, negotiations and institutions, see Center for Science and Environment (CSE), *Global Environmental Negotiations* Vol. 1 and 2.

approach. Switzerland, Germany and Austria among others opposed it, citing the lack of certainty in the accounting of removals by sinks (Bodansky 1993: 519).¹⁸⁸

This matter also brought up the highly contentious question of accounting for and allocating sinks under the global commons such as oceans. India suggested allocation on a per capita basis -which, given its large population and low emissions, resulted in negative net emissions- while Pacific islands proposed instead allocating sinks based on a country's exclusive economic zone. Given the impossibility of agreement, the principle of equal rights to ocean sinks was left out, and sinks were not defined by the INC (Bodansky 1993: 520).

In the end, in its typically "constructively ambiguous" way, the final text of the Convention has a bit of everything. The fourth paragraph of the Convention's preamble, right after the recognition that the largest share of historical and current greenhouse gas emissions originated in developed countries, notes its awareness "of the role and importance of terrestrial and marine ecosystems of sinks and reservoirs of greenhouse gases." UNFCCC Article 3 on Principles then calls for policies and measures to "cover all relevant sources, sinks and reservoirs of greenhouse gases." More precisely, UNFCCC Article 4.1 (d) requires all Parties to "promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems." But the main obligation on sinks stems from

¹⁸⁸ There is a gap between the atmospheric uptake and carbon dioxide. As stated in the IPCC 1990 Scientific Assessment report: "the current quantitative estimates of sources and of sinks and of CO₂ do not balance; the atmospheric increase is less rapid than expected from carbon cycle models." (see Bodansky 1993: 519).

UNFCCC Article 4.1 (b), which calls all Parties “to formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change.” That is, all Parties to the Convention are required to report annual emissions from sources and sinks, and to implement mitigation measures that address them. Still, when referring specifically to targets and timetables (or quasi-targets and quasi-timetables) for developed countries in UNFCCC Article 4.2, the Convention text mentions only emissions.¹⁸⁹

But accounting for sinks as part of quantified mitigation commitments under the Kyoto Protocol was something else, and depending on the definitions and modalities allowed, their effect could be as broad as to make any emissions limitation unnecessary. According to the IPCC, terrestrial ecosystems now sequester globally an average of 2.2 GtC per year through natural regeneration. If countries received credit for even half of these not-human induced, indirect effects of sinks,¹⁹⁰ they could meet their commitments without any additional measures (IPCC 2000: 80). It was only in

¹⁸⁹ UNFCCC Article 4.2, specifically on developed countries commitments, states that Annex I Parties “shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs.” But later (subparagraph (b)), it continues: “[...] with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol.” Consequently, in reviewing compliance, the UNFCCC Secretariat prepares a report with aggregate trends for each country and across Annex I countries both without and with sinks, but exclude sinks from the aggregate totals when addressing the quantified aims of UNFCCC Article 4.2. (Yamin and Depledge 2004, Ch. 4, pg. 9).

¹⁹⁰ Mainly naturally occurring carbon or nitrogen fertilization.

the later stages of negotiations to the Protocol that countries realized how much was at stake. This realization turned sinks into one of the most complicated and controversial issues in the whole process.

Sinks under the Protocol

Although calculating removals from sinks is far from accurate, when numbers began being crunched they showed that for most of the Scandinavian countries as well as New Zealand, the United States, the Russian Federation and some Eastern European countries, annual domestic sinks accounted for at least 10 percent of national gross emissions alone, even without any direct policy to promote them. In New Zealand, Sweden, Latvia and possibly Finland, for example, total net sinks could absorb more than half of their total emissions (in Latvia accounting for sinks brought down overall emissions in 1996 to 15 percent of their base year level) (FCCC/CP/1998/INF.9; see also Grubb 1999: 78). The case was very different for most of Western Europe, where high population densities and intensive land use patterns limited the potential of domestic sinks to trim down emissions accounts.

Many developing countries under the G-77 saw sinks as yet another loophole by some industrialized countries to avoid cutting back on emissions while giving the impression of doing so. The inclusion of sinks under the CDM also brought up sovereignty concerns relating to land use (see for example Brazil's and Indonesia's sensitivity towards anything to do with regulating forests at the global level). But as noted earlier, many countries, mainly Latin American ones, also saw the possibility of additional resources and investment in the forestry sector or in conservation. In any case, the United States made it clear that the inclusion of sinks allowed its offer of

stabilization of emissions to be more significant, and with New Zealand, Canada and others, forcefully argued that, “*from an atmospheric point of view,*” it made no sense to exclude them under the Protocol.¹⁹¹

The road to Kyoto

Negotiations on the issue began in earnest only at the eighth meeting of the *Ad Hoc* Group on the Berlin Mandate (AGBM 8) in October 1997.¹⁹² The negotiating text, prepared a few months earlier (April 22, 1997), included a note on the range of views on sinks. Some Parties advocated a “net” approach (Brazil, Iceland, Norway, Russia Federation, United States); others included in their proposals “removals by sinks” (Australia, the EU –though the EU later proposed that sinks be excluded from the Kyoto target until additional research was available); and yet others explicitly excluded sinks or omitted them (AOSIS, Czech Republic, Hungary et al., Japan and Switzerland). The proposal by G-77/China, Peru and the Philippines on quantified targets referred only to emissions, although sinks were mentioned in the *chapeau* paragraph introducing the targets; meanwhile, Canada’s proposal covered both sources and sinks. Only New Zealand proposed early on that sinks from certain listed categories be added to a Party’s emission “budget”¹⁹³ (Depledge 2000: 48, para. 226).

¹⁹¹ As noted earlier, the inclusion of sinks allowed the United States to add three percentage points to its reduction commitment (Grubb 1999: 117).

¹⁹² The AGBM was set up to start negotiations on a “protocol or other legal instrument.” It met nine times between the first COP in Berlin in 1995 and COP 3 in Kyoto in 1997. See Chapter 2.

¹⁹³ During informal consultations on the treatment of sinks by COP 3 Chairman Estrada, New Zealand, not present at the consultations, faxed a proposal based on its previous submission, containing the so-called “gross-net” approach -whereby sinks would not be included in a

To get a clearer sense of countries' positions, the Chair of the informal contact group on sinks, Antonio La Viña from the Philippines, prepared a questionnaire which was circulated by the UNFCCC Secretariat during the final meeting on sinks at AGBM 8, and which was to be submitted by Parties by November 12th. The questionnaire covered the range of basic questions on sinks, including which land-use change and forestry activities to account, and whether there should be a limit on the amount of sinks that count towards quantified emission limitations and reduction commitments. More than 85 pages of submission were received in response to the questionnaire.¹⁹⁴

The results of the questionnaire are telling of how, with the exception of a few countries that had a clear policy (in particular the United States and the CANZ group, which basically wanted all sinks with as much flexibility as possible), positions one month before Kyoto were for the most part ill defined. The EU for example said that limits on the use of sinks should be determined at the first COP/MOP,¹⁹⁵ although there was no chance that countries, in particular the United States, would ratify the Protocol without knowledge of what exactly they were committing to. Japan responded that it was premature to include sinks given lack of sufficient information –

Party's baseline, but the removals would be credited to in its "budget" (Depledge 2000: para. 227).

¹⁹⁴ See Parties' submissions under document FCCC/AGBM/1997.MISC.4 and Add.1-2, and compilation of responses by the UNFCCC Secretariat in document FCCC/AGBM/1997/INF.2. The Secretariat also prepared a technical paper with information on land use change and forestry from national communications and in-depth reviews from Annex I Parties, which appeared as document FCCC/TP/1997/5.

¹⁹⁵ As explained in Chapter 3, COP/MOP stands for "Conference of the Parties serving as the Meeting of the Parties" to the Protocol. While COP is the decision making body of the Convention, COP/MOP is the decision making body of the Protocol. Its first meeting, now that the Protocol has entered into force, was held 28 November through 9 December 2005 in Montreal, Canada.

a point of view that changed radically at Kyoto weeks later (apparently to do more with internal departmental differences than with matters of principle [Fry 2002: 160]). On which land use change and forestry activities to include, the fifteen countries that responded covered the whole range of possible answers: the United States, Australia and Norway wanted them all; Kenya, the Marshall Islands and Uzbekistan none; the EU, Iceland and others emphasized only those which were anthropogenic and quantifiable, while Peru specified only forest and woody biomass (see FCCC/AGBM/1997/INF.2).

More significantly, there was little understanding of what the terms exactly meant. A common mistake, still made today, was to assume that land use change and forestry refers only to sinks –that is, removals- and not to sources –that is, emissions from that sector. Even the UNFCCC Secretariat notes in its compilation that:

“The terminology associated with the issue of sinks can be confusing. For example, ‘sinks’ is sometimes used synonymously with removals by the land-use change and forestry (LUCF) category. As defined in Article 1 of the Convention, a sink means ‘any process, activity or mechanism which removes a greenhouse gas, an aerosol or precursor of a greenhouse gas from the atmosphere’ and a source means ‘any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere.’ The LUCF category has emissions and sinks, as defined in the Intergovernmental Panel on Climate Change (IPCC) Revised 1996 guidelines for inventorying national GHGs, and has four subcategories: forests and other woody biomass, land conversion, abandoned land and other.”
(FCCC/AGBM/1997/INF.2 paragraph 6; emphasis in the original).

Similar confusion was noted on the use of the terms “gross emissions” and “net emissions” (ibid., paragraph 7), to the point that the Secretariat felt compelled to emphasize, in bold, that “*precision in the use of terminology will be very important in the continuing discussion of ‘sinks’*”(ibid).

With the results of the questionnaire, consultations continued by email during the inter-sessional period, so that before AGBM 8 part II in late November 1997 Chair La Viña put forward four different options for the treatment of sinks. But Parties could not agree on any of these. Negotiations continued almost round the clock at Kyoto without Parties still being able to reach agreement despite the pressure of knowing that there would be no Protocol to sign, with specific binding commitments, until the treatment of sinks was agreed upon. COP 3 Chairman Raúl Estrada thus put forward an alternative text on Saturday, 6 December, which elicited a strong response (acceptable by AOSIS but unacceptable to many in the JUSSCANNZ group) and moved the discussion forward as Parties went back to their previous draft negotiating text. The main issues under discussion were which LULUCF activities would be allowed in the first commitment period, and whether and under what conditions to include other categories in the future (Depledge 2000: para. 232; see also ENB COP 3 report).

After intense debate, Parties finally agreed to allow for afforestation, reforestation and deforestation activities (ARD) for the first commitment period under Article 3.3 -but there was no agreement on how to treat forest harvesting for example. They also resolved to leave for later the decision on how and which additional activities to include in future commitment periods. Although some Parties expressed reservations, a text was provisionally agreed and presented to the plenary of the

Committee of the Whole (CoW) that evening. There, language was inserted stating that additional activities would only apply in future commitment periods. But then Japan, in a last minute intervention during the final CoW Plenary on December 10th, proposed an added sentence whereby additional activities could also be applied in the first commitment period as long as they took place after 1990 -a radical reversal of its earlier stated position that any decision on sinks was premature (see above). The proposal brought back discord and Chairman Estrada rejected the insertion, but was subsequently informed that the Japanese proposal had gained the support of the EU and the United States (Depledge 2000: para. 233). The proposed insertion was therefore included, making this article, with all the vacillations and last minute changes, a good example of what makes the text on sinks particularly confusing.¹⁹⁶

But there were also other inconsistencies. Annex A of the Protocol, which lists the sectors or source categories of greenhouse gases that are covered under the Protocol, includes some agriculture and waste sources (such as agricultural soils, rice

¹⁹⁶ See Protocol Article 3.4:

“Prior to the first session of the Conference of the Parties serving as the meeting of the Parties to this Protocol, each Party included in Annex I shall provide, for consideration by the Subsidiary Body for Scientific and Technological Advice, data to establish its level of carbon stocks in 1990 and to enable an estimate to be made of its changes in carbon stocks in subsequent years. The conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties included in Annex I, taking into account uncertainties, transparency in reporting, verifiability, the methodological work of the Intergovernmental Panel on Climate Change, the advice provided by the Subsidiary Body for Scientific and Technological Advice in accordance with Article 5 and the decisions of the Conference of the Parties. Such a decision shall apply in the second and subsequent commitment periods. A Party may choose to apply such a decision on these additional human-induced activities for its first commitment period, provided that these activities have taken place since 1990.”

cultivation, manure management, prescribed burning of savannas, and field burning of agricultural residues) but not land use change and forestry. There is no reference to sinks either in Protocol Article 3.13, which allows countries to save their excess emission reductions for subsequent commitment periods (commonly known as “banking”). This omission wasn’t even noticed until COP 7 in Marrakesh in 2001, when it was pointed out by the G-77 /China (Fry 2002: 161). More problematically, sinks are specifically mentioned in relation to projects undertaken in countries undergoing a transition to a market economy (EITs) under Joint Implementation (Article 6), but not in relation to projects in developing countries under the CDM (Article 12), warming up the already heated debates on this issue (see Chapter 5).

In sum, under the Protocol text, sinks appeared as follows:

- Article 3.3 (ARD): Under Protocol Article 3.3, net changes over the commitment period in emissions and removals resulting from direct human induced afforestation, reforestation and deforestation activities (ARD) may be counted towards a Party’s commitments. Both emissions and removals from these activities count towards the reduction targets if those activities commenced since 1990, the net changes in carbon stocks can be measured for each commitment period, and are transparent, verifiable and subject to review in accordance with Protocol Articles 7 (submission by Parties) and 8 (expert review of implementation). To count them, each Annex I Party must provide, before the first COP/MOP, data to establish its level of carbon stocks in 1990 (Article 3.4). This work began in August 2000. (Yamin and Depledge 2003: 49).

To account for activities under Article 3.3 (ARD), Parties agreed to use a *gross-net* approach. This means that gross emissions (without removals or emissions from sinks) are used for calculating the quantified commitments or assigned amounts, but net emissions (including removals by sinks) are counted at the end of the commitment period, allowing Parties to get credits from sinks in meeting their targets. For sinks under Article 3.4 (additional LUCF activities), a decision taken subsequently under the Marrakesh Accords established a capped *net-net* approach.¹⁹⁷

- Article 3.4 (Additional activities): Article 3.4 states that a decision will be made at the first COP/MOP or as soon as practicable thereafter regarding how and which additional activities from the LUCF sector and agricultural soils may count towards Parties' commitments. Accommodating those opposed to the use of sinks, the article mandates that this decision take into account uncertainties, transparency in reporting and verifiability. It must also take into account the methodological work of the IPCC, advice from SBSTA on inventories and reporting, and decisions by the COP. Furthermore, this decision by the COP/MOP shall apply in the second and subsequent commitment periods, but also, if a Party chooses, in the first commitment period as long as these activities have taken place since 1990. This last clause in effect brought forward the use of LULUCF activities and much dissension. It is further explained below (see COP 6 and the Marrakesh Accords).

¹⁹⁷ An open *net-net* approach is only allowed under Article 3.7 for Parties for whom land use change and forestry was a source of emissions in 1990 (that is, they shall include emissions from deforestation in calculating their base year emissions). See below, under Article 3.7.

- Article 3.7 (The “Australian Clause”): Another last minute insertion of text was made by Australia under Protocol Article 3.7, also known informally as “the Australian clause” (Yamin and Depledge 2003: ch. 5 pp. 9-10). This article allows Parties who had net emissions from LUCF in 1990 to add these emissions to their baselines in order to determine their assigned amounts (the so-called “net-net approach”). All other Parties must determine their baselines by counting only emissions from those sources of greenhouse gas categorized in Annex A of the Protocol, i.e.: energy, industrial processes, solvent and other product use, agriculture, and waste sectors -that is, not LUCF. Only Australia, the UK and Greece reported emissions from LUCF in 1990, but the article has no policy implications for the UK and Greece because their emissions from that sector that year are minimal compared to their emissions from other sources. However, for Australia it means a substantial emission allowance.¹⁹⁸

This article is worth expanding on because it provides a good example of the legal dimension at play. It states, in its second sentence, that:

Those Parties included in Annex I for whom land-use change and forestry constituted a net source of greenhouse gas emissions in 1990 shall include in their 1990 emissions base year or period the aggregate anthropogenic carbon dioxide

¹⁹⁸ Under the Protocol, Australia had committed to limit its projected increase in emissions to +8 percent by 2008-2012. In its first national communication, Australia reported 86,500 Gigagrams (Gg) of net emissions (including removals) from LUCF in 1990 (its base year emissions in 1990 were 430.45 MtCO₂e/yr, of which 19.8 percent were from the LULUCF sector) and 51,867 Gg in 1995, while projecting net emissions of 121,992 Gg in 2000 -that is, a 25 percent increase of national CO₂ emissions when taking into account LUCF in 1990 and a 17 percent in 1995, which results in a minus 6.8 percent from the baseline (a larger removal in 2000 than the base year, or a decrease in net emissions) (see FCCC/TP/1997/5). Meinshausen estimates that this results in an allowance from deforestation in Australia’s base year of 30.2 percent (Meinshausen 2004: 7).

equivalent emissions by sources minus removals by sinks in 1990 from land-use change for the purpose of calculating their assigned amount.

When this article was written, the definition of forest had not yet been adopted and it was not clear whether or not it would include dry woodland clearing. As Fry (2002) explains, it so happens that in 1990 Australia was in the middle of large-scale dry woodland clearing for agriculture; but it was also establishing large pine plantations that it did not want to include as removals in its baseline net emissions. Including the removals from these growing pines would mean it had less emissions then, and therefore the target reductions (which are a percentage of 1990 emissions) would be harder to achieve. Because of this, the first part of the text of Protocol Article 3.7 mentions both land-use change and forestry, but the last part of the text mentions only land-use change and not forestry (Fry 2002: 161).

Thus the issue was settled in principle with all the ambiguities necessary for agreement, but the work of precisely defining activities and the rules and procedures that would apply had only started. Three years later this work led to the total collapse of negotiations, which had to be suspended and resumed six months later. And it would be a long time before it was done.

The road after Kyoto

At the next subsidiary bodies meeting, six months after the Protocol was adopted, SBSTA 8 requested the IPCC to prepare a report “*examining the scientific and technical state of understanding for carbon sequestration strategies related to*

land use, land use change and forestry activities and relevant Articles of the Kyoto Protocol” (FCCC/SBSTA/1998/CRP.3). Although all Parties agreed on the importance of the report, its content was hotly debated, starting with its timing (see ENB report of SBSTA 8; see also CSE 1999: 70). The United States and Japan wanted an early deadline, while the EU and the G-77/China, with support from most NGOs, argued for a later date, allegedly to ensure the quality of the report. It was finally agreed to request it for late 2000, in time for COP 6 in The Hague.¹⁹⁹

In the meantime, some Parties pushed ahead with the agenda on sinks, even though the definitions were not yet settled and it seemed no formula could be found to suit all Parties. For example, in November 1998 at COP 4 in Buenos Aires, the accounting start date for changes in carbon stocks was set for January 1990; the decision included language on adjustments to a Party’s assigned amount based on whether it was a net sink or net emission.²⁰⁰ This reference to net emissions from sinks led some Parties to realize that, depending on the definitions adopted, they might appear as net emitters under Article 3.3, as would be the case for some Nordic countries with large forests but with limited afforestation, reforestation and deforestation (ARD) lands (Fry 2002: 162). And so debate and negotiations continued, as everything under land use and forestry was considered -from low and zero-tillage crop methods under Protocol Article 3.4, to avoided deforestation and

¹⁹⁹ See Qaiyum 1998.

²⁰⁰ Assigned amount is the total amount of greenhouse gas emissions that each Annex B country has agreed that its emissions will not exceed in the first commitment period. This is calculated by multiplying the country’s total greenhouse gas emissions in 1990 by five (for the 5-year commitment period), and then by the percentage it agreed to and which appears listed in the Annex B of the Protocol (for example, 92 percent for the European Union, 93 percent for the United States, etc.) (see IPCC Synthesis Report 2001: 149). See Chapter 3.

forest management under the CDM- and with Parties still not knowing the implications of what they were negotiating.

Still, Parties adopted the “Buenos Aires Plan of Action,” a one-page umbrella decision covering seven decisions on financial mechanisms, technology transfer, adverse effects of climate change/implementation of response measures, joint implementation, flexibility mechanisms, and preparations for COP/MOP (including reporting and review, policies and measures, compliance and LULUCF). This was a political deal whereby all these issues would be addressed in parallel. The deadline to resolve them was set for COP 6 in The Hague. In hindsight, the magnitude and complexity of the issues included appear as presenting an impossible task to be completed in two years. This unrealistic agenda was an important factor in the collapse of negotiations at COP 6.

At COP 5 in Bonn, Robert Watson, Chair of IPCC, presented an overview of the draft of the Special Report on LULUCF. The event was attended by 300 delegates and NGO observers, and lasted a full four hours. Watson noted that key decisions would have to be made regarding definitions, accounting, monitoring and reporting systems, and inventory guidelines for the Protocol to be implemented (see ENB COP 5). Given the void of information and its explosive implications, including on country-specific data to establish baselines for additional LULUCF activities under Protocol Article 3.4, COP 5 adopted a work program and elements of a decision-making framework to address LULUCF with a view to adopting a decision by COP 6 (FCCC/CP/1999/L.16). The work program requested Parties’ submissions on a whole range of LULUCF matters, including on methodologies that countries intended to use to measure and report on LULUCF activities. The COP then also decided to

undertake consideration of the IPCC Special Report on LULUCF by SBSTA 12, and to include an in-depth review at that session (see ENB report of SB 12).

The main fear was that Protocol Article 3.4 (additional activities) could create a bigger loophole than “hot air” (as expressed by CAN and others –see ENB report of COP 5) as the United States and other Umbrella Group members called for extensive accounting of carbon in managed lands, which would result in a considerable lowering of their reduction commitments. Besides, many developing countries were increasingly vocal on allowing for sinks under the CDM, notably as avoided deforestation -that is, accounting for avoided emissions in conservation projects. Most Latin American countries, with the significant exceptions of Brazil and Peru, joined to support the concept of promoting and accounting for forest projects, including conservation, restoration, and sustainable forest management (Goetze 1999). The African Group similarly expressed support for afforestation, reforestation and reclamation/preservation of wetlands to feature highly among the CDM projects (see ENB summary report of COP 5). All options seemed to be open for consideration, making negotiations all the more difficult (Krugg, personal communication). The amount of items on the agenda piling up for COP 6 and the complexity of the issues was such that in the run-up to The Hague, countries had spent all their time trying to figure out their positions and had had little time to understand those of the other countries and find possible middle grounds.

Collapse in The Hague (or “sinking the Protocol”)²⁰¹

²⁰¹ For an excellent account of failure at The Hague, see Grubb and Yamin 2001, or Ott 2001. See also Paterson 2001.

Key to understanding sinks in the Protocol is the United States' situation.

As Grubb and Yamin (2001) explain, emissions in the United States in 2000 were at 13 percent above 1990 levels. Even assuming strong mitigating action took place, they would probably be up to 10 to 20 percent above 1990 by the end of the first commitment period in 2012 (or 5 to 15 percent equivalent for the multi-gas basket). Given the inertia of the United States' energy infrastructure, and the fact that legislation can be held up in Congress for a long time, the chances of the United States meeting its commitment under the Protocol of - 7 percent compared to 1990 levels were slim. To do so would require radical changes in energy investment, in addition to emission credits for more than 200 million tons of carbon a year (MtC/yr), acquired either through the flexible mechanisms or through sinks (Grubb and Yamin 2001).

In fact, the United States had always assumed full net-net carbon accounting of sinks in its calculations, and had included them when it took up its minus 7 percent commitment. In January 1998 the State Department explained in a fact sheet that 4 percent of the 7 percent reduction would come from "certain changes in the way gases and sinks are calculated," so that the US commitment amounted to "at most" three percent in real reductions. A change in the baseline emissions from LULUCF was supposed to account for three of the four percentage points that were going to be solved in accounting (see Schlamadinger and Marland 2000: 44). But the definition and accounting of sinks kept changing as negotiations proceeded, which meant that countries kept having to reposition themselves as they recalculated how their targets and commitments were affected.

In August 2000, in the wake of COP 6 negotiations in The Hague, the United States thus tabled a proposal to include all managed lands under Protocol Article 3.4 (additional activities). Given the assumption that all lands in the United States are managed, this amounted to an estimated 300 MtC/yr (mostly soil carbon from shifts in agriculture to no-till methods (see Kaiser 2000)). This would make any additional efforts to reduce emissions almost unnecessary. The US proposal incensed NGOs (which responded, in one case, by smashing a pie on the face of the US delegate), as well as most countries, which already resented the profligate use of energy in the United States and were scandalized at a proposal that made nothing of the spirit of the Protocol and the principle that sinks be credited only for specific additional activities undertaken since 1990. As a result, the EU ended up opposing the inclusion of all sinks under article 3.4, even if this contradicted its otherwise favorable position towards incentives for good land and forest management (ibid.).²⁰²

This stalemate led to the collapse of negotiations at The Hague. On the one hand, the United States' over-ambitious and insensitive position could not have been better calculated to alienate most countries. It focused all its attention on cost-effectiveness, and forgot the long-term goals of the Convention. On the other hand, the EU's defensiveness turned to obsession, and in its discourse it assumed all flexibilities as environmental weaknesses (ibid.: 273). This prevented it from accepting a harsh political reality and looking for possible compromises.

²⁰² According Berg (2002), the EU was only willing to give 0.5 percent, or 27 MtC/yr for additional sinks activities, compared to the US request of 7 percent (or 450 MtC/yr). COP 6 President Jan Pronk proposed 150 MtC/yr as a compromise, but this was not found acceptable.

The standoff also affected the discussion of sinks under the CDM, which deeply divided the G-77 and needed to be handled with care. As Grubb and Yamin (2001) further note, because sinks are a fundamental piece of the Protocol's architecture and affect developing countries as much as countries with commitments, any decision on sinks could not have been taken in back rooms by a few friends of the friends of the Chair. Developing countries had already expressed frustration at having been practically shut out from the negotiations at The Hague. And then, in a last minute effort to save the negotiations, bilateral discussions between the United States and the UK resulted in a single sheet of paper circulated to a limited audience containing an agreement by the United States to exclude all sinks from the CDM in exchange for greater allowances on article 3.4 (Fry 2002: 167; CSE 2001: 256; Berg 2002). Under this Saturday morning deal, the United States would be allowed to count on 250 MtC/yr, or roughly 5 percent, for additional activities under Protocol Article 3.4, and would get other concessions on a range of issues (including supplementarity²⁰³ and compliance). As a trade off there would be no nuclear projects nor sinks under the CDM (Berg 2002).

This controversial US-UK deal fell short for various reasons, not the least of which was developing countries' possible opposition. In the final bickering, the British blamed the French for failing to defend them in front of the rest of the EU group; other Europeans said the British, headed by UK Deputy Prime Minister John Prescott, never had a mandate to seek a deal, and what was presented went too far,

²⁰³ This refers to the requirement that the Kyoto mechanisms be "supplemental" to domestic action. This had been a matter of disagreement between the EU and the United States for a long time, with the EU proposing a flat ceiling of credits that could be gained in international transactions (in the form of a percentage of a country's obligation), and the United States adamantly opposing any such limit.

conceding to demands of the Umbrella group on sinks and supplementarity, and was ambiguous. In any case, a follow-up meeting with ministers from the EU and the Umbrella Group in Ottawa shortly after the failed negotiations at The Hague revealed that there were still radical differences in understanding, in particular regarding the role of sinks in the CDM (Grubb and Yamin 2001: 264). By then, the United States had announced the result of the elections confirming George W. Bush to the presidency.

Once the heat dissipated and countries were able to take a cool look at the situation, the United States had withdrawn, and in doing so had given great leverage to the other countries –in particular the Russian Federation and the Umbrella group– to continue to press for sink allowances. Without the United States it was no longer a matter of ensuring the environmental integrity of the Protocol, but of securing support for its survival. Ironically, US withdrawal served to strengthen the commitment to multilateralism and for a while it brought the EU and the G-77 and China closer together in an “informal alliance” (Ott 2002). The release in the spring of 2001 of the IPCC Third Assessment Report also gave added urgency to the problem. So when negotiations resumed in May 2001 in Bonn, political agreement on the dividing ‘crunch issues’ at The Hague was hailed as a big success, even if in reality it had meant halving the reduction commitments originally agreed at Kyoto.

The Bonn Agreements and the Marrakesh Accords

When negotiations resumed in Bonn in May 2000, LULUCF was addressed in a closed contact group co-chaired by two of the best known and experienced chairs: Harald Dovland from Norway and Philip Gwage from Uganda. Subsequent drafting

consultations were conducted by Andreas Fischlin from Switzerland and another highly-regarded facilitator, Halldor Thorgeirsson from Iceland.²⁰⁴ Still, Ambassador Raúl Estrada who had gavelled the Protocol at Kyoto, was called in for the closed negotiations during the ministerial session. Although some countries continued to call for limited credits from additional sinks activities, and others continued to oppose them as a loophole and an opening up of commitments agreed to at Kyoto, by this time the issue was straightforward. In order to obtain agreement at the resumed COP 6 session, Australia, Russia, Japan, and Canada were allowed to offset over half of their emissions with carbon sinks under article 3.4 (see FCCC/CP/2001/L.11/Rev.1). An Appendix Z attached to the annex to the decision specified the Annex I Party maximum credits from article 3.4 forest management and LULUCF activities under Joint Implementation during the first commitment period. And still, after the political negotiations had settled the issue but before the final decision was adopted, the Russian Federation called to amend its Appendix Z cap on forest management credits. As a result, a new paragraph was inserted allowing countries to request from the COP a revision of their caps in Appendix Z no later than two years before the beginning of the first commitment period.²⁰⁵ This is known as “the Russian Fix.”

Together with sink allowances under article 3.4, agreement on penalties for non-compliance and the establishment of new funds for assistance to developing countries, the package deal agreed at Bonn (Decision 5/CP.6) contained limits to sinks in the CDM. For the first commitment period, avoided deforestation was left out of the CDM and only afforestation and reforestation would be allowed. These were

²⁰⁴ Thorgeirsson later became Chair of SBSTA.

²⁰⁵ For a detailed account of the negotiations see ENB report of COP 6 II.

capped for each Annex I party at 1 percent of its base year emissions times five (that is, for each of the five years of the commitment period)²⁰⁶ (see Chapter 5). The decision also included the definitions as well as the rules, modalities, and guidelines that were to apply to LULUCF under the Protocol (see the problem with defining sinks, below). These political decisions were further technically clarified and translated into legal text at COP 7 six months later, and became known as the Marrakesh Accords (Decisions 2-24/CP.7).²⁰⁷

An important part of this package of decisions was the inclusion of a set of principles that should govern all LULUCF activities under the Protocol -and in particular, although not explicitly stated, all CDM project activities (Krugg, personal communication).²⁰⁸ These were proposed by Brazil together with the G-77/China, and although initially opposed by many industrialized countries, they were eventually included in an annex to Decision 11/CP.7 on LULUCF. Because the occasional reference to human-induced reductions does not preclude that credits will be taken for actions that had nothing to do with climate change mitigation, these principles were meant to assure that any reductions claimed for removals from LULUCF are real and additional to any that would have happened anyway, and to avoid perverse incentives from LULUCF activities. They state that LULUCF activities should be based on sound science and contribute to biodiversity conservation and sustainable use of natural resources; that their accounting be consistent over time, with any reversal of

²⁰⁶ See Meinshausen 2004 for the implications of this cap for each Annex I Party.

²⁰⁷ The final COP decision on LULUCF is Decision 11/CP.7: Definitions, modalities rules and guidelines relating to land use, land use change and forestry activities under the Kyoto Protocol. Marrakesh, 2001. COP 7. (FCCC/CP/2001/13/Add.1).

²⁰⁸ Krugg was then part of the Brazilian delegation and later served as Co-Chair of the contact group on sinks in the CDM. See Chapter 5.

removals being accounted for at the appropriate moment, and that their accounting not imply any transfer of commitments to the future; that the mere presence of carbon stocks be excluded from accounting, as well as removals resulting from high CO₂ concentrations, indirect nitrogen deposition and other natural effects of past practices on the land (later known as the problem of “factoring out” –see section on the problem with sinks); and that their accounting not change the goal of the Protocol to reduce overall emissions by at least 5 percent below 1990 levels in 2008-2012 (FCCC/CP/2001/13/Add.1).

Thus in spite of a number of provisions and principles, the final decision on LULUCF in effect meant that of the average 5.2 percent emission reduction target that had been agreed at Kyoto, only about 2 percent would actually come from reductions in fossil fuel burning (see Gillon 2001; Ott 2001). This allowance on sinks, together with concessions on the tradability of emissions rights, led some commentators to conclude that Kyoto had been reduced to mere symbolic policy of little environmental effectiveness, codifying more or less business-as-usual emissions and making it cheap to comply with any commitments (Böhringer and Vogt 2004).

Defining the Decision: The IPCC Special Report on LULUCF

Meanwhile the IPCC, whose mandate is to produce “policy-relevant” but not “policy prescriptive” scientific information, was expected to insert science into this highly politicized process (Fry 2002: 162). This proved to be a most difficult task, and accusations that the IPCC had taken to policy prescribing were soon being heard.

Although the report could not fail to note the uncertainties of accounting for carbon from LULUCF activities, many noted several instances where sinks appeared in a rather too positive light.²⁰⁹

Questions were raised in particular about the authors of the Special Report. Fry for example notes that most of them were forestry scientists, aware that the Kyoto Protocol, in contrast to failed attempts by other UN processes (in particular the UNFF), “was breathing new life into the forestry industry” (Fry 2002: 162). Suspicions were also hard to avoid when one of the three coordinators of the Special Report, appeared at COP 6 in contact group discussions on sinks as part of the Australian delegation (as mentioned earlier, Australia always supported the inclusion of sinks) (ibid.; see also FCCC/CP/2000/INF.2). The World Rainforest Movement published an article highlighting the connections of some of the authors to companies that stood to benefit from sink projects (WRM 2000). The article pointed that Sandra Brown was a Senior Program Officer for Winrock International, a nonprofit private organization with a department of ecosystem services specializing in “*measuring and monitoring carbon and other eco-assets*” and “*providing high quality resource surveys and analysis at an affordable cost.*”²¹⁰ Brown, one of the three lead authors of

²⁰⁹ An example given by Fry (2002) of a statement that could be interpreted as lacking objectivity is from the IPCC Chair’s report on key findings, where it reads, in bold, that: “LULUCF activities and projects can have a broad range of positive environmental, social and economic impacts if the projects are appropriately designed and implemented.” Robert Watson, “A report of key findings from the IPCC Special Report on LULUCF”, Bonn, June 2000 (in <http://www.ipcc.ch/press/sp-lulucf.htm>); see Fry 2002: 162)

²¹⁰ In its web-page presentation, Winrock International explains: “We use innovative approaches in agriculture, environmental protection, renewable energy, leadership development, and policy to increase long-term productivity, equity, and responsible resource management. Our mission is to help the poor and disadvantaged. Our workplace is the world” (<http://www.winrock.org> 2005).

Chapter Five on project activities and among the authors of Summary for Policymakers, is the contact person at Winrock International for the Noel Kempff Carbon Offsets Verification Project in Bolivia, with funding from The Nature Conservancy.²¹¹ The article also pointed to another one of the lead authors of Chapter Five, Pedro Moura Costa, founder and director of EcoSecurities Ltd. -in their own words: “*World market leaders in sourcing, structuring and trading carbon credits since 1996.*”²¹² There is also Dr. Mark Trexler, review editor of Chapter Five, and founder and president of Trexler Climate and Energy Services, “*an internationally recognized leader in the emerging field of climate change risk management.*”²¹³ The WRM article further identifies an author who had worked for the *Société Générale de Surveillance* (SGS) Forestry of Geneva, the company that certified Costa Rica’s Certified Tradable Offsets (CTOs), and another author with Monsanto Corporation. And then there is Richard Tipper, among the lead authors of Chapter Five, from the Edinburgh Center for Carbon Management (ECCM), and whose first project was the *Scolet Te* project in Chiapas, in charge of offsetting emissions from Formula One international car races (see Introduction).²¹⁴

²¹¹ The project description notes that “results will be used to build the confidence of the Government of Bolivia to certify and potentially sell its share of offsets.” (<http://www.winrock.org> 2005)

²¹² See: <http://www.ecosecurities.com> (dated 7/8/2005).

²¹³ Trexler Climate and Energy Services is presented as “The natural resource for climate change mitigation services” with more than 13 years experience on, among others, “understanding and forecasting the behavior of the greenhouse gas market” and “identifying mitigation opportunities and evaluating and developing carbon offset projects.” They specialize in the provision of services to the private sector. See: <http://www.climateservices.com> (visited 8/7/2005).

²¹⁴ The long list of expert reviewers of the IPCC Special Report on LULUCF includes also well known critics of sinks such as Bill Hare from Greenpeace, Larry Lohmann of The

Whatever the role and influence played by the individual authors and their connections, it is clear that it was mainly government pressure that finally determined the tone of the Special Report, with discussions on the final text of the Summary for Policymakers at the IPCC XVI Plenary in May 2000 as intense as some COP negotiations (Fry 2002: 162).²¹⁵

To understand how LULUCF is perceived, it is instructive to note the cover of the IPCC Special Report on LULUCF. Against a purple background and yellow letters for the title, there are only three pictures: one is a ground view of an agricultural field under conservation tillage, courtesy of The Monsanto Company; the other is an aerial view of land-use change in the Department of Santa Cruz, Bolivia, courtesy of The Nature Conservancy; the third is an aerial view of a forest stand, courtesy of the American Forest and Paper Association. All three are very large scale; two of the three are a view from above (recalling “*the atmosphere’s point of view*”); and all three are monocultures, courtesy of big industry and multinationals. Similarly, the Summary for Policymakers of the LULUCF Special Report has a picture of two large agricultural machines working a large extension of yellow grass, and this picture is placed on top of what appears to be a map of the world. There is nothing here to recall forest biodiversity or small-scale conservation or community forestry –not even agroforestry. There is practically no green in the pictures.

Corner House, as well as Daniel Lashof of the Natural Resources Defense Council, Youba Sokona of ENDA-Tier Monde, and Jennifer Morgan of the World Wildlife Fund –though it is unclear what influence they had.

²¹⁵ See the draft report of the IPCC on its Sixteenth Plenary session, and the statement by Australia on the complexities and political nature of the Special Report on LULUCF.

The problem with sinks

What follows is just a sample of the issues that had to be sorted out before anyone could envisage what the decision of including sinks in the Kyoto Protocol entailed. Because sinks were to work as a quantifiable and tradable unit, and eventually as a commodity, they had to be very clearly defined. This meant abstracting, isolating, carving up, and putting a figure on the highly complex organic process of terrestrial carbon exchange and the even more complex social one of land use change. The IPCC Special Report prepared to address sinks covers almost 400 pages, and there is hardly a page that does not mention the word “uncertainty.” Most of the problems were somehow resolved through a combination of definition and accounting techniques. But as with the invention of private property and the owning of nature, once the rules are known and we live by them, it is hard to remember that they were once far from obvious and to recognize what was lost with their adoption.

Defining forests

The first and most important question that had to be settled was the definition of forests and the related meaning of afforestation, reforestation and deforestation. As noted earlier, the definitions had to be applicable to all Parties, simple, based on accessible data, and subject to verifiable accounting. They also had to be consistent with the aims of the Protocol. Clearly, this was no easy task. The IPCC report cites an article listing 240 definitions of forests used by countries, depending on their social and economic structures and biogeophysical conditions –and these are just some

official ones (Lund 1999, in IPCC 2000: 63).²¹⁶ The definitions are often based on legal and administrative requirements -such as “Any lands within the XYZ jurisdiction”-, or on land use and cultural considerations –typically: “An area managed for the production of timber and other forest products or maintained as woody vegetation for such indirect benefits as protection of catchment areas or recreation” (IPCC 2000: 64). These definitions have for the most part little to do with carbon content.

A general definition of forest used by the Food and Agriculture Organization (FAO) is based on land cover, establishing a threshold of minimum canopy cover – that is, the proportion of ground area covered by tree crowns. But again, this is not a widely applicable or accepted definition. Globally, about 50 percent of wooded land has a canopy cover of less than 20 percent, and can vary at the national level between 10 and 70 percent (IPCC 2000: 64).²¹⁷ Variations between regions and between countries are also great. One can have a closed canopy moist forest in one place, and a sparsely treed, low canopy cover savanna in another.

In pure carbon accounting terms, establishing a precise and global definition simply based on canopy cover is highly problematic. If the threshold is low, say a 10 percent canopy cover, a dense forest could be seriously degraded and result in high carbon emissions without qualifying as forest loss or deforestation. If the threshold is high, for example 70 percent, significant areas could be cleared without the resulting

²¹⁶ See Fairhead and Leach (1998) for a fascinating account of contested ideas of the forest and their implications in Africa. See also Dove (1992) for another fascinating account of the etymology of the word jungle in Pakistan in relation to the physical environment and cultural values (it went from referring to ‘savanna’ to ‘forest waste’).

²¹⁷ In the definitions covered by Lund (1999) the minimum canopy projected cover to be included as forest varied between 10 to 70 percent.

loss of carbon being accounted for. Conversely, any increases in the canopy cover beyond 10 percent (up to 90 percent) would not comply with the definition of reforestation or afforestation and would not accrue credits for carbon sequestration.

There is also the problem of measuring actual canopy cover without consideration of potential canopy cover. Since definitions under the Protocol are about a change in land use –from forest to non-forest in the case of deforestation for example- a definition of a forest based strictly on actual canopy cover could lead to harvesting and shifting agriculture falling under deforestation, or to natural regeneration being referred to as reforestation -and thus allowing for undue credits. Similarly, if potential canopy cover at maturity under planned land-use practices was the basis of the definition, carbon loss from harvesting or carbon sequestered from regeneration activities might not be counted (IPCC 2000: 6).

This points to the problem of timing, i.e., the great asymmetry in the rates at which carbon is released into the atmosphere and the rate at which it is recaptured as the forest grows again –decades and centuries, depending on the species of trees and site conditions.²¹⁸ Yet the carbon uptake needs to be tallied by a specific date to count towards fulfillment of commitments under the Protocol. A regenerating boreal forest stand, which could require decades for its canopy cover to reach the definitional threshold, would reach this maturity level well beyond the five year commitment period established by the Kyoto Protocol.

This problem of time and accounting for harvesting also comes up in defining afforestation and reforestation. Reforestation is defined as “the establishment of trees

²¹⁸ For time factor, see Fearnside et al. 1999.

on land that has been cleared of forest within the relatively recent past” or, in terms of operational forestry, land that has just been harvested. Afforestation commonly refers to land that has had no forest for much longer (20-50 years or more) and was under a different land use. But if the definition does not include harvesting, credits may be awarded in spite of carbon loss, even though credits from regeneration are given. And this accounting has to somehow be in line with the five-year commitment period during which verification takes place.

A worst-case scenario resulting from this paradox was reported recently in New Zealand (RNZ/TVNZ June 14 2005). According to the Forest Owners Association there, foresters have begun felling their immature forests to avoid penalties under the Protocol. Because they expect to be subject to liability for trees planted before 1990 and felled after 2007, new plantings have likewise all but stopped.

During the negotiations opinions varied widely as to how to solve the problem of defining forests. Canada supported a “pick-your-own” approach; the EU proposed a modified version of the FAO definition based on canopy cover; and AOSIS called for a biome-based set of definitions. The latter would address ecosystem differences setting out the tree height and crown cover for particular forest types. It would require countries to identify their lands according to the forest types, and would be thus more ecologically sound and more easily verifiable. Developing this set of definitions however, was not considered to be feasible for the first commitment period (Yamin and Depledge 2003: 5.52).

In September 2000 at SBSTA 13 negotiations started revolving around a modified FAO definition including a minimum tree canopy cover. To avoid the

problem of selecting a low canopy cover that would let deforestation pass without notice, AOSIS proposed a maximum assessment unit for a forest of no more than one hectare. This was strongly opposed by the United States and Canada, which preferred to aggregate data rather than account for each hectare of forest. As a solution, a decision text outside the definition of forest states that for the purposes of determining deforestation under Article 3.3, the spatial assessment must not be greater than one hectare (Annex to draft decision -/CMP.1 (LULUCF) (FCCC/CP/2001/13.Add.1)).

Another creative solution was found to address perverse incentives to cut down ‘natural’ forests in order to install fast growing plantations. This had been a major concern of several environmental NGOs, whose leaders had campaigned loudly against sinks for this reason.²¹⁹ The solution entailed defining forests as being either natural or a plantation. That way, cutting down a forest to establish a plantation would not be considered reforestation as they are officially both “forests.”

In the end, the definitions were finally settled in Marrakesh in 2001, at COP 7 (Decision 11/CP.7). There, a forest was defined as follows:

A minimum area of land between 0.05 and 1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30 percent with trees with the potential to reach a minimum height of 2-5 meters at maturity *in situ*. It may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground, or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10-30 percent or tree height of 2-5 meters are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked

²¹⁹ Together with the fear of ‘alien’ species and GMOs, this image of cutting ‘pristine’ forests to make space for fast-growing monoculture plantations to gain carbon credits was used effectively by ENGOs against sinks.

as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

This definition of forest, contrary to common perceptions of what a forest is, contains no mention of biodiversity, for example. Nor is there reference to sustainable use of natural resources, which one would expect of an international environmental treaty dealing with forestry activities.

Problems defining forests

This whole dissertation could have been written on the problems of defining a forest for the purposes of the Protocol. Here I want to point to those that received most attention during the negotiations. Many of these are particularly problematic in the context of CDM projects in developing countries.

First is the distinction between a forest and a plantation. The FAO definition of forest, like the definition under the Protocol, included both “natural forests and forest plantations” (FAO 2000). Yet there is indeed a difference between a multi-species forest ecosystem and 10,000 hectares of fast growing eucalyptus, pine or gmelina, genetically modified to produce higher yields of more uniform woods. To equate these two has serious policy implications, and the lack of distinction in the words serves to promote monoculture plantations as an effort to counter deforestation or advance reforestation by “increasing forest cover.” Furthermore, big monoculture plantations usually have negative impacts on the soil, water, plants and wildlife, they create very few jobs, mostly low quality, and do not generate wealth at the local level –canceling out more options for the local people than creating them.

This has been the flagship argument for those ENGOs opposing sinks.

They point out that it is not only that plantations cannot substitute forests, having such contrasting environmental impacts, but plantations usually mean the cancellation of the possibility of natural forest regeneration. More than “green deserts,” plantations are therefore referred to as “green wastelands,” because “there is more biodiversity in a few square meters of the Namib desert than in an entire plantation” (Carrere 2004: 2).

This is a good argument. Under an international environmental treaty that speaks of sustainable development, it would be an aberration to prize large-scale plantations for the carbon stored in tree trunks while the soils and the flora and fauna are depleted. But this is about carbon accounting as an offset of greenhouse gas emissions.

The problem is not if a tree or a forest is planted or not, but the scale at which either of these takes place. There is a wealth of studies to show how the dichotomy between investing human labor on the land, versus the idea of untouched or “virgin” forests that require fencing off from humans to survive, is misguided, historically untenable and politically devious, part and parcel of the history of enclosures (Williams 1980; Cronon 1983; Fairhead and Leach 1996, 1998; Dove 1992). From its beginnings, environmental conservation of forests has been the prerogative of the state and/or the upper class. In his history of environmental conservation, Grove (1995) shows how institutional conservation, as a “legitimate concern” of the state, develops largely as part of the colonial enterprise, directly linked to control of valuable resources (wood for the royal navy as well as control of territories and population). Meanwhile in Europe, in the two most important early works in the

history of forestry -John Evelyn's *Silva: A Discourse of Forest Tress*, from 1664, and Colbert's *French Forest Ordinance of 1669*, forestry is clearly a matter for gentlemen, not rustics, hence the importance of fencing for preservation against "rude Commoners" (Glacken 1967: 487 and 491). It is revealing that the word "paradise" derives from the old Persian word for "enclosure," and that it takes in turn the meaning of garden in Greek and Latin (Merchant 1989).²²⁰

In that sense, it is interesting to note how ideas of ecosystem and climax are differently applied in Europe and in the colonies. While Sir Arthur Tansley (1871-1955), the Oxbridge botanist who coined the term "ecosystem" in 1935, rejected the idea of climax vegetation in England because it implies lack of human agency, the idea was always applied in the colonies, in particular after the work of F. E. Clements, the American plant ecologist who wrote on the progression toward "climatic climax" (Cameron 1999: 13). This has to do with the convenient failure to acknowledge indigenous peoples' agency in the colonies ("the people without history" [Wolf 1982]) whereas in Europe at that same time this agency would be impossible to deny (it is what distinguishes Europeans, "the people with history").

Direct versus indirect effects

Both the Protocol and Decision 9/CP.4 make clear that for LULUCF activities to count as carbon sinks or sources and generate credits, any change in land use has to

²²⁰ On the idea of a past golden age in human's relation with nature going back and back, always receding –William's escalator ride- to Hesiod in Greek times (at least), the theme repeated by Seneca, Ovid, Varro and Virgil, see Glacken, pp. 130-134. A sure sign of it being a popular myth is reflected in the funny parodies by Greek comic poets of this innocent golden age -when people not only possessed "physical and moral superiority, but the fertility of the soil was so great that it supplied men with food without the need of tillage" (131-2). The myth includes already the notion "that the soil is most fertile when it is least interfered with by human art." (132). See also Cronon 1995; 492, fn 8.

be the result of a “direct human-induced” action. However, distinguishing what is a natural event from a human-induced one is far from easy. Even the most common example of a natural cause of sink reversal, forest fires, is tricky. These can be the result of a natural event such as lightning, or of a direct or indirect human act, such as accidental fire, arson or prescribed burning and its escape. The causes are in many cases not simple to attribute.

A definition that assumes forest fires as carbon loss might not even be consistent with the long-term maintenance of forests or the increase of carbon stocks. Fire is in fact a natural part of many forest ecosystems, as well as a forest management tool. Natural or prescribed, fires work as breaks that reduce the chances of more intense fires spreading. So even though they are beneficial and necessary, in the short time of a commitment period they appear as carbon loss. In this case, carbon accounting could serve as a disincentive to the sustainable management of the forest. To complicate things a little more, it appears that the fire regime in parts of the world is changing, due possibly to direct and deliberate human manipulation, as well as indirect manipulation –including climate change (IPCC 2000: 68). Fire regimes will thus vary with rapid climate change or in response to El Niño pattern changes. Furthermore, forest fires do not always result in complete tree mortality -or in deforestation as commonly defined. In eucalyptus and some pine forests, most mature trees will survive even intense fires. Most trunks and large branches will regrow full canopies in a few years -but probably not in time for the verification process during the commitment period.

In sum

There is a difference between the many and varied values attached to forests and the one monetary value attached to carbon. Carbon is only one commodity -and that is, only for some people, and only provided it is measured, registered and validated as such-, while the forest provides a range of commodities –both material and ideal. Even the IPCC warns that:

“...promotion of carbon over other forest values could impoverish people who benefit from the diversity of products and non-carbon services. This problem will be greatest where livelihoods are at stake, especially where food security is threatened (Ogle 1995) as well as where the interests of forest-dependent people are poorly represented (Tipper and de Jong 1998). This factor is particularly important in countries with low per capita incomes that are not self-sufficient in terms of growing food and have a low capacity to finance food imports” (IPCC 2000: 112).

This is tied to the idea of involution and to problems resulting from the compartmentalization of nature, or its production in discrete units (carbon here, biodiversity there, people farther away, and so on), which work at cross-purposes and become unecological, inefficient, and result in the continuous reproduction of uneven development. The level of complexity that resulted from this fragmentation will, I hope, become clear in the following chapter.

Chapter 5

Sinks in the CDM: Creating the rules of the market

“Invest in Forest Carbon; Promote the Millennium Development Goals: Fight Hunger and Poverty, Enhance Biodiversity”

Forest Trends and The Katoomba Group.

“Forest Fraud: Say No to Fake Carbon Credits.”

FERN and SinksWatch.

These two appeals could be read next to each other in equally glossy brochures on top of strategically placed tables in the conference center in Milan on the occasion of COP 9. There were many others, such as one by the BioCarbon Fund of The World Bank, which read *“Harnessing the carbon market to sustain ecosystems and reduce poverty,”* or another one advertising *“Carbon as a Non-Timber Forest Product”* from the “Action Research to Bring Community Based Forest Management Projects under the UNFCCC and the Kyoto Protocol.”

The messages from the various groups supporting and opposing sinks in the CDM could not be farther apart. While those in favor made it seem like an absolute win-win situation, an opportunity “to save the tropical forest” and fight hunger and poverty (see quotation above), those against spoke of green deserts, dispossessed and displaced rural populations, and “forest fraud.”²²¹ This disparity of views was shared

²²¹For arguments in favor, see for example the Innovations Report, 2006. Noting that tropical forests are “currently disappearing at a rate of fifty tropical football fields a minute,” the report announces that “Developing nations may save the tropical forest,” (and that the “New initiative is an alternative to destruction of their forests in order to develop economically.”) http://www.innovations-report.com/html/reports/environment_sciences/report-57982.html Last checked April 13, 2006. For arguments against, see www.fern.org, www.sinkswatch.org, www.carbontradewatch.org

by the Parties negotiating the modalities and procedures for sinks in the CDM, making the negotiations arduous and sometimes tense. Some small and poor countries in Africa and elsewhere were distressed because sinks in the CDM represented practically the only chance to participate in the Protocol's mechanisms, given their low potential for emission reductions in the energy sector, limited industrial capacity and largely rural economies. The result was a decision full of compromises that, the moment it was adopted, everybody hailed as a finely crafted balance. As time passed however, it became clear that the rules adopted presented more challenges than opportunities, in particular for small-scale projects aimed at low income populations.

This chapter details the history of the negotiations on sinks in the CDM, from the early discussions considering avoided deforestation to the final decision on small-scale afforestation and reforestation. It describes the various methodological and technical issues that had to be sorted out to make removals from sinks credible as emission credits, the various countries' positions, and the compromises made. Some of what follows on the negotiation history is fairly detailed and technical. I wanted to include it because I had the opportunity to observe it first-hand and because so much of it is not found elsewhere (the UNFCCC secretariat makes a report of the meeting, but some of the discussions in informal contact groups and the proposals circulated are not noted or kept or not easily available). The implications of these decisions on the ground will be further explored in the next two chapters.

Sinks or toilets?

“Why should African governments let their land be used as a toilet for absorbing emissions from Americans’ second cars?”²²²

Already in 1977, in what is often considered the earliest paper on sinks and climate change, Dyson suggests that, provided they are planted on a sufficient scale, trees could offset the global annual increase in emissions in the face of an imminent ecological disaster from increasing CO₂ levels. To make this economically feasible, he suggests plantations be carried out “by labour intensive methods in countries where labour is cheap” (Dyson, 1977: 290).

Twenty years later, arguments for including sinks in developing countries in the Kyoto regime have become more sophisticated. There is less explicit reference to cheap labour and instead, in line with prevalent neoliberal economic ideas (that each place should specialize and produce what it can do best and trade the rest), the argument revolves mainly around the suitability of the land. The IPCC’s Second Assessment Report and the LULUCF Special Report thus note the great difference in the rate at which forests grow in the tropics and sub-tropics compared to temperate areas, and from that observation derive that the projected costs of establishing forestation schemes to act as sinks is between once cent of a dollar and \$20 per ton of

²²² The metaphor of toilet, as recounted by Grubb in noting the “depth of feelings” and complexities surrounding the issue, was used by an African attendant to a meeting in the early 1990s. It was in response to a talk by an economist from a US environmental NGO, who elaborated on the advantages of Activities Implemented Joint (the pilot-phase for flexible mechanisms before the creation of the CDM and JI) and the reduced costs of absorbing CO₂ in Africa compared to limiting emissions in the US. “*Shaking with anger, an African present arose and asked ‘why should African governments let their land be used as a toilet for absorbing emissions from Americans’ second cars?’*” (Grubb 1999: 99).

carbon in the tropics, compared to \$20-\$100 per ton of carbon in non-tropical countries.

Other influential arguments for the inclusion of sinks under the CDM stem from the surge of public interest in forest conservation. This represents a large and extremely well-funded enterprise in developed countries. Meanwhile, most developing countries lack the resources to undertake and maintain forest conservation, even if under pressure by international grant and loan awarding organizations. Many have also bet on tourism as a source of foreign income, and publicized natural resources among the national attractions. To them, the sale of emission reduction credits from sinks appeared as a potential source of sustained income in a sector where “no-strings attached” investment is practically non-existent. The money so gained could be used to assist conservation efforts and even possibly contribute to rural development.

This view was very much promoted by what is known as the conservation lobby. This was composed of a number of powerful ENGOs, mainly from the United States, who had already invested in carbon sequestration projects, knew that they had a major role to play as intermediaries, and saw many potential benefits from their inclusion under the CDM. Although they were less vocal regarding tree plantations, groups such as The Nature Conservancy, the Union of Concerned Scientists, Conservation International, Environmental Defense Fund, and others argued that, with clear rules, sinks projects in the CDM could deliver social and environmental benefits, promote biodiversity and help developing countries in the conservation of forests.

As negotiations began on the issue expectations ran very high. There was talk of billions of dollars going South for the sale of reduction emission credits. In the words of a Costa Rican in charge of the national climate change program, “it could imply, for once in over 500 years, resources flowing North to South instead of the other way around.”²²³

But these expectations were not shared by all. As noted earlier, many countries opposed the inclusion of sinks in the CDM based on the uncertainty of the reductions which, they claimed, could threaten the “environmental integrity” of the Protocol. This was the official position of the EU, AOSIS and others, as well as of a number of powerful international ENGOs such as Greenpeace, the World Wildlife Fund, Friends of the Earth, and others grouped under the Climate Action Network (CAN). Besides, the EU’s opposition to sinks in general was arguably also a matter of economic self-interest. In almost every country in the EU the price of gasoline is at least double that in the United States, presenting a real problem of competitive advantage. So they naturally opted for options that could increase US fossil-fuel prices and thus indirectly promote the development of alternative energy sources -in particular, those technologies which they possess (see Chapter 3).

Another persuasive and important argument against sinks projects is that they deliver little in terms of technology transfer to developing countries. Moreover, because the assumption was always that forest projects presented a cheap option to acquire reduction credits, it was feared that if they competed with energy projects under the CDM, they would divert investment that would otherwise be directed at

²²³ Personal communication, July 1999. Similarly, Boyd (2003) quotes a delegate at the climate change meetings saying “I overheard the representative of Colombia saying that there were millions of dollars for sinks in the CDM.”

improvements in energy efficiency and at developing renewable energy. China for one stood much more to gain from energy projects and was not really interested in sinks. The small island states grouped under AOSIS, knowing that they would be the most directly affected by climate change and with few chances of implementing sinks projects, also opposed sinks, wanting rather to ensure that emissions would be reduced at the source.²²⁴

Brazil's position was mystifying to many people, who a priori assumed Brazil had most to gain from a market in sinks -in particular, from avoided deforestation. Yet while Brazil did support the inclusion of plantations and agroforestry under the CDM, it adamantly opposed including avoided deforestation. Sovereignty concerns are commonly used to explain this position, as Brazil, like Peru, resisted any strategy that would tie up land that could be used for the country's national development. Some have even referred to the Brazilian government's fear of "'internationalization' of the Amazon using environmental protection as an excuse" (Fearnside 2001: 174). Moreover, there seemed to be a discrepancy of views within the government about this (differences between the Ministry of Foreign Relations and that of the Environment, as well as differences among and between state and federal governments [ibid.]).²²⁵ But at the negotiations the Brazilian delegation never wavered in presenting avoided deforestation as creating an enormous loophole for real reduction commitments in industrialized countries, knowing too well how precarious forest conservation is and how difficult it is to monitor. And given the remarkable

²²⁴ Also opposed to sinks in the CDM was the Indigenous Peoples' Forum on Climate Change, which presented a declaration (see Boyd 2003). Yet the influence of this group in the negotiations was effectively insignificant.

²²⁵ See letter from the governor of Amazonia at Montreal 2005 (*copy in file of author*).

negotiating skills of the Brazilian delegation, these supposed national differences were never manifested and its position was never questioned.

In contrast, sinks appeared to many developing countries as a development opportunity to address soil erosion, degradation of land and loss of forest cover. They welcomed what they saw as an opportunity to deal with natural resource conservation as free as possible from the intervention from international agencies and environmental lobby groups.²²⁶ Sustainable land-use policies and practices were very much part of their sustainable development goals –in particular insofar as they implied erosion prevention and improved water quality- and they thought the CDM could provide inputs in research and capacity building activities to assist them in this goal. They argued that assigning a price to carbon was one of the few ways that sustainable land or forest management and conservation could compete with alternative land uses and avoid further land degradation. Costa Rica, Colombia and several other countries were already coming up with such policies at the national level, but as usual, lacked the funding.

The role of Costa Rica, together with other Latin American countries, was particularly noteworthy: as a group they had hosted 15 out of 20 LULUCF projects under the Activities Implemented Jointly (AIJ) pilot phase (UNFCCC 2002). When SBSTA 16 requested submission from Parties to begin consideration of the modalities and procedures for afforestation and reforestation project activities under the CDM, almost half the submissions received by the Secretariat (9 out of 20) were from Latin American countries, including a common submission from Bolivia, Colombia, Ecuador, Guatemala, Nicaragua, and Uruguay.

²²⁶ This is not the case with the other options, such as debt-for-nature-swaps.

Similarly, for many African countries with little prospect of investments in energy efficiency, sinks projects represented the only possibility of participating in the Kyoto Protocol. And of course some Annex I countries, in particular those in the Umbrella Group, viewed sink projects under the CDM as a relatively inexpensive way to meet their reduction commitments, potentially while also meeting other international environmental and economic goals. More to the point, since emissions from land use change and forestry account for an important part of emissions from developing countries, it was argued that improving forest and land management in developing countries would eventually contribute to stabilizing concentrations of greenhouse gases –the ultimate objective of the Convention.

The inclusion of sinks in the CDM was, like LULUCF in general, a most divisive issue, splitting sharply not only developed countries, but more significantly the G-77/China and the environmental movement –which are normally expected to negotiate as a group and hold uniform positions (Fearnside 2001). Like all accounting for LULUCF, sinks under the CDM have problems of uncertainty, leakage, non-permanence, and others. But unlike LULUCF under article 3.3 and 3.4 or under Joint Implementation, where the uptake of carbon is added as a credit and the loss of carbon is deducted as a debit in a national account, what makes sinks in the CDM particularly tricky is the fact that developing countries have no commitments under the Protocol. Once a project is completed, any loss of carbon from that project in the host country goes unaccounted for, even while it has enabled an added ton of a greenhouse gas to be released in the buyer country. This presented the possibility that sinks in the CDM could ultimately result in increased greenhouse gas emissions

instead of reductions. Still, supporters of sinks argued that the environmental benefits of sinks projects outweighed deficiencies in carbon accounting precision. In any case, dealing with this problem was going to be a most creative exercise.

Negotiating sinks in the CDM

One of the most suspicious inconsistencies of the Kyoto text is the lack of reference to sinks under the CDM (Article 12). This was apparently to do with the “text clean-up process” which deleted all footnotes in the text at Kyoto after COP 3. But there are suspicions as to whether this was deliberate. (Depledge 2000: para. 76; Fry 2002: 161). It is more likely that the omission of sinks was because Parties –in particular the G-77/China- could not agree on the issue.²²⁷ For one, Ambassador Estrada had very clear views on this. In a UNDP text written soon after Kyoto on issues and implications of the CDM, he observed that:

“Article 6 on Joint Implementation includes both reduction of greenhouse gases emissions and removals of greenhouse gases; it explicitly refers to ‘projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks.’ However, Article 12 on the CDM instead only refers to reduction of emissions of greenhouse gases and says nothing about removals of greenhouse gases. It is only logical to conclude that different wording reflects different meaning, and it is against any legal methodological interpretation to hold that different wordings in the same legal text have equal meaning. It has been suggested that there was an understanding among negotiators to make the texts of Articles 6 and 12 uniform on this point. That was never brought to my knowledge, neither during the negotiations nor after the negotiations in the Committee of the Whole and before formal approval by the Conference. Delegates involved in

²²⁷ Personal communication.

the negotiations were well-experienced diplomats, scientists, and professional staff, and nobody should be induced to error. If a negotiation ends with ‘we’ll revisit this text later’ and that ‘later’ never comes, it is because the will to revisit the text did not exist. At the end, in this as in other matters, the only real truth is the political will of governments, and sequestration will be included in the CDM or not according to that will” (Estrada-Oyuela 1998).

But political will there was –at least among a significant group of countries- and the issue was brought back to the negotiating table as soon as the next meeting was held. The United States, together with Japan, Canada, Australia, New Zealand, and others, argued that the original intent had always been to include sinks in the CDM and that this had been clear at the time. But the G-77/China had no unified position. As noted earlier, most Latin American countries -with the notable exceptions of Brazil, Peru and Argentina- as well as the EITs and some African and Asian countries, were in favor. But G-77 heavy-weights Brazil, India, and China, together with Peru and Argentina, as well as the EU, AOSIS and some other African and Asian countries, opposed them.

In many ways, negotiations started in earnest with the IPCC Special Report on LULUCF, which generated heated debate on whether sinks were portrayed in too favorable a light. Chapter Five of the Special Report on LULUCF on project-based activities was the subject of intense discussions when the IPCC Plenary XVI met in Montreal in May 2000. On that occasion, Brazil, Peru, China and others expressed in unequivocal terms their opposition to unqualified positive references to sinks -in particular regarding avoided emissions from deforestation, with Brazil noting that it

could alone offset every ton of carbon under the CDM by conserving the Amazon basin (Fry 2002: 167).

The reactions to the LULUCF Special Report varied greatly. AOSIS for example called for “a significant revision” of the report and gave detailed word-by-word comments on where and why it should be revised. While recognizing the enormity of the task and congratulating the numerous contributors for their efforts, “particularly in dealing with a complex subject with significant political implications,” AOSIS notes in its comments to the report that “there are some fundamental omissions, inaccuracies, biases and misconceptions” including “inherent biases and factual inaccuracies or unsubstantiated generalisations.” AOSIS further notes that even though “[I]t is fully recognised that any scientific discussion is prone to errors or differences of interpretation. [...] It would appear that some of these inaccuracies relate to inherent biases of some of the authors. We would hope that it does not reflect positions of certain Parties.”²²⁸

In contrast, in a statement to be recorded with the report of the meeting once the Special Report and the Summary for Policy Makers had been adopted, Australia noted that “[t]here have been sessions of the IPCC in the past where the political environment was just as intense as it has been here over the past week but none where the pressures on the scientific integrity of the end result have been as great,” adding that the Summary for Policy Makers was balanced and objective, due to the “the superb scientific and analytical work of the Coordinating Lead Authors and Lead Authors who have worked tirelessly on the report under enormous pressure and

²²⁸ AOSIS paper titled “Additional AOSIS Comments on the IPCC Special Report on Land Use, Land-use Change and Forestry” (copy in file of author).

maintained the integrity of the science through their highly professional handling of the debate in this forum.” Australia further congratulated the IPCC, and in particular Chair Robert Watson, “for the way [you and your co-Coordinating Lead Authors] have protected the overall scientific integrity of this Summary for Policy Makers through your absolute insistence that, ultimately, its scientific content must be supported by the Lead Authors and by the underlying report” (see IPCC XVI [draft] report).²²⁹

At the UNFCCC negotiations the issue was handled as a “hot potato” according to Fry, passed back and forth between the mechanisms and the LULUCF working groups, with none of the co-chairs wanting to take responsibility for it (Fry 2002: 167). Towards the end of COP 6, President Pronk came up with a compromise solution whereby avoided deforestation would be considered under the Adaptation Fund, but not as a credit generating activity under the CDM, leaving only afforestation and reforestation as eligible activities. The proposal mentioned non-permanence, social and environmental effects, leakage, additionality and uncertainty as important concerns of some Parties (such as the EU and AOSIS) (Note by the President of the COP, 23 November 2000). This represented a good middle ground and came close to being the final decision (ibid.). But then COP 6 was suspended.

²²⁹ The draft IPCC report of the Sixteenth session is found under <http://www.ipcc.ch/meet/p16.pdf>. The Australian statement further notes that: “We all knew that much of the debate and rewriting of the Summary for Policy Makers would be based on a balance of the interests of the Parties to the Convention and the Protocol rather than from the sole perspective of maximising the scientific integrity and clarity of the Report. But the fact that, even in those circumstances, after 7 days and nights, we’ve approved by consensus a balanced and objective Summary for Policy Makers and accepted, with minimum changes, an extremely comprehensive underlying report, is an enormous tribute to the professionalism, integrity and good will of many people.”

When negotiations resumed at COP 6 part II, a note by the co-chairs of the negotiating groups outlining key outstanding issues and options to be resolved by ministers and senior officials at the high level segment again included all possible options on LULUCF credits under the CDM: from no LULUCF activities credited under the CDM, to all LULUCF activities credited, including simple afforestation and reforestation as a set of LULUCF activities, but also possibly including them with a number of provisions, such as specific modalities and limited crediting by various mechanisms and caps (FCCC/CP/2001/CRP.8).

In the end, like many important issues under the Protocol, the decision was taken as part of a compromise political package known as the Bonn Agreements. As usual on this matter, it was mainly Brazil that brokered the final deal (Krugg, personal communication) in which, not surprisingly, avoided emissions was left out of the CDM and included under adaptation (Decision 5/CP.7).²³⁰

The final decision was adopted in Marrakesh and included in the Marrakesh Accords (Decision 11/CP.7 on LULUCF). This decision states that only afforestation and reforestation (A/R) are to be eligible LULUCF project activities under the CDM during the first commitment period, and that their implementation shall be guided by the LULUCF principles; eligible LULUCF activities in future commitment periods are to be decided in negotiations on the second commitment period. The decision further states that the definitions and modalities for including A/R project activities are to be developed by SBSTA with a view to adopting a decision at COP 9 in Milan

²³⁰ For a more detailed discussion on how avoided deforestation was excluded from accruing emission credits under the CDM see Boyd (2003). On Brazil's "tremendous influence in international climate negotiations" see Fearnside 2001). See also Dutschke 2000 in *Ciencias Ambientais, Universidade de São Paulo* (quoted in Fearnside 2001).

in 2004, and that this new Decision shall be in the form of an annex on modalities and procedures for A/R project activities for the CDM reflecting, *mutatis mutandis*, the annex to Decision 17/CP.7 on modalities and procedures for the CDM. Issues that had to be taken into account included “non-permanence, additionality, leakage, uncertainties, and socio-economic and environmental impacts, including impacts on biodiversity and natural eco-systems” (Decision 11/CP.7, para 2(e)). Significantly, the decision caps the amount of credits a country can get from A/R in the CDM at 1 percent of that country’s base line emissions, for each of the five commitment period years (that is, 1 percent times five). This quantitative cap effectively puts a limit on the demand for sinks in the CDM -something which was said to have large implications for the CDM and would further depress the expected price of carbon sequestration from A/R in this market.

The conservation lobby -with Costa Rica and others- was appalled.

A/R and what had to be sorted out

The fact that the decision on sinks in the CDM specifies “non-permanence, additionality, leakage, uncertainties, and socio-economic and environmental impacts, including impacts on biodiversity and natural eco-systems” as issues that had to be taken into account was, like everything else in the decision, a result of political negotiations. It delimited what had to be addressed, and set the scope of the political debate. This debate was to be further contained with the *mutatis mutandis* reference to the decision on CDM in general, which gave a strong message that Parties could not change anything that was not specific to these issues.

Still, there was plenty to consider, including the definitions of afforestation and reforestation -it was unclear if these definitions included agroforestry or natural regeneration for example. What follows is a review of these most important issues that had to be resolved, in order to give an idea of the complexities implied in making a commodity out of carbon sinks and designing a global market for them.²³¹ The discussions were suffused with the sense, often explicitly stated, that in these highly technical issues lay to a great extent the famous ‘environmental integrity’ of the Protocol.²³²

Baselines

Any accounting of carbon sequestered by a specific project would first of all have to determine a base from which to start counting, that is, a baseline on top of which carbon uptake has increased as a result of the project.²³³ Doing this implies two things: developing a reference scenario for future human activity on the site, and estimating the carbon stock under this scenario. This is a problem shared by energy projects as well, but in the case of land involving many people, making such assumptions is difficult at best. Neither human nor natural activity is ever static; they respond to a multitude of stimuli from various scales, and they have never been in a blank state from which to start counting. In the case of conversion of agricultural or

²³¹ In addressing these issues one by one I focus on the complexities mainly for A/R, but it’s useful to keep in mind that all of them apply, and are even greater, in the case of avoided deforestation (or forest conservation).

²³² Personal observation and notes.

²³³ Baseline is defined by the IPCC as: “A reference scenario against which any change in greenhouse gas emissions or removals is measured.” IPCC. 2000. *Land Use, Land-Use Change and Forestry. Special Report. Summary for Policymakers. Appendix III: Glossary.*

cattle grazing land to plantations one may assume that, all things being equal, existing human activity and carbon stocks would persist -the problem is of course assuming this “all things being equal” not for one or two years, but for the duration of the project, which can go from a couple of decades to sixty years and more. Then one would have to calculate numerically the carbon uptake under this scenario.²³⁴

To address this question, some pilot projects established control plots with the same characteristics as the project site before the project began, but this approach for all projects would make them extremely expensive and is not always possible. Others developed a scenario using site-specific information such as plans and inclination of the landowners, as well as regional and national economic trends and policies. Needless to say, extrapolating data from regional and national trends and then forecasting for a land use project, even while taking into account its specific particularities, is a speculative exercise and is always uncertain. A reforestation project may have difficulty proving why the area would not have regrown under a business-as-usual scenario, while the causes for farmers engaging in a land use change may be based on immigration fuelled by government policies, or be related to poor agricultural practices, or to all of the above combined. There is nothing much negotiators can do in establishing general rules for this. The decision therefore states that baseline methodologies are to be developed based on existing or historical changes in the carbon stocks, those expected from land use that represents an economically attractive course of action, or from the most likely land use at the time the project starts. These approaches follow those agreed for other CDM energy

²³⁴ Imagine doing this for avoided deforestation, where one would have to calculate the level of deforestation expected for this long period of time.

projects, except for one option that applies to energy and not forests, which allows for the establishment of the baseline according to average emissions of similar project activities undertaken in the previous five years.

But besides the establishment of the baseline scenario, one of the key discussions concerning baselines for A/R CDM projects was which of the carbon pools -above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon- and sources of emissions should be taken into account in establishing the baseline and the actual net greenhouse gas removals achieved by project activities. Accounting for all carbon pools could be prohibitively expensive, and some of them might not represent much in terms of emissions –they could actually be acting as small sinks. To address this, the decision allows project participants to choose not to account for one or more carbon pools as long as they can prove that this exclusion will not augment the reductions claimed.²³⁵ Thus if a pool is a sink, it doesn't need to be measured. But if it acts as a source, it must be measured lest it result in overestimating the reductions achieved by the project.

²³⁵On project participants, see Chapter 6. As stated in the CDM Guidelines for preparing a PDD, and in accordance with the usage of the term in the CDM and CDM A/R modalities and procedures, a project participant is a Party involved, and/or a private and/or public entity authorized by a Party to participate in an A/R CDM project activity (CDM-AR-PDD version 04 page 14). The Party authorizing a public or private entity does not necessarily have to be the one where the entity is located but can be any Party participating in the project. What is important is that only project participants may decide on the distribution of CERs. A common problem of project proposals is that project participants are not clearly defined. The certification and validation company DNV mentions cases where the project operator has not been included as project participant or even been informed of the CDM proposal, and has subsequently threatened to stop operation. Although it is not necessary to include the project operator as project participant, a private agreement would ensure against this situation. Designated National Authorities (DNAs), consultants and local municipalities do not typically have a share in the distribution of CERs (Kamel 2005: 17). See Chapter 6.

Moreover, in order to play it safe and provide a conservative account of the baseline, and to prevent earning credits for avoided emissions that result only from the displacement of the previous land use, the final decision states that greenhouse gas emissions from activities on the land before the project was implemented are not to be included in the baseline. In the case of conversion from cattle grazing to plantations for example, the emissions from the cattle that would occur had the cattle stayed and that are avoided by switching to trees, are not be counted in the baseline. The definition for baselines, then, considers only the changes in carbon stocks and a project scenario that equals the verifiable changes in carbon stocks minus the increase in greenhouse gas emissions by sources resulting from its implementation. But this, again, is easier said than shown.

Additionality

A related problem and major challenge for emission reduction projects under a market for limiting greenhouse gas emissions is proving that the reductions would not have taken place in a “business as usual” situation, that is, in a world without credits. This is known as the problem of “additionality,” in the sense that all certified reductions must be additional to what would have happened anyway.²³⁶ This sounds more obvious than it is in practice and proving additionality became one of the most difficult and controversial issues under the CDM. Part of the problem stemmed from

²³⁶ Protocol Article 12, paragraph 5(c) states that the emission reductions resulting from each project activity shall be certified by operational entities [...] on the basis of, *inter alia*, “reduction in emissions that are additional to any that would occur in the absence of the certified project activity.”

ambiguities and inconsistencies in the definition of additionality, which was sometimes understood as environmental additionality, sometimes as financial additionality, and sometimes as both.

Financial additionality refers to the need to sort out projects that would have taken place anyway in the absence of credits for emission reductions. This is tricky if applied strictly: a switch from coal to gas could be considered non-additional because it is cost-effective. Yet there are many reasons besides price why emission reduction projects are not undertaken (see Baumert n.d.).²³⁷ Still, it was not possible to leave the door open for business-as-usual. In terms of public funding the issue became linked to developing countries' fear that funding for climate change would come from re-oriented overseas/aid/development budgets, instead of the already agreed-to "new and additional funding." There was some discussion early on about the need for a financial test to prove that funding of CDM projects would be additional to official development assistance (ODA), including the Global Environment Fund (GEF) contributions.²³⁸ This was too controversial however, and only a reference was left in the Preamble to the decision on the CDM (Decision 17/CP.7) (a location which indicates its weak legal status), stating that public funding for CDM projects is not to result in the diversion of ODA (Yamin and Depledge 2004: 177 and 184-5). It is then

²³⁷ Most obviously, lack of information (often due to special interests and publicity campaigns (or lack thereof)) and risk aversion -so-called non-price barriers (the best known example is probably compact light bulbs.) Many have argued that taking advantage of these "non-regrets" opportunities (the famous "low-hanging fruits") would be a boost to the climate regime and an essential push for further emissions reductions.

²³⁸ Part of the problem here is that if public funds were used to fund CDM projects, resources earmarked for sustainable development as prioritized by developing countries would be distorted (not to speak of the perversion of using supposed development assistance to help the donor meet its own mitigation commitments).

up to the CDM Executive Board and to the COP/MOP to assess if Parties are complying with this stipulation.²³⁹

While financial additionality may be a matter of yes or no, environmental additionality requires a quantitative calculation of tons of carbon equivalent that would result had there been no issuance of certified credits. In the case of A/R, as with establishing the baseline, proving that the carbon sequestered would not have taken place otherwise requires considerations of national conditions as well as particular project histories and projections. These would have to encompass both local specificities and regional trends –including financial investment flows, development funding, legal and regulatory standards, current management practices, etc.- together with particular politico-economic, cultural, and geophysical contexts. Because forests and other biomass tend to grow back naturally if left undisturbed, additionality would have to be calculated in excess of any natural regrowth, unless it was proven that the land would be used for other purposes where this natural regrowth would be artificially prevented.

But there are technical problems which calculations on additionality would have to consider. In some wet areas, for example, an increase in plant biomass carbon can lead to a decrease in soil organic carbon, possibly offsetting any gains in sequestration made by the plants. This has been the case in certain grasslands of the southwestern United States, where woody plant invasions of wetter grassland resulted

²³⁹ On the difficulties of separating out funding for sustainable development from “new and additional” resources provided to the Conventions’ financial mechanism, see Yamin and Depledge 2004, chapter 10.

in a loss of soil organic carbon.²⁴⁰ A similar problem has been pointed out for intensively managed tree plantations which, once their productive life is over, tend to diminish the natural regrowth capability of the soil. This would have to be taken into account in the form of a higher baseline.

In the final decision on A/R (Decision 19/CP.9), a project is considered additional “if the actual net greenhouse gas removals by sinks are increased above the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the registered CDM afforestation or reforestation project activity” (paragraph 18, *ibid.*). The decision parallels that for energy projects in that it leaves it up to the Executive Board of the CDM to decide on a case by case basis which projects are additional.²⁴¹

Yet the issue remains controversial. It was revisited at COP/MOP 1 in Montreal as many Parties and non-Parties had called for its reconsideration. The most insidious unintended consequence would be that in order not to threaten the additionality test, developing countries could hold back progressive energy and land use policies. Christiana Figueres, for example, speaks of Costa Rica as being penalized for its progressive climate related policies, and notes that Mexico City has put on hold climate friendly policies “not to spoil CDM project opportunities” (see Point Carbon 2004). Many, like Figueres, have argued that the current interpretation of additionality is a disincentive for developing countries to institute sectoral

²⁴⁰ See Jackson et al. 2002.

²⁴¹ Amongst the information required in the project design document (PDD) (the document to be submitted detailing the proposed project activity), is:

(m) Information on sources of public funding for the project activity from Annex I Parties which shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of those Parties.

decarbonizing policies. The problem is that additionality is defined as the opposite of business-as-usual, and you can't reward business-as-usual. It is yet to be seen how they deal with this conundrum.

Base year

Although originally not part of the scope of discussions, when to start counting, or defining the baseline year after which the definition of afforestation or reforestation may apply, became an important point of contention. In principle, the date was agreed in Marrakech to be 31 December 1989. This means that only land that was under non-forested land-uses in the beginning of 1990 would be eligible to apply for carbon sequestration credits. In subsequent meetings a couple of countries – following a proposal by Canada- tried to move the base year to 2000. This move was opposed by many ENGOs and many countries, worried that a more recent baseline year would greatly increase the land available for sinks. Some also argued that changing the agreed date would create perverse incentives to deforest today in order to apply for credits for reforestation in the near future.²⁴²

Setting the base year at 1990 does restrict to a large extent the land where carbon sequestration projects can take place. Many tropical countries, most notably Indonesia -but to some extent also Costa Rica- saw massive forest loss in the 1990s decade (in the case of Indonesia for example, mostly burnt in order to turn the land to large oil palm and pulp plantations). The Climate Action Network (CAN) argued that, given a general rate of deforestation of 10 million hectares per year since 1990, moving the baseline year would add 100 million hectares to the area where such a

²⁴² See CAN submissions; see also Greenpeace's (copies in file of author).

project can take place.²⁴³ So if the baseline year was moved to 2000, Indonesia, the third largest forested country, would triple the area under which it could sell credits for reforestation as part of the CDM. Because of the cap of 1 percent times five of Annex I countries' base year emissions that may be used in A/R projects, it was argued that moving the baseline and increasing the land eligible for A/R under the CDM would only drive the price of the credits down –generating over-supply in a limited demand market. And this was deemed to be inconvenient both for addressing rising emissions and for the creation of scarcity required for an efficient market.

Non-permanence

A biological carbon sink today may be a source of carbon dioxide tomorrow, whether for natural or human-induced reasons, including climate change itself. This was the one most commonly cited issue against the inclusion of sinks in the CDM, and one that was only resolved by resorting to complicated accounting rules. It is referred to as the problem of non-permanence, and any accounting of emissions reductions from land use change would have to consider it. A major problem is the long time required for carbon sequestration by trees, and the no-time in which the carbon sequestered may be lost back to the atmosphere. Another one is the desire for a market for emission reductions credits to make all credits fungible –whether permanent or non-permanent.

Two main approaches were considered at the negotiations for accounting for non-permanence in A/R activities: the insurance approach (proposed mainly by Canada), and the temporary crediting approach (supported by the EU, Brazil and

²⁴³ See ECO newsletter No. 7, October 2002.

others). Other proposed options that did not last included buffers and ton/year accounting.

Under an insurance approach, project participants could insure the CERs²⁴⁴ generated by the project (which implies paying a premium to the insurer); in case of a loss during the project lifetime, plus an extra period of 10 years, the insurer would have to replace the CERs with other permanent carbon credits, that is AAUs (Authorized Assigned Units used for emissions trading and banking), ERUs (Emission Reduction Units, credits under Joint Implementation), or RMUs (Removal Units, from removals from LULUCF under Protocol Article 3.3 and 3.4). The principal argument in favor of the insurance approach was that it could result in a higher value for credits (provided that the cost of insurance remained low enough) because they would have been considered permanent credits when issued. Moreover, the insurer would have to acquire replacement credits, which means adding a captive buyer to the market. However, a set of technical questions limited the validity of this approach, including the uncertainty in the prices of CERs (with the consequent difficulty for insurers to establish a fixed premium in long-term projects), and institutional difficulties in developing countries relating to insurance markets (Wong and Dutschke, 2003).

²⁴⁴ As noted in chapter 3, Certified Emission Reductions (CERs) are the credits issued under the CDM. As explained in what follows, at COP 9 in Milan it was decided that those permanent credits from energy projects would remain CERs, and those from sink activities would be called tCERs or ICERs.

The temporary approach, presented by Colombia based on an earlier idea by Brazil,²⁴⁵ suggested that those carbon credits obtained by a developed country from forestry projects would expire when the carbon is emitted to the atmosphere for whatever reason. Then, the holding country would have either to reduce national emissions by that amount or buy the same number of carbon credits from another forestry project.

In the end, Parties agreed to a modified version of the temporary approach, using two new types of CERs to deal with non permanence: Temporary CERs (tCERs) and Long-term CERs (lCERs –also known as ul-CERs). For both types of credits, verification is required every five years with the exception of the first verification, which may be undertaken at a time selected by project participants. tCERs are issued after each project verification in an amount equal to the certified net increase in carbon stocks since the beginning of the project; they expire at the end of the next commitment period (meaning that they can only be used for the compliance period in which they were issued). If the trees are still there when the project is verified, replacement tCERs can be re-issued. Instead, lCERs are also issued after each verification but in an amount equal to the certified net increase in the carbon stock since the previous verification of the project, so that if there has been an increase since the last verification, more lCERs are issued, and if there has been a decrease, the corresponding lost lCERs must be replaced with permanent credits. They expire at the end of the project's crediting period. Prior to their expiration date, both tCERs and lCERs have to be replaced with AAUs, CERs, ERUs, RMUs (or

²⁴⁵This proposal was originally submitted in September 2000 and contained as a Colombian submission in document FCCC/SBSTA/2000/MISC.8.

other tCERs in the case of tCERs), but not with ICERs. In addition, ICERs must be replaced when the obligatory five-year certification report is not provided.

Parties agreed that project participants must choose one of these two approaches, which shall remain fixed for the crediting period, including any renewals. The crediting period was established at either 20 years - which may be renewed at most two times (up to 60 years), provided that for each renewal the baseline is reviewed - or a maximum of 30 years. No banking is allowed, that is, all credits are to be used for the commitment period for which they are issued.

Still, trying to solve the problem of non-permanence solely by accounting can bring up other problems. For example, liability gets pushed forward in time. NGOs and a few Parties feared that a situation could arise in which, once the lifetime of the tCERs comes to an end and replacements are needed, there could be a spike in demand for emission reductions, which would weaken further commitments, and which might ultimately mean that in fact the promised and additional permanent cuts would never materialize.²⁴⁶ To ensure that Parties were not too dependent on tCERs, or that they would not accumulate too much debit for the future, Brazil for one wanted a cleanup of accounts every now and then. For this reason, and to guarantee that credits are replaced in a timely way, each national registry has to include ICERs and tCERs replacement accounts for each commitment period.

²⁴⁶ As a corrective to the Colombian proposal, environmental groups under CAN proposed a five-year limit to the tCERs, with the possibility of renewal. This, they argued, would oblige periodic verification and monitoring of the projects, which might otherwise go for a long time unchecked. It would also make the projects more flexible for both developers and host countries and does not require land to be 'locked up' in long-term contracts (Submission by CAN on Issues Related to Modalities for Including Afforestation and Reforestation Under Article 12. August 20, 2002). If the definition of forestry was changed in the second commitment period, or carbon sinks no longer allowed after then, five-year tCERs could also be adapted or terminated without penalty to the Parties involved.

Leakage

Because projects don't operate in a vacuum, an offset of emissions in one place may result in an increase elsewhere, as when land is cleared for a plantation that generates no employment and people are displaced, often clearing forest land in another place, or when demand for timber, fuelwood or other goods is simply relocated. This "externality" is referred to as "leakage," and it can cross scales, from local to international. Commercial plantations are particularly prone to leakage, which is another reason why environmental groups want them out. The difficulty lies in establishing the boundary of the project and in accounting for leakages of different magnitude and type. Although it is impossible that all the consequences of an activity be accounted for before the project even starts, this is a matter of real consequence for the ecological and social integrity of the Protocol's mechanisms. A study in the United States of a large carbon sequestration program to convert agricultural land to tree plantations found that the benefits from the offsets would eventually be lost, as landowners responded by harvesting existing forests, converting unsubsidized land back to agriculture, and decreasing replanting of forests after harvest (Alig et al. 1998). And under a market for credits, it is not enough to acknowledge leakage -it must be quantified and reported.

During the negotiations, Norway introduced a text recommending an assumed 100 percent leakage default in cases where significant sources of leakage could not be estimated nor prevented -a proposal that was supported by NGOs under CAN. Some Parties, such as Canada and Bolivia, responded by proposing to account for positive

leakage –that is, positive effects such as emulation of the project in a nearby area. This was, according to some, merely a bargaining chip to ensure negotiating options against this default 100 percent leakage.²⁴⁷ The final decision merely states that all projects must account for potential leakage and include measures to minimize it.

Social and environmental impacts

The social and environmental impacts of sinks project under the CDM were always an issue. At SBSTA 18, Tuvalu, on behalf of AOSIS, and the EU with Norway and Switzerland, had each introduced a proposal detailing a list of topics that had to be covered in the analysis of environmental and socio-economic impacts of project activities. These issues entered the draft negotiating text at COP 9 as “Appendix E” (see Appendix of this dissertation). They would become one of the most contentious aspects of the rules for CDM A/R projects.

The discussion on Appendix E was one of the few instances where negotiations turned to actual impacts of the projects on the ground -the one, and perhaps the only, discussion of the effects of projects on people living where the project is to take place. And it is interesting to compare the options and the outcome. Whereas the EU’s proposal and language is more bureaucratic (it includes all those words that states use and few people agree on what exactly they mean, such as benefit-sharing, stakeholders, capacity-building, awareness raising, public participation, as well as “evolution of rights on tenure and land use”), AOSIS’s proposal is more straightforward and clear (displacement, damage or destruction,

²⁴⁷ Personal communication.

increase in disease and in noise or waste, changes in land tenure and in local economy or employment).

Both of these options for social and environmental impact assessments were strongly opposed by the majority of the G-77 and China (with the exception of AOSIS) and by Canada, on the grounds that the definition of a standard list of sustainable development criteria would impinge on national sovereignty. Many of these countries also opposed it on more practical grounds, noting that such assessment would significantly augment the project transaction costs -which were already anticipated to be very high and which they -that is, the project developers in the host countries- would have to bear. In practice, they argued, inclusion of Appendix E with that long list of things to consider would mean that almost no projects would be implemented. In response, AOSIS countered that the purpose of the list was to serve as a “tool kit,” a guideline to help in gauging a project, with criteria that are commonly used at international lending agencies such as the Asian Development Bank, World Bank and others. The EU argued along the same lines.

This is a good occasion to catch a glimpse of the faces behind the characteristically face-less Party positions at the negotiations. Specifically, it shows how Ian Fry, the delegate from Tuvalu speaking on behalf of AOSIS, pressed, as he consistently does, to include careful and rigorous consideration of social and environmental impacts. It is he who on other occasions has advocated for recognition of indigenous peoples’ rights or for addressing countries’ commitments under other conventions and international agreements, from ILO to CBD and CCD. Because he represents a very small island state, he can more easily get away with pushing ahead

with his own convictions. But for that same reason, his proposals do not always make it to the final text. Still, personalities loom large in explaining things, and he is more influential than one would expect a delegate from tiny Tuvalu to be. He knows the rules of the game, and this being the UN, where all Parties are in theory equal, his ideas have to be taken into account -at least nominally. Although I have no doubt that many delegates try to do as much, they often find it harder to push their line. In any case, it is not easy to assume that their position is a result of their own personal preferences, and only some people stand out. Fry is a good example of those who negotiate for a state but do not have only the state's interests in mind. And there are others. This is perhaps an easy illustration of an obvious fact: understanding the politics, economics and culture of the UN negotiations covers a great deal, but it is not always enough to explain things in detail. One must add to that *ad hominem* complexities.

Of course the EU, like Tuvalu and most other Parties, knew that clear rules for social and environmental impact assessments were necessary if the Protocol's flexible mechanisms were to have any public credibility –in particular in regards to forestry projects, which easily catch the popular imagination and emotion. Many NGOs had made forceful statements in this regard and made it clear that they would expose and bring disrepute to any attempt to bypass this most basic issue.²⁴⁸ Moreover, AOSIS has never supported sinks, always preferring to see real reductions in emission sources. The actual context of the negotiations probably also played a part. These

²⁴⁸ See Greenpeace's statement on sinks in the CDM and the possibility to include large-scale monoculture plantations or "environmentally and socially damaging projects": "Such projects should now, and most likely will, be opposed on the ground and investors should be held accountable." Greenpeace (Malte Meinshausen and Bill Hare). 2003. "*Sinks in the CDM: After the climate, biodiversity goes down the drain.*" 19th December 2003.

came after an infamous break in the relationship between the EU and developing countries at COP 8 in New Delhi. On that occasion, the EU and the G-77/China, sometimes referred to as the “Green Group” for their productive and sustained collaboration since COP 1 at Berlin, went back to their corners of the ring as the EU insisted on mitigation and future commitments (a subject which developing countries found unacceptable at that time), and developing countries insisted on adaptation and sustainable development (Ott 2003). This break was greatly aided by the United States’s and OPEC countries’ backstage peddling. Some of the distancing remained in Milan, where the EU was perceived by some (the delegate from Mexico for example) as having taken it upon itself to uphold the integrity of the Protocol (once salvaged after the United States’ withdrawal with the approval of the Marrakesh Accords), regardless of other considerations.

In any case, given the strong opposition of the G-77/China and a few others, after extensive negotiations Appendix E was abandoned and in its place a more general list of areas of enquiry for impact assessment were included as part of the information required in the project design document (PDD). APPENDIX B: PDD for A/R project activities under the CDM thus requires:²⁴⁹

[..]

(b) A description of the present environmental conditions of the area including a description of climate, hydrology, soils, ecosystems, and the possible presence of rare or endangered species and their habitats;

(c) A description of legal title to the land, rights of access to the sequestered

²⁴⁹In Decision 19/CP.9 (FCCC/KP/CMP/2005/3/Add.4) (originally FCCC/CP/2003/6/Add.2) Modalities and Procedures for Afforestation and Reforestation Project Activities under the CDM in the first commitment period of the Kyoto Protocol.

carbon, current land tenure and land use;

[..]

(j) Environmental impacts of the project activity:

(i) Documentation on the analysis of the environmental impacts, including impacts on biodiversity, natural ecosystems, and impacts outside the project boundary of the proposed afforestation or reforestation project activity under the CDM. This analysis should include, where applicable, information on, *inter alia*, hydrology, soils, risk of fires, pests and diseases;

(ii) If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation.

(k) Socio-economic impacts of the project activity:

(i) Documentation on the analysis of the socio-economic impacts, including impacts outside the project boundary of the proposed afforestation or reforestation project activity under the CDM. This analysis should include, where applicable, information on, *inter alia*, local communities, indigenous peoples, land tenure, local employment, food production, cultural and religious sites, access to fuelwood and other forest products;

(ii) If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation.

(l) A description of planned monitoring and remedial measures to address significant impacts referred to in paragraphs 2 (j) (ii) and (k) (ii) above;

(n) Stakeholder comments, including a brief description of the process, a summary of the comments received, and a report on how due account was taken of any comments received.

Under stakeholder comments, the decision on A/R emulates the decision for CDM energy project activities, stipulating under the Validation and Registration

requirements that a project's preparation phase should be subject to a period of local stakeholder comments and, prior to registration under the CDM Executive Board, subject to 45 days of scrutiny by Parties, stakeholders and UNFCCC accredited NGOs.²⁵⁰ Stakeholders are defined as “the public, including individuals, groups, or communities affected, or likely to be affected, by the proposed A/R project activity or actions leading to the implementation of such an activity.”²⁵¹

Thus, Decision 19/CP.9, paragraph 12 and 12(b) and (c) under G:, states:

The designated operational entity selected by project participants to validate a proposed afforestation or reforestation project activity under the CDM, being under a contractual arrangement with them, shall review the project design document and any supporting documentation to confirm that the following requirements have been met: [...]

(b) Comments by local stakeholders have been invited, a summary of the comments received has been provided, and a report to the designated operational entity on how due account was taken of any comments has been received.

(c) Project participants have submitted to the designated operational entity documentation on the analysis of the socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed afforestation or reforestation project activity under the CDM. If any negative impact is considered significant by the project participants or the host Party, project participants have undertaken a socio-economic impact assessment and/or an environmental impact assessment in accordance with the procedures required by the host Party. Project participants shall submit a statement that confirms that they have undertaken such an assessment in accordance with the procedures required by the host Party and include a description of the planned monitoring and remedial measures to address them;

²⁵⁰ In relation to stakeholder involvement, South Africa, Norway and the EU advocated to increase from 30 to 60 days the period to receive comments on the validation report by local stakeholders, Parties and UNFCCC accredited NGOs (30 days is the period for stakeholder comments for energy projects as per Decision 17/CP.7). But several Parties were opposed. The period for comments was finally set at a compromise 45 days.

²⁵¹ See CDM-AR-PDD Guidelines Glossary, Version 04, page 14.

In sum, the final decision simply states that the analysis of socio-economic impacts “*should include, where applicable, information on, inter alia,*” local communities, indigenous peoples, employment, land tenure, etc. (italics mine). *If* any negative impact is considered significant, project developers need only present a statement that the project participants have undertaken a socioeconomic impact assessment in accordance with the procedures required by the host Party; the designated operational entity (DOE) is only to verify whether this information has been submitted, but is not to assess it. Stakeholder comments on the project need merely be “invited” by project developers. As CAN said, “Let’s hope they’re home to get the invitation and not working on subsistence agriculture in fields that might soon be displaced by *Eucalyptus*.”²⁵²

In its final form, then, the text is open enough for all to agree and there are no real requirements of consequence to address social and environmental impacts of the projects. It is all in accordance with host Parties’ internal procedures, and no follow up is required. Whether local people’s interests are taken into account will depend on each specific project and on the amount of publicity and pressure civil society groups may bring to bear on buyers and (especially) host countries.²⁵³ At the UN, sovereignty rules: states are the ones negotiating, they uphold the right to decide.

²⁵² CAN, 7 December 2003. “Chair’s proposal for sinks: ‘Sinks –close to a decision???’” (copy in files of author).

²⁵³In many ways this is redolent of how state and capital work in similar circumstances: power is concentrated to make global decisions but the effects are then diffused by localizing and spreading responsibility and liability, making it harder to follow up and address (see also Strathern 2001).

GMOs and Invasive Alien Species

A particular issue that became contentious towards the last days of the negotiations was that of GMOs and invasive alien species (IAS). Referred by some delegates off the record as a “non-issue,” the question of GMOs and IAS came into the open on the third day of COP-9 formal negotiations, when Norway, which had earlier proposed excluding these from project activities, introduced alternative text. The text contained an option to use IAS and GMOs, provided their introduction had been subject to advanced informed authorisation by a competent national authority of the host Party, and that a risk analysis had been carried out in accordance with host Party procedures –an option supported by Canada, Japan, New Zealand, and Australia. The question was not openly discussed in the formal contact groups even though a number of draft proposals were circulated and discussed informally by delegates during COP 9. Yet, it was included in the Decision adopted by the COP, as “[R]ecognizing that host Parties evaluate, in accordance with their national laws, [potential] risks associated with the use of [IAS and GMOs in A/R project activities]”, and likewise, that “Parties included in Annex I evaluate, in accordance with their national laws, the use of [tCERs and/or ICERs] generated from [A/R] project activities that make use of [IAS and GMOs]”. Support of this text earned “Fossil of the Day” awards for Canada (twice), New Zealand (twice), China, Japan, Argentina, France, and Ireland.²⁵⁴ Even Norway was awarded one, for it was found to deserve “some friendly fire for temporarily chickening out on the clear GMO and IAS

²⁵⁴ “Fossil-of-the-Day” awards are given every day of the conference by the Climate Action Network based on Parties’ performance in the negotiations. See www.fossil-of-the-day.org

language.” Still, in their final statements, Australia and the United States voiced their discontent over the singling out of GMOs in the Decision.²⁵⁵ And although the United States is not a Party to the Protocol, its opposition resulted in the text being moved to the preamble (again, where its legal status is weaker). They based this opposition on the grounds of precedent setting. And even though this move makes the reference to GM trees non-binding, Washington insisted on putting its concerns on the record as "a miscellaneous document," as Harlan Watson, chief US negotiator said.²⁵⁶

Small-scale sinks

As negotiations progressed, it became increasingly clear that the rules for A/R projects under consideration would result in high transaction costs that would hinder participation by small producers and poor rural populations. There was soon consensus that simplified modalities and procedures for small-scale projects, such as those that already existed in the energy sector, targeted specifically for low-income communities, would be necessary. However, a small-scale project in a dense tropical forest in Nicaragua is very different from a small-scale project in a more sparsely populated savannah landscape elsewhere. The discussion on small-scale therefore

²⁵⁵ The United States opposition made the news: see, among others: Richard Ingham, “US defends GM trees in row at UN climate talks.” Agence France Presse. December 10, 2003.

²⁵⁶ Personal observation at the negotiations (see also UNFCCC records and report of the meeting). There are no commercial species of GM trees yet, but that innovation may not be too far away if there is the incentive under Kyoto to plant fast-growing trees that swiftly soak up CO₂.

centered on finding single definition for small-scale that could fit most national circumstances.²⁵⁷

At COP 9, Nicaragua, together with Colombia, Costa Rica, Bolivia, Uruguay, Chile and Mexico, put forward a proposal for small-scale and special projects under the CDM, subject to simplified modalities and procedures. The original text defined these special projects as those falling under any of the following categories:

- Small-scale project activities, defined as those afforestation and reforestation project activities that remove on the average less than 45 kilotons of CO₂ equivalent per year (Kt CO₂eq/year);
- Smallholder and community project activities, defined as those afforestation and reforestation project activities involving, as host country project participants, low-income communities as defined by the host country, and remove on the average less than 60 Kt CO₂eq/year;
- Environmental services project activities, defined as those afforestation and reforestation project activities that remove on the average less than 60 Kt CO₂eq/year where more than 50% of the land area covered by the project activity will be established as a protected forest for the protection of one or more of the following: biological diversity, water, soil, cultural heritage, scenic beauty, and human nutrition.²⁵⁸

There was prompt agreement on including reference to low-income communities, as defined by the host country. Mention of environmental services, at least partly

²⁵⁷ On what could count as small-scale, Chile, for example had proposed at COP 8 in New Delhi at a minimum an area of 5,000 to 10,000 hectares, prompting CAN to accuse Chile of disingenuously wanting to slip under the small-scale category large-scale mono-culture plantations, one of the country's main industries (ECO Newsletter, Volume CVIII, Issue #06).

²⁵⁸ Copy in file of author.

courtesy of Costa Rica, was soon dropped, since the discussion on protected areas had already taken place under avoided deforestation and there was no time nor will to engage in it again. It was the threshold for small-scale that divided countries, and with particular nastiness the G-77/China. While a large number of countries supported the 45 Kgt CO₂e threshold, China proposed a limit of 3 Kt CO₂e. This limit prompted accusations of China wanting to block small-scale sinks to favor energy projects, since sinks projects would never stand a chance with this limit and the low price expected from temporary crediting. Brazil was also accused of surreptitiously obstructing any agreements on small-scale, in which neither India nor it were interested,²⁵⁹ and using its power to speak on behalf of the G-77 to do little to defend it. Significantly, the major ENGOs, who had been most active at the discussions on large scale A/R, had dropped from the picture and their lobby representatives were hardly present at the negotiations on small-scale.²⁶⁰

Because of the need to decrease transaction costs, other matters under negotiation on small-scale sinks were the possibility of bundling projects, how to address leakage, and other measures such as developing project categories which could be readily used, elaborating a simplified project design document with simplified baseline and monitoring methodologies, and offering a discount from CDM Executive Board fees.²⁶¹ Failing to reach agreement on all these issues at SB 20, the matter was forwarded to COP 10 to be dealt with as a package.

²⁵⁹ Krugg, personal communication.

²⁶⁰ Personal observation, COP 9 and SB 20.

²⁶¹ The technical paper prepared by the UNFCCC Secretariat explaining these issues is found as document FCCC/TP/20004/2.

Given China's forceful position on the 3 Kgt CO₂e limit, and the lack of interest by Brazil and India, the final decision adopted at COP 10 established a threshold of 8 Kgt CO₂e for small-scale projects. Some compromise was made on allowing this limit to be the average projected net for each verification period. But any removals in excess of 8 Kgt CO₂e per year would not be eligible. Besides, it was agreed that these kinds of projects would be exempt from the 2 percent levy on CDM projects to be used for adaptation; be entitled to a reduced fee to cover administrative expenses of the CDM Executive Board; and be subject to simplified methodologies using default factors. Other than that, the COP "invites Parties to provide support for project participants interested in coordinating submission of several project activities, with a view to reducing the costs of validation, verification, and certification" and "invites relevant multilateral agencies, intergovernmental organizations, and nongovernmental organizations to participate in preparing these activities" (Decision 14/CP.10).

The Africa Group and many Latin American countries expressed frustration at the level of access and transparency of these discussions, as many important issues were discussed in informal "friends of the chair" groups. Off the record, they also expressed dismay at how the large developing countries had bullied the rest and gotten away with a decision that gave small-scale sinks projects only the slimmest chance.

Conclusion

Once adopted, everyone remarked how "finely balanced" the decision reached on sinks under the CDM had been and what a delicate compromise it had entailed.

Even CAN welcomed the “constructive elements” that were incorporated, such as on non-permanence, increased comment period, certain Appendices and aspects of monitoring and verification. They congratulated the co-chairs, in spite of “the serious flaws on the decision text regarding GMOs, invasive alien species and MEAs,” for their “vigilant efforts in pulling together a proposal derived from such divergent and complex issues.”²⁶²

Indeed, reaching a compromise that would meet most countries’ concerns was a most complicated affair. The most important concerns were ensuring that projects could be proven to contribute to the integrity of the Protocol by removing tons of carbon, and that rules were in place to uphold the credibility of the institution for any other matter that may arise. The irony is that the more ecologically and socially sound the requirements are, the greater the requirements for validation, monitoring, verification and certification. These in turn increase transaction costs and make carbon sequestration projects more expensive for the project developers. They are thus hardly attractive in a market where other more simple, secure and profitable products exist, such as simple efficient energy generation like hydroelectric plants or methane capture -the social and environmental impacts of which are not to be disdained. In fact, these latter kind of projects constitute already the majority of projects under the CDM.

Ideally, what would really compensate for these problems is if projects were designed to be sustainable in the long term. Many of those supporting sinks under the CDM spoke of potentially several hundred years of carbon storage under agroforestry

²⁶² CAN paper, 7 Dec 2003. See also paper on opposition by Greenpeace, 19th Dec 2003 (copy in file of author). MEAs refers to multilateral environmental agreements.

projects for poverty alleviation or forest restoration, which, if found locally beneficial and useful, could be maintained even if payments for credits were to stop. This was contrasted with short rotation plantations of exotic species, which aim for the cheapest achievable outcome and fail on most counts –long-term carbon sequestration, biodiversity preservation, and social benefits. But for the most part, the parties negotiating had no objections to large plantations. In fact, many of them saw the logging industry as an important contributor to their countries' sustainable development. Others simply did not care to bother with small-scale forestry projects, specially if they were placed to compete with projects in the energy sector. In any case, when Parties negotiated the regulations for sinks in the CDM, the main concern was with making the modalities and procedures as unassailable as possible in terms of carbon removed. ENGOs, while strongly opposing large-scale monoculture plantations, lobbied hard to have the most thorough rules, and once that was done, they hardly participated in the design of special provisions for small-scale projects. How this translates on the ground is the subject of the next Chapter.

Chapter 6

The market for sinks: how it works

In early June 2006, the UN Framework Convention on Climate Change (UNFCCC) Secretariat sent a press release announcing that the market for emission reductions under the Clean Development Mechanism (CDM) had passed the one billion-ton mark. This meant that the CDM was, as of that date, estimated to generate more than one billion tons of emission reductions by the end of 2012.²⁶³ This was equivalent to the annual emissions of Spain and the United Kingdom combined. And it had not even been seven months since the Kyoto Protocol was formally adopted.²⁶⁴

The climate change literature is full of quotations by economists saying that a global carbon market could become the largest commodities market in the world. If so, “the commissions alone could be worth many millions” (Goodell 2006). Indeed, financial and investment research houses have begun to rate “carbon dogs” and “carbon leaders,” and create a host of new instruments to make money speculating on the how emissions will be reduced.²⁶⁵ Innovation has been particularly prolific in

²⁶³ Note that the tons referred to throughout the dissertation are metric tons, i.e., 1000 kgs.

²⁶⁴ UNFCCC Press Release. Bonn, 9 June 2006. “Emission reductions from Kyoto Protocol’s Clean Development Mechanism pass the one billion tons mark.” The press release explained that “More than 800 projects are presently in the pipeline, of which 210 are registered and another 58 are requesting registration. Last year, only around 140 activities were registered or being considered for registration.”

²⁶⁵ While socially conscious investing has a long history, and some investors have for some time been putting their money specifically into environmentally-friendly companies, the idea that a carbon-constrained future is in sight has led some of the “pure profit-and-loss players” to purchase shares of low emitter companies and to short those of the big emitters, in the hope that money will be made as climate change regulations go into effect (see Deutsch 2006). Accordingly, some investment research houses have begun setting up carbon-tilted rating scales that measure companies according to who will lose and who will win with new emissions reduction rules (ibid.). One example of this is the “carbon beta basket,” a fund

mechanisms and structures that reduce investment risk, which is still very much the common denominator. As noted in the executive summary of the World Bank's and the International Emissions Trading Association's (IETA) joint report, *State of the Carbon Market 2006*, "innovative structures that managed both down-side and up-side carbon price risk and reduced delivery risk began to emerge, which aligned purchases of carbon with an interest in the underlying project, through equity, debt, mezzanine finance, technology or operating agreements" (World Bank and IETA 2006: ii).²⁶⁶ A new climate services industry has developed involving (to a greater or lesser degree) players in almost 150 countries and is now based, keeping with tradition, in the City of London. And the new carbon market that it manages has already shown its potential impact on other markets. In one instance in 2006 the stock price of a chemical company in a developing country increased 35 percent in the eight days after a proposed CDM methodology was approved by the CDM Executive Board (World Bank and IETA 2006: ii). In another case, a power company in the EU saw its

created by Innovest Strategic Value Advisers in partnership with UBS, which holds 50 stocks in five industries. In it, the fund managers buy and sell stocks on the basis of how the companies would be affected by climate change regulations, and divide each industry grouping of stocks between an equal number of "carbon leaders" and "carbon dogs." So in the electric utilities industry grouping, the FPL Group, specialized in renewable energy sources such as wind, is a carbon leader, while A.E.P., one of the largest generators of power from coal (and on whose board Richard Sandor, C.E.O. of the Chicago Climate Exchange sits), is on the top of the list of carbon dogs. Interestingly, though, because the carbon beta basket only measures costs incurred in relation to climate change regulations, a company which decides to do something to lower its level of emissions –either by installing new low-emission equipment or by buying offset credits- could end up with the carbon dogs. Conversely, nuclear power plants could top the list of carbon leaders. This is precisely what happened in a different but related exercise, where Exelon, the largest owner of nuclear plants in the United States, was listed as a top beneficiary of carbon rules and therefore a good stock to buy in a report in April 2006 by the investment research house Sanford C. Bernstein. In contrast, the "carbon dog" A.E.P. rates high in the Ceres list, which is compiled by a coalition of environmentalists and investors, for how its top management is addressing climate change.

²⁶⁶ Mezzanine financing refers to debt capital that gives a lender the right to convert to an ownership or equity interest in the company in case of default (see <http://www.investopedia.com/terms/m/mezzaninefinancing.asp> October 6, 2006).

stock price decline 16 percent when news leaked that the EU had been too generous with its emission allowances (ibid.).²⁶⁷

With all this ferment, one would think that emission reduction credits are easy to produce. Yet the process of coming up with a viable CDM project and complying with all requirements to offer Certified Emission Reductions (CERs) for sale is widely recognized as a most complex and time-consuming matter. It is technically demanding, administratively cumbersome, and most of all, requires a lot of know-how.²⁶⁸ Moreover, most of this knowledge is not readily available and has to be paid for by hiring outside consultants. The data and arrangements needed to complete a Project Design Document take many months to assemble. Besides, the host country's Designated National Authority has to prepare a letter of approval stating that the project contributes to its sustainable development; all accounting and monitoring methodologies have to be approved by the CDM Executive Board; individual legal contracts between investor and project developers detailing who bears which risks have to be specifically negotiated; and an environmental impact assessment might need to be carried out. On the whole, getting a project off the ground could be a

²⁶⁷ The price of an allowance under the European Union Emissions Trading Scheme (EU ETS) went in a couple of weeks in April 2006 from €31 to €8.60 (or from \$37 to \$10). See Timmons, Heather. 2006. "Data Leaks Shake Up Carbon Trade" *New York Times*, Market Place. May 16, 2006. See also Wynn, Gerard 2006. "CO₂ Market on Brink as Price Continues to Slide." *Reuters News*, Planet Ark: April 28, 2006.

²⁶⁸ Know-how is widely regarded as the most challenging problem for developing projects and accessing the market, and is commented on in every presentation on the subject. Most recently, and just to cite one simple recent example, during a side-event organized by the UNFCCC at SB 23, a representative of AgCert (a leading business dedicated to the production and sale of agriculturally derived emission reductions, headquartered in Dublin, Ireland) noted the enormous difficulty interpreting modalities and procedures and the CDM Executive Board's guidance, and understanding documentation requirements. The presenter pointed to the different rules in different countries and the difficulties with privacy concerns of "farmers" (agribusinesses) to explain the necessity of expert guidance. He even suggested watching Executive Board minutes and webcasts (personal observation and notes, May 2006).

matter of two to three years and lots of working hours and money (Monroy and Dutt 2005).²⁶⁹ The requirements are even more complicated and more time-consuming for sinks projects.²⁷⁰

Businesses and NGOs alike have criticized this complex web of procedures, even if for quite different reasons. The complexity is such that investment risk has become the essential feature of the market, determining to a large extent the price paid for carbon emission reductions. Clearly, this affects who has access to the market and influences how resources are distributed and redistributed as a result of the production and exchange of this new commodity. Understanding this in detail is the goal of this chapter.

The chapter thus analyzes the different kinds of costs involved in the implementation of a sinks project and who has to pay for them, and compares the government-regulated and the voluntary versions of the new market in emission reductions from sinks. It begins with an introductory glimpse at the overall state of the so-called carbon market and addresses the details of how the market under the

²⁶⁹ This problem affects the current negotiations on the second commitment period, given the business need for clarity on what will be the validity and value of CDM credits after 2013. As noted by Hamilton and Kenber (2006): “Within 2–3 years CDM project proposals will start drying up as returns will have to be achieved by 2012 and so become largely irrelevant.” (2006: 7).

²⁷⁰ Besides the longer crediting periods and expiring nature of the credits awarded, additional requirements for sinks projects that are not needed for CDM energy projects include: precise geographical location of the project activity in such a way that it can be uniquely identified; legal title of the land and current land tenure and right of access to the sequestered carbon; a list of the carbon pools selected; a description of the present environmental conditions of the area; and an analysis of the environmental and socio-economic impact, which, if considered significant by project participants, must include an environmental or socio-economic impact analysis. Moreover, given changes in carbon stocks due to harvesting cycles and other management activities, verification has to be done in such a way that it avoids coinciding with peaks in carbon stored, and the period of time when the PDD is available for public comments is lengthened to 45 days instead of 30. *Note: I use here interchangeably the term CDM sinks project with CDM afforestation or reforestation (A/R) project activity, as these are the only two modalities allowed so far under the CDM.*

UNFCCC works, focusing on the CDM. I first examine how projects are distributed globally by region and by sector, and then describe what it takes to do a CDM sinks project, step by step. The point of this step-by-step account is to understand what the project requirements and their costs are, and who pays them. It shows how and why small-scale projects or those with wider participation will be unable to enter the market. In the manner of a *filière* or commodity chain, and paying particular attention to the time invested, the rate of return, and the risk involved in the various activities, the section highlights the points at which profit is made and reveals how opportunities and resources flow up to those already well placed, while other “stakeholders” are further excluded.

Because the problems with the CDM market largely derive from government regulation and have to do with the need to ensure the credibility of the UNFCCC, and because future climate change mitigation measures are likely to include various sorts of initiatives and markets, this section is followed by a brief analysis of the voluntary market approach under the Chicago Climate Exchange (CCX), the greenhouse gas allowances commodity market that is part of the Chicago Board of Trade. As an example, it looks at emission reductions from a reforestation project in Costa Rica that The World Bank bought through the CCX to offset emissions from its Washington D.C. operations. In contrast to the complexity and costliness of developing a CDM sinks project, under this voluntary but legally binding private market, additionality is a non-issue, there are no clear consequences for non-compliance, and the baseline was conveniently determined in such a way that, intentionally or not, it benefits the major corporations involved in the sector. This is precisely the reason that many environmental organizations have not endorsed but

instead criticized the CCX: it cannot claim responsibility for the emission reductions, as in many cases these would have taken place without the allowance market. Although Richard Sandor, CCX's creator and C.E.O., refers to the CCX as "the engine of an environmental revolution" (Goddell 2006), so far what it really represents is a vehicle for gaining experience and claiming authority with the view to accommodate anticipated regulations so that they serve the interests of those companies involved. In this sense, it sheds light on one of the ways that capital moves to ensure its continued power and how the unevenness is again reproduced, this time at high levels of corporate influence. So while the CDM sinks project cycle hints at accumulation by dispossession in the manner described by Harvey (2003, 2006; see Introduction), the Chicago Climate Exchange stands as an example of accumulation by re-position and repossession.

State of the carbon market

From the very beginning, volumes of emission reduction transactions have consistently increased, more than doubling every year since 2001: from 13 million tons of CO₂ equivalent (CO₂e) in 2001, to 30 million in 2002, to 70 million in 2003 (World Bank and IETA 2003). At that time (in 2003), Point Carbon, the greenhouse gas market analyst, estimated that the value of contracts would increase towards \$10 billion by 2007. This amount was reached just two years later, in 2005, as the international carbon market transactions went from 94 million tons of CO₂e in 2004, worth €377 million (around \$500 million), to a total of 799 million tons of CO₂e, worth €9.4 billion (approximately \$11 billion) in 2005. This represents an eight-fold

increase in volume and about 25 times larger financial values in 2005 compared to 2004. (Point Carbon 2006: 15). The exponential growth has continued: in the first quarter of 2006 alone, overall transactions amounted to \$7.5 billion, suggesting that this new financial market would be valued by the end of 2006 at \$25-30 billion (World Bank and IETA 2006). As Timmons (2006) notes, the value of the entire US wheat crop of in 2005 was \$7.1 billion.²⁷¹ And these are still the very early days.

The increase in activity follows the entry into force of the Kyoto Protocol on February 16, 2005, and the start of the European Union's Emission Trading Scheme (EU ETS) in January of that same year. Still, given the many uncertainties, the steep rise in carbon credits under the EU ETS during just a few months came as a big surprise: the price of a European Union Allowance (EUA) started around €8 in January (that is, slightly more than \$10), and went from there to over €30 (or circa \$38) before the summer. As Point Carbon reports, "carbon trading suddenly came on the agenda in boardrooms across Europe" (Point Carbon 2006: v). Thanks partly to this rise, the EU ETS brokerage and exchange market transacted an estimated 262 million tons of CO₂e in 2005, at an estimated financial value of €5.4 billion (that is, more than \$6.4 billion) (ibid: 15).

And despite a resounding slump shortly after, the prospects for the future seem rosy. In a wide and well-respected market survey report conducted by Point Carbon in 2006, survey respondents were "bullish on prices. Only 20 percent expect the EUA price in one year to be lower than it was in December 2005. More than 70 percent expect the price of an issued CER to increase over the same time period" (Point

²⁷¹ Granted, wheat prices are low.

Carbon 2006: 42).²⁷² Perhaps more meaningfully, more than 40 percent of those surveyed see carbon costs as very important for new investments in their industry (ibid.).

Key to this ongoing market success is the government-mandated European Union's Emissions Trading Scheme (EU ETS).²⁷³ Under the EU ETS, member states develop National Allocation Plans setting caps and allocating EU emission allowances (EUA) to sectors and individual installations mainly in five sectors: heat and power (accounting for 55 percent of the allowances in the system); metals; cement, lime and glass; oil and gas; and pulp, paper and packaging. These plans are approved by the European Commission, which thereby sets an annual average cap for the EU as a whole and distributes it among the member states. Germany holds the highest number of allowances, followed by Italy, Poland and the UK (these countries, together with France and Spain, have 71 percent of the total allowances in the market). A total of 6.57 billion allowances were issued for the period 2005-2007 (EU Environment MEMO/05/84),²⁷⁴ while some allowances are set aside for new

²⁷² Point Carbon manages the largest carbon project database. Its calculations are based on this database combined with a wide web-based survey and in-depth interviews with 67 key market players (see Point Carbon 2006). In its market survey, Point Carbon also reports that the market expects tighter allocations for EU ETS phase 2 (only 8 percent expect the allocation for the next round to be looser than in the current phase), with 25 percent expecting it to be much tighter. Furthermore, 24 percent expect there to be more internal abatement in the next phase (Point Carbon 2006: 42) (See below).

²⁷³ In 2005, the EU ETS was the largest market segment in financial value, although not in terms of physical volumes. In total, 262 million EU allowances (EUAs), worth €5.4 billion EUR were transacted through brokers and exchanges (79 percent of this through brokers). In addition, Point Carbon estimates that the bilateral market (company-to-company, not brokered or exchanged) did 100 million tons of CO₂e, or €1.8 billion EUR. (Point Carbon 2006: 15).

²⁷⁴ Note that the standard trading contract in the EU is for 1,000 tons, and trades are commonly done in lots of 10,000 to 25,000 tons (Saltmarsh 2005). For how the EU ETS works, see <http://ec.europa.eu/environment/climat/emission.htm>

installations (so-called New Entrant Reserves, which would be available in the market later in the first trading period if left unused).²⁷⁵

In this manner, an average of 2.1 billion allowances are to be distributed every year. More than 11,500 installations have commitments within the scheme (EU Environment MEMO/05/84), accounting for approximately 44 percent of greenhouse gas emissions within the EU (Point Carbon 2006: 9). Any deficit allowances on a given year are transferred or surrendered in the second year to make up for overshooting in the first. The penalty for missing the target in the 2005-2007 period is €40 per ton of CO₂e, besides having to purchase the deficit on the market.²⁷⁶

Installations with reduction obligations under the EU ETS may use CDM CERs directly for compliance under the Linking Directive –all, except for sinks projects.

While to date only the EU has a comprehensive emissions trading system, other countries –in particular Japan, New Zealand and Canada²⁷⁷ - are considering them. Besides, some countries have established procurement programs that buy credits under the UNFCCC's flexible mechanisms. Netherlands and Denmark have well-known operational programs of this kind. Others have invested in funds of

²⁷⁵ A second phase will run from 2008 to 2012, and after that, it is expected that other sectors will be added (including road and maritime transport and aviation) and that sulfur dioxide and nitrogen oxide emissions will also be regulated (Saltmarsh 2005). Since it coincides with the first commitment period and the beginning of the second under the UNFCCC, everybody expects this will be the time when substantial trading starts. Now it's more a matter of "warming up."

²⁷⁶ At the current exchange rate in October 2006, this would be approximately \$50.

²⁷⁷ The position of Canada has recently changed as a result of national elections and the takeover of the Conservative Party as the head of government in late 2005.

procurement, such as those established by the World Bank.²⁷⁸

Although the bulk of the action is centered around the EU ETS and the flexible mechanisms under the Kyoto Protocol, some other operational greenhouse gas trading systems are also quite active. The largest of these is the New South Wales Greenhouse Gas Abatement Scheme in Australia.²⁷⁹ Also worthy of note is the voluntary Chicago Climate Exchange in USA -where most of the future growth is expected (see Point Carbon 2006: 26).²⁸⁰ Regional initiatives for carbon trade involving states and cities are sprouting in many places, notably in the United States and Australia –the only two countries to have rejected the Kyoto Protocol.²⁸¹ Meanwhile, the Asian branch of carbon trading will be courtesy of Asia Carbon International which, with government backing, plans to open the first carbon credit exchange in Singapore –the Asia Carbon Exchange- to trade up to 8 million tons of credits per year from 2009 (Saltmarsh 2005).

What is the demand that justifies all this activity? Based on countries' national

²⁷⁸ This refers to some of the various World Bank carbon funds, which include a portfolio of project-based emission reductions purchased on behalf of governments and companies in OECD countries. See The World Bank Carbon Finance Unit: <http://carbonfinance.org/Router.cfm?Page=Home&ItemID=24675>

²⁷⁹ According to Point Carbon, in 2005 the New South Wales Greenhouse Gas Abatement Scheme in Australia totaled 78 percent of the physical volume in the other markets, and 93 percent of the financial value. (Point Carbon 2006: 26). But these were the early days of carbon trading and the other markets were incipient.

²⁸⁰ In Europe, besides the European Climate Exchange (ECX) (the European branch of CCX), other markets to trade spot or futures contracts in emissions include Nord Pool in Oslo, the European Energy Exchange in Leipzig, Powernext in France (now with ECX), and others. [*check relevance*].

²⁸¹ See “Australian states reveal emissions trading plans” *Carbon Finance News Update*, Volume 3 (8) August 2006. See also “California GHG bill leaning toward market.” *Carbon Finance News Update*, Volume 3 (8) August 2006. And many others on the Regional Greenhouse Gas Initiative (RGGI).

communications and reports to the UNFCCC, figures for historic emissions growth and projections, and assuming a business-as-usual scenario without new policies or domestic trading systems, Point Carbon estimated that the overall gap for the Protocol's five-year commitment period (2008-2012) would be 5.54 billion tons of CO₂e.²⁸² (Point Carbon 2005, 2006). The EU has the largest amount of tons to reduce, but it is only 12.5 percent short of its Kyoto target.²⁸³ Meanwhile, as of 2005, Canada was projected to be 46 percent short of the target and Japan 29 percent. Overall, Spain, Italy, Canada, and Japan were expected to miss their Kyoto target by at least 20 percent unless drastic action is taken (ibid.) Still, without credible policies and measures, almost all countries were found to be short. Even with measures that reduce this shortage by half, major buyer countries will likely be 9.5 percent off their collective target, with a 548 million-ton shortfall to cover each year of the five-year commitment period (ibid.).

Conveniently for those failing to meet their targets, the supply provided by the Protocol's flexible mechanisms is likely to comfortably cover this demand, with all the "hot air" from Russia and some Eastern European countries and the great potential for emission reduction projects in developing countries. The problems lie in how.

As noted by Point Carbon, "the carbon market is now to all extents a fully operational commodity market. Volumes are large, but there is still room for considerable growth. Prices are reacting to fundamentals, although policy decisions still impact from time to time. All in all, the carbon market is a multi-billion euro

²⁸² This is using 2010 as a reference year.

²⁸³ Within the EU, Spain and Italy have the biggest gap to fill, having undergone rapid economic growth and rising emissions exceeding their burden sharing agreement under the EU.

industry which results in emission reductions that will help countries meet their Kyoto targets.” Furthermore, “the issuance of EUAs to more than 10,000 installations throughout Europe has in fact created a whole new currency, which can be used as hard capital. In total, the three-year allocation is currently valued at more than €153 billion. The recent guidance for phase 2 indicates that the full five-year allocation for the 2008-2012 period would be some 2,063 billion allowances per year which, given current prices for December 2008 delivery, values the underlying assets in that phase at more than €220 billion” (Point Carbon 2006: 28).

But (and this is the question posed by everyone), does it really work? And what does it really do? In an attempt to answer this question, I now turn to the market under the CDM, providing first a general overview, and then focusing on the specifics of the projects.

The CDM carbon market

The high price paid for carbon emission reductions in Europe led to an increase in the scale of investment in CDM projects. Point Carbon estimates that, in 2005, emission reduction purchase agreements (ERPAs) corresponding to 397 million tons of CO₂e were entered into. “Assuming payment on delivery and a 7% discount rate, this is valued at €1.9 billion” (Point Carbon 2006: 22). These 397 million CERs were contracted for future delivery at a volume-weighted average price of €6.70 per CER (ibid.). The volumes transacted were more than three-times those of 2004, and five-times those of 2003. In the first three months of 2006 alone, 79 million tons were transacted, for a value of almost \$0.9 billion. The price of CERs has also escalated. World Bank and IETA report an average price for CERs in primary market

transactions of \$5.15 in 2004, increasing to \$7.23 in 2005²⁸⁴ and then soaring to \$11.45 per ton of CO₂e in the first three months of 2006 (World Bank and IETA 2006: 21) -although this last figure is misleading since it corresponds to the three-month spike in EUAs.²⁸⁵ By July 2006, according to the UNFCCC CDM website, a total of 248 projects had been registered, with 10,235,616 CERs issued, and 460 million CERs projected to be issued by 2012.²⁸⁶ According to Point Carbon's market survey, more than 70 percent of the people surveyed expect the price of CERs to increase in 2006 (Point Carbon 2006: 45).

This upbeat mood is shared by many. Although for a long time it was thought that so-called "hot air" from Central European states with "economies in transition" (EITs –see chapter one) would swamp the market, Joint Implementation has been slow to pick up.²⁸⁷ Granted, this was due to an uncertain institutional framework, as

²⁸⁴ Equivalent to Point Carbon's figure cited above of €6.70.

²⁸⁵ The price of a ton of CO₂e has varied widely since the idea and practice of selling emission removals was first introduced. In one study by Pearce and Bello from 1998, the range went all the way from \$2-3 to \$400 (quoted in Landell-Mills and Porras 2002: 85). In 2000, the average price of a credit for the Dutch government's ERUPT 2000 tender was \$8.30 USD per ton of CO₂e reduction. The following year this price dropped significantly, to \$4.80 USD per ton for the ERUPT 2001 tender (note that prices also vary with the crediting period; thus while for the World Bank's Prototype Carbon Fund the crediting period is 20 years, for CERUPT it is only 10 years) (de Coninck and van der Linden 2003: 19). In 2003, the average price of CDM credits was in the range of \$3-4 per ton of CO₂e (ibid.). This increased, particularly during 2005, as EU ETS market made its influence felt and as companies and carbon funds became operational for purchasing credits. Still, prices vary greatly from project to project depending on the distribution of risk between buyer and seller, and on what stage the project is at. Contracts signed before the project has reached the PDD phase are less expensive than those that are in the process of validation or have been approved by the CDM Executive Board (Point Carbon 2006: 24). The time of delivery is also an factor: credits delivered before 2007 when the first phase of the EU ETS ends are "currently fetching a premium." (ibid).

²⁸⁶ See: <http://cdm.unfccc.int/Statistics>

²⁸⁷ In terms of projects, in 2005 93 percent of the volumes in the market came through CDM, at 397 million tons of CO₂e, or € 1.9 billion EUR. In comparison, Joint Implementation (JI)

important regulations were only recently agreed upon, and the market is likely to soon catch up as host countries set up the required offices (see World Bank and IETA 2006: 24). Still, Point Carbon and other analysts suggest that “CDM is set to be the project mechanism of choice, also in the future. Developing countries are indeed taking their participation in the market seriously, and are years ahead of large Joint Implementation (JI) sellers when it comes to project approval frameworks. [...] It also seems clear that the CDM will survive even without a successor agreement to the Kyoto Protocol” (Point Carbon 2006: iv).

Every year, this good news has been announced in the World Bank’s and IETA’s jointly prepared report on the State of the Carbon Market -with a caveat. The 2003 version, for example, reads: “The good news is that, unlike 2002, most of this money now flows to World Bank client countries – about 90 percent – but the bad news is that Africa and small developing countries have been essentially bypassed” (World Bank News Release No. 22004/167/S). This has remained the case in every report after that, with the most recent one, in 2006, reading: “A number of projects in Africa appear in the UNFCCC PDD pipeline and a few transactions have taken place in South Africa, Egypt and the Maghreb, representing about 2% of project-based volumes. Despite these gains, Africa, as well as countries of Central Asia and the Pacific, continues to be largely bypassed by the carbon market. The under-representation of these regions raises deep concerns about the overall equity in the

did 28 million tons, at € 95 million EUR. (Point Carbon 2006:) Brazil alone is about the same size as the total JI market (ibid: 23).

distribution of the CDM market” (World Bank and IETA 2006: 28)

On distribution

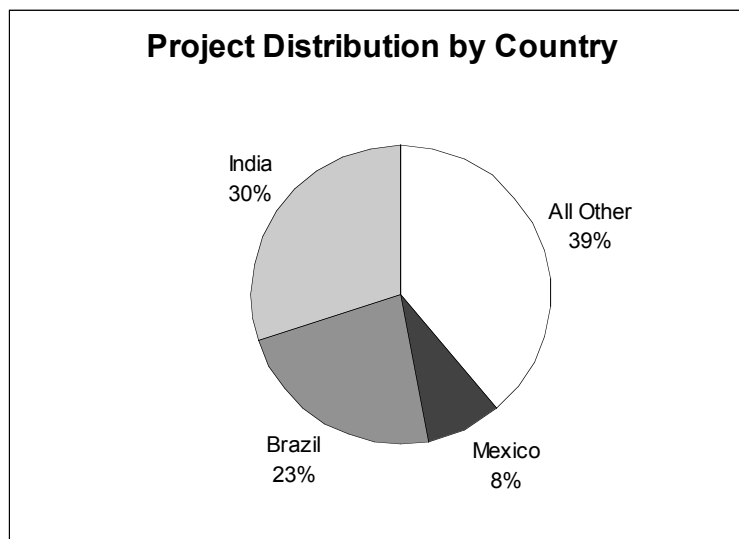
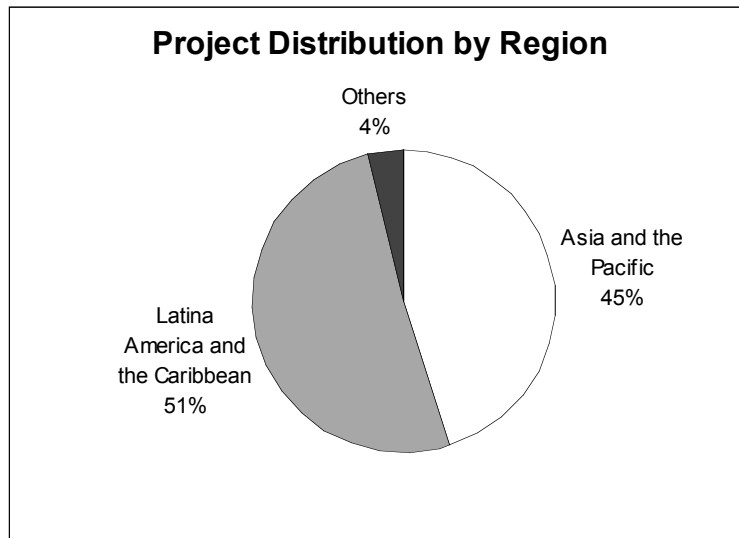
Of the 248 registered CDM projects as of July 22, 2006, 51 percent of all projects were located in Latin America and the Caribbean, and 45 percent in Asia and the Pacific –the two regions accounting for 96 percent of all projects.²⁸⁸ Of these, 30 percent are in India (a total of 75 projects), followed by 23 percent in Brazil (58 projects). Mexico follows far away with only 8 percent (20 projects). Brazil and India therefore alone account for over half of all CDM projects.²⁸⁹ When it comes to numbers of CDM emission reduction purchase agreements (ERPAs),²⁹⁰ China, India and Brazil are the main seller countries (Point Carbon 2006: 14).

²⁸⁸ For these and all following numbers in this section, except where noted, see: <http://cdm.unfccc.int/Statistics>

²⁸⁹ According to Point Carbon’s database, of the 10 host countries with the largest estimated volume by 2012, China, India and Brazil are responsible for about 63 percent of the total volume for all projects at PDD stage. This doesn’t mean that the various projects might not be implemented after all, that they might be implemented later than stated in the PDD, or that they will deliver fewer reductions than aimed for.

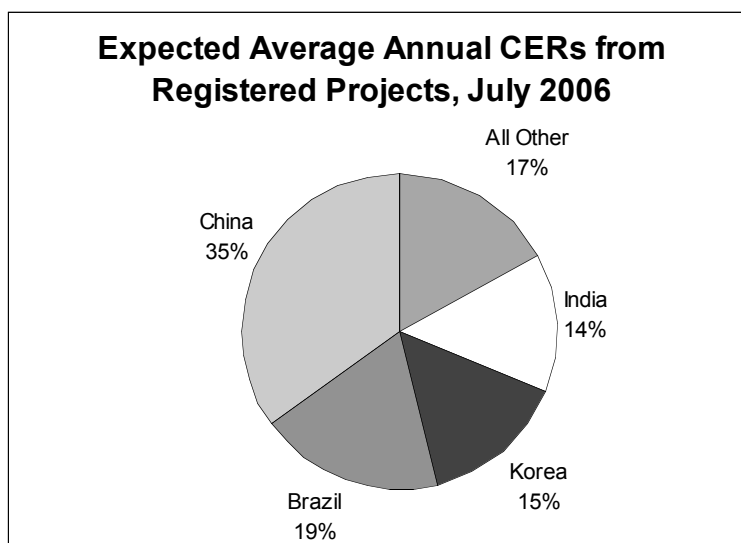
²⁹⁰ These are agreements signed by both seller(s) and buyer(s), as reported to Point Carbon in 2005.

CDM Projects July 22, 2006
248 total



But the number of projects is not proportional to the number of CERs. Of the 72,012,040 expected average annual CERs generated from registered projects as of July 2006, 35 percent will be coming from China, almost 19 percent from Brazil, 15 percent from the Republic of Korea, and close to 14 percent from India. China and

Brazil therefore account for more than 54 percent of the total, and if Korea and India are added, the four countries will be the source of 83.4 percent of all expected CERs from registered projects to this date. There are important differences –the Republic of Korea, with only five projects, is expected to generate 11,075.047 average annual CERs -or 15 percent of all registered CERs. Meanwhile, the whole of Africa is host to a total of only five projects, and these amount to only 2 percent of expected CERs.²⁹¹



In terms of the projects by sector, 52.77 percent are from energy industries (both renewable and non-renewable sources), and 23.45 percent from waste handling and disposal. Agriculture accounts for 13.36 percent. In terms of project types, 70 percent

²⁹¹ According to the UNFCCC Secretariat, as of June 2006 there were 27 activities in the CDM pipeline in Africa, of which 5 have been registered. This constituted a five-fold growth within a year. “Whilst the mechanism is seeing very strong growth, the growth is still too unevenly distributed amongst regions”, said Janos Pasztor, acting coordinator for Project Based Mechanisms with the UNFCCC Secretariat. Pasztor added that governments are expected to address this issue at the UN Climate Change Conference in Nairobi in November 2006. (UNFCCC Press Release. Bonn, 9 June 2006). On the demand side, the CDM is dominated by the private sector, mainly European and Japanese, driven by high EU ETS prices, together with an increasing number of carbon funds (Point Carbon 2006: 24). Notably, Canada is pretty much absent from the CDM market.

of CDM volumes in 2005 came from a few large HFC-23 reduction projects in China (Point Carbon 2006). The number of credits from the destruction of HFC-23 are likely to dominate in the future as well, given the enormous global warming potential of this gas (14,000 times that of CO₂) and the ease and low cost of destroying it (see Chapter 1 on the basket of gases and global warming equivalences).

In regards to scale, of all projects registered, 60 percent are large-scale and 40 percent are small-scale. This refers only to projects, and not to the CERs generated, which would obviously be skewed (there is a limit as to how many CERs can be generated by a small-scale project. While the number of methodologies for all large- and small-scale projects approved corresponds roughly with the projects registered in the case of energy, the CDM pipeline reports that, as of June 20, 2006, twenty-five methodologies had been proposed for afforestation or reforestation (A/R) projects (Fenhann, UNEP RISØ Centre 2006), with only three having been approved.²⁹² Only one methodology for small-scale sinks has so far been submitted. To date, there are no approved A/R projects.²⁹³

In order to understand what some of the reasons for this highly skewed distribution are, the chapter now turns to what it takes to complete a CDM sinks project.

²⁹² According to the CDM Pipeline of June 2006, of the 25 methodologies submitted, 19 had already received a verdict from the Executive Board, with the following results: ten of them had to resubmit the PDD, in three the projects participants had to make some changes, and two others were in the process of being recommended to make some changes. One was withdrawn. For the complete table of approved A/R methodologies, see: http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html

²⁹³ This is as of November 2006.

The CDM project cycle for sinks

... [A] “time intensive, lawyer invented scheme, with benefits to a lot of consultants” (one company’s description of the UNFCCC administration and the CDM, quoted in Hamilton and Kenber 2006: 8)

Selling certified emission reductions from sinks begins with the completion of a Project Design Document (PDD) by the so-called Project Developer or project proponent.²⁹⁴ The completed PDD is then presented to a Designated Operational Entity (DOE), which acts as the independent third party in charge of assessing and validating the project, and to the host Party’s Designated National Authority (DNA), which must issue a letter of approval confirming that the project activity contributes to the host country’s sustainable development. As part of the validation process, the PDD is made publicly available on the UNFCCC CDM website for stakeholder comments for 45 days.²⁹⁵ After this time, the DOE prepares a validation report indicating whether the PDD, as presented, meets the Kyoto Protocol’s and the CDM’s criteria, and whether it is operational and primed for monitoring and reporting. If it does, and the PDD is approved by the host country’s DNA, the PDD, together with the validation report, an explanation of how stakeholder comments received were

²⁹⁴ Although strictly speaking these are not emission reductions but removals, all CDM project activities accrue Certified Emission Reduction units (CERs). The difference is that, in the case of A/R, these are either long-term CERs (ICERs) or temporary CERs (tCERs). See Chapter 4 and below.

²⁹⁵ For energy projects the time available for stakeholder comments is 30 days. Note that stakeholders are defined under the UNFCCC as “the public, including individuals, groups, or communities affected, or likely to be affected, by the proposed A/R project activity or actions leading to the implementation of such an activity.” (CDM-AR-PDD Guidelines Glossary, Version 04 page 14). See Chapter 5.

taken into account, and the DNA's letter of approval, are presented to the CDM Executive Board with a request for registration. The validation report is then posted on the UNFCCC CDM website. The registration is considered complete and final if no request for review is made within eight weeks of reception (four weeks for small-scale projects) by either three CDM Executive Board members, or by one of the Parties involved.²⁹⁶ At some point after this stage, if not earlier, negotiations will likely proceed on the financing of the project and eventual sale of the CERs. A private contract should be made detailing carbon credit ownership, the rights and obligations of each participant (including the option to sell CERs to third parties), the project's insurance coverage and the rules for resolution of disputes between participants.²⁹⁷

Once the project is registered and underway, the project developer must undertake periodic monitoring of the net removals from sinks according to a monitoring plan previously identified in the PDD, and submit a monitoring report to another DOE contracted to verify and certify the removals. To avoid conflict of interests, this verifying and certifying DOE must not be the same one who undertook the validation of the project, except in the case of small-scale projects or with the explicit approval of the CDM Executive Board. The verifying and certifying DOE will conduct periodic auditing of the monitoring results, review the conformity of the project with the plan, and assess the achieved greenhouse gas removals in order to produce a verification report and eventually a certification report. The first verification and certification may be done at any time the project participants decide,

²⁹⁶ Any review requested at this point should be related to issues associated with validation requirements, and should be completed no later than at the second meeting of the CDM EB following the request for review, with the conclusion of the review being communicated to the project participants and to the public (Decision 17/CP.7, Article 41).

²⁹⁷ See UNEP 2004, *CDM: Information and Guidebook*, page 49.

and then every five years after that until the end of the crediting period either a maximum of 20 years which may be renewed twice, up to 60 years, or a maximum of 30 years (see Chapter 4). Based on the verification report, the DOE certifies in writing the net greenhouse gas removals by sinks achieved by the project since its start. Both the verification and certification reports have to be made public. The certification report constitutes a request to the Executive Board to issue the verified amount of CERs generated by the project. The Executive Board then has 15 days to issue the CERs, unless a Party involved in the project or three members of the Executive Board request a review.²⁹⁸ The CERs will be moved to a pending account in the CDM Registry developed by the UNFCCC Secretariat to keep track of all CERs, and from there to the acquiring Party's legal entity's account according to the contract previously agreed upon by buyers and sellers. As with all CDM projects except for small-scale ones and those undertaken in the Least Developed Countries (LDCs), 2 percent of the achieved CERs go to the UNFCCC Adaptation Fund.²⁹⁹

This is a quick sketch of the general steps required to complete the process of developing a CDM sinks project activity. I now turn to disaggregate the most relevant steps of the procedure, focusing on the three main stages of project development: the completion of the PDD by the project developer; the validation, verification and certification of the project by the DOE; and the approval of the project by the host country's DNA.

²⁹⁸ In this case, the review would have to do with cases of fraud, malfeasance or incompetence of the DOEs.

²⁹⁹ On this levy, see Chapter 3.

1. The Project Design Document (PDD)³⁰⁰

The PDD is a standard document necessary for all CDM projects that contains all the information on the project activity and is submitted by the DOE for validation and then to the CDM Executive Board for registration. The PDD exists only in English.³⁰¹ During the validation phase, the PDD is made available on the internet for a limited period of time for public comments. As noted earlier, besides basic technical data, the information submitted in the PDD for A/R must include, *inter alia*: the precise geographical location and project boundary allowing the unique identification of the project; a description of the present environmental conditions of the area, including the possible presence of rare and endangered species and their habitats; a description of the legal title to the land, current land tenure and land use, and right of access to the sequestered carbon; and a description of the technology and the know-how to be employed by the project.

Besides, the PDD has to provide evidence that the land is not a forest at the moment the project starts (by demonstrating that it is below forest national thresholds of crown cover, tree height and minimum land area as communicated by the host country's DNA, and that it is not temporarily unstocked as a result of human intervention -whether harvesting or natural causes- and is not covered with young

³⁰⁰ Because the complexity of the requirements for implementing a CDM A/R project have been identified as the main stumbling block for project development by NGOs and business alike, and I have argued that they are what largely determines access to the market, I here give an outline of the information that is required to complete the PDD. It is somewhat detailed so the reader gets an idea of the amount of work and information that the project developer (assumed to be from the host country (usually Third world) needs to prepare a project.

³⁰¹ As noted in Chapter 3, the only working language of the CDM Executive Board is English. There are however instructions and guidance on filling the PDD in the six UN languages. It is available for download in the internet at: <http://cdm.unfccc.int/Reference/Documents>.

natural stands or a plantation that would reach a crown density or tree height as defined by national thresholds and with the potential to revert to forest without human intervention). There should also be proof that the land was below the DNA's national threshold for forest definition on 31 December 1989 in the case of a reforestation project, or for at least 50 years in the case of an afforestation one.³⁰²

On more technical grounds, the PDD has to specify the greenhouse gas emissions that are expected to be released as a result of the implementation of the project activity, such as those resulting from soil preparation, use of fertilizers, machinery and other on-site vehicles, and determine the actual net removals and the baseline giving a selection and justification of the carbon pools accounted (above-ground biomass, below-ground biomass, dead wood, litter, and/or organic carbon in soils). It must also include detailed baseline information, a description of the baseline methodology to be applied, and an explanation of how and why this project is additional.³⁰³ The baseline methodology may be among those already approved by the CDM Executive Board but, if a new methodology is proposed, a separate form must be completed. This form, called "Proposed New Methodology for A/R Project Activities," covers 21 pages of very detailed technical information. If just filling in the standard PDD using an approved methodology is complicated (in terms of justifying the choice and applicability of the methodology), proposing a new one for

³⁰² This can be done by either providing aerial photographs or satellite imagery complemented by ground reference data, providing ground-based surveys (such as land use permits, land use plans or information from the cadastre, property registry, and land use or management registry), or if none of these options are possible, by providing a written testimony produced following a participatory rural appraisal methodology.

³⁰³ The latter explanation must include a description of the baseline scenario according to the chosen methodology, a description of the project scenario, and an analysis showing why the removals in the baseline scenario would likely be less than those in the project scenario.

approval is something very few people are trained and able to do. As noted earlier, as of June 2006, twenty-five methodologies for A/R had been submitted, with only 4 being approved.

The PDD must also provide a detailed description of the monitoring methodology and plan, with precise identification of the data to be collected to monitor changes in carbon stocks and emissions. This should include a description of formulae and/or models used to monitor the estimation of removals, carbon stock changes and emissions for each source and gas. There should also be information on how all this data will be archived,³⁰⁴ the operational and management structures that the project operator will implement to monitor the actual removals and any leakage, and the quality control and quality assurance procedures undertaken for data monitored. Moreover, the document must describe how leakage will be treated in the monitoring plan (with identification of data to be collected to monitor it and formulae and/or models used to estimate it for each greenhouse gas, source and carbon pool) as well as the procedures for measures undertaken to minimize it.

Finally, the PDD must also include documentation on the analysis of the environmental and socioeconomic impacts of the project, including impacts on biodiversity and natural ecosystems and impacts outside the project boundary (including information, where applicable, on hydrology, soils, risk of fires, pests and diseases), and impacts on local communities, indigenous peoples, land tenure, local employment, food production, cultural and religious sites, and access to fuel wood and other forest products. If project participants or the host Party consider that any

³⁰⁴ Monitoring data should be archived for two years following the end of the last crediting period.

negative impact is significant, an environmental and/or socioeconomic impact assessment has to be undertaken in accordance with the procedures required by the host Party, and, together with the conclusions and all references to support the documentation, a description of the planned monitoring and remedial measures to address it must be submitted. Note that the planned remedial measures need only be submitted. There is no explicit follow-up of potential negative impacts under the CDM project cycle. Similarly, the PDD must include a description of the process by which comments by local stakeholders were invited and compiled, a summary of the comments received (identifying the stakeholders who made them), and a report on how due account was taken of the comments received.³⁰⁵

Besides this detailed list of data and technicalities that have to be resolved, by the start of the crediting period the project has to be implemented, the training of the personnel completed, the monitoring equipment installed, and the monitoring and project management procedures put in place (Kamel 2005: 11). As stated in UNEP's PDD Guidebook, "experience has shown that the information needed to judge the suitability of a project for the CDM is vast and *can take months to assemble*" (Kamel 2005: 7). "Also, the *time required* to assemble the relevant information *increases with the number and diversity of stakeholders* involved and the complexity of the information itself" (Kamel 2005: 7; italics mine). Working with numerous small landowners clearly becomes a serious disadvantage. Moreover, the complexity and

³⁰⁵ The instructions for this section read: "An invitation for comments by local stakeholders shall be made in an open and transparent manner, in a way that facilitates comments to be received from local stakeholders and allows for a reasonable time for comments to be submitted. In this regard, project participants shall describe an A/R project activity in a manner which allows the local stakeholders to understand the proposed A/R project activity, taking into account confidentiality provisions of the CDM modalities and procedures." (CDM-AR-PDD, version 04, page 30, G.1)

difficulty of implementing a project is such that, although CDM project developers were always assumed to be local people from the host developing countries, a look at the projects so far approved by the CDM Executive Board reveals that, in many cases, the projects are undertaken by organizations and institutions (including research institutes) in developed countries.³⁰⁶ They are the ones who develop the projects to the non-Annex I Parties, and, accordingly, appear as project developers. Whatever income from this node of the chain that was meant to stay in a developing country in the form of built capacity is in this way reduced, and projects become one more foreign investment opportunity that leaves little capacity built or value-added.

2. Validating, verifying and certifying the project: The Designated Operational Entities (DOEs)

“DNV Certification is a leading independent greenhouse gas validator and verifier operating globally. Sustainable development falls squarely within our company’s missions since 1864: to protect life, property and the environment.” *Det Norske Veritas (DNV)*.³⁰⁷

The DOE is the entity officially approved by the COP/MOP based on a recommendation by the CDM Executive Board to validate proposed CDM project activities, and to verify and certify net anthropogenic removals by sinks. As

³⁰⁶ For the list of projects approved to date, see <http://cdm.unfccc.int/Projects/index.html> See also CDM Pipeline, Fenhann 2006.

³⁰⁷ In Chaudhary and Kumaraswamy 2005. Or to take it directly from the DNV web page introduction: “Established in 1864, DNV is an independent foundation with the objective of safeguarding life, property, and the environment and is a leading international provider of services for managing risk.” See: http://www.dnv.com/certification/about_us/index.asp

previously noted, to avoid a conflict of interests, the same DOE cannot verify and certify removals from a project it has validated, unless approved to do all those things by the Executive Board upon request. In Milan, COP 8 decided that the Executive Board may designate operational entities on a provisional basis (Decision 21/CP.8). As of June 2006, sixteen DOEs had been approved by the CDM Executive Board (see Table below). None of them was originally from a developing country (unless one counts PricewaterhouseCoopers-South Africa (PwC) as from a developing country). Of these, four are from Japan, four from the United Kingdom, three are from Germany, two are from South Korea, one from the Netherlands, one from Spain, and the last one -PricewaterhouseCoopers-South Africa (PwC)- is listed as from South Africa (see Fenhann, CDM Pipeline, UNEP RISØ Centre, 20 June 2006). One of them, *Det Norske Veritas* (DNV), alone has validated more than 50 percent of all

List of Designated Operational Entities (April 24, 2007)³⁰⁸
<u>Entity Name (short name)</u>
Japan Quality Assurance Organization (JQA)
JACO CDM.,LTD (JACO)
Det Norske Veritas Certification AS (DNV Certification AS)
TÜV SÜD Industrie Service GmbH (TÜV-SÜD)
Tohatsu Evaluation and Certification Organization Co., Ltd. (TECO)
Japan Consulting Institute (JCI)
Bureau Veritas Certification Holding S.A. (BVC Holding S.A.)
SGS United Kingdom Ltd. (SGS)
The Korea Energy Management Corporation (KEMCO)
TÜV Industrie Service GmbH, TÜV Rheinland Group (TÜV Rheinland)
KPMG Sustainability B.V. (KPMG)
British Standards Institution (BSI)
Spanish Association for Standardisation and Certification (AENOR)
TÜV NORD CERT GmbH (RWTUV)
Lloyd's Register Quality Assurance Ltd (LRQA)
Korean Foundation for Quality (KFQ)
PricewaterhouseCoopers - South Africa (PwC)

CDM projects coming through to the validation stage (Kamel 2005: 3).

Of those applications currently under consideration, José Domingos González Míguez, Chair of the CDM Executive Board, reported in May 2006 at a UNFCCC side-event on the CDM that of the 30 applications from DOEs and so-called Applicant Entities being considered by the Board, 24 were from Annex I and 6 from non-Annex I Parties (Asia and Pacific, and Latin America and the Caribbean). Only one of the DOEs listed on the UNFCCC CDM website, TUV Industrie Service GmbH TUV SUD GRUPPE (TUV Industrie Service GmbH TUV), is accredited to validate A/R project activities.³⁰⁹ The Colombian Institute for Technical Standards and Certifications (ICONTEC) in Bogotá, Colombia, was issued an indicative letter as an applicant entity and is applying to certify afforestation and reforestation projects.

This small number of accredited DOEs and the lack of participation by developing countries in the DOE process has partly to do with the process of applying for accreditation as a DOE, which is complicated and expensive. The application includes a non-reimbursable application fee of \$15,000. To soften this, applicants from non-Annex I Parties may pay 50 percent of this amount at the beginning (application phase) if they state their inability to pay the full amount up-front, and the other 50 percent once it is approved and in operation.³¹⁰ As noted by Gracia (2005), of ICONTEC, “For ICONTEC, the most challenging issue in pursuing the accreditation process was the high cost involved. These costs include, among others, training, travel arrangements for the accreditation team, and fees to the Executive Board. Although they are considered as an investment, ICONTEC found *that the return period is long*, considering the limited numbers of approved CDM projects and long accreditation process” (Gracia 2005: 3; italics mine).

And what does the DOE do? According to the UNEP RISØ Center PDD Guidebook, prepared with DNV, the validation process should ideally not take more than 40 days, including the 30 days of stakeholder comments (Kamel 2005: 9). In practice however, this process takes on average 100 days, with no project having taken less than 70 days (ibid.). Although two or three months might seem a long time, it is only a fraction of the many months (up to a year or more) it takes a project developer to complete a PDD. Significantly, this is the average for both full-scale and small-scale projects, meaning that the advantages of the simplified modalities for small-scale projects are not felt at the validation stage, and that it again is more efficient to develop a large scale project for more credits.

The state's approval: the Designated National Authority (DNA)

For a project activity to be validated and registered, the DNA of the involved Parties must issue a statement noting that it has ratified the Kyoto Protocol and that it voluntarily participates in the proposed CDM activity. In the case of the host country, the statement should explicitly say that the project activity contributes to the Party's sustainable development. However, a project may be registered without the buyer Party being involved. Only when acquiring CERs from an account within the CDM Registry the buyer Party must submit a letter of approval to the Board in order for the CDM Registry administrator to be able to forward CERs from the Registry to the national registry of the Annex I Party. Thus projects can be developed and implemented without a buyer Party, with the project developer doing so assuming all the costs and risks.

According to the UNEP PDD Guidebook, more than 80 percent of all PDDs submitted for validation lack the letter of approval from the DNA, either because the request was late and/or the DNAs don't have in place the procedures for approving CDM projects, or because some DNAs will only grant approval after having seen the validation report,³¹¹ or because private investor or operator relations may change during the validation process and in so doing alter the list of project participants (Kamel 2005: 19).³¹²

The lack of capacity in many of the poorest developing countries (in terms of both institutions and personnel) is therefore an important inhibiting factor, so much that it has led to capacity building efforts by development agencies financed by industrialized countries. These are the kinds of transaction costs incurred by governments (from the setting of rules and institutions to their application) which are not quantified, as it is assumed to be part of their duty of promoting investment. They are also one way the state subsidizes private markets. Accordingly, developed country governments with an interest in the CDM market have had to put up resources to ensure the existence of projects that, given high transaction costs, institutional deficiencies and lack of capacity, would otherwise never make it. The role of the state, both nationally and internationally through international development agencies such as UNEP (CD4CDM), has again been crucial in promoting private investment and energizing the market for emission reduction credits. The Dutch tender program, for example, offered a reimbursement for baseline development to project developers who passed the initial screening and were invited to elaborate a full proposal (SENER 2002, quoted in Michaelowa et al. 2003).³¹³ Other governments also offer partial coverage for preparing PDDs.³¹⁴ Still, it is worth noting that the offer is usually

to reimburse after preparation of the full proposal, so the up-front money has to be found elsewhere.

The cost of a project

In a much cited study of transaction costs under the CDM, Michaelowa and Stronzik (2002) provide a simplified sketch of the expenses incurred when developing a project, according to whether these are fixed or variable and receding, and divided into pre-implementation, implementation and trading stages.³¹⁵ The following is a modified and expanded version of their main outline generally adapted to A/R project activities. It should, however, be borne in mind that it does not include the projects' actual implementation and operation expenses, but focuses only on what are understood as transaction costs incurred in presenting the project activity for approval and eventual sale of CERs.

Pre-implementation costs

- 1) **Formulation of the project and completion of a PDD:** This includes the design of the project, negotiation and consultation with stakeholders and determining the baseline. The latter is probably the most costly step in preparing the PDD, in particular for some carbon pools and greenhouse gases such as NO₂, and is likely to involve paying for an external consultancy. Ecosecurities (2002) calculates the minimum cost of just establishing a baseline for energy projects to be between £12,000 and £15,000 (roughly between \$22,800 and \$29,500 USD). The costs are for the most part variable but also fixed. Overall, the preparation of the PDD

is usually the most time-consuming step of the whole process, taking many months (up to two years) to complete.

- 2) **DNA Approval:** Refers to securing an official authorization from the host country. In transaction cost studies this expense is often assumed to be fixed but, depending on the host country, can be rather unpredictable and in many instances may depend on informal political and social relations and influence. As noted earlier, in the UNEP's CDM PDD Guidebook, DNA approval is identified as one of the most common pitfalls in effectively presenting a PDD for validation, often delaying the process by more than a month (Kamel 2005: 19).³¹⁶ In terms of transaction costs, the cost of a project will also vary greatly depending on how strict local regulations are on the need for an environmental or social impact assessment: the more rigorous, the more costly. This puts countries with stringent environmental and/or social regulations at a disadvantage.
- 3) **Validation:** Requires contracting and paying the services of an accredited DOE, which are fixed. As no DOE has yet been fully accredited from a developing country as of June 2006, and only a few have applied, these services normally include overseas travel costs for consultants and other related fees. In their study on transaction costs for sinks projects, Locatelli and Pedroni (2003) calculate that the cost of design and validating a project can range from \$40,000 to \$200,000.
- 4) **Review:** Refers to waiting and reviewing the validation report prepared by the DOE, and undertaking the recommended actions it may include. It implies variable cost and time.

5) **Registration:** The costs incurred by the CDM Executive Board in reviewing the projects are covered by project developers in the form of a registration fee, which follows a staggered structure. This ranges between \$5,000 for projects expected to result in less than 15,000 CERs per annum, to \$30,000 for projects generating more than 200,000 CERs per annum.³¹⁷ This fee is not enough to cover the Executive Board's operating costs, which Michaelowa et al. calculate at €2.3 million including Executive Board meetings and UNFCCC staff costs, as well as website administration. Assuming 200 project proposals are dealt with, the Board would need to charge €11,500 per project (or approximately \$13,500) (Michaelowa et al. 2003: 272). The Board can also charge fees for issuance of CERs, and will likely do so to cover the budget shortfall. Still, after many complaints that the CDM Executive Board was ill-suited to manage a market of the expected scale of the CDM, a revision of various decisions was undertaken in 2005 at COP MOP 1. This included a pledge of increased funds specifically for the CDM from various Annex I countries.³¹⁸

Implementation costs:

1) **Monitoring:** Consists of the periodic data collection and monitoring of leakage undertaken every five years to assure that any serious defaults or shortcomings of the project are corrected in a timely manner. It is one of the most resource-absorbing stages. According to Michaelowa and Stronzik (2002), together with the determination of the baseline, the cost

of monitoring alone represents 30 percent of the minimum fixed costs for any CDM project. In the case of sinks, Locatelli and Pedroni (2003) calculate the cost to be between \$2,000 and \$10,000 for each monitoring, plus \$0.10, \$0.30, and \$0.50 per hectare.

- 2) **Verification:** Entails contracting a different DOE to verify and report to the Executive Board. As with the validation stage, it is likely to entail overseas travel and other specialized fees for consultants from Europe or Japan. Michaelowa et al. (2003) quote verification fees charged by SGS for energy projects amounting to €17,000 for the first verification and €8,500 for each subsequent one (approximately \$20,000 and \$10,000). For sink projects, Locatelli and Pedroni (2003) found the overall costs of verification to range between \$15,000 and \$75,000, with \$45,000 as a mid-range figure.
- 3) **Review:** The verification report completed by the DOE might require a review and adjustments in order to be forwarded for certification to the Executive Board. The time and costs will be variable.
- 4) **Certification:** Refers to the final issuance of CERs by the Executive Board.
- 5) **Enforcement:** Refers to potential administrative and legal costs incurred in case of departure from the originally agree upon contract.

To this, one would have to add costs incurred in negotiating and drafting the specific legal contract with the buyer, which again, is likely to take time and requires outside legal expertise. Ecosecurities (2002) calculates the legal and contractual

arrangements minimum cost for energy projects to be between £15,000 and £25,000 (or \$29,500 and \$47,500), but they're likely to be much higher for sinks projects as the time frame is longer and the delivery of a precise number of credits is more uncertain and risky. Finally, there are also trading costs to consider –that is, transfer and registry, or brokerage, and the costs of holding an account in the national registry. Overall, according to Michaelowa and Stronzik (2002), the *minimum fixed* costs for any CDM project amount to €150,000 (or a little over \$148,000). To this one would have to add the many variables which increase transaction costs, and which happen to be what sink projects specialize in.

Transaction costs

Although it is not possible to calculate this with precision, and one would have to take into account time and uncertainty at the most important steps (in particular completing the PDD and negotiating the sale of credits), the highest share of transaction costs is the result of contracting outside experts. In a report for PCF*plus* (the research arm of the World Bank's Prototype Carbon Fund [PCF]) on transaction costs for small-scale energy projects, De Gouvella and Soto (2003) find that contractual costs to be paid to the DOEs represent 46 percent of total transaction costs with the most simplified procedures and in the best case scenario (where the project developer alone can address CDM issues and administrative aspects, the hired DOE is local, the host country's legislation on environmental impact assessment is not stringent, and the crediting period is not renewed). These same costs reach up to 90 percent of total transaction costs in cases where a consultant has to be hired from an

international consulting firm and other optimal conditions are not given (de Gouvella and Soto 2003: 15).

Broken up in terms of salary costs, de Gouvella and Soto (2003: 13) estimate that, including overheads and all types of costs in each case, these are as follows:

- Monthly cost technician local Project Developer: \$500 per month³¹⁹
- Monthly cost director local Project Developer: \$1000 per month
- Per day cost consultant: \$140 per day
- Per day cost local translator: \$60 per day
- Per day cost “local DOE”: \$200 per day
- Per day cost “international DOE”: \$1000 per day

Even including air fare and travel-related expenses, this list shows that the cost of hiring an international DOE is five times that of hiring a local one. While the local technician makes almost \$23 a day and the local director makes a little over \$45 a day in a month, the services of an international DOE costs \$1,000 a day. To this, one would have to add the cost of employing a local translator. Thus the cost of hiring a DOE for one day is more than what the local director of the project makes in one month. The local costs reflect the advantages of hiring Third World labor and operating under free market rules. They display the logic of the “flexible mechanisms” approach under the Kyoto Protocol and are the primary and the ultimate means of how global uneven development is reproduced.

Allocating risk

The project-based market is very diverse, with unique risks inviting a range of confidential transaction structures and legal terms defining contracts. Price discovery is difficult and prices in this segment reflect

the various risks associated with guaranteeing delivery of the compliance asset when and where required.

(World Bank and IETA 2006: 1).

Besides the potential for technical failure, projects may go under at any of the stages of the application and certification process. While preparing the PDD and at its initial stage of development, the project may succumb for various reasons, ranging from technical inconsistencies and lack of necessary data to problems with stakeholders or DNA consent; at the validation stage, the DOE may find the methodology inadequate and decline to validate the PDD; at the time of approval, the CDM Executive Board may reject it and deny registration; upon implementation, delays or vagaries may result in postponement or breakdown; and at the end of the project, the expected emissions reductions may not be -or be only partly- verified or certified.

The risks are so conspicuous and real that they have become an important parameter for the price paid for carbon emission reductions. Some carbon brokers and analysts have devised project categories based on risk to assist buyers of CERs in designing a convenient contract and figuring out the right price to pay. Point Carbon, for example, developed four forward CER contract categories that structure prices based on how different risks are distributed between seller and buyer (Point Carbon 2006: 25). These are as follows:

- 1) For non-firm volume, where the buyer buys what seller delivers even if emissions reductions turn out not to qualify as CERs, the average price range is between €3 and €6 per ton of CO₂e (or approximately \$3.6 and \$7).

- 2) For non-firm volume, where the contract contains preconditions (e.g., that the underlying project qualifies for the CDM): between €5 and €10 per ton of CO₂e (\$6 and \$12).
- 3) For firm volume, where the contract contains preconditions (as above), as well as usually strong force *majeure* clauses and high credit rating requirements: between €9 and €14 per ton of CO₂e (\$10.7 and \$16.7).
- 4) For firm volume, with no preconditions:³²⁰ between €12 and €14 per ton of CO₂e (\$14.3 and \$16.7).

Although the range is large and the price of CERs depends to a large extent on specific risk factors, the great majority of forward CERs transacted fit categories 2 or 3. Clearly, it is project developers who are assuming the lion's share of the risks. But it is not only a matter of how much but when, as there is a difference between so-called "upstream" and "downstream" risks.³²¹ Generally speaking, the more advanced a project is in the project cycle, the less the odds of failure. In developing the project and having it validated, registered and verified, project developers are taking responsibility for the most risky and time consuming tasks. Instead, buyers come in at a safer point which is closer to cashing time. "With sellers increasingly bearing registration risks, the primary concern for buyers has moved downstream to project performance, issuance of CERs and delivery into the buyers' account" (World Bank and IETA 2006: 32). Even if considerable, the risk for buyers of losing at these nodes in the *filière* are much less than at any of the previous ones.

Moreover, the risk goes beyond the project cycle and extends to the longer term market outlook as well. Given that the market ultimately depends on national government regulation that in turn responds to international negotiations at the UN level, uncertainty exists as to whether and how the market will continue after the first

commitment period. As stated in a confidential note quoted by Hamilton and Kenber, “In 2–3 years it will become irrelevant if there is not a post-2012 signal by 2008 or 2009”; *project developers are the real ones taking the risk*; speaking broadly “no bank in the world will lend against CERs, full stop”³²² (Hamilton and Kenber 2006: 8).

Access

A study by Michaelowa et al. on energy projects’ transaction costs based on information from the World Bank’s Prototype Carbon Fund (PCF), PricewaterhouseCoopers, and the Swedish government among others, clearly demonstrated that at price ranges between €1 and €5 per ton of CO₂e, (or approximately \$1.20 and \$5.80) “only projects classified as large and very large are viable” (Michaelowa et al. 2003: 273).³²³ They quote a PCF statement that “any project with a volume below €3 million of greenhouse gas benefits would not be attractive due to transaction costs” (ibid). This means that at a minimum a project would have to achieve 50 kilotons of CO₂e reductions per year during 20 years to be worth it. Assuming transaction costs of no more than 25 percent of total proceeds from sales of credits, the cost threshold for a project would be €1 (or little over \$1) per ton CO₂e (ibid.). For small-scale projects of between 2 and 20 kilotons CO₂e per year, transaction costs are estimated to reach up to €10 per ton of CO₂e (that is, about \$12), while for micro-projects reducing less than 2 kilotons of CO₂e per year, transaction costs can be as high as several hundred dollars per ton of CO₂e. (ibid.). Similarly, Ellis et al. (2004) calculate that a small-scale energy project would have to generate between 8 and 37 kilotons of CO₂e during its whole crediting period –circa

10 years- to be able to cover its transaction costs. Given that sinks projects accrue temporary credits that will fetch a much lower price in the market (they have to eventually be replaced), and that the limit of 8 kilotons of CO₂e per year for A/R projects of small scale is lower than it is for energy ones (15 kilotons CO₂e per year), the chances for small-scale sinks projects are dim indeed.³²⁴

This is confirmed by Locatelli and Pedroni (2003) in their study of transaction costs in small-scale sinks projects. Using data from experts and certification agencies, existing project case studies and a literature review, Locatelli and Pedroni (2003) estimate transaction costs values specifically for sinks projects of:

- \$40,000, \$120,000 and \$200,000 for design and validation costs;
- \$2,000, \$6,000 and \$10,000 for each monitoring, plus \$0.1, \$0.3, and \$0.5 per hectare; and
- \$15,000, \$45,000 and \$75,000 for verification costs.

They then use a total of 7,776 parameters combined (different accounting methods, different CER prices and variations in their rates, different transaction costs, different values for risk and economic discount rates, and different verification intervals) to calculate what would be the minimum area required for a project in which the transaction costs would be at least equal to the revenues from CERs. Only 7.1 percent of the parameter sets make projects with less than 500 hectares worth it. Their results also show that, under the ton-year accounting method (see Chapter 4) assuming standard or average values for most parameters, a price of \$3 per ton of CO₂, and a crediting period of 50 years, projects smaller than 100 hectares cannot profit from the CDM (Locatelli and Pedroni 2003: 12). And even with transaction

costs half of those, projects smaller than 500 hectares are out. Unfortunately, depending on the type of project and method used for measuring the scale of 8 kilotons of CO₂e per year, the maximum area of a small-scale project is found to range between 200 and 6000 hectares (Locatelli and Pedroni 2006). Locatelli and Pedroni further show that even if transaction costs were reduced by 20 or 50 percent, the probability for a small-scale project being favored by simplified modalities and procedures is less than 2 percent (2006: 639). Transaction costs would have to go down by 80 percent for an 11 percent probability that small-scale project consider participating.

Understanding transaction costs and built-in inequality

There are several factors worth noting in trying to understand how transaction costs became the primary obstacle to developing CDM sinks projects, ranging from the merely technical to more structural ones. First and most basically, there is the nature of the scheme itself. As Michaelowa et al. (2003) point out, there is a difference between cap and trade systems such as international emissions trading, and baseline and credit regimes such as the CDM. In the design of cap and trade systems the greatest work and effort is made at the beginning, as the goods are allocated, the rules and procedures are decided, and the regulatory institutions are put in place. Once this is done, these schemes mainly depend on an inventory analysis of the regulated entities (see Sorrell and Skea 1999 in Michaelowa et al. 2003). Instead, credit regimes require less effort at the beginning, but the onus of proof falls on each project, which must demonstrate the achievements accomplished during its lifetime. It was precisely to reduce transaction costs that the CDM was developed to work on a case-law basis,

so that methodologies approved for one project serve, if they can be proven to apply, for other analogous projects.³²⁵ The regime thus depends on a project-by-project analysis, and it is up to the project developer to supply all the evidence that will attest to the project's worth.

Moreover, because sinks in the CDM operate as a credit-based scheme in which both investor and seller have an interest in exaggerating the success of the project and downplaying any accounting or leakage problems, transparency, monitoring and verification are critical for the whole system to have any credibility. UN negotiators deciding on the rules of the market were acutely aware of this, and if they forgot, the environmental NGOs engaged in the discussions were there to constantly remind them. What's more, since some of the negotiators were in fact the future investors, the whole process was marked by what some observers characterized as an "obsession with avoiding risk."³²⁶ Some countries in the EU (the Netherlands is a prime example) had already invested in pilot projects, and set up official procurement programs (CERUPT and ERUPT in the Dutch case), and were anticipating the need to buy more credits to comply with their emission reduction commitments. They thus tended to shirk anything that might one day leave them exposed and played it as safe as possible.

The direct consequence of this preoccupation with credible emission reductions and the need to ensure transparency and reduce risks for the buyer (that is, Annex I countries, which held more power during the negotiations) resulted in an overly complex CDM project cycle. This complexity in turn meant that the up-front costs required to design and implement a project were exceptionally high. At the same time, with water-tight rules, the cost of verifying was lessened. In other words, the

remarkably complicated set of rules increased *ex-ante* transaction costs and in so doing decreased them *ex-post*. As a result, in complying with the requirements of a project, developers bear the greatest burden, and this in turn eases the work of the validating and certifying entities.

Yet precisely because credibility is of the essence, the work of monitoring and verification acquires great value. And since this is being developed as part of the UN system and is meant to work internationally, the task has to be undertaken by agencies enjoying the highest levels of official recognition. These agencies charge accordingly and as a result come to cash in on the bulk of the projects' budgets.

This lack of correspondence of time and effort employed relative to profit affects small and large projects disproportionately, since, for the most part, certification costs are fixed by the certifiers, and tend to be rather independent of the size of the project -or at least the relationship is not proportional.³²⁷ The combination of the higher costs at the design phase, and the fixed costs of validation, verification and certification, result in a persistent bias towards larger projects accruing more credits. This also has to do with the establishment of credibility: as DNV explains, if their fee were proportional to the amount of emission rights verified, their integrity could be questioned (DNV 2002, quoted in Michaelowa 2003). What this translates into, however, is that transaction costs represent an even greater proportion of the total costs for small-scale projects –especially calculated as cost per ton of CO₂-, whereas they are easier to accommodate in larger projects.³²⁸ The bias in favor of large projects is thus built in.

Moreover, transaction costs are heavily dependent on the context and on the institutional framework (Heller 1999 in Michaelowa et al. 2003: 264). Developers in

poor regions lack access to the tools and know-how necessary to complete a PDD. A representative of an environmental and developmental NGO in Panama interested in developing a sinks project explained that development of the baseline had to be done in Argentina because the Panamians lacked the technical tools, doubling the up-front costs of developing the project (Lanchberry, personal communication). So even though cheap land and labor make poor regions more attractive to investment, the cost of fulfilling the requirements, particularly those of a technical nature, can and often do cancel out any comparative advantage. This has been the perpetual story of most African countries since independence from colonial rule, and is repeated again in the case of climate change. In the words of Donnelly, President of the Greenhouse Emissions Management Consortium: “You need a deal of a couple of million tons, at a fairly high price of carbon, before money starts flowing to the landowners. No-one has brought me a proposed CDM transaction that’s large enough” (Nicholls 2002, quoted in Landell-Mills and Porras 2002: 101).

This was the story of a state-designed market meant to work internationally under the auspices of the United Nations. Now I turn briefly to the market’s own designed model, which has no great stated credibility concerns other than those regarding market efficiency.

The Chicago Climate Exchange: “To Save the Planet”?

The idea of the Chicago Climate Exchange came from the US sulfur market to Richard Santor, known as “the father of financial futures” for inventing interest-rate

futures in the 1970's (Goddell 2006).³²⁹ It was he who, as part of the Environmental Protection Agency's (EPA) Acid Rain Advisory Committee, persuaded the EPA to hold the annual auction for sulfur dioxide allowances on the Chicago Board of Trade.³³⁰ A little after that, while US negotiators were busy selling the idea of carbon offsets trading to their UN world counterparts, Sandor started working on the idea of an all-electronic exchange for carbon trading. In 2000 he received a \$450,000 grant from the Joyce Foundation and, with the help of around 100 people (power-industry executives, environmentalists, lawyers and so on) set out to study the feasibility of a voluntary emissions-trading market (ibid.). Three years later, in December 2003, after raising \$25 million in a public offering in the Alternative Investment Market (which is part of the London Stock Exchange), the Chicago Climate Exchange (CCX) opened for business. Corporations enlisted included Ford, I.B.M. and other blue-chips, as well as American Electric Power (A.E.P.), on whose board of directors Sandor sat (ibid.).

In the first month of operating the CCX, a total of 82,000 metric tons of CO₂e were traded at about \$1 per ton (Goddell 2006). A year after that, according to Sandor, CCX's members had reduced 30 million metric tons of emission, or the equivalent of what two big coal plants emit a year (ibid.). Although trading volumes were lower in 2005 than in 2004 (from 2.24 million tons of CO₂e in 2004 down to 1.45 million tons in 2005), they recovered in 2006, and the price per ton "*across all vintages*" went from a weighted average of \$1.95 to above \$3.50 (with a spike of \$5) (World Bank and IETA 2006: 19). According to Santor, by May 2006, with more than 175 participants (besides A.E.P. and Ford, there were Motorola, Du Pont, Rolls-Royce, I.B.M. Amtrak, Bayer Corporation, and various US states, cities and

universities, as well as several big Brazilian and other multinational corporations³³¹), more than six million carbon allowances had been traded, for a price between \$3 and \$5 per ton of CO₂e (Goddell 2006).

While the World Resources Institute (WRI) has endorsed the CCX, other environmental organizations are less enthusiastic. Although its transactions are audited by N.A.S.D., a respected private securities industry regulator, and the CCX has links to the EU ETS, where Sandor also runs the European Climate Exchange (ECX)³³², its credibility as a source of emission reductions is questioned. Given that it is an incipient voluntary market, it makes sense to render the game appealing and not punitive to attract players. Moreover, its goals are hardly ambitious. A reduction of only 1 percent between 2003 and 2006 (the market's first phase) is required from the participating emitters, and emissions greater than 4 percent -today increased to 7 percent- past a company's baseline are not even counted (Goddell 2006). The emissions reduction goal has now increased, and new participants are invited to aim at a 6 percent reduction below the baseline by 2010 (the end of phase II target) (World Bank and IETA 2006: 19). But in any case, there are no explicit penalties for missing the target (Goddell 2006). So for 2004, all members were found to be globally in compliance with limited trading (World Bank 2006: 19).

Some critics have also questioned the choice of baseline after which changes in the level of emissions are measured. Even though establishing a baseline will always be problematic, the baseline chosen by CCX -an average of emissions between 1998 and 2001- happens to coincide with an increase in coal burning by A.E.P. (on whose board Sandor sits) to compensate for the shutting down of a big nuclear plant.

Like the Eastern European economies, a high baseline allows A.E.P. to count reductions that would have happened anyway for other reasons, and this was mentioned to Goddell (2006) as one of the reasons other big emitters have not joined in (as a former executive of CCX said, “other big emitters had no interest in joining a program that seemed designed to help A.E.P. look like a good corporate citizen” [ibid]).

But perhaps the biggest problem is with additionality, particularly with what falls under the category of LULUCF (see Chapter 5). As Goddell (2006) notes, farmers in the United States were getting paid for avoided emissions resulting from using no-till (or zero tillage) methods in farmland soils. But they had been no-tilling for 14 years, and would likely continue to do so whether they were paid for the carbon offsets or not. Meanwhile, Ford or any other emitter can use these as credits to emit. As Goddell explains, “When I asked Sandor about this, he argued that it doesn’t matter if these agricultural reductions are “real” or not, because they make up only a small fraction of CCX’s overall reductions. “What’s important,” he told me, “is to incentivize people who are doing the right thing” (Goddell 2006). Of course, as Goddell further notes, the companies advertise and use the credits as if they were indeed real. Hence, in the best case, CCX is mainly validating emission reductions or removals that have already occurred; in the worst case, it is allowing for increases in emissions through sophisticated green-washing; and in every case, it is making a profit out of it.³³³

In June 2006, on the occasion of World Environment Day, The World Bank announced that it had offset all the emissions produced by its Washington D.C.

operations and business transportation tracked from its headquarters in that fiscal year. The total of 22 kilotons of CO₂e offsets came from a reforestation project in Costa Rica undertaken by the Swiss company Precious Woods. The credits were acquired and retired through the CCX. Precious Woods Holdings, a reforestation and forest management company with operations in the Latin American tropics, was enlisted in 2005 through the CCX, to “provide forest carbon offsets consisting of reforestation on formerly degraded pasture land in Costa Rica, while also maintaining existing natural forests” (Sandor and Kanakasabai 2005). This was done explicitly as part of CCX’s “mission of establishing a *standardized*, transparent, broad-based framework for greenhouse gases that includes carbon sinks such as forestry” and reduces transaction costs (ibid.; italics mine).

There is probably much for which to commend the Precious Woods reforestation projects. The process is certified by the Forest Stewardship Council (FSC) and seems to follow high quality environmental and possibly also social standards. But in terms of carbon offsets, there is no additionality whatsoever in the projects as this is precisely Precious Woods’ business.

What’s more interesting, two of Precious Woods’ properties or *fincas* appear as a World Bank’s BioCarbon Fund reforestation project in Nicaragua, in which the Emission Reductions Purchase Agreement (ERPA) has been signed for a total of 174,796 ERPA tons of CO₂e emission reductions.³³⁴ The spin abilities of the World Bank are well known, including amongst experts of the CDM Methodology Panel in charge of revising methodologies for projects,³³⁵ but it is instructive to consider them briefly. On the World Bank’s Carbon Finance Unit web page, the project appears as a

Nicaraguan project, Precious Woods appears as an “agro-forestry” company, and “the potential risk of *non-permanence* is mitigated by the long term commercial nature of the project, and by the critical importance of the *additional* revenue from the carbon sequestration” (op. cit.). Thus the problem of non-permanence is nonchalantly resolved by the fact that this is a successful commercial enterprise (and there is therefore no risk that the trees will be simply cut and operations stopped), and by the claim that the revenue from carbon sequestration is critical –never mind that the company’s shares have been listed on the SWX Swiss Exchange since March 2002, and the company proudly presents itself as a “world leader in the sustainable management and use of tropical forests.”³³⁶ Moreover, even though teak will cover 95 percent of the plantation surface and supposedly “valuable” native wood species will take up the remaining 5 percent, the project is presented as creating “a mosaic pattern consisting of secondary forest, (native) single trees, teak and groups of newly planted native trees” because some existing natural forest remnants and advanced secondary forest and major single trees will remain.³³⁷

It is also interesting to see what the World Bank chooses when, for once, it is itself a client looking to buy offset emissions. Even though its motto is “working for a world free of poverty” (its stated mission is “global poverty reduction”) and it has its own Community Development Carbon Fund (CDCF), it went for safe sinks credits in the voluntary, private market, buying from a large Swiss company (and Switzerland is not exactly a “World Bank client” as Bank documents like to put it). Under these terms, the project can only be justified as providing supposedly “valuable” direct foreign investment (the neoliberal state’s main concern). However, the sustainable development benefits on the ground really boil down to a few temporary employment

options, mainly for men, and stretching it out a bit, perhaps some (unavoidable) basic technical training. So much for the World Bank's constant preaching that carbon offsets can contribute to poor countries' sustainable development.

Going back to the commodity itself, the cost to Precious Woods of marketing verified carbon offsets from reforestation is probably negligible,³³⁸ with most of it being integrally absorbed by foreign technical and financial consultants and experts. The commodity goes pretty cleanly from Precious Woods, through CCX, to the World Bank, but in fact no *additional* greenhouse gas emission removals have taken place, no local communities have particularly benefited, and nothing has been produced, other than numbers and paper (arguably, more emissions). So even if the World Bank doesn't sell the offsets again at a profit but uses them for public imaging, this fictitious capital has materialized in real increased capital primarily for the financial sector and consultants and then for an already well-capitalized and established industry, in addition to the advantages that derive from a good marketing image.

Clearly though, the point of this effort goes beyond that of realizing value from whatsoever. Sandor and the corporations he enlisted have assumed that the market in greenhouse gas emission reductions will one day be mandatory and are moving to assure "first-mover status." This is what economists refer to as the "capture theory of regulation," which suggests that those producers who have most interest in the regulation outcome tend to monopolize the process of regulation and use it to prevent competition.³³⁹ As Goddell (2006) explains,

"in a few years, if a mandatory carbon-trading system is finally established in

the United States, one of the most contentious issues in the design of that system will be how companies that have already made reductions in their emissions will be credited for those reductions — if indeed they are credited at all. In other words, should a company like DuPont or I.B.M., both good corporate citizens that have already made sizable cuts in emissions, be required to reduce greenhouse gas emissions just as much as a competitor who has done nothing? If they do get credit for those early reductions, how might that credit be measured? For DuPont and I.B.M., hundreds of millions of dollars could be at stake in how this question is resolved.”

This is where the target lies: “The bigger CCX gets, the more cities and states it can get to join, the more likely it will be that carbon credits on the exchange will be viewed as the *de facto* standard by politicians and others responsible for designing a national system — and the more likely it will be that credits on the exchange, which at the moment are only informally recognized among CCX participants, will be grandfathered into a national system and granted full legal status as property rights. “This is all about business,” one carbon-market veteran told me. “It has nothing to do with the environment” (ibid).

In sum

Whether it is under the government-regulated or the voluntary-market version, when we look at who has access to the new market in emission reduction credits from land use change and forestry we see marginalization running across various scales: at one extreme, pretty much the whole continent of Africa is left out; at another, poor forest communities everywhere are left out. The two are linked, given the role played by agriculture and forestry in most African countries’ productive activities, the

number of rural poor, and their so-called “low energy and industrial footprints” (World Bank and IETA 2006: 28). The fact that under the CDM only afforestation and reforestation are allowed, that even for those limited categories the methodologies and rules are remarkably complex, and that sinks are not included in the EU ETS Phase I, results in the practical exclusion from the market of poor forest communities the world over.

This is clearly nothing new under capitalism, but rather what characterizes it most plainly. Here I presented only a detailed story of the how this new market works and who, as a consequence, has access to it and is able to profit. But ironies and contradictions abound. As noted throughout this chapter, given the stringent conditions and high transaction costs for CDM projects, these are biased precisely towards the kinds of projects so strongly opposed by the major environmental NGOs.³⁴⁰ If only large-scale projects are eligible or able to bear the costs, many small and poor countries, as well as community forest projects, will be left out and possibly confronted with increased competitive pressures on their land and production. Large-scale plantations, which are most often monocultures, tend to have negative effects on the ecology and the local livelihoods of developing countries with dense rural populations (see Chapter 4). As pointed out by Locatelli and Pedroni (2003), there is also the problem of leakage, in that the sale of carbon credits biased to favor large-scale plantations works as an incentive or subsidy to increase production and lower prices, depressing competition and displacing or making forestry projects elsewhere unworkable. This does no favor to either climate change mitigation or sustainable development –whatever the definition used.

Also ironic and contradictory is the fact that, as a result of the market rules, most of the cost and effort of undertaking a CDM project now falls mainly on people in the host country, given the cost of getting it registered and certified. So what started out as a cost-effective mechanism to contribute to non-Annex I Parties' sustainable development while helping industrialized countries make good on their commitments, turned into a challenge for developing countries' organizations seeking to enter a small market and leave some value-added investment in place. This has to do with the fact that every requirement -particularly in regards to transparency- is made on the seller, not on the buyer. It was the buyer countries that held most power during the negotiations. And yet, because buyers are the ones in need of the reductions, more and more governments and companies in developed countries are undertaking tasks that were originally meant to be done by the project developers, and are providing all manner of funds to get the supply of credits from CDM projects going. As noted in the State of the Carbon Market report of 2006, prepared by the World Bank and IETA, "In an effort to reduce potential operational and performance risks, many buyers are becoming more actively involved in the development of the project as a means to deal with technology risks [...] For instance, they offer extended assistance during the early stages of the project or once it has started, participate in the operation and maintenance of the project, or in the monitoring of the CER data" (World Bank and IETA 2006: 32).

Clearly, the effect of accounting rules on which projects can be undertaken has implications for equity. The *filière* analysis and attention to who has access to the market at the various nodes and why this is so could help remediate the built-in inequality and provide a better distribution of benefits -if only there is the will. But

the solutions are not simple or without a reconsideration of prices paid and a relocation of risk. A good example is the possibility established in the UNFCCC decision on bundling small-scale projects to decrease transaction costs under certain limited circumstances (see Chapter 5), which was explicitly meant to improve access by low-income forest communities to the CDM market. But here again, the problems are likely to be compounded as more people and more land leads to greater complexity and risk in market terms. This is confirmed by the experience of the Payment for Environmental Services in Costa Rica, to which the following chapter turns.

Chapter 7

On the ground: Costa Rica and the Payment for Environmental Services

*Have you breathed your investment yet? Have you drunk your investment yet?
Have you admired your investment yet?*³⁴¹

Costa Rican Ministry of Natural Resources and Energy

But I was thinking of a plan to dye one's whiskers green.

Lewis Carroll

By the mid 1980s, the small Central American republic of Costa Rica was desperately seeking resources that would allow it to emerge from a crippling economic crisis and one of the highest deforestation rates in the region. Ten years later, the same Costa Rica was burnishing its reputation as a world leader in environmental conservation, selling the first carbon offset credits in the international market, and teaching the world about paying for the environmental services that forests provide.

How this came about, what the Costa Rican Payment for Environmental Services (PES) is and how it works is the subject of this chapter. The chapter thus describes the Carbon Fund in Costa Rica, the first national system for the international marketing and sale of carbon offsets, which gave way to the creation of a national system for PES. Because carbon sequestration by trees was the only environmental service that had a well-defined institutional structure for its compensation based on the UNFCCC, the Costa Rican PES can be said to originate in the sale of carbon offsets.

The PES is widely admired and presented as exemplar for very good reasons, notably the focus on small- and medium-scale landowners and the linking of carbon

offsets with other forest environmental services such as biodiversity, water protection and scenic beauty. Yet, despite a nearly impeccable model, the reality of PES on the ground offers a glimpse of the many problems inherent in the market for carbon sequestration by trees. Like the market for sinks under the CDM, transaction costs and risk allocation imply that the small-scale peasant farmers at which PES is aimed and who need it most are excluded –either from the beginning, because they don't meet the requirements, or eventually, because it is unsustainable given the scale of their economies. More troublesome, a survey of PES until 2001 showed that the few small landowners who participated ran the risk of further impoverishment. At its worst, the PES contract could result in serious loss for the peasant who, in case of default, according to the law would have to pay back to the state the total amount received for the expected environmental service, in addition to interest and damages incurred. It is not hard to envision a scenario in which the continuous erosion and impoverishment of small-scale peasant enterprises, combined with lucrative opportunities afforded by planting trees for the sale of carbon offsets at a larger scale, result in peasant farmers losing their land to wealthier landowners better able to profit from PES or the CDM. Although judiciously aimed originally at addressing deforestation and sustainable livelihoods, the PES contract contains the seeds of a classic case of what Harvey (2003, 2006) describes as accumulation by dispossession.

Because Costa Rica is often presented as exceptional, the chapter addresses the conditions that gave rise to the creation of the Carbon Fund and PES. Where do they come from –in terms of ideas, institutions, and processes? What are their effects?

Responding to this question involves briefly revisiting the history of Costa Rica, from the creation of a modern welfare state in the 1950s and 1960s to the economic crisis and structural adjustment of the 1980s, focusing on the processes and institutions that provided the background for the Carbon Fund and PES. These include the tradition of state involvement in the economy as part of the welfare state; the 1960s and 1970s agrarian policies that, while quelling unrest, did not manage to redress a highly skewed land distribution; and the creation of semi-private institutions with USAID funds after the 1980s crisis. From there I analyze the turn towards green marketing that occurred in the 1990s as part of a strategy to capitalize on the environmental “cluster” (Porter 2000), and the other conditions that enabled this turn, in particular the existence of a coterie of scientists and environmentalists and the distinctive amalgam of environmental organizations present in Costa Rica. This is then followed by a description of the Costa Rican Carbon Fund and the PES, including its history and how it works, first in theory and then in practice. The latter involves looking at who has access to PES and how this access is maintained or lost. The concluding thoughts are an attempt to address both the salutary aspects of PES and the contradictions within it. What emerges will be taken up in the final conclusion in light of the development of the international market for sinks under the UNFCCC.

The creation of a modern welfare state: the 1950s and 1960s

In the three decades after the 1948 civil war, Costa Rica saw the gradual but solid consolidation of a welfare state upheld by democratic institutions. The

nationalization of the banks and the abolition of the army in 1948, increased social spending on health and education, and the constant expansion of state intervention in the economy laid the ground work for years of social stability and constitutional governments. These changes were accompanied at times with repression of the more radical elements, in particular of communists and *calderonistas* after the civil war.³⁴² But for the most part, social demands and unrest were met with the opening up of spaces by the state, which, although easily qualifying as co-optation, absorbed real and potential conflict and contributed to a widespread rise in the standard of living and political stability.

Central among these reforms were state interventions in the economy through subsidized credits from the national banking system in the 1950s, and protectionist policies and tax breaks for industrialists, including multinational corporations and foreign investors in the 1960s. This was the time of the creation of the *Central American Common Market* (CACM), which was meant to stimulate import-substitution industrialization and diversify production in order to reduce the vulnerability of the small Central American economies to fluctuations in the prices of one or two primary products (usually coffee and bananas), and save foreign exchange which otherwise always left the country to pay for imports. The complications of doing this in such small domestic markets meant that the consolidation of the five Central American republics was essential to increase the size of the market and justify the diversification of products. More than 100 companies were formed in Costa Rica between 1963 and 1975 as a result of the state's incentives and policies. These interventions included support for cooperatives (23 coffee cooperatives were founded between 1963 and 1972), inexpensive credits and the promotion of domestic markets.

The CACM started unwinding after the 1969 “soccer war” between Honduras and El Salvador (see Durham 1979), delaying payments for Costa Rica’s exports and contributing to its debt crisis. As the Costa Rican economy slowed in the 1970s, again the state intervened, this time more directly, by establishing and managing its own industrial and services enterprises under the Costa Rican Development Corporation (CODESA), as well as numerous agencies and “autonomous institutions” addressing issues that ranged from low-income housing to community development and health care. Public and state employment tripled between 1950 and 1970. In the latter year, the 51,000 employees in the state’s payroll comprised 10 percent of the work force (Molina and Palmer 1997a: 86). This number was to grow to 20 percent in the next ten years (Edelman and Kenen 1989: 188).

This active role in the state in the economy and especially the investments in health and education meant that by the end of the 1970s life expectancy was at 70 years and literacy rates were 90 percent; social security coverage extended to three-quarters of the working population and unemployment did not reach 5 percent. Overall, the 1960s is sometimes called “the golden age” of distributed growth (Bulmer-Thomas 1987). Yet this golden age eventually had three main losers: peasant farmers producing traditional crops, forests, and workers (Molina and Palmer 1997a: 89).

Agrarian policy in Costa Rica in the 1960s and 1970s

In the 1960s coffee exports still accounted for half of Costa Rica’s foreign income. Aided by increased use of pesticides and fertilizers, coffee production intensified and multiplied, so that the area dedicated to coffee production tripled

between 1950 and 1970. Banana production grew likewise with the introduction of more resistant varieties and more intensive use of agrochemicals, land and labor. Although the banana sector goes back to the 1900s, the Costa Rican government authorized the entrance of the Standard Fruit Company in 1956, and other foreign companies in 1965.³⁴³ Sanctions on Cuban sugar after the Revolution and the rise of fast and frozen food in the United States also contributed to the growth of sugar and cattle production. These incentives for capital investments in agriculture deepened land concentration, exacerbating highly skewed land distribution, especially as banana plantations spread and cattle ranches continued their expansion in the Northwest.

Peasant farmers responded to the increasing requirements for machinery and technical equipment by organizing cooperatives. But except for the cases of rice and dairy where they associated with well connected industrialists, these ventures were not very successful (see Masis 1989). In contrast to the country's image as a land of poor but equal yeoman farmers, land concentration and landlessness was prevalent.³⁴⁴ Cattle ranches in particular generated landlessness as they expanded, with the total number of landless families going from 14,000 to 17,421 between 1963 and 1973. And with the increase of landlessness, came an increase in land conflicts. In the seven years between 1963 and 1970, the number of land conflicts was 2,203, mostly in areas of cattle and banana expansion (Molina and Palmer 1997b: 22).

Conflict over land has a complex background in Costa Rica, dating to the civil war. The outright support of the civil war's winning party (the PLN³⁴⁵) by the small-landholding peasantry of the Central valley, the steadfast opposition to the same party by agricultural laborers under the Communist-backed banana labor unions, and the influence in government of large landholders, meant that, although there were many

soft loans for peasant producers, peasant issues did not receive priority attention after the civil war. This fact was masked by the agricultural frontier, which provided an escape valve.

But then in 1961, amidst growing concern in the United States for leftist moves inspired by the Cuban revolution, the “Alliance for Progress” was launched. This US-sponsored “massive hemispheric aid program” (Edelman and Kenen 1989: 126) promulgated agrarian reforms in the region as a means to quell more radical calls for change.

As talk of agrarian reform grew and the frontier’s closing neared, land invasions multiplied. This prompted landholders under attack to press the government to pass the agrarian reform law. The law, passed on October 14, 1961, placed heavy emphasis on “respect for private property” and the obligation of the state to fully compensate prior to expropriating any land based on the owner-declared value of the property for tax purposes. As a consequence of this policy, every expropriation ended up contributing to national indebtedness. And for this same reason reform was limited (see Seligson 1980).

Still, the Costa Rican government responded to peasants’ claims for access to land and better conditions as it usually did with all other issues, that is, by establishing in 1962 a government agency in charge of agrarian reform, the *Instituto de Tierras y Colonización* (ITCO) (Institute of Land and Colonization), later known as *Instituto de Desarrollo Agrario* (Institute of Agrarian Development) or IDA.³⁴⁶ Since 1968 ITCO-IDA has promoted a program called “*Asentamientos Campesinos*” (Peasant Settlements) with which it officially aims to “respond to pressure points by means of

rural lands that have been insufficiently exploited and the settlement of families on parcels appropriate for rational exploitation, and ensure the welfare of the affected population constituting the pressure point” (ITCO 1968: 2). The financing for this program initially came from the issuance of state bonds and a loan from the United States Agency for International Development (USAID).

As of July 2001, IDA had distributed 788,000 hectares, buying more than 500 farms, to accommodate more than 68,000 families (IDA, Department of Planning and Statistics, personal communication).³⁴⁷ The problem is that some of the land bought was not suitable for agriculture. In the Northeast for example, in the mostly tropical forest areas, it was not uncommon for a large landowner to pay for clearing the forest, cash in on the trees, and then abandon the land, because it was unfit for intensive agriculture or plagued by low productivity. The abandoned land would then be invaded by poor landless peasants, at which point the landowner and IDA would come to an agreement for compensation and expropriation. In this way, the peasants got to stay on the land, IDA did its job of quelling unrest and distributing land to poor peasants, and the landowner made a good deal (and possibly moved elsewhere for another good deal).

This was however bound to create larger problems down the road and it became one of the main contradictions of the PES. According to IDA’s mandate, the land it distributes is supposed to be “grade A” –that is, suitable for annual crops. Peasants who receive land from the IDA sign a contract whereby they commit themselves to work the land and make it agriculturally productive. If they fail to do so, they risk losing it to some other land-hungry peasant. The reality, as noted, is that IDA often acquired land suitable for forest because it was agriculturally unproductive

and cheap, and then distributed it to poor peasant farmers as if the land was good for agriculture. As peasants tried various forms of productive activity, they accumulated more debt. One of the best options was usually small-scale cattle ranching, for which more forest had to be cleared. And even this was not always an option: the grass is so wet and thin that cattle often broke their bones (personal communication). Allowing the land to revert back to forest was clearly the best -and often the only- option ecologically, but was not an option economically. This is what the payment for the environmental services through reforestation came to address. But because the land was supposed to be for agriculture, peasants who had received their land from IDA were not allowed to apply to the PES. This was to turn into one of the major problems of complying with the goal of incorporating small and medium landowners into the payment of environmental services scheme, and is further explained below.

The 1980s: structural adjustment and the “free market miracle”

In the meantime, under import-substitution industrialization, the economic expansion continued. More than one hundred companies were formed between 1963 and 1975. These however, were mostly owned by foreign capital (Molina and Palmer 1997b: 23). The government’s protectionist policies made no distinction whether the new industry used local or imported materials. In fact, tax benefits often favored imports. In 1976, 75 percent of the raw material used by industry had to be imported. For every \$100 of industrial output the country imported \$80 in inputs and machinery. So despite the import-substitution industrialization goal of decreasing the drain of foreign exchange, the reality was that imports in machinery and inputs led to a growth

in the trade deficit. This kind of industrialization was clearly not integrated into the local economy and as such failed to provide the expected necessary incentives, instead contributing to national debt.

The crisis was soon to be felt. Between 1978 and 1981, prices for agricultural inputs went up by 600 percent, leading to a rise in average production costs of 310 percent. At the same time, food prices rose only 180 percent (Edelman 1999: 93). The number of peasant organizations and activity increased in tandem: between 1970 and 1978, only four organizations were created; in 1979-82, another ten were founded; but in the seven years between 1983 and 1990, 126 were registered with the Ministry of Labor and Social Security. Many more probably applied but did not obtain legal status (Edelman 1999: 255-256). With the onset of the 1980s debt crisis, Costa Rica became the first country to default on its international loans, and the first one to plunge into structural adjustment programs.

The much touted “free-market miracle” in Costa Rica was largely a result of Washington’s careful handling of IMF, World Bank and International Development Bank (IDB) prescriptions for the country, and most importantly, of the country’s earlier reformist state policies (Edelman and Monge Oviedo 1993). Thirty years of investing on health and education gave Costa Rica advantages in adapting to neo-liberal globalization. Besides, given its geopolitical location, between Sandinista Nicaragua and Noriega’s Panama, Costa Rica’s various structural adjustment programs were considered with much strategic sensitivity (Edelman 1999). Although the “remedy” of structural adjustment was as bitter as in so many other countries, it was here softened, directly and indirectly, by vast additional resources via USAID.

Between 1982 and 1984, USAID thus became the shadow Ministry of the Economy (Molina and Palmer 1997b: 29), financing programs in Costa Rica for almost US \$380 million, and donating almost \$150 million. And its involvement continued throughout the decade, setting up institutions to implement the export-led growth model it was promoting. As with all other structural adjustment programs, social spending was cut back and public companies were replaced by private ones. But many times this included also the creation of new nonpublic organizations, ranging from agricultural schools to export promotion offices, that duplicated functions of public sector institutions and that were show-cased as examples of private sector efficiency (Edelman 1999: 78). These types of institutions were to play a crucial role in the sale of carbon offsets.

The Office for Joint Implementation, or OCIC (*Oficina Costarricense de Implementación Conjunta*), in charge of the promotion and sale of carbon emissions reduction units (so-called Certifiable Tradable Offsets [CTOs]) and of any matter relating to climate change policy under the Kyoto Protocol, is precisely one of these institutions. OCIC is a “strategic alliance” between the Ministry of Environment, the Foundation for the Development of the Cordillera Central (FUNDECOR), the Costa Rican Association of Energy Producers (ACOPE), and the Coalition for Development Initiatives (CINDE). This alliance was made possible by funding from the Costa Rica-USA Foundation, which was formed with USAID resources as this latter arm of the US government officially ended its activities in Costa Rica.³⁴⁸

CINDE (*Coalición de Iniciativas para el Desarrollo*) in turn was founded with money from the United States to provide funds for nontraditional export projects, training, private-sector “educational” activities, and opening new markets abroad

(Edelman 1999: 79).³⁴⁹ This office duplicated –though with a much larger budget– many of the functions of the government export promotion office, CENPRO, and played a key role in establishing and staffing a new Ministry of Exports (ibid.).

Another agency that came to duplicate the functions of well-established Costa Rican institutions whose funds were being cut as a result of structural adjustment, and which has played an important role in the sale of carbon offset credits, is the EARTH, *Escuela de la Agricultura de la Región Tropical Húmeda* (Agricultural School for the Region of the Humid Tropics). Located on the road to the poor Caribbean port of Limón, in an immense and preciously manicured garden that looks more like a fancy golf course in a tropical island, the EARTH is a private school with the same programs as the University of Costa Rica, or CATIE, *Centro Agronómico Tropical de Investigación y Enseñanza* (Center for Tropical Agricultural Research and Higher Education Center). With funds from the Kellogg Foundation, it was one of the most controversial of the USAID “parallel state” institutions. It is also the only institution to have completed a sale of emission reduction units outside of the PES framework, as part of a deal with the Port of Rotterdam to grow trees in an abandoned banana plantation to absorb the greenhouse gas emissions resulting from the expansion of the Dutch port.³⁵⁰ This arrangement was handled without the oversight of the Costa Rican Ministry of Environment, leading to tense relations between the school and the ministry.³⁵¹ The deal, however, was not renewed, because the Dutch Ministry then hired an intermediary firm to negotiate the carbon sequestration transactions, which sought to impose extremely stringent conditions. Under its terms, it would have been

necessary to commit the land for 40 years and use it as collateral in case of breach (that is, they would lose the land should they fail to deliver).

The 1990s: Greening Costa Rica

While tenuously recovering from the economic crisis, in the second half of the 1980s Costa Rica had already a well established reputation as a stable democracy for its position in Central America and for its role in securing peace in Nicaragua through the Central American Peace Accords that resulted in the 1987 Nobel Peace prize award to president Oscar Arias. Some years later, to the image of “Costa Rica the peaceful” was added the one of Costa Rica “the world leader in conservation.” Like Costa Rica’s legacy of rural democracy, the ‘green republic’ “is a curious blend of legend and truth that has taken on a life of its own and become an entrenched political ideology” (Edelman and Kenen 1989: 3).

As noted earlier, peace in Costa Rica was greatly aided by the influx of money and resources that arrived from the United States with the intention of presenting it as a showcase for liberal, democratic policies in opposition to communist Cuba, Sandinista Nicaragua, and the various other liberation movements in Latin America. The political stability of the region allowed a large number of researchers to work there and establish scientific and academic institutions with international connections and prestige, many with an environmental focus, such as CATIE, the Central American chapter of the IUCN (International Union for the Conservation of Nature³⁵²) and most notably, the Organization of Tropical Studies –but significantly, not a Greenpeace office, against which the National Legislative Assembly voted

unanimously (Van den Homberg 1999: 194).³⁵³ Today, more than a hundred local and international environmental NGOs have branches in the country (Honey 2003).

This contributed to the existence of what has been called the “conservation cartel”: a small group of committed scientists and public advocates, foreign and national, who occupied important positions in government and education and were able to shape government policy –both administrative and legal decisions (see Evans 1999). Their influence was clearly felt in the terms in which the matters relating to the environment were discussed. In a very small country where everybody knows each other, or is related to each other, it was not that hard for some of these people to exercise their influence.

One key member of the cartel, for example, was Karen Olsen, the wife of José Figueres Ferrer, twice President of Costa Rica (1953-58 and 1970-74) and the one who abolished the army, nationalized the banks and is credited with being the architect of the social democratic welfare state. Born in Denmark and raised in the United States, Karen Olsen was already among the group of five who attended the World Summit in Rio in 1992, led by then Costa Rican President Rafael Calderón Fournier. Other important figures include Joseph Tosi, who founded the Organization of Tropical Studies; Gerardo Budowski, who trained a whole generation in progressive forestry at CATIE; and more recently, Daniel Janzen, who has worked for decades consolidating the Guanacaste National Park in a manner that does not exclude the local population and has been involved in various attempts at selling carbon offset credits for forest restoration.

Most of the foreign-born members of the cartel were tropical biologists and scientists who had spent decades studying in Costa Rica (such as Daniel Janzen), or

expatriates (some of them naturalized) who acquired land to be established as nature reserves, some of it later incorporated into the National Park system (examples include Archie Carr, Joseph Tosi, Alexander Skutch, Olof Wessberg and Karen Morgensen, Amos Bien, and many others.) Many of them had studied in the United States (Gerardo Budowski got his Ph.D. from Yale; René Castro went to Harvard; Javier Baltodano to the University of California, Berkeley; and Alvaro Ugalde and Mario Boza took training courses in U.S. national parks),³⁵⁴ or were trained by someone in Costa Rica who had done so (Boza with Budowski and Kenton Miller in CATIE). But to understand what is specifically Costa Rican in all of this (I believe that in a fundamental way this is Costa Rican, and cannot be considered solely an imported model or a direct child of US conservation) it is important to remember that most of the Costa Ricans in the cartel then and now were first trained at the University of Costa Rica. René Castro, the ideologue behind Payment for Environmental Services, was actually a student leader at the University of Costa Rica, known for its progressive politics and activism (and from where many of the country's leaders are drawn).

These committed individuals are largely responsible for the establishment of Costa Rica's national park system. Officially created in 1969, the system grew rapidly, and today Costa Rica proudly claims that more than 25 percent of its territory is under some form of protection. While the percentage of national parks and other strictly protected areas is around 13 percent, and some of the rest is protected more on paper than in reality (see below the case of the Caño Negro Wildlife Refuge), this vast area is complemented by hundreds of private nature reserves.

Both a consequence and a cause of this government investment in nature was the explosion of ecotourism starting in the early 1990s. Driven by Costa Rica's infrastructure, combined with the country's reputation as safe and green (in contrast to other Central American countries, even though they may be, like Panama, richer in biodiversity), the number of foreign visitors nearly doubled and gross receipts grew more than 11-fold between the mid-1970s and mid-1990s (Honey 2003).³⁵⁵ By 1994 tourism had supplanted banana and coffee exports as the country's leading source of foreign exchange, with ecotourism and nature-based attractions leaving by 2000 over \$600 million in the country (ibid.).³⁵⁶ But besides ecotourism, the success of Costa Rica's image as a responsible steward of its natural graces had other linked benefits. In the early 1990s the Netherlands paid US banks \$5 million for \$33 million of Costa Rican debt. In return, the Costa Rican Central Bank assigned \$10 million in *colones* for reforestation programs.³⁵⁷ Although not many such transactions materialized, these debt-for-nature swaps added to the sense that environmental conservation could indeed be profitable.

Investing in the environmental 'cluster'

This turn was apparently part of a concerted effort to increase foreign investment in Costa Rica after the 1980s crisis. Tourism promotion was based on the "cluster theory," which centers on the importance of "clusters," or "geographic concentrations of interconnected companies" (Porter 2000) in a particular location for an economy to secure competitive advantage. Basically, the theory posits the idea that competitive economies (whether national, state or local) function thanks to a range of related marketable goods and services that command a market, as opposed to just one

or two disconnected export commodities.³⁵⁸ The classic examples are Silicon Valley and Hollywood. Accordingly, in 1996, Harvard Business School, the Central American Institute of Business Administration (INCAE) and the Central American Bank of Economic Integration (CABEI), initiated a three-year project to analyze regional policies and provide strategic policy advice to the governments of Costa Rica, Honduras, Guatemala, Nicaragua, and El Salvador.³⁵⁹ The project, called “Central America in the 21st Century: A Strategy for International Competitiveness and Sustainable Development,” was led by Jeffrey Sachs, then director of the Harvard Institute for International Development (HIID); Professor Felipe Larraín, project director at HIID; Eduardo Doryan, director of the Latin American Center for Competitiveness and Sustainable Development at INCAE; and the guru of cluster theory, Michael E. Porter, from the Institute for Strategy and Competitiveness of Harvard Business School. The project initially identified four clusters “with the potential to produce world-class industries” (*The Washington Times*, March 24, 2000) in Central America: tourism, *maquila* (apparel manufacturing), forestry and agro-industry. In furthering these results, a second phase of the project singled out biodiversity and anything environmental as prime strengths of the region (Kaimowitz, personal communication).³⁶⁰ Another report prepared by INCAE, together with the Central American Commission for Environment and Development (CCAD) and HIID in 1998, provided goals for land use until 2020 and drew attention to the potential for carbon capture in Costa Rica (see Rodriguez and Corrales 1998).³⁶¹

Costa Rica’s environmental organizations

If the cluster theory is correct in pointing to the importance of enabling

cooperative settings to develop competitive ventures -of which the greening of Costa Rica is a prime example- understanding where PES and the market in carbon sequestration by trees came from also calls for looking not only at public sector promotion, but also at the environmental organizations that existed in Costa Rica. Following Van den Homberg (1999), these organizations can be divided in three: the most important group is deeply tied to the government; the second most important is very technically oriented; and the most radical or socially engaged group has been rather effectively contained or co-opted –and reportedly, not always by peaceful means.³⁶²

- 1) The government-initiated or “promoted sector” of environmental organizations, is the most influential and secures the largest number of resources –between 75 and 90 percent of international contributions and access to debt-swap funds. It was the national government that formed some of these when, due to IMF restrictions on aid to the government, Alvaro Umaña (Environmental Minister with Arias [1986-1990]) was forced to engage in “full-time fundraising” in Washington. They are the smallest group (five or six most important organizations), and have no interest in forming alliances with other groups. They are *Fundación Neotrópica* (Neotropica Foundation), *Fundación Parques Nacionales* (National Parks Foundation), and the *Instituto Nacional de Biodiversidad (INBio)* (National Biodiversity Institute).
- 2) Technocratic groups are more numerous than the government-initiated ones, but have fewer resources. They are largely service-oriented, often

internationally affiliated, and possess valuable technical expertise they offer to the government. Most are independent, but institutionally stable and somewhat influential. They do establish relations with other groups. Examples of this type of organization are the Organization for Tropical Studies, the Tropical Scientific Center (*Centro Científico Tropical*) and *CEDARENA*. They carry out smaller-scale projects but manage to have several running at the same time. *EARTH*, *IUCN*, and the Caribbean Conservation Corporation (*CCC*) can also be considered part of this group, but there are others. They have been instrumental in shaping PES and the Carbon Fund insofar as they provide guidance, assessment, personnel and, most importantly, credibility to the government agencies.

- 3) Base groups are more diverse, local, and have few or no resources. They are also more likely to lack legal status. Examples include *COECO-La Ceiba* and *ASCONA*, both known formerly as the *Asociación Ecologista Costarricense*, *AECO* (Costa Rican Ecology Association). These base groups are now grouped under the *Federación Costarricense para la Conservación del Ambiente* (*FECON*) (Costa Rican Federation for the Conservation of the Environment). Of all the organizations, they have been the most critical of PES, citing irregularities in the management of the projects and inconsistencies in their conceptualization -such as paying for biodiversity through tree plantations which are usually monocultures. Some have ties to well-known international organizations. *COECO-La Ceiba* for example, is the Costa Rican chapter of Friends of the Earth. The government often dismisses these groups as radical environmentalists.

Envisaging a Niche: Costa Rica's PES

The idea –and the success of the idea- of the sale of the service of carbon sequestration at an international level is owed without a doubt to Costa Rica, and not to other countries.

Franz Tattenbach, December 1998.³⁶³

Origins

It all started during the government of José María Figueres Olsen, son of twice-president José Figueres Ferrer and Karen Olsen de Figueres, a prominent member of the original “conservation cartel” (see above). His Minister of the Environment, René Castro, set up in June 1994 (just a few months into his term) an office of Joint Implementation within the Ministry (*Oficina de Implementación Conjunta*) (OCIC), headed by Franz Tattenbach.³⁶⁴ The OCIC was established by the Ministry together with what they called “the non-governmental specialized technical sector,” represented by the Costa Rican Trade and Development Board, or Coalition for Development Initiatives (Coalición de Iniciativas para el Desarrollo, CINDE), a private organization specialized in attracting foreign investment (see above); the Costa Rican Association of Energy Producers (ACOPE); and the Foundation for the Development of the Central Volcanic Cordillera (FUNDECOR), also headed by Tattenbach.³⁶⁵ Its funds came partly from the Costa Rica-USA Foundation, in turn constituted with USAID funds. OCIC’s mission was to develop the procedures and mechanisms to market emission offset credits, and to promote the use of technologies that reduce greenhouse gas emissions –including forest sinks. It was also to be in charge of all climate change negotiations.

Two months after the establishment of OCIC and a few months after Costa Rica ratified the UNFCCC in 1994, Costa Rican president Figueres Olsen and then US Vice-president Al Gore signed the first bilateral joint implementation agreement in the Western Hemisphere, titled “Letter of Intention for Sustainable Development, Cooperation and Joint Implementation.”³⁶⁶ Like Costa Rica, the United States had set up an office to oversee carbon offset projects, known as the US Initiative on Joint Implementation (USIJI). In the first round of submissions to the Pilot Project Phase of the USIJI that year, six of the thirty projects received were from Costa Rica. Of these thirty, only seven were approved; three of them were Tico (that is, from Costa Rica.)³⁶⁷ By 1997, of the fifteen projects counted by the USIJI, eight were from Costa Rica. All of them were initiated by the private sector, with the government limiting its role to their approval. The dominance of Costa Rica at this early stage of the market was thus well established.

One of these projects was the Klinki Forestry Project, or KLINKIFIX, which involved planting up to 6,000 hectares of Klinki pine.³⁶⁸ With a total cost of \$3.8 million, it was meant to last forty years –the time it would take the trees to absorb 1.968 million tons of CO₂. Initiated by the Cantonal Agricultural Center of Turrialba, it counted as its main partner the Newton Treviso Corporation, a private company in Mystic, Connecticut which, “for over 25 years, has been working with the Cantonal Agricultural Center of Turrialba to develop farm crops.” As a previous indication of its success, the Newton Treviso Corp. advertised “the establishment of macadamia nut as a new crop in Costa Rica, placing Costa Rica among the top four world producers of this nut.”

Dr. Hester Barnes, Project Coordinator from the Newton Treviso Corporation, had this to say about the project:

We believe that only through the active participation and involvement of farmers in Latin America can we make significant contribution to the atmospheric carbon and global warming. While farmers may have been responsible for the original changes in land use -destroying the tropical forest to plant crops or graze cattle- today they also represent the best potential for reforestation of those same lands, once cleared by their grandfathers.³⁶⁹

Other projects from this first phase of the emissions market were the BIODIVERSIFIX Forest Restoration Project in Guanacaste (which included the WETFIX and the DRYFIX projects) under the guidance of Daniel Janzen; and the ECOLAND-Esquinas National Park, in the Osa peninsula.

But the most ambitious one was CARFIX, in the Central Volcanic Conservation Area, undertaken by FUNDECOR and designed by Franz Tattenbach. With almost 2,000 independent farmers involved, CARFIX would serve as a model for the subsequent nation wide PES. It was designed to last twenty-five years and fix over two million tons of CO₂. It would do this by regenerating 26,355 acres of forests, managing 50,640 acres, and reforesting 13,666 acres. A private timber investment company from the Southeast of the United States was meant to finalize the deal and provide the funding.

Ironically, according to William Alpizar, who has been an executive of OCIC since its creation, it was the success of these early projects that became the main hurdle to further develop the market – in his words, “*ese éxito se volvió cuchillo para el propio pescuezo*” (“that success became a knife [scalpel/blade] at our own throat”)

(personal communication). Alpizar explained that by setting a high standard and allowing the industrialized countries to bargain for more, these projects complicated matters for new ones. It was at this moment that the government saw that the potential benefits of joint implementation would be concentrated in a few hands, and that these would not be those mostly contributing to the government's forestry and energy policies. So a decision was made to create a portfolio of projects directly commerciable by the state. They called these "umbrella-projects" (*proyectos sombrilla*) because they incorporated all the smaller projects.³⁷⁰ They were divided in two: Protected Areas Project (PAP), and the Private Forestry Project (PFP). It was around these two umbrella-projects that the PES would develop, aided by initial funds from the World Bank of half a million dollars to launch the market and to pay for international certification, and to develop the software to account for the carbon sequestered.

In order to transact with these larger, more inclusive projects, the government then created its own brand of credits, called Certified Tradable Offsets (CTOs). These were financial instruments designed to be traded in an open market. They were defined as a specific quantity of greenhouse gas emission reductions, expressed in carbon equivalent units, that have been or will be reduced. In issuing one CTO, the Costa Rican State commits itself to sustain the validity of the reduction for 20 years, guaranteeing additional compensations in case discrepancies are observed with the certified reductions. They are thus pre-certified by an independent third party and fully transferable. Therefore "an AIJ investor does not need to get tied to a project." The investors simply buy the offset credits. In the spring of 1997, CTOs went up for sale at the Chicago Stock exchange, and in May of that year, on the occasion of his

official visit to Costa Rica, President Clinton became the first recipient of the first CTOs.³⁷¹ All of this was done well before the signing of the Kyoto Protocol, on December 10, 1997.³⁷²

Meanwhile, newspapers in Costa Rica explained the sale of air as a natural exchange between over-consuming industrialized countries with a deteriorated environment, and developing ones –such as Costa Rica- whose economy based on agriculture and protected forests made them “great producers of oxygen.” The headlines included, among others, “The Sale of Air Brings Costa Rica 444 Million Colones” (*La Nación*, February 13, 1997); “Panama Could Sell Air: Would Follow Costa Rica’s Steps” (*La Nación*, June 29, 1998); and “The Sale of Oxygen Enters the Chicago Stock Exchange” (*El Financiero*, May 15, 1998).

It was from this market opportunity for the sale of carbon offsets that emerged the idea of a more holistic payment for environmental services.

How it works

“Costa Rica is evolving as a testing ground for the hypothesis that markets can be used to drive sustainable development.”³⁷³

FUNDECOR and MINAE.

It is widely recognized by government officials and others that PES originated as an alternative to forestry incentives in the context of structural adjustment programs that mandated a reduction in government expenditures and subsidies.³⁷⁴ As such, PES was first established in the Forestry Law # 7575, approved in April 1996. It is based on the idea that owners of forests provide services to the world and to the

local community that are not recognized and for which they receive no compensation. Because of this, the costs of maintenance of these natural resources are borne by private landowners or the government, with uncertain results.

Under the PES program, the law recognizes four main services: climate change mitigation through carbon sequestration, biodiversity, watershed protection, and scenic or natural beauty. There is one well-known table, reproduced in every brochure or paper dealing with the topic, that neatly explains the logic behind PES. The first column lists various environmental services that forests provide. The next column, with the heading “Principal Beneficiaries,” is divided into three: Owner, Country and World. Small “Xs” fill out the different boxes, according to which party benefits from the service and who, in consequence, should pay for the benefit. Thus, carbon sequestration and biodiversity are benefits provided to the world, and watershed protection and scenic beauty mostly benefit the country.

<u>Type of Benefit</u>	Principal Beneficiaries		
	Owner	Country	World
Carbon sequestration			x
Biodiversity			x
Watershed protection		x	
Scenic beauty		x	x

The trick then is to figure out how to bill these unaware beneficiaries for the service they liberally enjoy. The government has been working on this problem for

some time and there exist now some projects to charge, for example, a certain amount of money to those industries that consume large quantities of water (such as the brewery) for the protection of the hydrological resource; or to tourist agencies for the natural beauty they sell. Biodiversity is a bit of a problem, because, although Costa Rica has the first arrangement in the world whereby a foreign pharmaceutical company (Merck) pays for bioprospecting done in the country in exchange for patent rights, it is a private arrangement. Only *InBio* (*Instituto Nacional de Biodiversidad*, National Biodiversity Institute), the research institute that secured the deal and undertakes the prospecting on its property, gets paid.³⁷⁵

What makes the Costa Rican model of PES even more attractive is that it was designed to be internally sustainable. A provision in the Costa Rican law states that one third of the 5 percent tax on fossil fuels recovered by the state would be allocated to the program. This was meant as recognition of the “polluter pays principle,” but most importantly, it would allow Costa Rica to avoid depending fully on an external, uncertain and incipient market. In theory, this would add up to \$19.8 million per year for the PES. However, based on constitutional principles of “unique accounting” and “centralized tax collection” (“*caja única*”) requiring all tax revenues to be part of the national budget, the revenue in fact never makes it to the PES program. The money goes first through the Ministry of Finance and is allocated according to political economic priorities dictated by the overall government budget deficit. The amount thus collected for the PES has in fact never been fully channeled to that purpose. But the model is good.

At the receiving (or producing) end, a private landowner signs a contract with the state whereby the landowner sells its right to sequester carbon. This is facilitated

by an intermediary forestry service organization or agency, in charge of preparing the contract, developing a management plan (whether for forest conservation, forest management or reforestation), overseeing the project, and, if all goes well, passing the check to the owner. The details and reality of this are described in what follows.

Access to PES³⁷⁶

The Costa Rican PES has been rightfully praised for its creativity and ambition. It not only aspires to be sustainable on a national level, being financed mainly by internal sources (in part though a tax on hydrocarbons and eventually other industries), but one of its main goals is the incorporation of small and medium-size landowners into sustainable forestry activities.³⁷⁷ Although this is a new experiment and is being fine tuned, it is possible to understand how it functions and what some of its effects are. What follows is a study of access to PES considering the provisos of the law and its application in the field based on several audits and independent studies, complemented by observations made in the field between October 2000 and November 2001.³⁷⁸ It shows how small and medium-size landowners have actually been little favored by the PES program. Some of the reasons are more obvious and manageable than others and, although they generally reflect the existing social inequity, unless they change, PES will simply perpetuate that inequality.

On distribution: small, medium- and large-scale owners

Most of the official reports on PES have emphasized that many of the contracts have been for small- and medium-scale projects. Yet there is a difference between the number of projects approved, and the percentage of the total area

allocated –the latter being a clearer indication of resource distribution, since payment is made by the hectare. Of the total projects between 1995 and 1997, 35.2 percent were for less than 20 hectares; 38.9 percent had an area of between 20 and 99 hectares; and the remaining 25.9 percent were projects for over 100 hectares. All told, the projects involving less than 20 hectares represented only 3.9 percent of the total area awarded with PES; those between 20 and 99 hectares represented 24.1 percent; and 72 percent of the areas financed represented projects over 100 hectares (CECADE 1999: 39).

To put it another way, projects involving less than 50 hectares represented 60.6 percent of the total projects approved, although they in fact accounted for only 15.9 percent of the total hectares with PES; projects with areas ranging from 51 to 150 hectares covered 21.2 percent of the projects and 23.8 percent of the hectares; while projects with over 150 hectares, although they only came to 18.2 percent of the operations, received 60.3 percent of the total approved area.

Predictably, women's participation is very low. In hectares, it represents 6 percent of the total, although the number of contracts is 12.5 percent for forest conservation, 15.34 percent for forest management, and 13.37 percent for reforestation (data from the *Proyecto Estado de la Nación* based on the annual FONAFIFO report for 1999). This reflects the trends for land held by women on a national level. Shortage of information, difficulty in accessing technical support and the lack of land titles have consistently decreased women's participation. This gender inequality is taken into consideration in FONAFIFO's most recent plans, mainly in the Ecomarkets Plan.³⁷⁹

Global versus Individual

In order to incorporate small- and medium-scale producers, PES law allows for so-called global projects, in which, in order to reduce costs, a number of owners may apply for PES jointly as an organization. The problem is that, since payment is per hectare, the amount allotted is the same for an individual project as for a global one, even though the latter benefits a greater number of people. Obviously, it is harder to work several projects at the same time, not only in terms of paperwork (although the procedure can be simplified) and supervision of land plots, but also in personal terms. It will always be easier and more affordable for the organization in charge of developing PES management plan to work with a single owner of, for example 100 hectares, than with 20 owners of five hectares each. This is all the more so since the forestry organization developing PES projects only charges a percentage of the total amount of PES, and, when it comes to global projects, is responsible to the state for the observance of the contract –in contrast to the individual projects, where the beneficiary is directly responsible.

For most of the year 2000, it was the *Centros Agrícolas Cantonales* (Cantonal Agricultural Centers) that had been working with small- and medium-scale owners. However, the deterioration of some of these centers in regards to their involvement in PES was obvious in 2001. In many cases, the centers had disintegrated due to administrative problems -sometimes, but not always, caused by corruption (although this was not a particularity of Cantonal Agricultural Centers; both regional agricultural centers and independent organizations were also charged with corruption.) Despite the importance of these organizations in incorporating small-

scale producers, the law does not establish any kind of additional support for them, and their importance has decreased dramatically over time.

Similarly, although much of the increase in secondary forest growth and plantations is attributed to small- and medium-scale owners organized into cooperatives or associations, many of these community forestry organizations are now facing financial and administrative problems.³⁸⁰ During field interviews, I found a certain resentment against the government and against some NGOs for having used the participation of small landowners to their advantage, without showing any real interest in their involvement through the local cooperatives. The peasant-farmers that have organized in this way feel that, once again, “the government promises and gives support only to take it away when one is hooked.”³⁸¹

For example, the law stipulates that the organizations applying for PES must have “an adequate organizational structure” (*Manual de procedimientos, Ley Forestal No.7575, art. 6.2.3.*) However, the law is not clear on how such organization is to be judged, and the use of such a general term is applied to peasant organizations, development associations, cooperatives and foundations with very diverse resources and structures. In the case of ASCOMAFOR (*Asociación Comunal de Manejo Forestal, Communal Association for Forest Management*), an association made up of five small associations of producers and women in IDA settlements, the authorities rejected the application for PES because the organization did not have such a structure –which they were told must include, among other things, an accountant, an administrator, a forestry technician and vehicles at their disposal. This was so despite the fact that the people in charge of sub-regional offices of MINAE were well acquainted with the people of ASCOMAFOR and knew it was a poor peasant

farmers, association with a solid reputation as a small, participatory organization, without the slightest problem of corruption.³⁸²

Thus the trend has clearly been toward a greater number of individual projects and many fewer global ones. These decreased from 73.2 percent of the total number of projects approved in 1995, to 57.9 percent in 1997. In contrast, individual projects accounted for 58.1 percent of the total area designated in 1995, and 70.3 percent in 1997. By 1999, 90.1 percent of the contracts were individual, with an area of 79.1 percent, while global contracts accounted for 9.9 percent and a total of 20.9 percent of the area.³⁸³

The problem of land titles

Perhaps the greatest problem for the small- and medium-scale owners is the need for a land title, which excludes proprietors who owe IDA money as part of the land distributed and or inputs for agriculture, and those in areas with uncertain title to the land. In the beginning, the Forestry Act allowed untitled lands to be included, as long as the petitioner provided proof of ownership. This proof could be established by a number of means, including a certified, notarized letter, information *ad perpetua memoria*, information documenting formal possession, or, lacking these, a sworn statement by the owner, the adjoining landowners and two witnesses certifying ownership, and an official inspection visit. But then Decree No. 27694-MINAE published on March 12, 1999 cancelled this option.³⁸⁴ In so doing, the decree ironically excluded PES from many areas that had been declared environmental reserves or refuges. Although the state simply has no resources to purchase or expropriate the land, declaring the areas reserves or refuges plainly prevents

landowners from acquiring land titles and applying for PES. This is the case in the Transboundary Biological Corridor and the Caño Negro Wildlife Refuge, where families that settled there years ago cannot obtain land titles and cannot receive PES because the place has been declared a protected area. These lands are not apt for cultivation and can hardly sustain cattle raising. As a consequence, the families tend to be very poor and, without PES, they have only incentives for cutting down the trees. These are the very lands that should be a priority in terms of PES for forest protection because they are areas that have already been declared of national interest by the State, and there are no resources available from the Ministry (monetary or human) to buy them and care for them.

The issue of IDA settlements is even more awkward. In 2001, MINAE announced that all agrarian reform beneficiaries wanting to participate in PES should request authorization from IDA. Yet IDA denied most applications, arguing that the institute buys “grade A” lands -that is, those suitable for annual crops. Not all of the representatives or leaders of IDA agree with this: IDA’s legal office has declared that PES is not compatible with IDA’s mission. Still, some officials have refused permission without offering any other explanation.³⁸⁵ Even within IDA it is acknowledged that the lands distributed were not the best for crops in any case. And that makes sense: in the North, for example, many of the lands distributed by IDA were taken from squatters occupying underused or abandoned farms –many times precisely because they were not good lands. The banana companies, moreover, did buy fertile lands in this region, putting pressure on the price of remaining land and fanning speculation. Thus most of the farms purchased by IDA were cattle ranches

with serious agrological limitations, requiring large investments –which are obviously beyond the means of poor peasant farmers— in order to make them productive.

The problem was a serious one as of 2001, since, while IDA refused permission to receive PES or incentives for reforestation and obliged peasant farmers to cultivate the land to comply with the distribution program, MINAE forbade the change in land use for the same plots because they were categorized as not apt for agriculture, but only for forestry. The result was more often than not illegal logging, the loss of the forest and gradual change of land use and, eventually, the abandonment of the farm, with the peasant ending up as poor or more impoverished than before.

Then there was the case of forest reserves in peasant settlements which were retained in IDA's name. Although by law these reserves were to go to MINAE, lack of resources meant that they did not, and therefore no one took responsibility for them. In the Northern Zone alone, there were almost 4,000 hectares of woods in forestry reserves on peasant settlements that were officially owned by IDA, but which were effectively looked after by the community of peasant farmers. This was done with great effort and without any support –from PES or any other source. Unsurprisingly, it was not always successful and added pressure and created conflict between IDA's settlers. It was clear in 2001 that if the issue of the IDA reserves was not resolved soon, they were destined to disappear in the very short term.

Lien on property

A major problem affecting access to PES by small- and medium-scale landowners was the lien put on their property when they signed a PES contract.

Although in principle it is understandable that the state should ensure, at least for some time, the conservation of the forest or plantation for which it is paying a service, lack of information and imprecision in the law resulted in banks considering the lien as a mortgage on the land, leading them to refuse all requests for loans until the lien notice was removed.³⁸⁶ Although there were attempts to clarify this situation, the fact is that as soon as peasants hear the word lien (*afectación a la propiedad*) they lose all interest in PES.

Indeed, after years of structural adjustment and free market policies, there are very few peasants who are not in debt or with outstanding credits.³⁸⁷ Land is almost the only guarantee for obtaining loans to invest in the farm or use in case of need, since it can be mortgaged. That is partly why struggles over land have not ceased, in spite of the fact that it is very difficult to make a decent living from it. In this situation, a PES lien should be seen more as an additional guarantee that the beneficiary will answer for the property, if nothing else, then to avoid trial for breach of PES contract and having to return PES funds. In fact, one of the great achievements of the Forestry Act lies in establishing the trees and the forests as assets within the National Banking System. This was a problem that hopefully will be resolved in practice, and there was in 2001 already better communication between the banks, the National Property Registry and FONAFIFO – although as usual, the most difficult part seems to be to establish such communication with the landowners.

Procedures and costs

One of the obstacles mentioned most frequently in relation to PES was delays in the disbursement of funds.³⁸⁸ In the case of reforestation, which depends on the

reproductive and growth cycle of trees, this delay is especially problematic. The decrees regulating the program, as well as the approval of contracts and the payments were often quite late and did not take into account the specific needs of a plantation, such as time to make or hire nurseries and the rainy season for planting. Such delays tend to benefit large landowners, who can bear the cost; they often eliminate small owners who are at risk if the plantation does not work out.

With regard to the cost, the law establishes a maximum of 18 percent of the project as the fee for the services rendered by the intermediary agency in charge of developing a PES management plan, including any administrative cost. However, some of these agencies charge more by passing on to the proprietor some costs such as lawyer's fees (see Baltodano 2000). Thus, in the Northern Zone, for example, the processing costs range between 22 and 25 percent (ibid.). This cost increases over time, since the prices paid under PES remain fixed for the five years the contract lasts, while the processing costs tend to go up with inflation. For example, in 1999, the amount paid for forestry protection went up by 20 per cent when the accumulated inflation was over 65 per cent (CECADE 1999: 44). The rule remains: the smaller the area available for PES, the less profitable the project, so that for forestry conservation projects of less than 20 hectares, the transaction and implementation costs absorb nearly all of the income. The problem is that most of the forested areas in Costa Rica, outside of protected areas and indigenous reserves, are a mosaic of small plots.

Knowledge and training: a problem of sustainability

A problem that may prove even more insidious is the concentration of knowledge in the intermediary forestry service agencies that develop PES contracts,

because not only are they in charge of supervising the conservation, forest management or reforestation plan for the duration of the contracts, but they must also oversee all the procedural and administrative requirements. Their role is important, and their services have clear and consequently important practical advantages, both for the better-off landowners, who do not live on their farms and have other employment, and for those with few resources, who must go back and forth to the city to prepare the paper-work required for PES and who are often unable to absent themselves from the tasks on the land. But leaving it all to the intermediaries does not generate any skills and knowledge among the small- and medium-scale landowners who live on the land. When it comes to reforestation, this affects the quality of the plantations, as can be seen by the high percentage of deficient pruning when there is no technical assistance or supervision on the part of the forest manager or other officials (CECADE 1999: 80). This in turn has repercussions for the economic viability of the project and the permanent incorporation of those producers into the sustainable forestry sector. These deficiencies are both the cause and the consequence of the fact that local participation in decision making is so low, and they affect all of the activities that are part of PES. The study by CATIE and CIFOR (2000) shows that, although Costa Rica has generated a large amount of forestry information, this is not available to most landowners.

Conclusion

The most prestigious carbon brokerage firm has told me: there is no other carbon in the world with the quality of the carbon being offered by Costa Rica. Franz Tattenbach, 1998.³⁸⁹

In contrast to the image of developing countries as passive recipients of whatever market opportunities they are allowed, the history of PES and the Carbon Fund in Costa Rica show that not only was the Costa Rican government an active mover in the creation of the international market for carbon offsets, but that it also designed a domestic market to take advantage of the perceived international demand to suit its development goals.

Tattenbach speaks easily about the “high quality” of Costa Rican carbon offsets. After all, as he himself willingly admits, he is paid to sell. Yet it is true that no other country has such a far-reaching and sophisticated system to sell carbon emission reductions. In fact, no other country has a program at the national level, much less one that is an intrinsic part of its national environmental policy. What makes it even more special is that it is a national strategy created as a means to finance long-term sustainable environmental development –and not the other way around (promoting a new export product which will ideally one day allow pursuing sustainable development). Tattenbach has always insisted that the sale of carbon offset credits is not something to “fatten the country’s export line,” but an opportunity to finance a Costa Rican environmental agenda of sustainable development that would otherwise be very hard to afford. His point is that the reduction of greenhouse gas emissions constitutes more than anything a “subproduct” of forests and silvicultural activities, whose financial profitability in the present markets is not doing so well. These activities are mainly forest conservation, forest management, and small-scale reforestation by small landowners. The sale of emission reductions in those cases raises the level of profit enough to assure the maintenance of the benefits they provide

-above all protecting biodiversity and water resources. These benefits in turn add value to other productive activities, such as ecotourism and the hydroelectric industry.

Moreover, with this program, Costa Rica makes access to the international market in greenhouse gas emissions the most democratically open, since, at least in theory, it is possible for everybody to participate via the PES program administered by FONAFIFO. As Tattenbach says, Costa Rica is the largest buyer of carbon reduction emissions: nobody in the world is buying more or faster than FONAFIFO is.

But perhaps the most important aspect of it all is that the Costa Rican scientific capabilities and know-how, which made the development of the program possible in the first place, are reinvested in Costa Rica. This is precisely one of the things that makes the carbon “high quality”: the amount of scientific research and monitoring that has already gone into assessing the carbon absorbed in different ecosystems and situations.³⁹⁰ Other reasons that make this carbon high quality are, according to Tattenbach, the total backing of the government, the fact that the reductions in emissions are assured by the scale of the project, and the transparency of the process -something that is really quite unique. To quote again Tattenbach selling his product:

“The added value that results from the scientific knowledge incorporated in each ton of Costa Rican carbon in the market is 100 percent national. In the other countries, a large part of that added value migrates with the hired foreign scientists.”³⁹¹

Unfortunately, the market is not necessarily looking for “high quality carbon.” So Costa Rica has begun capitalizing on what is perhaps its most valuable asset, one

that it can still capitalize on when the market goes elsewhere for cheaper credits, that is, know-how. The lack of brain drain is a significant contributor to Costa Rican development. Castro and Tattenbach know it well and they are actively selling this know-how to their Latin American neighbors. Members of OCIC as well as scientists have served as consultants on PES to many countries in the region, in particular Nicaragua and Puerto Rico (personal communication). And there is much pride on this vernacular ingenuity –the “made in Costa Rica” approach, on which Tattenbach eloquently insists:

“In other countries, projects are and will be undertaken as they are discovered by international NGOs that do not divulge very well the general methodology of work nor the operating technique. Instead, in Costa Rica, the effort is strictly national, endogenous: with national professionals in forestry, biological and economic science... and therein lies, I believe, an important part of our success.”³⁹²

At another scale, there is the question of PES and local development. The areas generating most of the timber in Costa Rica are characterized mainly by poor populations, few schools or health centers, and minimal opportunities for employment or training. This is not to say that logging is the direct cause of this underdevelopment. The reason that there is a forest to be exploited is precisely because of lack of access and roads, combined with small concentrations of population. But the fact is that timber activity has not generated opportunities or important changes contributing to local development. While logging is an important form of primary or primitive accumulation, where natural capital is easily converted into money capital this capital –whether raw or processed- exits the area and is accumulated outside the region, leaving behind little more than depletion. The PES

Program was conceived as a way to overcome this, but for the reasons that have been pointed out and other structural ones, there remains much to be done.

Concluding thoughts

A thousand-times-told tale

The story of the creation of a market for emission offsets by trees is one that is well-known and in many ways predictable: it tells how the production and trade of a new commodity resulted in reproduced inequality and the further marginalization of those people who, for social and ecological reasons, it made most sense to incorporate. In recounting this story I sought to detail how it unfolded, through the creases of so much inbuilt inequality and according to principles and values such as market efficiency and pragmatism that left little space to question the paradoxical results. This was not an inexorable outcome. And still, what at first appeared as the unintended consequences of understandable positions or defensible decisions, resulted in a surprisingly coherent picture of the logic of capitalism and the intrinsic contradictions it entails. This points to another recurring story and familiar problem: that of the relation between concrete actions and abstract structures. In this section I will try to review some of the incongruities that resulted from the creation of a market for sinks focusing on areas where the study of the particular can add to the understanding of the general. I address mainly three elements of various types that determined this story: the UN and the tacit reality of the negotiations; the rule of pragmatism and efficiency; and the creation of scarcity and standardization under a market approach. The emphasis in each case is on how specific elements and disjunctures result in a coherent general picture of the reproduction of inequality under capitalism.

On the UN and the nature of negotiations

“...a true bureaucracy (in the pejorative sense of that word) will never be interested in the validity of the results, but in the validity of the process producing the results” (Galtung 1986: 6).

The complexity of climate change is compounded. Like other environmental problems, it knows no geographic boundaries and needs cooperative and coordinated action by states to limit its effects, yet this goes against the foundations of international law, which is based on “concepts of state responsibility, sovereign equality, and the paramountcy of state consent” (Yamin and Deplege 2003: 2). But in addition, climate change cuts across scales not only on account of space but also of time, and is characterized by scientific uncertainty (involving complex interactions between the Earth’s atmosphere, the biosphere and the oceans over time and the impact of human activities upon them). This implies potentially huge damages and costs that are impossible to calculate, and entails vast discrepancies between those responsible for the damage and those mostly affected by it.

And still, the international community has managed to negotiate two treaties in less than a decade to deal with the issue: the UNFCCC in 1992, and Kyoto Protocol in 1997-the latter binding. These agreements, and particularly the Kyoto Protocol, have come to share the complexity of the issue itself and become inaccessible to everyone except those involved in the negotiations. The rules are increasingly technical and have produced specialized experts who know in detail only particular topics. Very few people have an understanding of the whole picture. Even assuming

one could read all the documents, they are impossible to understand without a knowledge of the institutional practices and procedures, both formal and informal, behind the negotiations.³⁹³ As Bodansky notes regarding the difficulty of interpreting the UNFCCC (and other international agreements):

“Words are debated and selected as much for their political and for their legal significance. Indeed, proposed formulations often took on a talismanic quality, only distantly connected to the actual meaning of the words. Linguistic debates became a proxy for political confrontation, with success or failure measured not just by the substantive outcomes, but also by the inclusion or exclusion of particular terms. For example, developing and developed countries argued for hours over whether economic development should be characterized as “essential” or a “prerequisite” for developing countries’ response measures. Delegations often sought to introduce identical language in different parts of the Convention or to move language from one part of the Convention to another, not to effect particular legal consequences, but to highlight certain provisions for political reasons” (Bodansky 1993: 492-493).

The elusive fairness

All men are equal before the law, but they are no longer equal after it
(quoted in Collier 1975: 126).

In principle, the UNFCCC and Kyoto Protocol negotiations, like most other UN processes, are set up to ensure equality of representation and opportunities. So, at least in the context of formal negotiations, the United States has exactly the same rights and responsibilities as Niue or Bhutan. It is one of the few fora where Parties’ interests are equally heard and, as Tuvalu has proven several times, individuals can exert an influence in the process not proportional to the power of the nation they

represent.³⁹⁴ Yet as anthropologists have noted, redistribution and reciprocity can also reinforce inequality where the exchanges made result from different valuation of the goods exchanged between partners with different needs (see Orlove 1977, in Wolf 2001: 164; see also Mauss 1990 [1950]). This inequality is reinforced and reproduced in myriad ways –starting with the most insidious and obvious one, that of the use of English as the common language for negotiations when official translation to the six UN languages is not available, and for drafting the texts.³⁹⁵

UN institutional practices and procedures are highly ritualistic and self-referential. And under the rituals it is easier to hide real inequalities.³⁹⁶ Although the process is political, the manner is by default legal. This international legal system generates frustration among delegates from developing countries, because, “while promising the rule of law in terms of procedural issues, [it] does not provide substantive guidance. There is a fear that legal principles of justice and fairness are not being developed, and instead the international legal system provides an arena for *realpolitik*, which then gets institutionalized by the legal power of precedents.”³⁹⁷ Thus, the international legal process appears to merely ensure a “‘polite order’ within which the ‘rules of the jungle’ operate” (Gupta 2001, 142; see also Gupta 2000a).

Furthermore, the highly formal and ritualistic manner of international negotiations in the UN fora is eccentric and complicated to learn. Delegates from poor countries are “socialized” into the process, but for the most part their involvement remains a formality (Gupta 2001). During the negotiations, the less compromising option for the delegates, and often the only one available when they lack explicit guidelines from the home government, is keeping quiet. Even when a certain general mandate has been approved by their government, because the negotiations proceed

rapidly and often unpredictably (given the large number of parties involved and complexity of issues addressed), it is very hard to have a position on everything. Delegates thus often accept things by default to avoid being further exposed. Moreover, developing country delegates dedicate most efforts to analyze developed countries' proposals, suspicious of what they entail, leaving them little time to elaborate their own proposals. The group of G-77 and China's only common position is generally a defensive one. As one delegate told Gupta, "We mistrust the North and we spend all our time analyzing their agenda rather than preparing ours" (Gupta 2001: 142). This attitude often generates frustration on the other side of the table: developed country delegates often lose patience and faith in frequently ill-prepared negotiators who respond most often on the defensive. Bias is thus reproduced, and mistrust bred.

A lot has to do with the importance accorded to climate change and environmental issues in general in most developing countries: it is not high on the agenda given other more pressing social problems and few resources. The sense is that, unlike the perception in industrialized countries of climate change as a common, scientific and technological problem, climate change in most developing countries is perceived as symptomatic of a more systemic problem to do with unequal distribution and development, caused largely by industrialized countries (Gupta 1997).

On disjoints and the decision-making process

The disjoints and gaps that characterize the decision-making process are numerous and pervasive. They are part of the rules of procedure as well as inherent in the structure of the negotiations. The division of work between ministerial input and

the technical negotiations is one of them. Ministerial input is limited to specifying key issues of highest importance to national interests and to the final trade-offs once the options have been boiled down to the minimum and compromise is needed; the rest is the job of bureaucratic negotiations, which define and pare down the options as legal text (see Grubb and Yamin 2001). This often results in contradictions between, on the one hand, what governments are able to obtain in the broader context of negotiations on emission reductions (or wider world politics) based on what they perceive to be in their interest, and on the other, what technical and legal experts come up with. This then has to be further confronted and made compatible with what the peer-reviewed scientific literature and experts linked to the IPCC consider acceptable and sound knowledge.

This disjuncture is magnified when looking up close at the reality of the negotiations, in that many of the delegates actually negotiating have different backgrounds. Although many have some sort of scientific training, they are not always specialists in the subject matter. The principal negotiator on sinks under the CDM for Brazil for example, José Domingos Gonzalez Miguez, is an energy specialist. And although the early negotiations were covered for Costa Rica by Franz Tattenbach, who has extensive experience in forestry projects, the head of the delegation for many years now is Paulo Manso, a meteorologist. These are two of the countries with the highest stakes and capacity in forestry issues. Even the Greenpeace representative on LULUCF had no strong background in forestry science or terrestrial biology.

This lack of specialized knowledge resulted sometimes in surprising blunders. In Milan for COP 9, for example, once the draft text on afforestation and reforestation

under the CDM had been adopted by the contact group, the representative of the secretariat for the UN Convention for Biological Diversity (CBD) present at the negotiations went to correct both Greenpeace and the Norwegians for their text on GMOs and invasive alien species. The text had been agreed upon and nobody had noticed that in fact the way it was written it went against the CBD convention (to which all Parties of the UNFCCC were also signatories), and would have the opposite effect from that desired. It turned out that nobody in the contact group knew the correct term, which is invasive alien species, not alien invasive species -the problem being invasive, not alien.³⁹⁸

One example of how the numerous disjunctures in the decision-making process contribute to the reproduction of inequality is the case of funding for adaptation to climate change. The problem stems partly from the UNFCCC definition of climate change as a result of the human-caused increase in atmospheric concentrations of greenhouse gases (see Pielke Jr. 2005). Although the UNFCCC contemplates a number of funds for special needs related to climate change (including the Least Developed Countries Fund and the Adaptation Fund, the latter financed by the 2 percent levy on all transactions under the CDM [see Chapters 4 and 5]), these resources are very hard to access. This is because any country wishing to use them for an adaptation to climate change project (for example in flood control) would have to distinguish between the human-caused aspect, and aspects stemming from natural environmental variations or standard underdevelopment deficiencies such as those in infrastructure and institutions. Adaptation to climate change under the UNFCCC definition does not include water management or biodiversity conservation for example. Besides, these projects are usually part of local and national development

projects. But funding from the Global Environmental Facility (GEF), which manages the funds, can only go to cover the additional harm caused by human-induced climate change. Calculating the portion and cost of this, and finding someone to co-finance the rest, is extremely difficult, so the funds are, in practical terms, often basically out of reach.³⁹⁹

On the rule of pragmatism and efficiency

The attitude and logic that characterized the creation of a market for sinks is part of the general move towards neoliberal approaches starting in the 1980s, which became more evident in environmental policies during the 1990s. This move has included notorious controversies on the possibilities of social participatory approaches to environmental protection as they had been tried before, and the hardly concealed recent backlash amongst conservation organizations towards more preservationist policies (see Chapin 2004). It surprises no one anymore that not a single indigenous representative or some kind of local organization sits on the board of any of the big conservation organizations, while a large number of corporations (some quite disreputable) do.

The neoliberal move is distinguished by the idea that markets are an integral part of the solution to any environmental (or other) problem. This idea goes unchallenged in the case of climate change which, given the many and different sources and effects of greenhouse gas emissions, appears as a regulator's nightmare. The market's "natural" instinct for maximizing profit is thus portrayed as the engine of innovation and progress, and the ultimate source of efficiency in allocating effort. As Dan Dudek, chief economist at Environmental Defense, a nonprofit advocacy

group, put it, “The beauty of carbon trading is that it takes a primal human impulse — greed — and redirects it toward saving the planet rather than destroying it” (quoted in Goodell 2006).

In fact, the market might be quite efficient at lowering the costs of reducing emissions for certain individual private companies. As a place and way of trading goods, markets might make it cheaper for single entities to get what they need -in this case, compliance with regulations. One could even argue that the spread of gains –in which consulting agencies, government organizations, non-governmental organizations, research centers and brokers of all kinds, all profit- further justifies it. But this effectiveness has nothing to do with efficiency in environmental or ecosystemic terms. Its measure is money, not the environment or greenhouse gas concentrations. There is an assumption that, if a market is efficient for reducing costs, it must be efficient for addressing environmental problems, and for that matter, for everything. This is quite a jump. Cost-effectiveness is, however, uncontested. As Gupta says, “The open-mindedness with which equity is being dealt with can be contrasted with the rigidity with which cost-effectiveness is covered in the literature” (Gupta 2001: 135). This is also why the Stern Report (2006), prepared by former World Bank economist Sir Nicholas Stern at the request of British Prime Minister Tony Blair in November 2006, making the case for taking prompt action on climate change as a matter of cost-effectiveness, was welcomed with such fanfare.

But perhaps what is most attractive in the market approach to reducing emissions is that, as Goodell says, “Best of all, it helped transform the problem of reducing pollution from a moral issue into a pragmatic one” (Goodell 2006). And anything that gets rid of moral dilemmas or morality is most welcomed. The ideology

of political realism permeates the whole approach to climate change: that the world is as it is and one should focus on what is possible rather than on what should be achieved (see Gupta 1997). This alone serves to eliminate developing countries' positions in the negotiations and excludes alternative points of view, which are relegated to wishful thinking, when not dismissed as naive or idealistic.⁴⁰⁰

On creating scarcity to create a market

As noted in the Introduction, perhaps the most important expression of a market is the creation of conditions of scarcity that ensure that the goods have value. This was vital but most complicated in the case of something like carbon sequestration from trees and vegetation, which happens anyway, everywhere. The fear that sinks credits would "flood the credits market" was often explicitly stated, and resulted in the cap on CDM sinks credits to 1 per cent of the five-year commitment period (equivalent to 5-6 percent of the total greenhouse gas emission reductions by Annex I countries in the first commitment period), and to the restriction to afforestation and reforestation project activities.

But scarcity was also assured by making the rules complex, the modalities difficult to apply to projects, and the transaction costs high.⁴⁰¹ Again, it was explicitly brought up in the negotiations when discussing the baseline year, which some Parties wanted to move for arguably good reasons (see Chapter 5). All of this was partly intentional: there was the clear sense that rules could not be too lax lest CDM projects would saturate the market and obliterate the incentive to reduce emissions at home. But to some degree it was also unintentional, a result of the concern for credibility.

Creating scarcity is in fact something that the business sector involved in the climate talks has continuously demanded, calling for “credible constraints” and clarity. As stated by the World Bank and IETA, “reducing climate risk and promoting investment in clean energy systems is a long-term venture requiring billions of dollars of annual investment. This will require long-term solutions, long-term capital and *long-term legally binding constraints*” (World Bank and IETA 2006: ii; italics mine).⁴⁰² Similarly, the “Business Views on International Climate and Energy Policy” survey, prepared by the UK Business Council for Sustainable Energy and The Climate Group, reports:

There is a unanimous view that mandatory caps (within ETS) are the critical element to providing scarcity and driving demand within carbon markets; there was a strong preference, often assertively made, for absolute targets over a longer time period. The key question for business is: how short (constrained) is the market going to be? (Hamilton and Kenber 2006: 6).

Producing for the global market also entailed standardizing products and processes insofar as possible. This is central to how saleable sinks were defined: the definition of forest was based on canopy cover, whereas a fairer definition would have to distinguish between biomes; a single year was established as the base-year for all afforestation and reforestation projects everywhere, despite hugely divergent recent histories of land use and deforestation in the different regions; and so on (see Chapters 4 and 5). Norms and standards are necessarily a “technological abstraction outside of time and place, (developed) in a social and ecological vacuum” (Rocheleau 1999, quoted in González and Nigh 2005: 46). These norms and standards are then translated into a structure of incentives that does little or nothing to distinguish

between high quality and marginal or poor reforestation activities. In fact, it results in a policy that encourages monoculture plantations, and does not recognize tree farming of mixed stands –for wind barriers, fuel, shade, posts, lumber, as well as fruit and nuts. These and similar processes of fragmenting and standardizing further explain how it is that small, independent, alternative projects are left out.

The paradoxical reality of the decisions and capital involution

Where just a few years ago the word “sink” used to refer to a conception of nature as a “free good” where pollutants are readily absorbed, some sort of garbage bin (Hajer 1995: 28; Harvey 1996: 378), now sinks are goods to be paid for. Sinks have thus become another example of the abstraction, the simplification and interchangeability needed to make tradable commodities that is so typical of capitalism. Petroleum pumped out of the ground in the Middle East or elsewhere blows out of someone’s tailpipe in a road race somewhere in Europe, and a tree in southern Mexico or Costa Rica comes to “stand for” that emitted carbon -a stunning example of the universal fungibility of things under capitalism.

What is perhaps the more outstanding contradiction is that after great lobbying efforts by environmental NGOs on the principles and modalities of afforestation and reforestation projects under the CDM, and the emphasis on “safeguarding the integrity of the Protocol,” the resulting decision favors precisely the kinds of projects that these self-proclaimed environmental stewards most adamantly opposed. By abstracting carbon from the natural process of which it is part, and putting a price on it, the decision on sinks under the Protocol makes nothing of critical relations –both social and environmental.

The resulting increased marginalization occurs at diverse scales: not only are smallholders and low-income communities in developing countries left out, but so are whole regions. The discrimination has become so blatant and embarrassing that at COP 12 in Nairobi, Kenya, former UN Secretary-General Kofi Annan announced the launching of the “Nairobi Framework,” an initiative by six UN agencies to help developing countries, particularly in Africa, participate in the Protocol’s Clean Development Mechanism.⁴⁰³

But the paradox of sinks is not unlike that which affects funding for other development projects: that it is precisely those projects with various social and environmental components and benefits that are harder to finance by the international development institutions set up to do so. Because despite the love of talk on synergies, these projects have in practice to be approved by various departments (or so-called “focal areas”) not made to work together.⁴⁰⁴ So the more integrated and rich a project, the more difficult it is to finance; the more human-free and environmentally-restricted, the easier and more lucrative.

Ultimately, however, the problem might be one of the actual inefficiency of the market to address climate change. Because the market will always seek the least-cost opportunity, in a context of fungibility and flexibility like the one provided by a basket of gases with different global warming potentials, and a net approach to accounting for emissions, the money –and reductions- will go to the “low-hanging fruits”: that is, the projects that provide the maximum amount of emission reduction credits at the lowest cost. This leaves unaddressed the transformation in the energy matrix that is really needed in a timely manner to stabilize concentrations of greenhouse gases. The destruction of HFC-23 is a perfect example. With a global

warming potential around 11,000 times that of carbon dioxide, and a cost of destruction of less than \$ 0.5 cents per ton of CO₂e, a large number (if not the largest number) of emission reduction credits from the CDM are from HFC-23 destruction. These projects do reduce emissions of a potent greenhouse gas, but they leave the energy infrastructure untouched. Yet it is precisely the energy infrastructure, with its long-lived investments, that needs to be revolutionized in order to affect the necessary, timely changes in the consumption of fossil fuels. More problematically, crediting the destruction of HFC-23 can provide an incentive to artificially increase the production of HCFC-22, an ozone-depleting gas regulated in industrialized countries under the Montreal Protocol that is also a greenhouse gas not covered by the Kyoto Protocol.⁴⁰⁵ But the market alone would first exhaust the cheapest and simplest options, and only then would it be forced to invest in more radical changes. This would take a lot more time than is safe in the case of climate change. Furthermore, given its narrow, fragmented and profit-seeking logic, the market approach leaves other problems in its wake that have to be constantly corrected by state regulations.

This is where the idea of capital involution is evidenced. The repetition of a discrete, simplistic pattern in confined space results in increased density and entrapment. Instead of opening up options, it generates new problems. Of course every new constraint opens up possibilities in a dialectical process. But as long as the approach taken is narrow (as the CO₂e credit-based market approach under the Kyoto Protocol is), the real cause of the problem will be left unaddressed, while the efforts go to tinkering with the convoluted arrangements.

This involution is reflected in nature, in the way that capital produces nature: fragmented, uneven, incoherent. Large-scale monoculture plantations of fast-growing

temperate species in tropical ecosystems, managed by one big corporation based elsewhere while local people are displaced, cancels options that make more social and ecological sense. This is not evolution in any sense of the word.

Still, I have tried to stress throughout this dissertation that this is not the result of some abstract mode of production, in the same way that there is no such thing as an abstract “free” market. Clearly, these are inextricably bound up with and shaped by legal regimes that derive from specific decisions and processes.⁴⁰⁶ Besides, presenting capitalism as an abstract mode of production that reproduces inequality makes the responses to it harder to envision. Here I have tried to detail how capitalism was promoted, codified, legalized and installed by specific regimes and processes, governed by specific ideas and values of efficiency and growth. Sometimes people are tied up with these processes in a way that recalls rituals, where actors are caught up in the form. Still, the outcome is not inexorable.

If we can abstract labor, it is not so surprising we can abstract a gas absorbed by trees in the simple process of breathing and then trade it as a commodity. This is of course a fiction, just like the idea of the free individual and the free market are fictions. The way they pile up and reproduce towards ever increasing complexity that is nevertheless not transformative is what I have called involution. In their involution they generate other such fictions and continuous ensnarement. A world divided in such discrete, abstract entities, is doomed to frustration if not failure because things are simply not found in isolation. Trees are part of social and ecological systems, and any attempt at separating them is delusional. The chances are that it will result in an accounting or fictional game where, as in liberal economic theory, reality will be called up only when the theory fails.

Appendix

Proposals for Appendix E of the Annex on modalities and procedures for CDM A/R on social and environmental impacts of project activities.⁴⁰⁷

APPENDIX E

Option 1 (proposed by the EU, Norway and Switzerland)

1. For the preparation of the project design document, this appendix outlines issues to be addressed in the analysis of environmental and socio-economic impacts of afforestation and reforestation project activities under the CDM, as required under paragraphs X, Y and Z of appendix B of the present annex.
This is to facilitate the preparation by the designated national authority of national guidelines, as appropriate, or to be used as a default list if guidelines are not available or are being developed.
2. For the analysis of environmental impacts, including possible impacts on biodiversity and natural ecosystems, taking into account relevant multilateral environmental agreements such as the Convention on Biological Diversity, the Ramsar Convention, and the United Nations Convention to Combat Desertification, the following topics are to be addressed:
 - (a) Present environmental status of the area, including a description of soils, climate, vegetation, fauna, habitats and rare and/or endangered species as described in national and or global red lists (e. g. IUCN);
 - (b) Infrastructural developments if extensive (e. g. construction of roads, nurseries, etc.) and their possible impacts;
 - (c) Species selection, origin and processing of reproductive material and silvicultural systems envisaged;
 - (d) Soil protection and measures for soil preparation and fertilization;
 - (e) Forest protection (e. g pest management, fire control);
 - (f) Appropriateness and safety of the use of chemicals;
 - (g) Expected effects on the hydrological system (run-off, water table, watershed, reservoir, riparian zone);
 - (h) Expected effects on biodiversity and ecosystem integrity within the project area and adjacent ecosystems;
 - (i) Monitoring and remedial measures for major project impacts.
3. For the analysis of socio-economic impacts the following topics are to be addressed:
 - (a) Present and expectable evolution of rights on tenure and land use;
 - (b) The needs of indigenous and forest-dwelling peoples;

- (c) Definition of responsibilities including those of primary stakeholders, project developers and host country authorities;
- (d) Stakeholders' involvement and integration in decision and management processes, access to information on the project and public participation [in accordance with Article 6 of the Convention];
- (e) Benefit-sharing, taking into consideration local communities;
- (f) Effects on local communities and their employment, market access and food production;
- (g) Inclusion of social and cultural impacts of the project, including capacity-building, awareness raising and safety of working conditions.

Option 2 (proposed by Tuvalu, on behalf of AOSIS)

1. This appendix addresses the potential environmental and socio-economic impacts that need to be considered in the preparation of the project design document and during the monitoring phase of the afforestation and/or reforestation project activities under the Clean Development Mechanism.
2. Issues to be addressed include:
 - (a) Present description of the environmental conditions of the project area including; vegetation, wildlife, soils, water quality
 - (b) Present description of socio-economic conditions of the project and surrounding area including;
 - i. current land tenure of project area,
 - ii. an account of the human habitation within project area and surrounding the project area,
 - iii. current land use of project area
 - (c) Description of potential environmental impacts resulting from project activity, both within and outside the project boundary, including:
 - i. soil erosion, soil compaction, loss of soil nutrients;
 - ii. water contamination , including increases in turbidity;
 - iii. loss or reduction in the number of indigenous plant and/or animal species and/or their habitats (in terrestrial and aquatic species);
 - iv. increases in the occurrence of fires
 - v. contamination of soil and water through use of chemicals
 - vi. changes in air quality (including increases in dust and smoke)

- vii. changes to the local climate
- (d) Description of potential socio-economic impacts resulting from the project activity, both within and outside the project boundary, including:
 - i. changes in land tenure and/or land use;
 - ii. displacement of local communities or indigenous peoples;
 - iii. damage to or destruction of religious or cultural sites of local communities and indigenous peoples;
 - iv. changes to local economy or employment;
 - v. increases in noise and/or waste;
 - vi. changes in the production and/or supply of food, medicines and fuelwood;
 - vii. increase in diseases

3. Consideration of the potential environmental and socio-economic impacts should take into account the obligations of the host country and/or acquiring TRECER Annex I Party with respect to other relevant multilateral environment agreements.

List of abbreviations

AAU Assigned Amount Unit

ACOPE Asociación Costarricense de Productores de Energía. Costa Rican Association of Energy Producers.

AGBM Ad Hoc Working Group on the Berlin Mandate

AIJ Activities Implemented Jointly

A/R Afforestation and Reforestation

AOSIS Alliance of Small Island States

ARD Afforestation, Reforestation and Deforestation

ASCOMAFOR Asociación Comunal de Manejo Forestal. Communal Association of Forest Management.

CACM Central American Common Market

CAN Climate Action Network

CCX Chicago Climate Exchange

CDM Clean Development Mechanism

CER Certified Emission Reductions

CINDE *Consejo de Iniciativas para el Desarrollo*. Counsel of Initiatives for Development. (Costa Rican Trade and Development Board -according to OCIC's translation.)

COP Conference of the Parties (UNFCCC)

COP/MOP Conference of the Parties serving as the Meeting of the Parties (Kyoto Protocol)

CoW Committee of the Whole

CSA *Certificados de Servicios Ambientales*. Costa Rican Certificates of Environmental Services.

CSE Center for Science and Environment

CTOs Certified Tradable Offsets

DNA Designated National Authority

DOE Designated Operational Entity

DNV *Det Norske Veritas*

EIT Economies in Transition

ENB Earth Negotiations Bulletin

EPA United States Environmental Protection Agency

ERU Emission Reduction Unit

EU ETS European Union's Emissions Trading Scheme

EUA European Union Emission Allowance

FCCC Framework Convention on Climate Change

FONAFIFO *Fondo Nacional de Financiamiento Forestal*. National Fund for Forestry Finance

FUNDECOR *Fundación para el Desarrollo de la Cordillera Volcánica Central*. Foundation for the Development of the Central Volcanic Mountainrange (?)

G-77 Group of 77 (developing) Countries

GEF Global Environment Facility

GM Genetically Modified

GMO Genetically Modified Organism

HFCs Hydrofluorocarbons

IAS Invasive Alien Species

INBIO *Instituto Nacional de Biodiversidad*. National Biodiversity Institute.

INC Intergovernmental Negotiating Committee

IPCC Intergovernmental Panel on Climate Change

JUSSCANNZ Japan, United States, Switzerland, Canada, Australia, Norway, and New Zealand

ICER Long-term Certified Emission Reduction

LDCs Least Developed Countries

LUCF Land Use Change and Forestry

LULUCF Land Use, Land Use Change and Forestry

MEA Multilateral environmental agreement.

MINAE *Ministerio de Recursos Naturales y Energia*. Costa Rican Ministry of Natural Resources and Energy.

OCIC *Oficina Costarricense de Implementación Conjunta*. Costa Rican Office of Joint Implementation.

ODA Official Development Aid

OPEC Organization of Petroleum Exporting Countries

PAP *Proyecto de Areas Protegidas*. Protected Areas Project. [Originally “Proyecto de Consolidación Territorial y Financiera de los Parques Nacionales y Reservas Biológicas de Costa Rica,” “National Proposal for the Territorial and Financial Consolidation of Costa Rican National Parks and Biological Reserves”]

PCF Prototype Carbon Fund

PDD Project Design Document

PFP *Proyecto Forestal Privado*. Private Forestry Project

PSA *Pago de Servicios Ambientales*. Payment for Environmental Services

QELROs Quantified Emission Limitation and Reduction Objective. After Kyoto, the term used was QELRCs: Quantified Emission Limitation and Reduction Commitment)

RMU Removal Unit

SBI Subsidiary Body for Implementation

SBSTA Subsidiary Body for Scientific and Technological Advice

tCER Temporary Certified Emission Reduction

UNCED United Nations Conference on Environment and Development

UNEP United Nations Environmental Program

UNFCCC United Nations Framework Convention on Climate Change (also Climate Convention or the Convention)

UNFF United Nations Forum on Forests

USIJI United States Initiative on Joint Implementation

WMO World Meteorological Association

Glossary⁴⁰⁸

A/R. Stands for **Afforestation and Reforestation**, the only two activities from the land use and forestry sector that can be accounted and credited under the CDM.

Activities Implemented Jointly (AIJ). The pilot phase for *Joint Implementation*, as defined in Article 4.2(a) of the *United Nations Framework Convention on Climate Change*, that allows for project activity among developed countries (and their companies) and between developed and developing countries (and their companies). AIJ is intended to allow Parties to the United Nations Framework Convention on Climate Change to gain experience in jointly implemented project activities. There is no crediting for AIJ activity during the pilot phase. A decision remains to be taken on the future of AIJ projects and how they may relate to the *Kyoto Mechanisms*. As a simple form of tradable permits, AIJ and other market-based schemes represent important potential mechanisms for stimulating additional resource flows for the global environmental good. See also *Clean Development Mechanism* and *emissions trading*.

Adaptation. Adjustment in natural or *human systems* to a new or changing environment. Adaptation to *climate change* refers to adjustment in natural or human systems in response to actual or expected climatic *stimuli* or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

Adaptive capacity. The ability of a system to adjust to *climate change* (including *climate variability* and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Additionality Reduction in *emissions* by *sources* or enhancement of removals by *sinks* that is additional to any that would occur in the absence of a *Joint Implementation* or a *Clean Development Mechanism* project activity as defined in the *Kyoto Protocol* Articles on Joint Implementation and the Clean Development Mechanism. This definition may be further broadened to include financial, investment, and *technology* additionality. Under “financial additionality,” the project activity funding shall be additional to existing Global Environmental Facility, other financial commitments of Parties included in Annex I, Official Development Assistance, and other systems of cooperation. Under “investment additionality,” the value of the *Emissions Reduction Unit/Certified Emission Reduction Unit* shall significantly improve the financial and/or commercial viability of the project activity. Under “technology additionality,” the technology used for the project activity shall be the best available for the circumstances of the host Party.

Aerosols. Solid or liquid particles suspended within the atmosphere (see “sulfate aerosols” and “black carbon aerosols”). Particles of matter, solid or liquid, larger than a molecule but small enough to remain suspended in the atmosphere. Natural sources include salt particles from sea spray and clay particles as a result of weathering of

rocks, both of which are carried upward by the wind. Aerosols can also originate as a result of human activities and in this case are often considered pollutants. See also Sulfate Aerosols. (EPA).

Afforestation. Planting of new forests on lands that have not been recently been forested. According to Decision 11/CP.7, “‘Afforestation’ is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through plating, seeding and/or the human-induced promotion of natural seed sources.” Decision 11/CP.7 Annex A 1(b) [*see same decision for other basic definitions (revegetation, cropland management et al.)*]

Alliance of Small Island States (AOSIS): A coalition of some 43 low-lying and small island countries, most of which are members of the G77, that are particularly vulnerable to the potential adverse consequences of climate change such as sea-level rise, coral bleaching, and increased frequency and intensity of tropical storms.

Allocation. Under an emissions trading scheme, permits to emit can initially either be given away for free, usually under a ‘grandfathering’ approach based on past emissions in a base year or an ‘updating’ approach based on the more recent emissions. The alternative is to auction permits in an initial market offering.

Annex I Party Group of countries included in Annex I (as amended in 1998) to the *United Nations Framework Convention on Climate Change*, including all the developed countries in the Organisation for Economic Cooperation and Development, and *economies in transition*. By default, the other countries are referred to as *non-Annex I countries*. Under Articles 4.2(a) and 4.2(b) of the Convention, Annex I countries commit themselves specifically to the aim of returning individually or jointly to their 1990 levels of *greenhouse gas emissions* by the year 2000. They are 40 countries plus the European Economic Community: Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, European Economic Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, The Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United States.

Annex A: A list in the Kyoto Protocol of the six greenhouse gases and the sources of emissions covered under the Kyoto Protocol. See also "Basket of Gases."

Annex B: A list in the Kyoto Protocol of 38 countries plus the European Community that agreed to QELRCs (emission targets), along with the QELRCs they accepted. The list is nearly identical to the Annex I Parties listed in the Convention except that it does not include Belarus or Turkey.

Annex II countries. Group of countries included in Annex II to the *United Nations Framework Convention on Climate Change*, including all developed countries in the Organisation for Economic Cooperation and Development. Under Article 4.2(g) of the Convention, these countries are expected to provide financial resources to assist

developing countries to comply with their obligations, such as preparing national reports. Annex II countries are also expected to promote the transfer of *environmentally sound technologies* to developing countries. See also *Annex I, Annex B, non-Annex I, and non-Annex B countries/Parties*.

Annex B countries/Parties. Group of countries included in Annex B in the *Kyoto Protocol* that have agreed to a target for their *greenhouse gas emissions*, including all the *Annex I countries* (as amended in 1998) but Turkey and Belarus.

Anthropogenic. Derived from human activities.

Anthropogenic emissions. *Emissions of greenhouse gases, greenhouse gas precursors, and aerosols* associated with human activities. These include burning of *fossil fuels* for energy, *deforestation*, and *land-use* changes that result in net increase in emissions.

Assigned amounts (AAs). Under the *Kyoto Protocol*, the total amount of *greenhouse gas emissions* that each *Annex B country* has agreed that its emissions will not exceed in the first commitment period (2008 to 2012) is the assigned amount. This is calculated by multiplying the country's total greenhouse gas emissions in 1990 by five (for the 5-year commitment period) and then by the percentage it agreed to as listed in Annex B of the *Kyoto Protocol* (e.g., 92% for the European Union, 93% for the USA).

Assigned amount unit (AAU). Equal to 1 tonne (metric ton) of *CO₂-equivalent emissions* calculated using the *Global Warming Potential*.

Banking. According to the *Kyoto Protocol* (Article 3.13), Parties included in Annex I to the *United Nations Framework Convention on Climate Change* may save excess *emissions allowances* or credits from the first commitment period for use in subsequent commitment periods (post-2012).

Basket of Gases. This refers to the group six of greenhouse gases regulated under the *Kyoto Protocol*. They are listed in Annex A of the *Kyoto Protocol* and include: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

Base Year. Targets for reducing GHG emissions are often defined in relation to a base year. In the *Kyoto Protocol*, 1990 is the base year for most countries for the major GHGs; 1995 can be used as the base year for some of the minor GHGs.

Baseline. The baseline (or reference) is any datum against which change is measured. It might be a "current baseline," in which case it represents observable, present-day conditions. It might also be a "future baseline," which is a projected future set of conditions excluding the driving factor of interest. Alternative interpretations of the reference conditions can give rise to multiple baselines.

Baseline Emissions. The emissions that would occur without policy intervention (in a

business-as-usual scenario).

Berlin Mandate. A ruling negotiated at the first Conference of the Parties (COP 1), which took place in March, 1995, concluding that the present commitments under the Framework Convention on Climate Change were not adequate. The Berlin Mandate established a process that would enable the Parties to take appropriate action for the period beyond 2000, including a strengthening of developed country commitments, through the adoption of a protocol or other legal instruments. (EPA).

Biomass. The total mass of living organisms in a given area or volume; recently dead plant material is often included as dead biomass.

Bubble. An option in the Kyoto Protocol that allows a group of countries to meet their targets jointly by aggregating their total emissions. The member states of the European Union are utilizing this option.

Capacity building. In the context of *climate change*, capacity building is a process of developing the technical skills and institutional capability in developing countries and *economies in transition* to enable them to participate in all aspects of *adaptation* to, *mitigation* of, and research on climate change, and the *implementation* of the *Kyoto Protocol flexible mechanisms*.

Carbon Cycle. The global scale exchange of carbon among its reservoirs, namely the atmosphere, oceans, vegetation, soils, and geologic deposits and minerals. This involves components in food chains, in the atmosphere as carbon dioxide, in the hydrosphere and in the geosphere. (EPA). The term used to describe the flow of carbon (in various forms such as as *carbon dioxide*) through the *atmosphere*, ocean, terrestrial *biosphere*, and *lithosphere*.

Carbon dioxide (CO₂). A naturally occurring gas, and also a by-product of burning *fossil fuels* and *biomass*, as well as *land-use changes* and other industrial processes. It is the principal *anthropogenic greenhouse gas* that affects the Earth's *radiative balance*. It is the reference gas against which other greenhouse gases are measured and therefore has been assigned a 100-year GWP of 1 (i.e., the warming effects over a 100-year time frame relative to other gases) (see carbon dioxide equivalents, or CO₂e). Atmospheric concentrations of CO₂ have been increasing at a rate of about 0.5% per year and are now about 30% above preindustrial levels.

Carbon dioxide Equivalent (CO₂e). A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents." The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. For example, the GWP for methane is 24.5. This means that emissions of one million metric tons of methane is equivalent to emissions of 24.5 million metric tons of carbon dioxide. Carbon may also be used as the reference and other greenhouse gases may be converted to carbon equivalents. To convert carbon to carbon dioxide, multiply the carbon by 44/12 (the ratio of the molecular weight of carbon dioxide to carbon). (EPA). (CO₂e) The

emissions of a gas, by weight, multiplied by its "global warming potential."

Carbon dioxide (CO₂) fertilization. The enhancement of the growth of plants as a result of increased atmospheric *carbon dioxide* concentration. Depending on their mechanism of *photosynthesis*, certain types of plants are more sensitive to changes in atmospheric carbon dioxide concentration. In particular, plants that produce a three-carbon compound (C3) during photosynthesis—including most trees and agricultural crops such as rice, wheat, soybeans, potatoes, and vegetables—generally show a larger response than plants that produce a four-carbon compound (C4) during photosynthesis—mainly of tropical origin, including grasses and the agriculturally important crops maize, sugar cane, millet, and sorghum.

Carbon Pool. A Reservoir. A system which has the capacity to accumulate or release carbon. Examples of carbon pools are forest biomass, wood products, soils, and atmosphere. The units are mass (e.g. tC).

Carbon Sequestration. The uptake and storage of carbon. Trees and plants, for example, absorb carbon dioxide, release the oxygen and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned. (EPA)

Carbon Sinks. Processes that remove more carbon dioxide from the atmosphere than they release (carbon sequestration). Both the terrestrial biosphere and oceans can act as carbon sinks.

Certified Emission Reduction (CER) Unit. Equal to 1 tonne (metric ton) of *CO₂-equivalent emissions* reduced or sequestered through a *Clean Development Mechanism* project, calculated using *Global Warming Potentials*. See also *Emissions Reduction Unit*. A CER can be sold or counted toward Annex I countries' emissions commitments. Reductions must be additional to any that would otherwise occur.

Chlorofluorocarbons (CFCs). *Greenhouse gases* covered under the 1987 *Montreal Protocol* and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower *atmosphere*, CFCs drift into the upper atmosphere where, given suitable conditions, they break down *ozone*. These gases are being replaced by other compounds, including hydrochlorofluorocarbons and *hydrofluorocarbons*, which are greenhouse gases covered under the *Kyoto Protocol*.

CINDE. *Consejo de Iniciativas para el Desarrollo*. Counsel of Initiatives for Development. (Costa Rican Trade and Development Board -acc. to OCIC's translation.)

Clean Development Mechanisms. Defined in Article 12 of the *Kyoto Protocol*, the Clean Development Mechanism is intended to meet two objectives: (1) to assist Parties not included in *Annex I* in achieving *sustainable development* and in contributing to the ultimate objective of the convention; and (2) to assist Parties included in Annex I in achieving *compliance* with their quantified emission limitation

and reduction commitments. *Certified Emission Reduction Units* from Clean Development Mechanism projects undertaken in *non-Annex I countries* that limit or reduce *greenhouse gas emissions*, when certified by operational entities designated by *Conference of the Parties/Meeting of the Parties*, can be accrued to the investor (government or industry) from Parties in *Annex B*. A share of the proceeds from the certified project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of *climate change* to meet the costs of *adaptation*. One of the three market mechanisms established by the Kyoto Protocol.

Climate Change Climate change refers to a statistically significant variation in either the mean state of the *climate* or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or *external forcings*, or to persistent *anthropogenic* changes in the composition of the *atmosphere* or in *land use*. Note that the *United Nations Framework Convention on Climate Change* (UNFCCC), in its Article 1, defines “climate change” as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.” The UNFCCC thus makes a distinction between “climate change” attributable to human activities altering the atmospheric composition, and “climate variability” attributable to natural causes. *Climate variability* thus refers to changes in long-term trends in the average climate, such as changes in average temperatures. So whereas in IPCC usage, climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity, in UNFCCC usage, climate change refers to a change in climate that is attributable directly or indirectly to human activity that alters atmospheric composition.

Climate Feedback. An interaction mechanism between processes in the *climate system* is called a climate feedback, when the result of an initial process triggers changes in a second process that in turn influences the initial one. A positive feedback intensifies the original process, and a negative feedback reduces it.

Climate scenario. A plausible and often simplified representation of the future *climate*, based on an internally consistent set of climatological relationships, that has been constructed for explicit use in investigating the potential consequences of *anthropogenic climate change*, often serving as input to impact models. *Climate projections* often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as about the observed current climate. A “climate change scenario” is the difference between a climate scenario and the current climate.

Climate System (or Earth System). The climate system is the highly complex system consisting of five major components: the *atmosphere*, the *hydrosphere*, the *cryosphere*, the land surface and the *biosphere*, and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external forcings such as volcanic eruptions, solar variations, and human-induced forcings such as the changing composition of the atmosphere and

land-use change.

Climate variability. Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the *climate* on all *temporal and spatial scales* beyond that of individual weather events. Variability may be due to natural internal processes within the *climate system* (internal variability), or to variations in natural or *anthropogenic external forcing* (external variability). See also *climate change*.

Commitment Period. The period under the Kyoto Protocol during which Annex I Parties' GHG emissions, averaged over the period, must be within their emission targets. The first commitment period runs from January 1, 2008 to December 31, 2012.

Conference of the Parties (COP). The supreme decision-making body comprised of the parties that have ratified the UN Framework Convention on Climate Change. It meets on an annual basis. As of February 2003, it is comprised of 189 countries. The first session of the Conference of the Parties (COP-1) was held in Berlin in 1995, followed by COP-2 in Geneva 1996, COP-3 in Kyoto 1997, COP-4 in Buenos Aires 1998, COP-5 in Bonn 1999, COP-6 Part 1 in The Hague 2000, and COP-6 Part 2 in Bonn 2001, COP-7 in Marrakech 2001, COP-8 in New Delhi 2002, COP-9 in Milan 2003, COP-10 in Buenos Aires 2004, COP-11 in Montreal in 2005, COP-12 in Nairobi in 2006. COP-13 will be held in Bali.

CTO. Costa Rican Certified Tradable Offsets.

Deforestation. Conversion of *forest* to non-forest. For a discussion of the term forest and related terms such as *afforestation*, *reforestation*, and *deforestation*, see the IPCC Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000b).

Economies in transition (EITs). Countries with national economies in the process of changing from a planned economic system to a market economy.

Ecosystem. A system of interacting living organisms together with their physical environment. The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus, the extent of an ecosystem may range from very small *spatial scales* to, ultimately, the entire Earth.

El Niño Southern Oscillation (ENSO). El Niño, in its original sense, is a warmwater current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. This oceanic event is associated with a fluctuation of the intertropical surface pressure pattern and circulation in the Indian and Pacific Oceans, called the Southern Oscillation. This coupled atmosphere-ocean phenomenon is collectively known as El Niño Southern Oscillation, or ENSO. During an El Niño event, the prevailing trade winds weaken and the equatorial countercurrent strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru current. This event has great impact on the wind, sea surface temperature, and precipitation patterns in the tropical Pacific. It has climatic effects

throughout the Pacific region and in many other parts of the world. The opposite of an El Niño event is called *La Niña*.

Emissions. In the *climate change* context, emissions refer to the release of *greenhouse gases* and/or their *precursors* and *aerosols* into the *atmosphere* over a specified area and period of time.

Emissions Reduction Unit (ERU). Equal to 1 tonne (metric ton) of *carbon dioxide emissions* reduced or sequestered arising from a *Joint Implementation* (defined in Article 6 of the *Kyoto Protocol*) project calculated using *Global Warming Potential*. Emissions reductions generated by projects in Annex B countries that can be used by another Annex B country to help meet its commitments under the Kyoto Protocol.

Emissions trading. A market-based approach to achieving environmental objectives that allows, those reducing *greenhouse gas emissions* below what is required, to use or trade the excess reductions to offset emissions at another source inside or outside the country. In general, trading can occur at the intracompany, domestic, and international levels. The IPCC Second Assessment Report adopted the convention of using “permits” for domestic trading systems and “quotas” for international trading systems. Emissions trading under Article 17 of the *Kyoto Protocol* is a tradable quota system based on the *assigned amounts* calculated from the emission reduction and limitation commitments listed in *Annex B* of the Protocol.

Emissions scenario. A plausible representation of the future development of *emissions* of substances that are potentially radiatively active (e.g., *greenhouse gases*, *aerosols*), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships. Concentration scenarios, derived from emissions scenarios, are used as input into a *climate model* to compute *climate projections*. In IPCC (1992), a set of emissions scenarios were used as a basis for the climate projections in IPCC (1996). These emissions scenarios are referred to as the IS92 scenarios. In the IPCC Special Report on Emissions Scenarios, new emissions scenarios—the so-called *SRES scenarios*—were published.

Externalities. By-products of activities that affect the well-being of people or damage the environment, where those impacts are not reflected in market prices. The costs (or benefits) associated with externalities do not enter standard cost accounting schemes. (IPCC)

Fluorocarbons. Carbon-fluorine compounds that often contain other elements such as hydrogen, chlorine, or bromine. Common fluorocarbons include chlorofluorocarbons and related compounds (also know as ozone depleting substances), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Forest. A vegetation type dominated by trees. Many definitions of the term forest are in use throughout the world, reflecting wide differences in bio-geophysical conditions, social structure, and economics. For a discussion of the term forest and related terms such as *afforestation*, *reforestation*, and *deforestation*: see the IPCC

Special Report on Land Use, Land-Use Change, and Forestry (IPCC, 2000b).

Framework Convention on Climate Change (FCCC). See UNFCCC.

General Circulation Model (GCM). A global, three-dimensional computer model of the climate system which can be used to simulate human-induced climate change. GCMs are highly complex and they represent the effects of such factors as reflective and absorptive properties of atmospheric water vapor, greenhouse gas concentrations, clouds, annual and daily solar heating, ocean temperatures and ice boundaries. The most recent GCMs include global representations of the atmosphere, oceans, and land surface. (EPA).

Global Warming Potential (GWP). The index used to translate the level of emissions of various gases into a common measure in order to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWPs are calculated as the ratio of the radiative forcing that would result from the emissions of one kilogram of a greenhouse gas to that from emission of one kilogram of carbon dioxide over a period of time (usually 100 years). Gases involved in complex atmospheric chemical processes have not been assigned GWPs due to complications that arise. Greenhouse gases are expressed in terms of Carbon Dioxide Equivalent. The International Panel on Climate Change (IPCC) has presented these GWPs and regularly updates them in new assessments.

Greenhouse Effect. The insulating effect of atmospheric greenhouse gases (e.g., water vapor, carbon dioxide, methane, etc.) that keeps the Earth's temperature about 60°F warmer than it would be otherwise. *Greenhouse gases* effectively absorb *infrared radiation*, emitted by the Earth's surface, by the *atmosphere* itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus greenhouse gases trap heat within the surface-troposphere system. This is called the "natural greenhouse effect." Atmospheric radiation is strongly coupled to the temperature of the level at which it is emitted. In the *troposphere*, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average, -19°C, in balance with the net incoming *solar radiation*, whereas the Earth's surface is kept at a much higher temperature of, on average, +14°C. An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a *radiative forcing*, an imbalance that can only be compensated for by an increase of the temperature of the surface-troposphere system. This is the "enhanced greenhouse effect."

Greenhouse Gas (GHG). Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of *infrared radiation* emitted by the Earth's surface, the atmosphere, and clouds. This property causes the *greenhouse effect*. Water vapor (H₂O), *carbon dioxide* (CO₂), *nitrous oxide* (N₂O), *methane* (CH₄), and *ozone* (O₃) are the primary greenhouse gases in the Earth's atmosphere. Moreover there are a number of entirely human-made greenhouse gases in the atmosphere, such as the

halocarbons and other chlorine- and bromine-containing substances, dealt with under the *Montreal Protocol*. Besides CO₂, N₂O, and CH₄, the *Kyoto Protocol* deals with the greenhouse gases *sulfur hexafluoride* (SF₆), *hydrofluorocarbons* (HFCs), and *perfluorocarbons* (PFCs).

"Hot Air". A situation in which emissions (of a country, sector, company or facility) are well below a target due to the target being above emissions that materialized under the normal course of events (i.e., without deliberate emission reduction efforts). Hot air can result from over-optimistic projections of growth. Emissions are often projected to grow roughly in proportion to GDP, and GDP is often projected to grow at historic rates. If a recession occurs and fuel use declines, emissions may be well below targets since targets are generally set in relation to emission projections. If emission trading is allowed, an emitter could sell the difference between actual emissions and emission targets. Such emissions are considered hot air because they do not represent reductions from what would have occurred in the normal course of events.

Hydrofluorocarbons (HFCs). These chemicals (along with perfluorocarbons) were introduced as alternatives to ozone depleting substances in serving many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are powerful greenhouse gases with global warming potentials ranging from 140 (HFC-152a) to 12,100 (HFC-23). (EPA).

Ice Core. A cylindrical section of ice removed from a glacier or an ice sheet in order to study climate patterns of the past. By performing chemical analyses on the air trapped in the ice, scientists can estimate the percentage of carbon dioxide and other trace gases in the atmosphere at that time. (EPA)

INC. Intergovernmental Negotiating Committee. The body in charge of negotiating the text of the UNFCCC between 1990 and 1992, set up by the UN General Assembly in resolution 45/221 (1990).

Intergovernmental Panel on Climate Change. The IPCC was established jointly by the United Nations Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social, and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods

for conducting national greenhouse gas emission inventories. (IPCC).

Invasive species. An *introduced species* that invades natural *habitats*.

Joint Implementation. A market-based implementation mechanism defined in Article 6 of the *Kyoto Protocol*, allowing *Annex I countries* or companies from these countries to implement projects jointly that limit or reduce *emissions*, or enhance *sinks*, and to share the *Emissions Reduction Units*. JI activity is also permitted in Article 4.2(a) of the *United Nations Framework Convention on Climate Change*. See also *Activities Implemented Jointly* and *Kyoto Mechanisms*.

Kyoto Protocol. The Kyoto Protocol to the *United Nations Framework Convention on Climate Change* (UNFCCC) was adopted at the Third Session of the *Conference of the Parties* to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments, in addition to those included in the UNFCCC. Countries included in *Annex B* of the Protocol (most countries in the Organisation for Economic Cooperation and Development, and countries with *economies in transition*) agreed to reduce their *anthropogenic greenhouse gas emissions* (*carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride*) by at least 5% below 1990 levels in the commitment period 2008 to 2012.

Land use. The total of arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The social and economic purposes for which land is managed (e.g., grazing, timber extraction, and conservation).

Land-use change. A change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land-use change may have an impact on the *albedo, evapotranspiration, sources, and sinks of greenhouse gases*, or other properties of the *climate system*, and may thus have an impact on *climate*, locally or globally. See also the IPCC Special Report on Land Use, Land-Use Change, and Forestry.

Land Use, Land-Use Change and Forestry (LULUCF): Land uses and land-use changes can act either as sinks or as emission sources. It is estimated that approximately one-fifth of global emissions result from LULUCF activities. The Kyoto Protocol allows Parties to receive emissions credit for certain LULUCF activities that reduce net emissions.

Leakage. Refers to emissions occurring elsewhere as a result of the establishment of a LULUCF activity. It occurs for example when people are displaced and demand for timber or fuelwood is simply relocated, leading to land clearance and increased emissions elsewhere. As defined in decision 19/CP.9 (Afforestation and reforestation project activities under the CDM), leakage “is the increase in greenhouse gas emissions by sources which occurs outside the boundary of an afforestation or reforestation project activity under the CDM which is measurable and attributable to the afforestation or reforestation project activity.” (Decision 19/CP.9 Annex A 1(e)).

Lifetime (Atmospheric). The lifetime of a greenhouse gas refers to the approximate

amount of time it would take for the anthropogenic increment to an atmospheric pollutant concentration to return to its natural level (assuming emissions cease) as a result of either being converted to another chemical compound or being taken out of the atmosphere via a sink. This time depends on the pollutant's sources and sinks as well as its reactivity. The lifetime of a pollutant is often considered in conjunction with the mixing of pollutants in the atmosphere; a long lifetime will allow the pollutant to mix throughout the atmosphere. Average lifetimes can vary from about a week (sulfate aerosols) to more than a century (CFCs, carbon dioxide).

Meeting of the Parties (to the Kyoto Protocol) (MOP). The *Conference of the Parties* of the *United Nations Framework Convention on Climate Change* will serve as the *Meeting of the Parties (MOP)*, the supreme body of the *Kyoto Protocol*, but only Parties to the Kyoto Protocol may participate in deliberations and make decisions.

Megatonne (Mt). One million (10⁶) tonnes. Greenhouse gas emissions are often measured in megatonnes. (Australia)

Methane (CH₄). A hydrocarbon that is a greenhouse gas with a global warming potential most recently estimated at 24.5. Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and oil, coal production, and incomplete fossil fuel combustion. The atmospheric concentration of methane has been shown to be increasing at a rate of about 0.6% per year and the concentration of about 1.7 parts per million by volume (ppmv) is more than twice its preindustrial value. However, the rate of increase of methane in the atmosphere may be stabilizing. (EPA).

Metric Ton. Common international measurement for the quantity of greenhouse gas emissions. A metric ton is equal to 2205 lbs or 1.1 short tons. (EPA)

Mitigation. An *anthropogenic* intervention to reduce the *sources* or enhance the *sinks* of *greenhouse gases*.

Montreal Protocol. The Montreal Protocol on substances that deplete the *ozone layer* was adopted in Montreal in 1987 and entered into force in January 1989 to phase out the use of ozone-depleting compounds such as methyl chloroform, carbon tetrachloride, and CFCs. CFCs are potent greenhouse gases which are not regulated by the Kyoto Protocol since they are covered by the Montreal Protocol.

Nitrogen fertilization. Enhancement of plant growth through the deposition of nitrogen compounds. In IPCC reports, this typically refers to fertilization from anthropogenic sources of nitrogen such as, man-made fertilizers and nitrogen oxides released from burning fossil fuels. (IPCC).

Non-Annex I countries/Parties. The countries that have ratified or acceded to the *United Nations Framework Convention on Climate Change* that are not included in Annex I of the Climate Convention. See also *Annex I countries*. Developing countries.

Ozone layer. The *stratosphere* contains a layer in which the concentration of *ozone* is greatest, the so-called ozone layer. The layer extends from about 12 to 40 km. The ozone concentration reaches a maximum between about 20 and 25 km. This layer is being depleted by human *emissions* of chlorine and bromine compounds. Every year, during the Southern Hemisphere spring, a very strong depletion of the ozone layer takes place over the Antarctic region, also caused by human-made chlorine and bromine compounds in combination with the specific meteorological conditions of that region. This phenomenon is called the *ozone hole*.

PAP. *Proyecto de Areas Protegidas*. Protected Areas Project. Originally “Proyecto de Consolidación Territorial y Financiera de los Parques Nacionales y Reservas Biológicas de Costa Rica,” “National Proposal for the Territorial and Financial Consolidation of Costa Rican National Parks and Biological Reserves.”

Party. A state (or regional economic integration organization, such as the European Union) that agrees to be bound by a treaty and for which the treaty has entered into force.

Photosynthesis. The process by which plants take *carbon dioxide* (CO₂) from the air (or bicarbonate in water) to build carbohydrates, releasing oxygen (O₂) in the process. There are several pathways of photosynthesis with different responses to atmospheric CO₂ concentrations.

ppm or ppb: . Parts per million. A unit of concentration for a particular substance (e.g., CO₂). Abbreviations for "parts per million" and "parts per billion," respectively - the units in which concentrations of greenhouse gases are commonly presented. For example, since the pre-industrial era, atmospheric concentrations of carbon dioxide have increased from 270 ppm to 370 ppm.

Pool. See *reservoir*.

Positive Feedback: A process that results in an amplification of the response of a system to an external influence. For example, increased atmospheric water vapor in response to global warming would be a positive feedback on warming, because water vapor is a GHG.

Project participants: As stated in the CDM Guidelines for preparing a PDD, and in accordance with the usage of the term in the CDM and CDM A/R modalities and procedures, a project participant is a Party involved, and/or a private and/or public entity authorized by a Party to participate in an A/R CDM project activity (CDM-AR-PDD version 04 page 14).

QELRC (Quantified Emission Limitation and Reduction Commitment): Also known as QELRO (Quantified Emission Limitation and Reduction Objective): The quantified commitments for GHG emissions listed in Annex B of the Kyoto Protocol. QELRCs are specified in percentages relative to 1990 emissions.

Radiative Forcing. The term radiative forcing refers to changes in the energy balance of the earth-atmosphere system in response to a change in factors such as greenhouse gases, land-use change, or solar radiation. The climate system inherently attempts to balance incoming (e.g., light) and outgoing (e.g. heat) radiation. Positive radiative forcings increase the temperature of the lower atmosphere, which in turn increases temperatures at the Earth's surface. Negative radiative forcings cool the lower atmosphere. Radiative forcing is most commonly measured in units of watts per square meter (W/m^2).

Ratification: After signing the UNFCCC or the Kyoto Protocol, a country must ratify it, often with the approval of its parliament or other legislature. In the case of the Kyoto Protocol, a Party must deposit its instrument of ratification with the UN Secretary General in New York.

Reference scenario. See *baseline*.

Reforestation. According to Decision 11/C.P.7, “‘Reforestation’ is the human-induced conversion of non-forested land to forested land through plating, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989” (FCCC/CP/2001/13/Add.1) (see Annex). Replanting of forests on lands that have recently been harvested.

Reservoir. A component of the *climate system*, other than the *atmosphere*, which has the capacity to store, accumulate, or release a substance of concern (e.g., carbon, a *greenhouse gas*, or a *precursor*). Oceans, soils, and *forests* are examples of reservoirs of carbon. *Pool* is an equivalent term (note that the definition of pool often includes the atmosphere). The absolute quantity of substance of concerns, held within a reservoir at a specified time, is called the stock. The term also means an artificial or natural storage place for water, such as a lake, pond, or *aquifer*, from which the water may be withdrawn for such purposes as irrigation, water supply, or irrigation.

Secretariat of the UN Framework Convention on Climate Change: The United Nations staff assigned the responsibility of conducting the affairs of the UNFCCC. In 1996 the Secretariat moved from Geneva, Switzerland, to Bonn, Germany.

Sequestration: The process of increasing the carbon content of a carbon *reservoir* other than the *atmosphere*. Biological approaches to sequestration include direct removal of *carbon dioxide* from the atmosphere through *land-use change*, *afforestation*, *reforestation*, and practices that enhance soil carbon in agriculture. Physical approaches include separation and disposal of carbon dioxide from flue gases or from processing *fossil fuels* to produce hydrogen- and carbon dioxide-rich fractions and longterm storage in underground in depleted oil and gas reservoirs, coal seams, and saline *aquifers*. See also *uptake*.

Silviculture. Development and care of forests.

Sink. Any process, activity or mechanism that removes a *greenhouse gas*, an *aerosol*, or a *precursor* of a greenhouse gas or aerosol from the *atmosphere*. A reservoir that uptakes a pollutant from another part of its cycle. Soil and trees tend to act as natural sinks for carbon.

Stock. See *reservoir*.

Subsidiary Body for Implementation (SBI). A permanent body established by the UNFCCC that makes recommendations to the COP on policy and implementation issues. It is open to participation by all Parties and is composed of government representatives.

Subsidiary Body for Scientific and Technological Advice (SBSTA). A permanent body established by the UNFCCC that serves as a link between expert information sources such as the IPCC and the COP.

Sustainable Development. Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (IPCC)

Stakeholders are “the public, including individuals, groups, or communities affected, or likely to be affected, by the proposed A/R project activity or actions leading to the implementation of such an activity.” (CDM-AR-PDD Guidelines Glossary, Version 04 page 14).

Targets and time tables. A target is the reduction of a specific percentage of *greenhouse gas emissions* from a *baseline* date (e.g., “below 1990 levels”) to be achieved by a set date or time table (e.g., 2008 to 2012). For example, under the *Kyoto Protocol’s* formula, the European Union has agreed to reduce its *greenhouse gas emissions* by 8% below 1990 levels by the 2008 to 2012 commitment period. These targets and time tables are, in effect, an emissions cap on the total amount of greenhouse gas emissions that can be emitted by a country or region in a given time period.

Thermohaline Circulation. Large-scale density-driven circulation in the oceans, driven by differences in temperature and salinity. (IPCC).

United Nations Framework Convention on Climate Change (UNFCCC). The landmark international treaty unveiled at the United Nations Conference on Environment and Development (UNCED, also known as the "Rio Summit"), in June 1992. The FCCC commits signatory countries to stabilize anthropogenic (i.e., human-induced) greenhouse gas emissions to 'levels that would prevent dangerous anthropogenic interference with the climate system'. The FCCC also requires that all signatory parties develop and update national inventories of anthropogenic emissions of all greenhouse gases not otherwise controlled by the Montreal Protocol. (EPA). The Convention was adopted on 9 May 1992 in New York and signed at the 1992 Earth Summit in Rio de Janeiro by more than 150 countries and the European Community. It contains commitments for all Parties. Under the Convention, Parties included in *Annex I* aim to return *greenhouse gas emissions* not controlled by the

Montreal Protocol to 1990 levels by the year 2000. The Convention entered into force in March 1994.

Uptake. The addition of a substance of concern to a *reservoir*. The uptake of carbon-containing substances, in particular *carbon dioxide*, is often called (carbon) *sequestration*. See also *sequestration*.

Water Vapor. The most abundant greenhouse gas, it is the water present in the atmosphere in gaseous form. Water vapor is an important part of the natural greenhouse effect. While humans are not significantly increasing its concentration, it contributes to the enhanced greenhouse effect because the warming influence of greenhouse gases leads to a positive water vapor feedback. In addition to its role as a natural greenhouse gas, water vapor plays an important role in regulating the temperature of the planet because clouds form when excess water vapor in the atmosphere condenses to form ice and water droplets and precipitation. (EPA)

Bibliography

- Agarwal, A. and S. Narain
1990 *Global Warming in an Unequal World: A Case of Environmental Colonialism*.
New Delhi: Centre for Science and Development.
- Agarwal, A., S. Narain and A. Sharma, eds.
1999 *Green Politics: Global Environmental Negotiations-1*. New Delhi: Centre for
Science and Environment.
- Agarwal, A., S. Narain, A. Sharma and A. Imchen, eds.
2001 *Green Politics: Global Environmental Negotiation-2 (Poles Apart)*.
New Delhi: Centre for Science and Environment.
- Agrawala, S.
1998 "Context and Early Origins of the Intergovernmental Panel on Climate Change"
Climatic Change 39(4): 605-620.
- Alig R., D. Adams, and B. McCarl
1998 "Ecological and economic impacts of forest policies: interactions across forestry
and agriculture" *Ecological Economics* 27: 63-78.
- Allen, Julia C. and Douglas F. Barnes
1985 "The Causes of Deforestation in Developing Countries" *Annals of the
Association of American Geographers* 75 (2): 162-84.
- Alpizar, William
1997 "Venta de servicios ambientales a traves de proyectos de implementacion
conjunta" *Ambientico* 53: 1-4. Agosto 1997.
- Anderson, J. W.
1998 *The Kyoto Protocol on Climate Change: Background, Unresolved Issues and
Next Steps*. Washington, D.C.: Resources for the Future.
- Arrhenius, S.
1896 "On the Influence of carbonic acid in the air upon the temperature of the
ground" *London, Edinburgh, and Dublin Philosophical Magazine J. Sci* 41: 237-76.
- Aukland, L., Moura Costa, P. and Brown, S.
2002 "A conceptual framework and its application for addressing leakage on avoided
deforestation projects" Report no. CR 827293-01-0. Arlington, VA: Winrock
International.
- Baltodano, Javier
2000 "Pago de Servicios Ambientales para reconstrucción ecosistémica,
fortalecimiento de organizaciones locales y desarrollo rural" *Ciencias Ambientales*
18: 21-30. San José, Costa Rica.

- Baumert, Kevin A.
[date n/a] "The Clean Development Mechanism: Understanding Additionality"
Washington D.C.: Center for Sustainable Development in the Americas (CSDA).
Found in <http://www.csdanet.org/wp.baumert.html> (last visited March 6, 2006).
- Baumert, Kevin A. *et al.*
2002 *Options for Protecting the Climate: Building on the Kyoto Protocol*. World Resources Institute.
- Baumert, Kevin A., and Nancy Kete
2001 "The U.S., Developing Countries, and Climate Protection: Leadership or Stalemate?" Issue Brief. Washington D.C.: World Resources Institute. June 2001.
- Beck, U.
1992 *Risk Society: Towards a New Modernity*. London: Sage.
- Brenton, Tony
1994 *The Greening of Machiavelli: The Evolution of International Environmental Politics*. London: The Royal Institute of International Affairs and Earthscan.
- Berg, K.G.
2002 "Implementing the Kyoto Protocol on climate change: environmental integrity, sinks and mechanisms" *Global Environmental Change* 12: 331-336.
- Blanco, J.T. and C. Forner
2000 "Expiring CERs: a proposal to addressing the permanence issue for LUCF projects in the CDM." Unpublished manuscript, Economic and Financial Analysis Group, Ministry of Environment, Bogotá, Colombia. Also available as UNFCCC document FCCC/SB/2000/MISC.4/Add.2/Rev.1
- Bodansky, Daniel
1993 "The United Nations Framework Convention on Climate Change: A Commentary" *Yale Journal of International Law* 18(2): 451-558.
- Boehmer-Christiansen, S.
1993 "Science Policy, the IPCC, and the Climate Convention: The Codification of a Global Research Agenda" *Energy and Environment* 4(4): 362-407.
- Bohringer, Christoph and Carsten Vogt
2004 "The Dismantling of a Breakthrough: the Kyoto Protocol as Symbolic Policy" *European Journal of Political Economy* 20(3): 597-617.
- Boyd, Emily G. K.
2003 *Forests post-Kyoto: Global Priorities and Local Realities*. Ph.D. Dissertation. Norwich, UK: University of East Anglia.

- Bruno, Kenny and Joshua Karliner
2003 *earthsummit.biz: The Corporate Takeover of Sustainable Development*.
Oakland: Institute for Food and Development Policy.
- Bulmer-Thomas, Victor
1987 *The Political Economy of Central America Since 1920*. Cambridge, UK:
Cambridge University Press
- Callendar, G. D.
1938 "The artificial production of carbon dioxide and its influence on temperature"
Quarterly Journal of the Royal Meteorological Society 64: 223-240.
- Cameron, Laura
1999 "Histories of Disturbance" *Radical History Review* 74: 4-24.
- Carpenter, S. R.
2001 "Alternate States of Ecosystems: Evidence and Its Implications." In M. C. Press,
N. Huntly, and S. Levin, eds. *Ecology: Achievement and Challenge*, London:
Blackwell. Pp. 357–383.
- Carrere, Ricardo
2000 "Sinks that Stink" *World Rainforest Movement Bulletin* Issue 35, June 2000.
- Carson, Rachel
1962 *Silent Spring*. Boston: Houghton Mifflin; Cambridge: Riverside Press.
- CECADE
1999 *Pago de Servicios Ambientales: Informe Final de Evaluación*. San José, Costa
Rica: Fondo Nacional de Financiamiento Forestal.
- Chambers, R. et al.
1989 *To the Hands of the Poor*. London: Intermediate Technology Publications.
- Chapin, Mac
2004 "A Challenge to Conservationists" *World Watch Magazine* 17.
November/December 2004
- Charlson, R.J. and J. Heintzenberg
1995 *Aerosol Forcing of Climate*. New York: John Wiley & Sons.
- Chatterjee, Pratap and Matthias Finger
1994 *The Earth Brokers: Power, Politics and World Development*. London and New
York: Routledge.
- Chaudhary, Anu, and Chandrashekara Kumaraswamy

2005 “Sustainable Development – The Forgotten Dimension of CDM?” In Robert Dornau, ed. *Greenhouse Gas Market 2005: The rubber hits the road*. Geneva, Switzerland: International Emission Trading Association (IETA).

Chichilnisky, Graciela

1996 “The Greening of Bretton Woods” *Financial Times*, January 10, 1996.

Christianson, Gale E.

1999 *Greenhouse: The 200-Year History of Global Warming*. New York: Penguin Books.

CIFOR – CATIE

2000 “Almacenamiento de Carbono y Conservación de Biodiversidad por medio de actividades forestales en el Área de Conservación Cordillera Volcánica Central, Costa Rica” Unidad de Manejo de Bosques Naturales. Turrialba, Costa Rica: CATIE.

Collier, Jane E.

1975 “Legal Processes” *Annual Review of Anthropology* 4: 121-144.

de Coninck, H.C. and N.H. van der Linden

2003 “An Overview of Carbon Transactions: General Characteristics and Specific Peculiarities” March 2003. ECN-C--03-022.

Conroy, Michael E., Douglas L. Murray and Peter M. Rosset

1996 *A Cautionary Tale: Failed U.S. Development Policy in Central America*. Food First Development Studies. Boulder, CO: Lynne Rienner Publishers.

Cronon, William

1983 *Changes in the Land: Indians, Colonists and the Ecology of New England*. New York: Hill and Wang.

Cronon, William, ed.

1995 *Uncommon Ground: Toward Reinventing Nature*. New York: W.W. Norton & Co.

Cushman, John H. Jr. and David E. Sanger

1997 “No Simple Fight: The Forces that Shaped the Clinton Plan” *The New York Times*, December 1, 1997. Pg. 3.

Demeritt, D.

2001 “The Construction of Global Warming and the Politics of Science” *Annals of the Association of American Geographers* 91(2): 307-337.

Depledge, Joanna

2000 *Tracing the Origins of the Kyoto Protocol: An Article by Article Textual History*. UNFCCC document FCCC/TP/2000/2.

Deutsch, Claudia H.
2005 "Saving the environment, one quarterly earnings report at a time" *The New York Times*. November 22, 2005.

Deutsch, Claudia H.
2006 "Wall St. Develops the Tools to Invest in Climate Change" Market Place. *The New York Times*. May 24, 2006.

Dove, Michael R.
1992 "The Dialectical History of 'Jungle' in Pakistan: An Examination of the Relationship between Nature and Culture » *Journal of Anthropological Research* 48(3): 231-253.

Durham, William H.
1979 *Scarcity and Survival in Central America: Ecological Origins of the Soccer War*. Stanford, CA: Stanford University Press.

Dyson, F.J.
1977 "Can We Control the Carbon Dioxide in the Atmosphere?" *Energy* 2: 287-291.

Moura Costa, P.
2002 "Clean Development Mechanism: Simplified modalities and procedures for small-scale projects." Oxford, UK: Ecosecurities.

Edelman, Marc
1999 *Peasants Against Globalization: Rural Social Movements in Costa Rica*. Stanford, CT: Stanford University Press.

Edelman, Marc and Joanne Kenen, eds.
1989 *The Costa Rica Reader*. New York: Grove Weidenfeld.

Edelman, Marc and Rodolfo Monge Oviedo
1993 "Costa Rica: the Non-market Roots of Market Success » *NACLA Report on the Americas*, 26(4): 250-265.

Ellis, J., Corfee-Morlot, J. and Winkler, H.
2004. *Taking Stock of Progress Under the Clean Development Mechanism*. Paris: Organization for Economic Cooperation and Development (OECD) and International Energy Agency (IEA).

Estrada-Oyuela, Raul
1998 "First Approaches and Unanswered Questions" In José Goldemberg, ed. *Issues and Options: the Clean Development Mechanism*. UNEP. New York: UN Publications.

Evans, Sterling

1999 *The Green Republic: A Conservation History of Costa Rica*. Austin, TX: University of Texas Press.

Fairhead, James and Melissa Leach
1996 *Misreading the African Landscape: Society and ecology in a forest-savanna mosaic*. Cambridge: Cambridge University Press.

2003 *Science, Society and Power: Environmental Knowledge and Policy in West Africa and the Caribbean*. Cambridge, UK: Cambridge University Press.

Fearnside P. M. *et al.*
1999 “Accounting for time in mitigating global warming” *Mitigation and Adaptation Strategies for Global Change* 5(3).

Fearnside, P. M.
2001 “Saving tropical forests as a global warming countermeasure: an issue that divides the environmental movement” *Ecological Economics* 39 (2): 167-184.

Feder, Ernest
1977 *Strawberry Imperialism: an Enquiry into the Mechanisms of Dependency in Mexican Agriculture*. The Hague: Institute of Social Studies.

Fleming, James Rodger
1998 *Historical Perspectives on Climate Change*. New York and Oxford: Oxford University Press.

Fry, Ian
2002 “Twists and Turns in the Jungle: Exploring the Evolution of Land Use, Land-Use Change and Forestry Decisions within the Kyoto Protocol » *Review of European Community & International Environmental Law (RECIEL)* 11 (2): 159–168.

Galtung, Johan
1986 “On the anthropology of the UN system.” In David Pitt and Thomas G. Weiss eds. *The Nature of United Nations Bureaucracies*. Boulder, CO: Westview Press.

Geertz, Clifford
1963 *Agricultural Involution: the Process of Ecological Change in Indonesia*. Association of Asian Studies, Berkeley: University of California Press.

Gereffi, Gary, and Miguel Korzeniewicz
1994 “Introduction: Global Commodity Chains” In Gary Gereffi and Miguel Korzeniewicz, eds. *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press.

Gereffi, Gary, and Miguel Korzeniewicz, eds.
1994. *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press.

Gibbon, Peter

2001 “Agro-commodity Chains: An introduction.” In Gary Gereffi and Raphael Kaplinsky, eds. *The Value of Value Chains: Spreading the Gains from Globalization*. IDS Bulletin 32(3): 60. July 2001. Brighton, UK: Institute of Development Studies (IDS).

Gillon, Jim

2001. *The Lowdown on Carbon Sinks*. Dossier prepared for Sci.Dev. In <http://www.sci.dev.net> (as of 9 August 2005).

Glacken, Clarence

1967 *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century*. Berkeley, CA: University of California Press.

Goetze, Darren

1999 “Report on the 5th Meeting of the Conference of the Parties to the Climate Convention” *Union of Concerned Scientists*. November 1999.

Goldenweiser, Alexander

1936 *Loose Ends of a Theory on the Individual Pattern and Involution in Primitive Society*. In Robert Lowie, ed. *Essays in anthropology presented to A. L. Kroeber*. Pp. 99-104. Berkeley: University of California Press.

González, Alma Amalia, and Ronald Nigh

2005 “Who Says it’s Organic? Certification and Smallholder Participation in the Global Market.” In Leticia Merino and Jim Robson, eds. *Managing the Commons: Markets, Commodity Chains and Certification*. Mexico: Consejo Civil Mexicano para la Silvicultura Sostenible A.C., The Christensen Fund, Ford Foundation, Secretaría de Medio Ambiente y Recursos Naturales, and Instituto Nacional de Ecología, Mexico.

Goodell, Jeff

2006 “Capital Pollution Solution?” *The New York Times Magazine*. July 30, 2006

Gough, Clair and Simon Shackley

2001 «The Respectable Politics of Climate Change: The Epistemic Communities and NGOs » *International Affairs* 77(2): 329–346.

de Gouvello, Christophe, and Oscar Soto

2003 “Transaction costs and carbon finance impact on small-scale CDM projects.” PCFplus Report 14. February 2003. Washington DC: PCFplus.

Gracia, Juan Alberto

2005 “ICONTEC – an Applicant to become an Operational Entity that validates, verifies and certifies CDM project activities” *Carbon Market Update* No. 2, September 2005.

Grove, Richard

1995 *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600-1860*. Cambridge, New York: Cambridge University Press.

Grubb, Michael, with Christiaan Vrolijk and Duncan Brack

1999 *The Kyoto Protocol: A Guide and Assessment*. London: The Royal Institute of International Affairs.

Grubb, Michael, Matthias Koch, Koy Thomson, Abby Munson and Francis Sullivan

1993 *The 'Earth Summit' Agreements: A Guide and Assessment*. London: Royal Institute of International Affairs and Earthscan Publications.

Grubb, Michael and Farhana Yamin

2001 "What happened at The Hague, why, and where do we go from here?" *International Affairs* 77(2): 261-276.

Gupta, Joyeeta

1997 *The Climate Change Convention and Developing Countries: From Conflict to Consensus?* Dordrecht: Kluwer Academic Publishers.

2000a «'On Behalf of My Delegation,....': A Survival Guide for Developing Country Climate Negotiators» *Climate Change Knowledge Network, Center for Sustainable Development in the Americas and International Institute for Sustainable Development*.

2000b «North-South Aspects of the Climate Change Issue: Towards a Negotiating Theory and Strategy for Developing Countries» *International Journal of Sustainable Development* 3(2): 115-135.

Gutiérrez, María

2001 "Acceso al Pago de Servicios Ambientales en Costa Rica" In *Potencialidades de los Sistemas Pecuarios Tropicales para la Generación de Servicios Ambientales*. LEAD-FAO-CATIE.

Haila, Yrjö

2005 "War and the Environment" *Framework: The Finnish Art Review* 4, pp 24-27. December 2005.

Hamilton, Kirsty and Mark Kenber

2006 *Business Views on International Climate and Energy Policy: Summary and Key Observations*. London: UK Business Council for Sustainable Energy and The Climate Group. April 2006.

Hammitt, J.K.

2000 "Global Climate Change: Benefit-Cost Analysis vs. the Precautionary Principle" *Human and Ecological Risk Assessment* 6(3): 387-398.

- Harvey, David
 1974 "Population, Resources, and the Ideology of Science» *Economic Geography* 50(3): 256-277.
- 1996 *Justice, Nature and the Geography of Difference*. Oxford: Basil Blackwell.
- 1999 [1982] *The Limits to Capital*. Oxford: Basil Blackwell.
- 2001 *Spaces of Capital: Towards a Critical Geography*. Routledge: New York.
- 2002 *Spaces of Hope*. Edinburgh: Edinburgh University Press.
- 2003 *The New Imperialism*. Oxford: Oxford University Press.
- 2006 *Spaces of Global Capitalism: Towards a Theory of Uneven Geographical Development*. London and NY: Verso.
- Haas, Peter M.
 1992 "Introduction: Epistemic communities and international policy coordination" *International Organization* 46(1): 1-35.
- Heller, T.
 1999 "Additionality, Transactional Barriers and the Political Economy of Climate Change" In C. Jepma, W. van der Gaast, eds. *On the Comptability of Flexible Instruments* Kluwer Academic Publishers, Dordrecht, 78–92.
- Honey, Martha
 2003 "Giving a Grade to Costa Rica's Green Tourism" *NACLA Report on the Americas* 36(6).
- Hopkins, Terence K. and Immanuel Wallerstein
 1994 "Commodity Chains: Construct and Research." In Gary Gereffi and Miguel Korzeniewicz, eds. *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press.
- Houghton, John T.
 2004 [1994] *Global Warming: The Complete Briefing*. Cambridge: Cambridge University Press.
- Houghton, John T. *et al.* eds.
 1990 *Climate Change: The IPCC Scientific Assessment*. Cambridge: Cambridge University Press.
- Humphreys, Stephen, Youba Sokona and Jean-Philippe Thomas
 1998 *Equity in the CDM*. ENDA Tiers Monde, Dakar, Senegal.

IPCC

2000 *Land Use, Land Use Change and Forestry*. Special Report. Cambridge: Cambridge University Press.

Instituto de Tierras y Colonización (ITCO)

1968 *Programa de Asentamientos Campesinos*. Unidad Sectorial de Administración. Costa Rica.

Jackson, R. B. *et al.*

2002 “Ecosystem carbon loss with woody plant invasions of grasslands” *Nature* 418 (8): 623. August 2002.

Jacobson, H. K. and E. B. Weiss

1997 “Compliance with International Environmental Accords: Achievements and Strategies” *Environment and Policy* 9: 78–110.

Jasanoff, S. and B. Wynne

1998 “Scientific Knowledge and Decision Making.” In S. Rayner and E. L. Malone, eds. *Human Choice and Climate Change* Vol. 1. Pp. 1-87. Washington D.C.: Battelle Press.

Kaimowitz, David

2003 “Forest Law Enforcement and Rural Livelihoods” *International Forestry Review* 5(3): 199-210.

Kaiser, J.

2000 Soaking up carbon in forests and fields *Science* 290: 922.

Kamel, Sami, ed.

2005 *Clean Development Mechanism PDD Guidebook: Navigating the Pitfalls*. Roskilde, Denmark: UNEP RISØ Center. November 2005.

Katz, Cindi

1998 “Whose Nature, whose culture?: Private productions of space and the ‘preservation’ of nature.” In Noel Castree and Bruce Braun, eds. *Remaking Reality: Nature at the Millennium*. London and New York: Routledge.

Kwa, C.

1994 “Modeling Technologies of Control.” *Science as Culture* 4: 363-91.

Landell-Mills, Natasha, and Ina T. Porras

2002 *Silver Bullet or fool’s gold? A global review of markets for forest environmental services and their impacts on the poor*. Instruments for sustainable private sector forestry series. London: International Institute for Environment and Development.

Latour, Bruno

1999 *Pandora's Box: Essays on the Reality of Science Studies*. Cambridge, MA; Harvard University Press.

Leach Gerald and Melissa Leach

2004 "Carbonising Forest Landscapes? Linking climate change mitigation and rural livelihoods" *Climate Change and Development*, Special issue of the IDS Bulletin, Institute of Development Studies, University of Sussex. 35(3): 76-83. July 2004.

Leggett, Jeremy

2001 *The Carbon War: Global Warming and the End of the Oil Era*. New York: Routledge.

Liverman, Diana

2007 "Conventions of Climate Change: Constructions of danger and the dispossession of the atmosphere" *Journal of Historical Geography* (forthcoming).

Locatelli, Bruno and Lucio Pedroni

2003 «Accounting methods for carbon credits – impacts of the minimum size of CDM forestry projects» Working Paper, Global Change Group, Turrialba, Costa Rica: CATIE

2006 "Will Simplified Modalities and Procedures Make More Small-Scale Forestry Projects Viable under the Clean Development Mechanism?" *Mitigation and Adaptation Strategies for Global Change* 11(3): 621-643

Lund H. G.

1999 *Definitions of Forest, Deforestation, Afforestation and Reforestation*. Manassas, VA: Forest Information Services.

Mackensen, Jens

2004 "Background information for participants of UNEP-IUCN-FAO regional workshop on forests and the CDM." Nairobi: UNEP.

Mahlman, J. D.

2000 "Science and Nonscience Concerning Human-Caused Climate Change." In Luis Gómez-Echeverri, ed. *Climate Change and Development*. New Haven, CT: Yale School of Forestry and Environmental Studies.

Markandya, A. and K. Halsnaes

2002 *Climate Change and Sustainable Development: Prospects for Developing Countries*. London: Earthscan Publications.

Marland, G. T., A. Boden and R. J. Andres

2002 *Global, Regional and National Fossil Fuel CO₂ Emissions*. Oak Ridge: Carbon Dioxide Information and Analysis Center.

Martin, P. H.

1997 “‘If You Don't Know How to Fix it, Please Stop Breaking it!’ The Precautionary Principle and Climate Change” *Foundations of Science* 2(2): 263-292.

Mayorga, Emilio. *et al.*

2005 “Young organic matter as a source of carbon dioxide outgassing from Amazonian rivers” *Nature* 436: 538-541.

Meinshausen, Malte

2004 “Emissions, Targets and Projections for Annex I Parties.” In F. Yamin and J. Depledge, *The International Climate Change Regime: A guide to rules, institutions and procedures*. Cambridge, UK: Cambridge University Press.

Merchant, Carolyn

1989 *The Death of Nature: Women, Ecology, and the Scientific Revolution*. New York: Harper and Row.

Michaelowa, A. and M. Stronzik

2002 “Transaction Costs of the Kyoto Mechanisms” *HWWA Discussion Paper* 175. Hamburg: HWWA.

Michaelowa, Axel, Marcus Stronzik, Frauke Eckermann and Alistair Hunt

2003 “Transaction costs of the Kyoto Mechanisms” *Climate Policy* 3: 261-278.

Miller, Clark A. and Paul N. Edwards, eds.

2001 *Changing the Atmosphere: Expert Knowledge and Environmental Governance*. Cambridge, MA: The MIT Press.

Mintzer, I. M. and J.A. Leonard, eds.

1994. *Negotiating Climate Change: The Inside Story of the Rio Convention*. Cambridge, UK: Cambridge University Press.

Molina, Iván, and Steven Palmer

1997a *Historia de Costa Rica: Breve, actualizada y con ilustraciones*. San José: Editorial de la Universidad de Costa Rica.

1997b *Costa Rica 1930-1996: Historia de una sociedad*. San José: Editorial Porvenir.

Monroy, Marco G. and Gautam S. Dutt (MGM International)

2005 “Is time running out for the Clean Development Mechanism to mitigate climate change?” *Carbon Market Update*. UNEP, IETA and UNEP RISØ Center. September 2005.

Mora, Eduardo

1998 “Protección de Bosque, Venta de Fijación de Carbono y Protagonismo del Mercado” *Ciencias Ambientales* 15: 6-19.

Moss, R. H. and S. H. Schneider

2000 “Uncertainties in the IPCC TAR: Recommendations to Lead Authors for More Consistent Assessment and Reporting.” In R. Pachauri, T. Taniguchi, and K. Tanaka, eds. *Guidance Papers on the Cross Cutting Issues of the Third Assessment Report of the IPCC*, Geneva: World Meteorological Organization, 33–51.

Nakicenovic, N. *et al.*

2000 *Emission Scenarios: A Special Report of Working Group III of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Newell, Peter

2000 *Climate for Change: Non-State Actors and the Global Politics of the Greenhouse*. Cambridge: Cambridge University Press.

Nicholls, M.

2002 “CDM Fears Cloud Marrakech Success” *Environmental Finance* 3(3): 24-26.

Nove, Alec

1991 [1983] *The Economics of Feasible Socialism*. London, New York: HarperCollins Academic.

Ott, Herman

2001 “Climate Change: An Important Foreign Policy Issue” *International Affairs* 77 (2): 277-296.

Pal R. C. and Sharma A.

2001 “Afforestation for reclaiming degraded village common land: a case study” *Biomass and Bioenergy* 21: 35-42.

Paterson, Matthew

1996 *Global Warming and Global Politics*. London and NY: Routledge .

2001 “Climate Policy as Accumulation Strategy: The Failure of COP 6 and Emerging Trends in Climate Politics” *Global Environmental Politics* 1(2): 10-17 May 2001.

Pearce, D. and T. Bello

1998 *Selling Carbon Storage: Background Paper for the Guyana Forest Partnership Initiative*. CSERGE and University of East Anglia.

Peltzman, Sam

1993 George Stigler’s Contribution to the Economic Analysis of Regulation *Journal of Political Economy* 101(5): 818-32.

Pielke Jr. and Roger A.

2005 “Misdefining ‘Climate Change’: Consequences for science and action.” *Environmental Science and Policy* 8: 548-561.

Pitt, David

1986 "Power in the UN Superbureaucracy: A Modern Byzantium?" In David Pitt and Thomas G. Weiss eds. *The Nature of United Nations Bureaucracies*. Boulder, CO: Westview Press.

Point Carbon

2004 "Additionality criterion cripples CDM" *CDM Monitor*. March 17 2004.

2005 "Kyoto progress: Will countries meet their targets?" *CMA*. 12 September 2005.

2006 *Carbon 2006: Towards a truly global market*. Point Carbon Market Survey report. 28 February 2006.

Porter, Michael E.

2000 "Location, Competition and Economic Development: Local Clusters in a Global Economy." *Economic Development Quarterly* 14(1): 15-34. February 2000.

Proyecto Estado de la Nación, Costa Rica

2000 *Estado de la Nación 1999*. San José, Costa Rica.

Qaiyum, Nikhat Jamal

1998 "Sinks: A Carbon Reservoir" *Down to Earth* 7(8): 22-23. September 15 1998.

RTV/TVNZ

2004 "Forest Owners Side step Kyoto" June 14, 2005.

Rahman, Atiq and Annie Roncerel

1994 "A View from the Ground Up." In Irving M. Mintzer and J. Amber Leonard, eds. *Negotiating Climate Change: The Inside Story of the Rio Convention*. Cambridge: Cambridge University Press and Stockholm Environment Institute.

Raikes, Philip, Michael Friis Jensen and Stefano Ponte

2000 "Global Commodity Chain Analysis and the French *filiere* Approach: Comparison and Critique" *Economy and Society* 29(3): 390-417.

Rawls, John

1971 *A Theory of Justice*. Cambridge: Belknap Press of Harvard University Press.

Reich, Robert

1992 *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*. New York: Vintage Books.

Revelle, R. and H. Suess

1957 "Carbon Dioxide Exchange between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO₂ during the Past Decades." *Tellus*. Series A, Dynamic Meteorology and Oceanography 9(1): 18.

Revkin, Andrew C.

1992 *Global Warming: Understanding the Forecast*. American Museum of Natural History and Environmental Defense Fund. New York: Abbeville Press.

1997 “Struggling to Scare a Contented World” *The New York Times*. September 28, 1997.

2001 “White House moves to oust climate expert” *International Herald Tribune*. April 3, 2001.

2006 “NASA Chief Backs Agency Openness” *The New York Times*. February 4, 2006.

Ribot, Jesse C.

1998 “Theorizing Access: Forest Profits along Senegal’s Charcoal Commodity Chain” *Development and Change* 29: 307-341.

Rivera, Roy

1986 *Política de Distribución de Tierras en Costa Rica*. San José: Alma Mater.

Robinson, John and Alison Shaw

2004 “Imbued Meaning: Science-Policy Interaction in the IPCC” In F. Biermann, S. Campe and K. Jacob, eds. *Proceedings of the 2002 Berlin Conference on the Human Dimensions of Global Environmental Change “Knowledge for the Sustainability Transition: The Challenge for Social Science.”* Global Governance Project: Amsterdam, Berlin, Potsdam and Oldenburg. Pp. 143-153.

Rocheleau, D.

1999 “Confronting Complexity, Dealing with Difference: Social Context, Content and Practice in Agroforestry.” In L. Buck, J. P. Lassoie and E. C. M. Fernandes, eds. *Agroforestry in Sustainable Agricultural Systems*. Boca Raton: Lewis Publishers (CRC Press). Pp. 191–235.

Rodriguez, Jorge and Lenin Corrales

1998 “Potencial de Carbono y Fijación de Dioxido de Carbono de la biomasa en pie por encima del suelo en los bosques de Costa Rica” Documento de Trabajo –ENV 2.5. BCIE-INCAE-HIID. San José, Costa Rica: INCAE.

Román Vega, Isabel C. and Damaris G. Peraza Morales

1990 *La Lucha por la Tierra en el Cantón de Sarapiquí, 1960-1985: Un análisis dinámico*. Tesis Lic. Sociología. San José, Costa Rica: University of Costa Rica.

Ross, Andrew

1991 *Strange Weather: Culture, Science and Technology in the Age of Limits*. London: Verso.

Sagar A. and M. Kandlikar

1997 “Knowledge, Rhetoric and Power: International Politics of Climate Change”
Economic and Political Weekly 6. December 1997.

Saltmarsh, Matthew

2005 “Market for emissions picks up steam as Kyoto Protocol takes hold”
International Herald Tribune. Wednesday, July 6, 2005.

Sandor, Richard L. and Murali Kanakasabai

2005 “Update on developments in the Chicago Climate Exchange.” In Robert Dornau, ed. *Greenhouse Gas Market 2005: The rubber hits the road*. Geneva, Switzerland: International Emission Trading Association (IETA).

Scherr, S.J., A. White, D. Kaimowitz

2003 Time for Something Different: Putting Markets to the Service of the Forest Poor, ETRN News Special Issue, Vol 39-40. CIFOR.

Schiermeier, Quirin

2003 “The Oresmen” *Nature* 421: 109-110. January 9, 2003.

Schlamadinger, B. and G. Marland

2000 “Land Use and Global Climate Change: Forests, Land Management and the Kyoto Protocol.” Washington, DC: Pew Center on Global Climate Change,.

Seligson, Mitchell

1980 *Peasants of Costa Rica and the Development of Agrarian Capitalism*. Madison: University of Wisconsin Press.

SENER

2002 “Get a Higher Return on Your Investments in Sustainable Energy and Energy Efficiency.” At <http://www.senter.nl/asp/page.asp?id=i001003&alias=erupt> (accessed 12 February 2002).

SINAC

2001 *Encuesta: Percepción sobre el Programa de Pago de Servicios Ambientales*. E. Q. Consultores, S.A. San José, Costa Rica: SINAC.

Sheehan, Molly O.

2003 “Carbon Emissions and Temperature Climb” *Vital Signs* 2003. Washington D.C.: The Worldwatch Institute.

Smith, J. and S. J. Scherr

2002 «Forest carbon and local livelihoods: Assessment of Opportunities and Policy recommendations.» CIFOR Occasional Paper 37.

Smith, Wynet

2005 “Mapping Access to Benefits in Cameroon using Commodity Chain Analysis: A Case Study of the Azobé Timber Chain” In Leticia Merino and Jim Robson, eds.

Managing the Commons: Markets, Commodity Chains and Certification. Mexico: Consejo Civil Mexicano para la Silvicultura Sostenible A.C., The Christensen Fund, Ford Foundation, Secretaría de Medio Ambiente y Recursos Naturales, and the Instituto Nacional de Ecología.

Sorrell, S. and J. Skea
1999 *Pollution for Sale: Emissions Trading and Joint Implementation*. Cheltenham.

Spence, Chris
2005 *Global Warming: Personal Solutions for a Healthy Planet*. New York: Palgrave Macmillan

Strathern, Marilyn, ed.
2000 *Audit Cultures: Anthropological Studies in Accountability, Ethics, and the Academy*. London and New York: Routledge.

Sutter, Christoph
2003 *Sustainability Check-Up for CDM Projects. How to assess the sustainability of international projects under the Kyoto Protocol*. Berlin: Wissenschaftlicher Verlag.

Tansley, Arthur G.
1935 «The Use and Abuse of Vegetational Terms and Concepts» *Ecology* 16: 284-307.

Tattenbach, Franz and Lucio Pedroni
1999 «Implementación Conjunta y Desarrollo Limpio: La Experiencia de Centroamérica,» *Manejo Forestal Tropical* #11. UMBN. Turrialba, Costa Rica: CATIE.

The World Bank and International Emissions Trading Association (IETA)
2003 *State and Trends of the Carbon Market 2003*. Washington D.C.: The World Bank.

2006. *State and Trends of the Carbon Market 2006*. Washington D.C.: The World Bank.

Timmons, Heather
2006 «Data Leaks Shake Up Carbon Trade» *New York Times*, Market Place. May 16, 2006.

Thomas, Caroline
1992 *The Environment in International Relations*. London: The Royal Institute of International Affairs.

Tipper, R. and B. H. De Jong

1998 “Quantification and Regulation of Carbon Offsets from Forestry: Comparison of Alternative Methodologies, with Special Reference to Chiapas, Mexico.” *Commonwealth Forestry Review* 77 (3): 219-228.

UNEP

2004 *CDM: Information and Guidebook*, second edition. Roskilde, Denmark: UNEP RISØ CENTRE,.

Van den Hombergh, Helena

1999 *Guerreros del Golfo Dulce: Industria Forestal y Conflicto en la Península de Osa, Costa Rica*. San José, Costa Rica: Departamento Ecueménico de Investigaciones.

Wallerstein, Immanuel

1974 *The Modern World-System*. New York, NY: Academic Press.

Weiner, Jonathan

1991 *The Next One Hundred Years: Shaping the Fate of Our Living Earth*. New York: Bantam Books.

Wetherald, R.B. and Manabe

1975 “The Effects of Changing the Solar Constant on the Climate of a General Circulation Model” *Journal of Atmospheric Science* 32: 2044-2059.

Williams, Raymond

1973 *The Country and the City*. Oxford: Oxford University Press.

1983 [1976] *Keywords: A Vocabulary of Culture and Society*. Oxford: Oxford University Press.

Wolf, Eric R.

1982 *Europe and the People Without History*. Berkeley: University of California Press.

2001 *Pathways of Power: Building an Anthropology of the Modern World*. Berkeley: University of California Press.

Wong, Jenny L. P. and M. Dutschke

2003 “Can Permanence Be Insured? Consideration of Some Technical and Practical Issues of Insuring Carbon Credits from Afforestation and Reforestation.” HWWA Discussion Paper No. 235. Hamburg: HWWA.

World Rainforest Movement

2000 “Sinks that Stink” *WRM Bulletin*. 25, June 2000.

Wynn, Gerard

2006 “CO₂ Market on Brink as Price Continues to Slide” Planet Ark, *Reuters News*. April 28, 2006.

Wynne, B.

1995 “Misunderstood Misunderstandings: Social Identities and the Public Uptake of Science” In A. Irwin and B. Wynne, eds. *Misunderstanding Science? The Public Reconstruction of Science*. Cambridge, UK: Cambridge University Press.

Yamin, Farhana

1998 «The Kyoto Protocol: Origins, Assessment and Future Challenges» *RECIEL* 7(2): 113-126.

1999 «Equity, Entitlements and Property Rights under the Kyoto Protocol: the Shape of 'Things' to Come» *Review of European Community & International Environmental Law (RECIEL)* 8(3): 265–274.

Yamin, Farhana and J. Depledge

2004 *The International Climate Change Regime: A guide to rules, institutions and procedures*. Cambridge, UK: Cambridge University Press.

Yengoyan, Aram A.

2001 «Foreword: Culture and Power in the Writings of Eric R. Wolf» In Eric R. Wolf, *Pathways of Power: Building an Anthropology of the Modern World*. Berkeley: University of California Press.

Young, Oran R.

1997. *Global Governance: Drawing Insights from the Environmental Experience*. Cambridge, MA: MIT Press.

Zomer, Robert, Antonio Trabucco, Oliver Van Straaten, Lou Verchot and Bart Muys

2005 “Global analysis of the implications of the definition of forests on land area eligible for afforestation and reforestation activities in the CDM.” *ENCOFOR*.

Consultative Group on International Agricultural Research (CGIAR). At

<http://csi.cgiar.org/encofor/forest/>