

Deforestation

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Introduction

Forests play a key role in global climate regulation as a major sink for carbon dioxide, one of the main greenhouse gasses. Forests currently absorb carbon dioxide, thus promoting tree growth and slowing atmospheric warming. However, photosynthesis becomes difficult for tree species as temperatures warm and enzyme molecules start to break down. Above a certain temperature threshold (the exact temperature will vary between ecosystems and species) forests will start to leach carbon dioxide back into the atmosphere leading to further warming (Melillo *et al.* 2011). Additional warming would increase the risks of forest fires, which could release huge amounts of carbon dioxide into the atmosphere. Such loss of tree cover could have a deleterious effect on the world's climate. A holistic policy response to climate change thus needs to pay full attention to the iterative relationship between climate change and changes to the world's forest cover. Yet it is only since the turn of the millennium that there has been a sustained international policy focus on the role of forests in climate change. Prior to that climate change and deforestation were dealt with on largely separate international policy tracks.

After briefly considering how deforestation may be imagined as a global political issue this chapter will provide a historical overview of international cooperation on forests. The chapter concludes by examining the policy idea known as Reducing Emissions from Deforestation and forest Degradation (REDD), in the process noting some criticisms that this idea has attracted as well as some unresolved policy issues.

Defining Forests as a Political Problem

The climate regulation function of forests is just one of the public goods that forests provide. Forests provide a broad range of public goods at different spatial scales,

from the local level to the global. Public goods are non-excludable, in that no one can be prevented from benefiting from the goods that forests provide, and non-rival, in that consumption of a public good by one person does not affect what is left for others. At a global scale everyone benefits from the climate regulation services that forests provide and no one can be excluded from the benefits of a stable climate. Similarly, forests provide local public goods. They provide watershed services to local ecosystems and communities and they may replenish natural aquifers. Deforestation alters local hydrological regimes, changing the water in the soil and the moisture in the atmosphere, sometimes leading to the drying up of streams and rivers and local climatic change. Forests also provide local soil conservation functions. They may serve as cultural spaces and provide recreational and spiritual functions for local communities and indigenous peoples. They are the habitat for a huge range of biological diversity, both flora and fauna, and thus help maintain the diverse gene pool that is necessary for adaptable and resilient ecological systems and species. Forests, therefore, are shared between the world's people in the sense that they host or provide a range of public goods with life-preserving functions for both proximate and distant users (Perrings and Gadgil 2003; Humphreys 2006).

The political problem of deforestation is in part contention between different actors over the various public goods that forests provide. A forest valued solely for its carbon function would be managed very differently from one valued solely for its biodiversity, with a preponderance of fast-growing tree species that can provide rapid uptake of carbon dioxide in the case of the former and a wide range of different species in the case of the latter. But deforestation is in large part a political issue because as well as providing public goods forests also provide private goods, those that are excludable in that the owner of a good has the right, legally at least, to prevent others from using the good, and rival in that the more one actor consumes a given good, the less is left for others to enjoy. Private goods include timber, nuts, fruits, and rubber.

The harvesting of forest private goods is not necessarily incompatible with forest public good maintenance providing the harvesting of private goods does not lead to the depletion of the resource base. Often, however, unsustainable harvesting techniques are used, such as clear felling an area of forest for timber without replanting. A further problem is that while standing forests provide private goods, so too may the land on which forests stand. Deforestation may take place, for example, to clear land for agriculture, urban settlements, and oil prospecting (Barraclough and Ghimire 2000; Grainger 2009). Forest land itself may be privately owned, with different owners having very different approaches to forest management: long-term conservation in some cases and revenue maximization from short-term exploitation in others. Forests may be said to be sustainably managed when maximizing the yields of the private goods that forests provide does not lead to the degradation of any forest public good (Humphreys 2006).

Political conflicts over forests are due to contention between different actors over the various public and private goods that forests provide. This contention is played out at different spatial levels, from the local level to the global, with different actors making different claims to forest territory. Indigenous peoples and local community groups in tropical countries, often supported by civil society organizations such as international NGOs, argue that local communities are best placed to conserve the

forests, and that deforestation results when customary and traditional forms of forest ownership are undermined by outsiders who wish to exploit the forest for short-term gain. Indigenous peoples and local community groups argue that forests are, first and foremost, local commons (May 1992; Colchester 1994; Chhatre and Agrawal 2008). However, under international law forests, along with other natural resources, are a sovereign national resource of the state.

The two claims are not incompatible: national law may recognize and uphold local land claims and when this is the case the ability of local groups to resist incursions onto their ancestral lands is greatly enhanced. Many local groups in the tropics argue that they are best placed to conserve and sustainably use their forests when their traditional rights are recognized by the state and when they have secure and legally enforceable tenure rights. However, community groups dispute both state-owned and private forms of property in which customary and traditional rights are not recognized. Finally, and as noted, forests service a global public good, namely the atmospheric commons. The tension between these various scales – local, national, global – defines deforestation as an international policy issue.

From Vienna to Rio: A Century of International Cooperation on Forests (1892–1992)

Forest management first emerged as an international scientific issue in 1892 when the International Union of Forest Research Organizations (IUFRO) was established in Vienna following the recommendation to create an international forest science research body at the 1890 Congress of Agriculture and Forestry. The IUFRO has since emerged as the most visible and significant international forest science network. In 1945 the UN Food and Agriculture Organization (FAO) was established with responsibility for dealing with global food and agricultural issues. The FAO was also given responsibility for international forest issues, although only approximately 4% of the organization's budget is dedicated to forests, and for its first 40 years the FAO confined itself primarily to technical management issues. However, in the mid-1980s deforestation emerged as a global political issue.

International Tropical Timber Organization

Accelerating tropical deforestation in the 1960s and 1970s – in the Congo Basin, Southeast Asia, and Latin America, particularly Brazil, where the military government viewed the Amazon as a frontier to be rolled back and developed (a “land without people for people without land”) – had led many governments, environmental NGOs, development banks, and international organizations to conclude that concerted international action was needed to address the problem. In 1985 the International Tropical Timber Organization (ITTO) was created with the mandate of promoting the expansion and diversification of the international trade in tropical timber (the ITTO has no mandate on national-level trade within countries) and encouraging the sustainable utilization and conservation of tropical forests. Despite this latter mandate the ITTO is not a resource conservation organization (Colchester 1990). It is primarily an international commodity organization, one of a series that were created by the United Nations Conference on Trade and Development following concerns expressed by developing countries in the 1960s and 1970s that

they were not receiving a fair return on their natural resources and that they should have an organized voice in international politics. The ITTO encourages cooperation between producers and consumer governments and promotes market transparency, with some collaboration on development projects. As of 2011 ITTO had funded some 800 projects totalling more than US\$300 million (ITTO 2011). The main donors to project funding are the governments of Japan, the Netherlands, Switzerland and the USA, and the European Union.

In 1988 a study commissioned by the ITTO concluded that less than 1% of the international tropical timber trade (namely from Queensland, Australia) came from sustainable sources (Poore *et al.* 1989). These findings catalyzed the adoption by the ITTO in 1990 of the Year 2000 Objective, namely the target that by the end of the twentieth century the international trade in tropical timber should come from sustainably managed sources. Although many countries had adopted policies that supported the objective, these policies had not always been translated into action on the ground and the target was not met (Poore and Chiew 2000). The ITTO's two objectives – promoting the international timber trade while conserving the forest resource base – have always sat uneasily at the heart of the organization (Humphreys 1996).

Tropical Forestry Action Plan

The same year that the ITTO was created, the FAO, in collaboration with the World Bank, the United Nations Development Programme, and the Washington-based World Resources Institute, launched an ambitious plan, the Tropical Forestry Action Plan, intended to address tropical deforestation and organized around five program areas. The program areas were forestry in land use (at the interface between forestry and agriculture), forest-based industrial development, fuelwood and energy, the conservation of ecosystems, and the action program on institutions. The intention of the plan was that individual tropical forest countries would initiate national forestry action programs structured around these five program areas (FAO *et al.* 1987).

By 1990, 79 countries had initiated, or expressed an interest in initiating, a national forestry action program. But TFAP was attracting widespread criticism, both from NGOs and from an FAO-initiated independent review. Significantly, the TFAP had not succeeded in slowing tropical deforestation. The independent review noted that “the rate of deforestation appears to have accelerated in spite of the TFAP” (Ullsten *et al.* 1990: 12). Other criticisms that TFAP attracted were that it was overly focused on the forest sector thus ignoring causes of deforestation outside the forest sector, and that national forest action programs were donor-driven, reflecting the interests of donors rather than of forest communities. Reflecting this last point, critics argued that national forest action plans were focused predominantly on forest-based industrial development, to the exclusion of other action programs. As a result of this criticism the idea of a global plan receded and following the 1992 United Nations Conference on Environment and Development the emphasis changed to national-level action.

The United Nations Conference on Environment and Development

At the 1992 UNCED two conventions were opened for signature: the UN Framework Convention on Climate Change (UNFCCC) and the Convention on Biological

Diversity. But from the outset of the conference's preparatory negotiations there was contention over the measures for addressing deforestation due to some deep-rooted disagreements between developed and developing countries. While dichotomies between developed and developing countries are often overstated in analyses of international politics, in the case of the UNCED forest negotiations the distinction is a valid one. All the main developed countries – the EU (and its precursor, the European Community), Canada, the USA, Japan – argued for a forest convention for the conservation and sustainable management of the world's forests. However, almost all developing countries, including the main tropical forest countries in South America, Central Africa, and Asia, backed by China, opposed a convention which, it was suggested, could limit the sovereignty of states over their forest resources (Johnson 1993; Humphreys 1996).

One area of disagreement was on the causes of deforestation. Through the Group of 77 developing countries (G77), tropical countries argued that many of the causes of deforestation were to be found in global economic inequities. The G77 argued that unsustainable patterns of consumption in the developed countries, including high demand for tropical timber and agricultural produce farmed on deforested land, were drivers of tropical deforestation. Furthermore, it was claimed, high levels of international debt meant that developing countries paid more in debt interest and repayments than they received in international aid, leading many tropical countries to export timber and other natural resources to earn hard currency for debt repayment. The G77 argued that if tropical forests were to be conserved there should be an agreed package of international debt relief (Humphreys 1996).

The negotiations thus saw the developing countries using their forests to bargain for economic concessions from the developed countries. On this view the UNCED negotiations may be seen as a price negotiation: the tropical countries argued that if the developed countries wanted tropical forests conserved they would have to pay for it (Davenport 2005). The G77 introduced into the negotiations the concept of compensation for opportunity cost foregone: if tropical countries were to conserve their forests rather than exploit them they would forgo a major revenue stream and should expect to be compensated for this by those countries that wanted tropical forests conserved. While the developed countries did agree to some modest increased in development assistance during the UNCED negotiations these were insufficient to meet the aspirations of the developing countries.

In effect, the developing countries created a bargaining issue linkage between forests and other issues and in so doing they raised the price of forest conservation, a price that developed countries were unwilling to pay. There was a clear power-based dimension to the negotiations. In terms of possession of economic power the developed countries possess more capabilities than the developing countries on all important indicators, such as share of global GDP, GDP per capita, level of technological development, and influence in international economic and financial institutions. The developing countries have a history of staking a claim to the finance and technology of their developed counterparts, but prior to the advent of international environmental issues they had little they could bargain with in return. Now cognizant of the value attached to their forests by other countries the developing countries, recognizing their improved bargaining leverage, negotiated from a perceived position of increased strength, seeking to translate the concerns

of developed governments and citizens on tropical deforestation into economic and political gain.

This illustrates an important point from negotiating theory. The mere possession of a capability is not on its own sufficient for an actor to maximize its bargaining leverage. A cognitive factor enters the equation in that the actor in question must appreciate the value attached by other actors to its capabilities if it is to bargain to maximum advantage and secure the best returns in any negotiated deal (Raiffa 1982; Fisher and Ury 1992; Goldman and Rojot 2003). However, the developed countries were unwilling to meet the demands of the developing countries because they wished to protect their underlying economic power position. For example, to have agreed to technology transfer on preferential and concessional terms would have resulted in lower returns on research and development costs for businesses based in developed countries. Debt relief would have harmed the international banking sector or the taxpayer in developed countries. Agreeing to the demands of developed countries, therefore, would have eroded the North's relative advantages in international trade and finance. Ultimately no agreement was possible as neither side was prepared to meet the terms of the other (Humphreys 1996; Davenport 2005). The outcome from the negotiations was the non-legally binding statement of principles on forests, a declaration which, at the insistence of the G77, reaffirms in its first paragraph the principle that states have sovereignty over their natural resources (United Nations 1992).

International Forest Politics since Rio

Following the UNCED in Rio there was a three-year hiatus in international forest politics. The disagreements that had surfaced during the negotiations, along with the criticism of the Tropical Forestry Action Plan, contributed to a chilling effect in international forest politics. It was not until 1995 when, following a joint initiative from the Canadian and Malaysian governments, a temporary UN forum, the Intergovernmental Panel on Forests, was created under the auspices of the Commission for Sustainable Development (CSD) with a two-year life span.

One of the main political outputs from the Intergovernmental Panel on Forests (1995–1997) was the recommendation that all states should form “national forest and land use programmes.” The emphasis on “land use” reflected a consensus born out of the criticism that the Tropical Forestry Action Plan had encountered, namely focusing solely on forests and forestry would not address the causes of deforestation, which invariably lie outside the forest sector. Indeed, the Panel spent considerable time deliberating the causes of deforestation, a subject on which there has been extensive academic debate (Brown and Pearce 1994; Jepma 1995; Spray and Moran 2006; Spillsbury 2009; Boucher *et al.* 2011).

There is no “universal” theory of deforestation, and given how the causes of deforestation vary over time and space such a theory is likely to prove elusive. Monocausal explanations blame deforestation on single factors, such as population pressure, the high demand for tropical timber, or clearance for alternative land uses. Such explanations have been criticized for failing to take into account the often complex causes of deforestation and the variegated ways in which they may interact to produce deforestation in one space rather than another. But if monocausal explanations are

unsatisfactory then so too is the view that the causes of deforestation are impenetrably complex with no clear causal patterns evident (Geist and Lambin 2002).

A viewpoint that lies between that of monocausality and impenetrable complexity, one that has attracted a measure of consensus from scholars and which found support at the Intergovernmental Panel on Forests, is that there are different interactions between multiple causal factors, with different synergies of causation apparent in different places at different times. Many analyses now distinguish between direct causes (sometimes referred to as proximate causes) and underlying causes. To Geist and Lambin (2002: 143) proximate causes are “human activities or immediate actions at the local level, such as agricultural expansion, that originate from intended land use and directly impact forest cover.” Direct (or proximate) causes involve forest conversion to other land uses and the deliberate modification of forests at the local level; the felling of a tree in a particular space is, after all, an essentially local act.

Underlying causes, in distinction, are “fundamental social processes, such as human population dynamics or agricultural policies, that underpin the proximate causes” (Geist and Lambin 2002: 143). Underlying causes relate to the social forces and pressures that shape actors’ behavior and incentivize those actors who fell trees to do what they do. They may operate locally, but often operate from a distance. So, for example, the increasing international demand for tropical timber for furniture is an underlying cause of deforestation, while tree felling in tropical countries to feed that industry would constitute a direct, or proximate, cause. Other underlying causes of deforestation include the international demand for agricultural produce such as beef, soybeans, and palm oil (Boucher *et al.* 2011).

The Intergovernmental Panel on Forests was the first intergovernmental organization to adopt and work with the distinction between direct and underlying causes of deforestation. It was clear after the UNCED negotiations that if the Panel was to try to reach conclusions on the causes of deforestation, even at a very generalized level, then there would be political disagreement. Instead the Panel opted to develop a diagnostic framework that would enable individual countries to trace the causal chains that affect their forests (Table 5.1). No order of importance was implied in the framework. The Panel noted that the correlation between underlying and direct causes of deforestation is not always straightforward and the relative values assigned to forests and the alternative uses of forested land will change over time (United Nations 1996).

Eight types of underlying cause were identified by the Panel (United Nations 1996). The first type is economic and market distortions, in particular the valuing of private goods such as timber that can be bought and sold and the undervaluing of the public goods values of forests. Second, policy distortions include building roads into forested areas that enable migration from those seeking to exploit the forests for commercial gain as well as from the rural landless poor. Other policy distortions included providing subsidies to actors to convert forests to other land uses and promoting forest colonization. Third, insecurity of tenure refers to unclear property rights so that ownership of areas of forest is unclear, promoting open access and incursions from outsiders. Fourth, lack of livelihood opportunities refers to poverty and the lack of life opportunities that may lead the poor to exploit forests unsustainably, catering to short-term needs rather than the long-term viability of the resource base. Fifth, government deficiencies include lack of enforcement capacity resulting in

Table 5.1 Diagnostic framework: relationships between selected direct and underlying causes of deforestation and forest degradation.

<i>Direct causes</i>	<i>Underlying causes</i>							
	1	2	3	4	5	6	7	8
<i>Replacement:</i>								
By commercial plantations	X					X	X	
Planned agricultural expansion	X	X				X		
Pasture expansion	X	X				X	X	
Spontaneous colonization		X	X	X		X		X
New infrastructure						X	X	
Shifting agriculture			X	X				X
<i>Modification:</i>								
Timber harvesting damage	X		X		X		X	
Overgrazing			X		X			
Overcutting for fuel			X		X			
Excessive burning				X	X			
Pests or diseases					X			
Industrial pollution					X		X	

Source: United Nations. 1996. "Intergovernmental Panel on Forests, Programme Element I.2, Underlying Causes of Deforestation and Forest Degradation." E/CN.17/IPF/1996/2.

Key:

1 Economic and market distortions

2 Policy distortions, particularly inducements for unsustainable exploitation and land speculation

3 Insecurity of tenure or lack of clear property rights

4 Lack of livelihood opportunities

5 Government failures or deficiencies in intervention or enforcement

6 Infrastructural, industrial or communications developments

7 New technologies

8 Population pressures causing land hunger

limited compliance with laws and regulations, with transgressors often unpunished. Sixth, infrastructural, industrial, or communications developments include shifts in the global prices of products which may lead to forest clearance (for example, a rise in the price of agricultural produce leading to increased demand for agricultural land) and pressures for new land for urban expansion. Seventh, new technologies have accelerated land clearance. The invention of the chainsaw and its application to forestry in the early twentieth century revolutionized forestry and led to accelerated rates of tree felling. New technologies such as biofuels and genetically modified trees may also increase pressure on forest space. But technology is not necessarily a malign force in forests. New technologies may reduce wastage in wood processing, leading to reduced pressure for tree felling. Finally, demographic factors may affect forest use. While population increases in developing countries need not necessarily translate into deforestation, population hotspots in forested areas, perhaps due to colonization or road building, will increase pressure on forests.

The diagnostic framework was offered as a tool for countries to identify those causes of deforestation relevant for their national context. It was stressed that the framework was illustrative and that countries should add to and adapt the framework in line with national circumstances. The framework, it was suggested, could be used

to identify those underlying causes associated with particular direct causes so that appropriate remedial policies could be designed. For example if a country is experiencing deforestation due to an increase in commercial plantations, then according to Table 5.1 the underlying causes may be economic and market distortions; infrastructural, industrial, or communications developments; new technologies; or any combination of these factors.

The Intergovernmental Panel on Forests was succeeded by another temporary forum of the CSD, the Intergovernmental Forum on Forests, which had a three-year life span and was, to all intents and purposes, the same forum as its predecessor. Between them the Intergovernmental Panel on Forests and the Intergovernmental Forum on Forests produced some 270 proposals for action, namely suggestions on possible measures that countries can take when designing and implementing national forest programs.

When the mandate for the Intergovernmental Forum on Forests expired in 2000 it was replaced by a new body, the United Nations Forum on Forests (UNFF), which reports direct to the UN Economic and Social Council. In 2007 the UNFF negotiated a Non-Legally Binding Instrument on All Types of Forests which added to the growing body of soft law on forests. This instrument established four global objectives, namely reversing the loss of forest cover worldwide, enhancing forest-based benefits, increasing the areas of protected forests and sustainably managed forests, and increasing development assistance and financial resources for sustainable forest management (United Nations 2008). Despite the pledge to increase development assistance no new monies were pledged when the instrument was agreed.

By now many policy-makers were shifting attention away from UN forest institutions, which concentrated primarily on the negotiation of soft international law, and focusing instead on more practice-oriented measures to reduce deforestation. A major development has been the creation of non-state market-based forest certification schemes. Forest certification is the process by which an independent third party certifies that a forest management process conforms to agreed management standards. The first global scheme was the Forest Stewardship Council (FSC) created in 1993. As a market-based scheme the FSC relies for its success on demand from environmentally discriminating consumers who wish to purchase timber from well-managed sources, and forest managers and retailers who are prepared to meet this demand (Cashore *et al.* 2004; Gulbrandsen 2004; Pattberg 2005; Auld and Gulbrandsen 2010). The creation of the FSC subsequently led to the creation of a number of competitor schemes, most of which are now consolidated under the Programme for the Endorsement of Forest Certification schemes (PEFC).

The role of the market is also prominent in a recent policy innovation to reduce deforestation in order to tackle climate change. This policy has become known as Reducing Emissions from Deforestation and forest Degradation, or REDD.

REDD: An Evolving Concept

The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) found that despite widespread deforestation over the last century there is still more carbon in the world's forests than in the atmosphere. It estimated that approximately 17% of greenhouse gas emissions are caused by deforestation and forest

degradation (IPCC 2007). Most of these emissions take place in tropical countries that are subject to severe deforestation pressures, such as Brazil, the countries of the Congo Basin, and the forested countries of Southeast Asia, in particular Indonesia. Reducing these emissions is now seen as an important dimension of international action to tackle climate change.

Following a proposal from the governments of Costa Rica and Papua New Guinea to the eleventh conference of parties to the UN Framework Convention on Climate Change (UNFCCC) in 2005, there is now an international consensus that governments should actively seek to reduce greenhouse gas emissions from forests. Subsequent deliberations within the UNFCCC and the United Nations have developed and refined the principle that governments and communities that take measures to prevent deforestation that would otherwise have occurred should receive compensation. This idea has evolved significantly since 2005. Initially known as “avoided deforestation” (AD) the idea then became “Reducing Emissions from Deforestation” (RED). In 2007 the Stern Review of the economics of climate change endorsed the idea of reducing carbon emissions from deforestation, concluding that “A substantial body of evidence suggests that action to prevent further deforestation would be relatively cheap compared with other types of mitigation, if the right policies and institutional structures are put in place” (Stern 2007: xiii).

In 2006 during discussions on RED at the UNFCCC it was pointed out that there are significant emissions from forest degradation in addition to deforestation (Griffiths 2007). Deforestation is the complete removal of forest canopy from an area, while forest degradation is the partial removal of the forest canopy. So forest degradation is a qualitative change in forest cover while deforestation is a quantitative reduction. Degradation may take the form of a temporary disturbance of the forest canopy that can be repaired, either naturally or through planting of new saplings or careful management. But because degradation may be a precursor to broader changes leading in time to full deforestation, the concept of RED was broadened in 2007 to become Reducing Emissions from Deforestation and forest Degradation (REDD) (Kanninen *et al.* 2007).

Although the basic principle that countries taking action to reduce deforestation and forest degradation should be paid was now attracting support from a growing coalition of governments, it was pointed out that REDD privileged one particular forest good, namely carbon sequestration, above all others. So the principle was further broadened to REDD+, the plus sign denoting that forests provide a range of public and private goods in addition to carbon sequestration and that REDD+ should pay a poverty-alleviation role. While the REDD+ acronym is now widely used, within the UN system REDD remains the accepted acronym.

REDD has the potential to transform international climate and forest politics. When emissions from deforestation and forest degradation are taken into account (as opposed to just energy-based emissions) then some of the largest emitters of carbon dioxide are tropical forest countries, such as Brazil and Indonesia. The basic idea underpinning REDD is the “opportunity cost forgone” argument made by the G77 during the UNCED forest negotiations. Forests are cut down for one of two reasons: because they are worth more as timber than they are standing, or because alternative land uses are worth more than standing forest. A forest owner will conserve its forests if it can earn at least as much from conserving an area

of forest as it would from clearing it. The rationale is that REDD schemes will generate sufficient financial resources to incentivize those who make decisions that will generate forest degradation or deforestation, to change their behavior so that forests that would have been lost are conserved. The Stern Review estimated that the opportunity cost of protecting forests in the eight countries that emit more than 70% of non-energy-related emissions would be around US\$5 billion per annum, rising over time (Stern 2007: xxvi).

In order for reduced deforestation and forest degradation to be measured there needs to be a baseline, in other words the background rate of forest loss that would have taken place in the absence of REDD. Any difference between observed deforestation and the baseline is, it is assumed, due to changed behavior from the forest owner, who is thus entitled to REDD payments in line with the area of forest that has been conserved. Strictly speaking the baseline rate of deforestation should be determined scientifically from historical data, such as satellite imagery and ground observations. However, agreement on baselines is likely to involve an element of political bargaining. For example, some countries may negotiate for generous baselines – in other words baselines that tend to overestimate historical deforestation so that reduced deforestation is easier to achieve – before agreeing to participate in a REDD scheme (Humphreys 2008).

Parties to the UNFCCC endorsed in principle the idea of REDD at the Bali conference of parties in 2007. However, there is as yet no agreement on the legal principles that should govern REDD and what role, if any, it should play in a successor to the Kyoto Protocol. REDD has evolved as a governing principle and idea with no single multilateral, institutional focus. It is a broad term used for the various options for paying a government or other actor, such as a private forest owner, to conserve forests and their carbon stocks in order to slow anthropogenic climate change. REDD payments may come from a range of actors, including international development agencies such as the World Bank, donor governments, conservation NGOs, and businesses interested in investing in offsets.

Donors may have one of two motives for financing national REDD schemes. The first is altruism, the desire to make a contribution to stabilization of the world's climate. The second concerns offsets, in other words compensating for greenhouse gas emission made elsewhere. Actors criticized for high emissions may wish to demonstrate that they are taking action to offset their emissions through carbon sink enhancement activities. Criticism for high emissions may come from the electorate in the case of governments, shareholders in the case of businesses, and, for both, NGOs. Offsets are permitted under the Clean Development Mechanism of the Kyoto Protocol (for example, when a high-emitting Annex I country plants trees to absorb a share of its emissions) and under the EU's Emissions Trading Scheme. Individual companies and other actors may also buy offsets outside these schemes in the smaller voluntary carbon offsets market.

REDD funding can take place through bilateral arrangements between a forested country and a donor. Under such arrangements forested countries would negotiate bilaterally with donors to agree the forest area that should be conserved and the period of time over which it should be conserved in exchange for an agreed sum of money. Bilateral REDD arrangements are most likely to appeal to those countries with a significant expanse of forest cover and which are adept at leveraging

development assistance from donors. Brazil, the country with the world's largest expanse of tropical forest, favors such an approach and is a supporter of bilateral REDD funding.

An alternative is a market-based approach under which participating forested countries would sell carbon credits which would be bought and sold on the international offset market, bringing together those demanding offsets and those supplying carbon credits. An international market-based approach could be incorporated in a post-Kyoto protocol. However, a market-based approach to REDD will work only if the market price is high enough to compensate forest owners for the forgone opportunity cost of alternative land uses. If the revenue per hectare that a forest owner can earn from REDD is less than can be earned from deforestation and conversion to, say, planting soybeans then (and ignoring the transaction costs that would arise from changing land use) the rational forest owner seeking to maximize the revenue available from his land would plant soybeans. However, a price for REDD credits that conserves forests today need not necessarily do so in the future. Continuing with the example of soybeans: the REDD market would need to track the price of soybeans so that the per hectare revenues the forest owner can earn from REDD continue to remain just ahead of those that can be earned from soybeans. Furthermore, global commodity prices are dynamic and changing, and the forest owner may be tempted to convert to another land use, say palm oil or cattle farming, if the per hectare revenue earnings were to outstrip those from both REDD and soybeans. In short, REDD prices will only continue to incentivize reduced deforestation and forest degradation if they rise to track the returns offered by the best opportunity cost forgone by the forest owner. Because the opportunity cost forgone will vary from place to place, a REDD price may be high enough to reduce deforestation in one forest, yet insufficiently high to do so in another (Costenbader 2011: 36–37).

This discussion reveals a problem with the idea of an international market for REDD credits: there is no basis in market theory for concluding that a price in one product will rise to track those of competitor products. A REDD price may lag behind the price for alternative uses of forest land when the demand for REDD credits is low relative to alternative land uses, or when the REDD market is flooded with supplies of REDD credits so that, again, the price is suppressed relative to other land uses. And if, for whatever reason, the price of REDD credits is insufficiently high to prevent deforestation, what then will happen? Either deforestation will take place, or it will be avoided only if the shortfall between willingness to pay and the opportunity cost forgone is met so that forest owners are incentivized to continue maintaining their forest cover. The most obvious way that such a shortfall can be met is through international public finance (Karsenty *et al.* 2013).

To make financial sense REDD payments would go to those areas of forest where the money would make the most difference, in other words to those forests that are most at risk and where the investment will thus conserve the most carbon. A criticism that REDD has attracted is that it is therefore at risk of being exploited by unscrupulous forest owners (Griffiths 2007). An owner with no prior intention of deforesting his land could threaten to do so in order to claim REDD payments. Similarly, an investor may buy up an area of pristine land and threaten to clear it if he calculated that the cost of purchasing the land would be justified by the REDD payments that would be received. Ironically, therefore, forest communities who have

conserved their forests for centuries and who have no intention of deforesting their land would be unlikely to benefit from REDD payments. There is a thin dividing line between rewarding those who maintain an environmental service and those who threaten to destroy it, and it can be argued that REDD would favor the latter over the former.

REDD is redefining the idea of carbon offsets. The original idea of the carbon offset was to compensate for emissions of carbon dioxide in one space by reducing emissions or increasing carbon sink capacity in other space. So, for example, under the UNFCCC's Kyoto flexibility mechanisms offsets may take the form of an actor funding additional tree planting to offset its emissions. The problem of offsets is more problematic with REDD, where there would be no increase in forest cover. An actor could offset its carbon emissions in one space not through establishing additional forest cover elsewhere, but by maintaining forest cover that already exists. Proponents of REDD claim that such an offset model is acceptable if the emissions that have taken place are offset against emissions that have demonstrably been avoided in an area suffering a high background rate of deforestation in relation to an agreed baseline. Critics argue that merely maintaining forest cover, while certainly desirable in its own right, should not be a pretext for additional emissions from fossil-fuel burning. Given that two major biophysical processes have led to anthropogenic climate change, namely deforestation and the excavation and burning of fossil fuels, the solution to the problem lies in reforestation and emissions reduction. On this view the notion of REDD offsets is a flawed idea: while it is clearly desirable to conserve existing sink capacity through forest conservation, it is far more problematic in climate stabilization terms to offset such activities against additional carbon dioxide emissions (Humphreys 2008).

Another politically contentious issue is the participation of local communities in REDD schemes (Cotula and Mayers 2009; von Scheliha *et al.* 2009). Many indigenous peoples' groups have been suspicious of REDD due its focus on the global public good of climate regulation rather than the welfare of local communities, arguing that REDD will institutionalize global and national control over forests at the expense of customary local commons regimes, with most of the benefits flowing to national treasuries rather than to local communities (Griffiths 2007). A study from the Forests Peoples' Programme on the implementation of REDD in Peru concluded that REDD policies are "undermining rights of indigenous people and are likely to lead conflicts over land and resources" (Espinoza Llanos and Feather 2011: 6). One commentator has argued that

REDD is not inherently pro-poor and could be anti-poor. Market-based REDD could end up compensating wealthy developers who are threatening to cut down the rainforest rather than communities that have conserved forests for centuries (Richards 2008).

While local people will be the most affected by REDD they will have a low level of influence on the design and implementation of REDD schemes unless donors, host governments, and forest owners insist upon it.

The Kyoto Protocol established legally binding emissions targets only for the Annex I countries (the countries of Europe plus Canada, the USA, Japan, Australia, and New Zealand). The seventeenth conference of parties to the UNFCCC in Durban

in 2011 agreed that an international legal agreement on greenhouse gas emissions reductions should be agreed as soon as possible, but no later than 2015, to come into effect by 2020 (on climate negotiations, see Chapter 20 in this volume). If such an agreement can be reached it is very likely to include emissions reductions from forests and would thus provide a firm legal footing for REDD. Until then emissions reductions from forests will be voluntary and non-legally binding, and REDD will lack a single international institutional focus.

To date three international REDD initiatives have emerged. The UN-REDD program was established in 2008 to help developing countries develop national REDD strategies. The UN agencies involved are the FAO, the United Nations Environment Programme, and the United Nations Development Programme. The program also works closely with the United Nations Forum on Forests, the Global Environment Facility, and the UNFCCC secretariat. As of 2011 14 countries were receiving support to help build capacity for implementing a REDD scheme (so-called “REDD readiness” programs). The countries are Bolivia, Democratic Republic of Congo, Ecuador, Indonesia, Nigeria, Panama, Papua New Guinea, Paraguay, the Philippines, the Solomon Islands, Tanzania, Vietnam, and Zambia, none of which had yet been paid for any reduced emissions from their forests (UN-REDD 2011). The three largest donor governments to the UN-REDD program are Norway, followed by Denmark and Spain.

The second initiative, the Forest Carbon Partnership, is a partnership of governments with donors also including The Nature Conservancy and BP. Established in 2008, the Forest Carbon Partnership helps tropical and subtropical countries develop REDD readiness programs including developing national monitoring systems, management systems, and stakeholder consultation arrangements. The World Bank is a trustee for the Forest Carbon Partnership.

The third multilateral REDD initiative is the Forest Investment Program, which sits within the Strategic Climate Fund, one of two Climate Investment Funds set up to promote the objectives of the FCCC (the other being the Clean Technology Fund). The two funds aim to promote low-carbon development through scaled-up funding channelled through multilateral development banks (including the World Bank, which administers the Forest Investment Program) and other sources, including the private sector. Established in 2009, the Forest Investment Program aims to finance efforts that will address those underlying causes of deforestation identified in national REDD readiness programs. It is possible that these three multilateral REDD initiatives could become consolidated under the UNFCCC. For now they exist independently, although with very similar aims and overlapping membership in terms of recipients and donors.

Conclusions

While international scientific cooperation on forestry is now well over a century old, deforestation's emergence as an international political issue dates only to the 1980s. Early attempts to address deforestation focused on international organizations, plans, and negotiations, all of which have failed in one way or another. While the International Tropical Timber Organization continues to exist it remains primarily focused on international trade issues rather than forest conservation. The

Tropical Forestry Action Plan failed, and the UNCED forest negotiations failed to produce a global forest convention.

Since then there have been a succession of international forest institutions, the latest version of which, the United Nations Forum on Forests, continues to exist, meeting every two years. However, the focus of international forest cooperation has progressively narrowed. The Intergovernmental Panel on Forests agreed that the emphasis should be on national forest programs. Since then international agreements on forests have been soft and non-legally binding.

The degradation of forest public goods is due to the overexploitation of forest private goods, in particular timber, and the clearance of forests to free land for alternative uses, notable agriculture. REDD, which operates at the interface between climate and forest policy, seeks to place a value on the public goods dimension of forests, thus providing an economic incentive for forest conservation. But REDD represents a further narrowing of forest policy, valuing as it does the carbon sequestration function of forests. REDD has been criticized for this, and if REDD policies are to be effective at reducing deforestation they will have to overcome both political resistance and technical challenges, such as agreeing baselines and measuring forest carbon.

For now REDD initiatives are spread over a range of international institutions. However, REDD does offer the prospect that governments could, for the first time, agree a legally binding international policy on forests; not a global forest convention (an option still supported by many governments) but a forest policy embedded within a post-Kyoto climate change agreement. In this respect the future of REDD is now tied to a comprehensive agreement limiting emissions of carbon dioxide and other greenhouse gases not covered by the Montreal Protocol. Finalizing such an instrument is certain to see some hard political bargaining, and the agreement and ratification of such an instrument should certainly not be taken for granted.

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