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Abstract

Ambitious claims have been made about the development benefits of market-based policy instruments for climate mitigation. We examine the implications of forest carbon projects for different aspects of equity and development. We apply a Stakeholder Multi-criteria Analysis to explore the range of stakeholders, their roles, interests and perspectives, to a case study in Mexico. Two aspects of equity, access to markets and forests, and legitimacy in decision-making and institutions, are discussed. Robust cross-scale institutional frameworks are necessary to insure that objectives for equity and development are met and that already marginalised sectors of society are not excluded. These institutions are still developing and their establishment brings together many different stakeholders from government, private sector and civil society. However, the ability of the carbon economy to provide real benefits for development may ultimately be constrained by factors concerned with the nature of the market itself.

Keywords:

Stakeholders, institutions, forest carbon projects, Mexico, market-based mechanisms

A new carbon economy

Equity is central to sustainable development. But equity is frequently overlooked in the evolving carbon economy. By the 'new carbon economy' we mean the series of market-based policy instruments designed to reduce global greenhouse gas emissions through the creation of markets for carbon such as the proposed flexibility mechanisms of the Kyoto Protocol. These mechanisms are viewed by market advocates as being economically efficient and as providing incentives for a wide range of resource managers, from local to international level, to comply with environmental agreements such as the UNFCCC and Kyoto Protocol. But emerging insights from the political ecology of global environmental policy in diverse areas show that this new carbon economy, based on a discourse of global managerialism, promotes a global blueprint that has difficulties in incorporating local ecological and social realities, downplays issues of justice and equity, and can render invisible the losers and winners at the local scale (Adger et al., 2001).

The reasons why the apparently 'flexible' nature of markets are, in fact, insensitive to local context is that the markets for carbon do not spontaneously emerge, nor are they based on voluntary exchange. They are created markets, created by global and national institutions. Their creation involves changing property rights, often overturning long-established traditional management and property rights regimes. In the case of forest carbon projects this change may impact on local peoples' access to valuable resources, including environmental services, subsistence and marketed products. This challenges the assumptions about sustainable development within these initiatives. We develop these arguments in this paper and test these with initial observations on ongoing land use related carbon sequestration projects in Mexico.

Equity and development in the context of climate mitigation

Climate change mitigation through land use is part of growing trends towards global managerialism which seeks global solutions for global environmental problems assuming homogeneity between these problems in terms of their local manifestations and distribution of property rights. Increasingly, private investments in conservation, for example, including private nature reserves and trust funds and tradable development rights, are promoted and implemented as a means of conserving global biodiversity. Authors such as Godoy et al. (2000) argue that local forest dwellers should be paid for the non-local values of rainforest so that they can resist deforestation. Fearnside (1997) describes forest environmental services as the 'mother lode' for conservation in Amazonia waiting to be tapped. Similarly a range of such instruments is suggested to address climate change, and a key strategy has been carbon trading between developed and developing countries. A number of arguments are made in support of involving private investors in this international trade in carbon emissions. First, engaging the private sector is a fundamental necessity to meet carbon emission reduction targets. Inclusion of private sector actors draws them into environmental

management and monitoring, in addition helping to make their activities more transparent and accountable. Secondly, these partnerships provide a means of mobilising the necessary capital through private financial flows, a way of capturing foreign direct investment and channelling it towards environmentally beneficial activities. Thirdly, this funding can be used to support development activities and bring direct benefits to poor people in poor countries.

The convergence of global environmental priorities with national-level stakeholders' interests is allowing the rapid development of a new carbon economy. In the global arena, for example, the Clean Development Mechanism of the Kyoto Protocol and the World Bank's Carbon Funds (the Prototype Carbon Fund, the Bio-Carbon Fund and the Community-Development Fund) share the aim to promote investment in energy or forestry-related projects in developing countries. Involvement of a wide range of stakeholders in these developments is increasing, and numbers of projects are growing around the world. Prior to these initiatives, Costa Rica developed a national fund for promoting carbon mitigation in forestry projects, which has inspired other countries such as Brazil and Mexico to establish their own national funding mechanisms to promote both carbon sequestration and other environmental services such as biodiversity or water conservation.

But the markets proposed for ecosystem services do not spontaneously occur. The proponents of standard market economics argue that whilst forest ecological services are hugely valuable to human well-being (in effect all ecological functions of forests are ultimately also economic values) many of these functions have no markets and hence no apparent value, justifying the creation of markets. Many studies by environmental economists find that the most economically valuable environmental services provided by forests is indeed their carbon sequestration function (Pearce, 2000; 2001). This gives rise to the widespread optimism about the possibility of mitigating climate change through various forestry activities.

Equity is a key component of sustainable development. It concerns fairness of outcomes both now and in the future – who benefits and who is included in 'development' actions. Equity is about inclusion in the processes of decision-making for development. Thus equity is both instrumental and a right, concerned with both distributional and procedural justice. In line with emerging pluralist ideas in decision-making (Adger et al., 2003), we propose that equity in the context of the new carbon economy comprises three elements: equity in access, equity and legitimacy in institutions and decision-making at all scales, and equity in outcome. These three elements need to be addressed if instruments such as the Kyoto flexibility mechanisms can make any claim to sustainability. On the basis of evidence from previous carbon offset projects, this is a tall order, because of the coercive nature in changes in *de jure* property rights. At a minimum such initiatives require robust and equitable institutions at the local level and means of distributing financial benefits to the stakeholders who may forego immediate and short-term gains in lieu of longer-term benefits of sustainable development (Brown and Adger, 1994).

We investigate two aspects of equity, access and property rights, and institutions and decision-making, by examining the range of stakeholders involved in a forest carbon project in Mexico. We propose a Stakeholder Multi-criteria analysis framework, enabling the roles and interests and priorities of different stakeholders to be analysed by adapting conventional decision-analysis techniques in a constructivist approach which supports adaptive management (Brown et al., 2002). Following sections of this paper outline the types of forest carbon projects that are being developed within the new carbon economy and how they have so far been analysed. The *Fondo Bioclimatico* project in Mexico is introduced and the stakeholders and their interests sketched. The differences in stakeholder roles, access to decision-making and institutions and their perspectives on the development of the carbon economy have implications for the equity and sustainability of forest carbon projects and more broadly for other market-based mechanisms for climate mitigation.

Climate mitigation and forestry

Forests perform many important ecosystem services and functions, including maintenance of genetic diversity, watershed protection, soil and water conservation, in addition to mitigating global climate change. Forests can serve as reservoirs, sinks and sources of greenhouse gases and potentially have a key role in moderating the net flux of greenhouse gases between the land and the atmosphere. Forests act as sinks of carbon when their area or productivity increases, resulting in an increased uptake of carbon dioxide (CO_2) from the atmosphere. They act as a source of

carbon when biomass is burned or decays and soil disturbed, resulting in emission of CO_2 and other greenhouse gases to the atmosphere. Net CO_2 emissions from changes in land use – primarily deforestation in tropical regions – is currently estimated to contribute about 20 percent of global atmospheric CO_2 emissions (Schimel et al., 1996). There are however significant uncertainties concerning the exact role and the scale of carbon fluxes associated with forest and land use change. Accounting for these 'land use, land use change and forestry' (LULUCF) carbon sinks, and their inclusion under the Kyoto Protocol's flexibility mechanisms has been a controversial issue during climate negotiations (Dessai, 2001). There are fears that inclusion of LULUCF could result in a reduction of technological and financial transfers to developing countries (Mwandosya, 2000; Ramakrishna, 2000) or increase the spread of commercial plantations (FERN, 2000; Dutschke, 2001). Contrarily, LULUCF advocates claim their adoption can lower the costs of reaching emissions targets, and that synergistic effects are likely. Many scholars support this view, emphasising the "win-win" opportunities that forest carbon projects could provide to biodiversity conservation and rural development (Klooster and Masera, 2001; Fearnside, 1997).

The compromises and restrictions introduced at the sixth and seventh Conference of the Parties to the UNFCCC reflect widespread doubts about how forests should be treated in climate mitigation. These include which types of sequestration if any should be counted towards emission reduction targets and the extent to which national obligations can be met by financing sequestration or sink enhancement in other countries. The Bonn agreement defines the amount of carbon sinks which can be credited, and states that "for the first commitment period, the total of additions to and subtractions from the assigned amount of a party resulting from eligible LULUCF activities under Article 12, shall not exceed 1% of base-year emissions of that party, times five" (for activities started after 2000). Not only is the scale of the credits limited, but the type of activities is also constrained, and in the CDM eligible sink activities are currently limited to afforestation and reforestation projects during the first commitment period (2008-2012). Box 1 summarises the current policy position of carbon sinks in the various Kyoto mechanisms, and Table 1 the types of forest carbon projects.

Box 1: The carbon economy, the Kyoto Protocol and sinks

The Kyoto Protocol defines three flexibility mechanisms to enable trade in emissions rights:

1. International Emissions Trading, allowing Annex B countries to trade emission permits known as 'assigned amount units' (Article 17)
2. Joint Implementation allowing countries to earn emission reduction units through projects in other Annex B countries (Article 6)
3. Clean development Mechanism allowing for the generation of certified emission reductions from projects in non-Annex B countries (Article 12)

The Protocol defines four potential carbon commodities:

- Assigned amount units – achieved through emission reductions in Annex B countries that can be sold to other Annex B countries
- Emission reduction units – achieved through emission reduction activities by one Annex B country in another Annex B country
- Certified emission reductions achieved through emission reduction activities by Annex B countries in non- Annex B countries
- Removal units, generated through investment in carbon sinks in Annex B countries for use in the existing compliance period

Adapted from Pagiola et al., 2002

Fearnside (2001) provides a useful summary of the arguments surrounding forest carbon projects and identifies how the issue of conserving tropical forests as a global warming countermeasure has galvanised the environmental movement and public opinion. His article gives some insights into the range of perspectives articulated by different actors but also highlights how some key stakeholders – for example indigenous forest dwellers - are excluded from negotiations. Furthermore there are critical South-North dimensions to debates about the architecture and implementation of JI and

CDM and role of sinks (Newell, 2000; Mitchell and Parson, 2001; Sokona and Huq, 2002) although forest interests are not necessarily divided along these same lines (Brown, 2001).

Pagiola et al. (2002) summarise some of the issues raised by critics of carbon sequestration through forestry as (see also Fearnside, 2001; Subak, 2002):

- Carbon sequestration projects are likely to favour plantation forestry at the expense of natural forestry (because sequestration rates may be higher, management cheaper and monitoring easier) but this may have detrimental impacts on biodiversity;
- The avoidance of deforestation as a form of sequestration is problematic because it may be difficult to prove that those forests were directly at risk from deforestation ('additionality') and deforestation may simply be displaced to another area of forest ('leakage');
- Monitoring and measuring sequestration and particularly marginal sequestration is difficult making verification problematic;
- Smallholder farmers, peasants, forest users without secure tenure may have difficulty in meeting the contractual and negotiating requirements and may even find themselves pushed off land in favour of large-scale forest carbon enterprises;
- Uncertainties about how to account for the secondary benefits (if there are any) of forest carbon projects;
- Difficulties in defining 'sustainable forest management' and certifying activities.

Despite these difficulties, a number of projects are underway and to date, more than 20 initiatives for carbon mitigation through forestry and agroforestry projects have been developed since 1995 under the "learning through practice" approach of the AIJ-UNFCCC pilot phase. Table 2 outlines some examples from Latin America.

Table 1: Forest carbon projects

Forest project type	Characteristics /Approach	Use of carbon payments
Large scale industrial pulp or timber plantations	Establish plantations of fast growing trees for industrial use in deforested or degraded areas	To cover up-front costs of developing new industry
Agroforestry, community forest plantations	Increase tree growing and forest cover on farms or associated off-farm land to supply tree products or ecosystem services	To provide technical and marketing assistance, to subsidise three establishment, to pay farmers for carbon benefits, to increase local management capacity.
Agroforests/ forest gardens, secondary forest fallows	Convert land under annual crops or pasture to multiple species agroforests and secondary forest fallows	To provide technical and marketing assistance, to pay farmers for carbon benefits, increase local capacity
Forest rehabilitation and regeneration	Rehabilitate and regenerate degraded natural forests and develop sustainable management systems	To provide training, pay costs of forest protection, to compensate users excluded from regenerating forest
Strictly protected forests	Remove potential threats from deforestation and manage areas to minimise human impacts	Compensate sources of deforestation threats, pay costs of forest protection, develop alternative income sources, to reduce leakage
Multiple use community forestry within protected forest	Remove potential threats of deforestation, development sustainable forest management with local communities to maximise forest benefits	Compensate sources of deforestation threat, develop capacity for managing protected forest

Adapted from Smith and Scherr, 2002

Most of the studies so far carried out of forest carbon projects have focused on technical issues. There has been much discussion of how to estimate baseline scenarios and environmental additionality, how to avoid and monitor "leakage", how to evaluate transaction and opportunity costs, permanence and enforcement, how to undertake verification and how to grant carbon credits. Estimation of a baseline or a reference scenario that calculates what the emissions at the project site would have been in the absence of the project, determines the project's environmental additionality, and becomes a central concern if carbon reductions are to be achieved and suitably accounted. Several scholars have developed different types of methodologies for defining baselines (Jepma and van der Gaast, 2000; Michaelowa and Dutschke, 2000; Sedjo, 2001) but no standard method exists so far. In addition, there is no single technique to estimate expected carbon sequestration in ecosystems. Sequestration rates using different models that consider different temporal and spatial scales have been used (de Jong and Montoya, 1994; Klooster and Masera, 2000; The Royal Society, 2001). Yet again, the models and methods applied in ongoing LULUCF projects are various and their accuracy differs (Schwarze, 2000).

Leakage is the indirect impact that a targeted LULUCF activity in a certain place at a certain time has on carbon storage at another place or time (IPCC, 2000). For example, afforestation and reforestation projects might simply constitute a shift of land-use practices from one location to another. In the case of transnational logging companies it might mean a shift in operations from one country to another and no net reduction in carbon emissions. This effect is hugely difficult to estimate.

Opportunity and transaction costs are critical in determining the success and sustainability of carbon forest projects and will differ from project to project according to a range of factors. The calculation of opportunity costs is necessary in order to estimate an appropriate payment for the existing land managers and resource users. Experience has shown that payments in pilot initiatives have been substantially below local opportunity costs. The costs of monitoring and information gathering are often significant, making larger projects involving fewer local users more viable. Thus a trade-off between financial viability and the extent of local people's involvement exists. This in turn affects the likely development benefits of projects, effectively making small-scale projects with many local users less attractive for investors. On-going benefits have to be demonstrated in order for local resource users to continue to comply. The verification of carbon stocks and the promotion of social and economic welfare lie at the core of these projects if they are to be environmentally consistent and socially viable.

There are specific development implications of projects in forestry. Forests are valuable resources for poor people in developing countries, and estimates of the number of forest dependent people worldwide vary between one million and one billion (Byron and Arnold, 1999:789). For millions of people living in forest environments, a forest forms a dominant part of their physical, material, economic and spiritual lives. In addition to providing a means of livelihood, the forest is a habitat and an integral part of the social and cultural fabric of peoples' lives. But as Byron and Arnold (1999) point out, an even greater proportion of users of forest, although living less intimately with forest, are dependent on forest goods and services in both direct and indirect ways.

Table 2 Examples of forest carbon projects

Project Name - Country	Activities	Area (ha)	CDM Compliance	Project Risks
Rio Bravo Conservation and Management Area Carbon Sequestration Pilot project, BELIZE	Protection and sustainable forest management of endangered land	49985 hectares in a private nature reserve	No compliance; Carbon is sequestered through conservation of existing stocks; Maybe some reforestation activities are likely to be credited	Duration of funding endowment; illegal wood poaching; leakage along some project boundaries due to induced forest fires by surrounding communities
The Noel Kempff Climate Action Project, BOLIVIA	Protection and forest management	634286 hectares	No compliance; Carbon sequestration through conservation of existing stocks	Funding lifetime for project's development component, fires, leakage (logging companies shift to other areas and local communities extend cattle grazing areas)
Peugeot rehabilitation of degraded lands, BRAZIL	Reforestation of degraded land with native and exotic species	5000 hectares of reforestation and 8000 ha of conservation	Potential compliance in reforestation area	Funding lifetime, forest fires, encroachment, and difficulties in seedlings regeneration
Fondo Bioclimatico Carbon Project, MEXICO	Improved forest management and reforestation on individual and community managed forestlands	450 hectares in different communities on individual and communal holdings	Potential compliance in reforestation areas; Voluntary carbon reductions through agroforestry or conservation activities	Increasing population and pressure over natural resources; Low payments to local producers and high transaction costs

A complex set of property rights and access rules govern these different services and goods, enabling multiple actors or stakeholders to use and benefit from them. These systems of governance have often evolved over long periods of time and may be customary or *de facto,* rather than *de jure* recognised. The state or private control of forests in many parts of the world has resulted in hardship for poor people, increased degradation and mis-use of resources. Forests may be particularly important for poorest sectors of society and in times of contingency or as safety nets. It is critical then that any carbon mitigation projects in forestry do not undermine the access of the poor to these resources and do not favour other sets of users over the poor. Recognising these multiple stakeholders and property rights is key to ensuring the appropriate people benefit. But rights to forests are contested between stakeholders across different scales.

Humphreys (1996) identifies three competing proprietorial claims to the world's forests. First, forests have been promoted as constituting a global commons resource, particularly by those actors with interests in environmental and ecological dimensions and implications of forest cover change. Second, forests are sovereign resources to be used by the state to further national interest. Third, forests constitute local commons resources and that local forest dwellers and indigenous people have primary property rights. These three claims are each influential in negotiating and formulating forest policy and will influence the impacts and outcomes of carbon forest projects for different stakeholders. Access to resources for subsistence and income, and sensitivity to the poorest sectors of society who often have insecure usufruct and *de facto* rights are key factors in determining the development impacts of forest projects. The development of carbon markets may privilege global claims over those of other users and scales.

The Fondo Bioclimatico Carbon project

Project Origins and Activities

The *Fondo Bioclimatico* Carbon Project is located in the Mexican State of Chiapas. Its origins can be traced back to 1994 and 1995 when researchers from the Edinburgh Centre for Carbon Management (ECCM, University of Edinburgh), El Colegio de la Frontera Sur (ECOSUR, Mexico) and assessors from the local Credit Union "Unión de Crédito Pajal Ya kac'tic" (PAJAL) conducted economic and social feasibility studies in eight indigenous and *mestizo* communities of the Chiapas central highlands. The Mexican National Ecology Institute (INE) and the Overseas Development Administration Forestry Research Programme of the British government funded these early feasibility studies. Through participatory workshops and interviews they explored the interest of producers affiliated to the Union in a project that would provide technical assistance and financial incentives to shift from agriculture to agroforestry, convert pastures to plantations, restore degraded forest, and manage natural forests. The carbon sequestration potential of the agroforestry activities preferred by local farmers, and the potential to sell carbon was also investigated (de Jong and Montoya, 1994; de Jong *et al*., 1995; Montoya *et al*., 1995).

In 1997, the project was registered under the United States Initiative for Joint Implementation (USIJI) under the name of "Scolel Te", meaning "growing trees" in the Tzeltal language, involving an array of individuals and organisations. The International Automobile Federation (IAF) committed to purchase 5500 tons of carbon per year at a price of US$12-10 dollars per ton for the next 30 years. The price aims to cover the costs incurred by producers and to generate funds for project management, and depends on whether the carbon sequestered derives from agroforestry-reforestation activities or conservation and management of existing forest stocks. The other important project investor has been Future Forests, a UK-based institution concerned with climate change issues, which purchases carbon derived from reforestation activities at a price of US$12 per ton of carbon. In order to manage and administer carbon investments, a trust fund named "Fondo Bioclimatico" was created. In early 1998, some of the original researchers established a professional organisation, AMBIO, to promote the project across the region, train community technicians, and deal with administrative and monitoring procedures.

During the last five years the project has grown from an initial group of 47 *campesinos* from six of the surveyed communities to more than 450 “carbon suppliers” from 20 communities across the region, including some in the neighbouring state of Oaxaca (Nelson and de Jong, forthcoming). All of them are subsistence or semi-subsistence farmers relying upon maize and bean cultivation, coffee, and some cattle production. They belong to either PAJAL or four other local organisations that have joined the project in recent years: the “Unión Regional de Ejidatarios Agropecuarios, Forestales y de Agroindustria de los pueblos Zoque y Tzotzil del Estado de Chiapas” (UREAFA), the “Consejo para el Desarrollo Sustentable de la Selva Marqués de Comillas” (CODESSMAC), the “Coordinadora Estatal de Productores de Café de Oaxaca” (CEPCO) and the religious-based “Asociacion Mexicana de Transformación” (AMEXTRA).

Every producer or community involved have their own forest-management strategy, a “Plan Vivo”, which defines a number of agroforestry, reforestation or conservation activities to be carried out in either individual or communal holdings, and designed according to the specific geographical, physical and ecological conditions of the area (Montoya *et al*., 1995; Soto-Pinto *et al*., 2001; Tipper, 2002). Producers’ participation in the project differs according to the organisation they belong to and their history of land tenure and community organisation. Where the majority of members of a community are involved in the organisation participating in the project or the community shows social cohesion independently from any organisational affiliation, then developing management plans in their communal forest land is possible. But the majority of producers are involved on an individual basis, developing carbon activities on private plots.

Once the *Plan Vivo* is established and approved by project developers, participants receive an up-front payment about the 20 per cent of the carbon expected to accrue from the individual or community management plan, as a source of initial working capital. They annually receive the 60 percent of the sale price per ton of carbon sequestered, and the remaining 40 percent is set aside to cover the costs of technical support for farmers, administrative costs, monitoring and reporting (Tipper, 2002). So far the extent of carbon land per capita has been restricted to 1-2 hectares per producer in order to promote income equality across members and communities. However, the income has been variable according to the producer’s level of compliance, and to the characteristics of the management area, and some have experienced higher mortality rates or lower growth rates than expected. Producers’ maximum income gain, which is dependent on the forestry-management system and its carbon sequestration potential, has been estimated at around US$700 over 10 years.

A Stakeholder Multi-criteria analysis

Stakeholder analysis has been increasingly applied in social science research and, particularly, in the field of natural resource management or conservation and development issues. A first step in the process is the identification of primary and secondary stakeholders. *Stakeholders* are ‘all those who affect, and/or are affected by, the policies, decisions and actions of the system; they can be individuals, communities, social groups or institutions of any size, aggregation or level in society. The term thus includes policy makers, planners and administrators in government and other organizations, as well as commercial and subsistence user groups’ (Grimble and Chan, 1995:114). We define *primary stakeholders* as those that directly participate in the *Fondo Bioclimatico* project, and *secondary stakeholders* those who lie outside project activities but have an influential role in the new Mexican carbon economy and can thus directly or indirectly affect future project development. Key informants in the *Fondo Bioclimatico* project were interviewed and asked to identify other relevant individuals, organisations and interest groups within the project. Similarly, members of organisations and government officials were interviewed to identify organisations and groups with interests in the Mexican carbon economy. During the interviews, issues such as the global climate change policy, the clean development mechanism and carbon markets, as well as project-related topics, such as decision-making procedures, economic management, social development and property rights, were discussed. Table 3 presents the stakeholders, classified according to their scale of influence in decision-making and their interests in project development and the carbon economy.

Table 3: Stakeholders in the Mexican New Carbon Economy and the Fondo Bioclimatico Project

PRIMARY STAKEHOLDERS			
Stakeholder	**Role in the project**	**Influence in project decision-making**	**Interest in project development**
AMBIO	Project management (monitoring and accounting activities)	Increasingly HIGH in project management; LOWER in negotiating carbon price	Promote carbon sequestration and local development; Consolidate the organisation as a key reference for environmental services management at both local and national levels
ECCM	Project broker	HIGH between 1996-2001 in both project management and project brokering (negotiation of carbon prices with investors); Progressively LOWER in management aspects since 2002	International publicity and organisation consolidation
ECOSUR	Catalytic role in establishing and developing the project	HIGH between 1994-1998; Progressively LOWER since 1998	Promote research in the field of Ecological Services; Enhancement of existing linkages between ECOSUR researchers and some of project involved organisations
PROJECT ORGANISATIONS (PAJAL, UREAFA, CODESSMAC, CEPCO, AMEXTRA) and REPRESENTATIVES	Intermediate agents between project developers (AMBIO) and producers affiliated to the project	LOW influence in project decision-making when related to investment and administrative management; MODERATE-HIGH influence over management and monitoring activities	Interest differs according to the organisation. They generally aim to promote community-based projects whilst establishing themselves as the pioneers in the growing arena of ecological and carbon services
COMMUNITITY PRODUCERS	"Carbon suppliers"	Influence over project decision-making and monitoring activities is dependent on the relationship between them and their organisation	They aim to increase their income from forestry-based activities as well as improve agroforestry and forestry management; Other non-tangible benefits are also recognised such as improved organisation and technical capacity

SECONDARY STAKEHOLDERS			
Stakeholder	**Role in the carbon economy**	**Influence in its development**	**Interest in its development**
Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT)	Promote carbon sequestration projects to reduce GHG emissions and promote biodiversity conservation	HIGH. Key member of the CDM National Authority, currently under negotiation between SEMARNAT and other governmental agencies	Capture foreign direct investment through the CDM investment window
Comisión Nacional Forestal (CONAFOR)	Promote projects based upon payment of ecological services to complement its other development funding programmes	HIGH. It has recently established the Mexican Forestry Fund, which aims to combine private and public funds to finance environmental services projects, among others	Promotion of ecological services as a complement to other forestry development programmes; Capture foreign direct investment
Instituto Nacional de Ecología (INE)	Promote and conduct research in environmental services; Assess government environmental public policy	HIGH. Advising government policy development in legal and economic issues for the promotion of ecological services	Develop innovative research policies
NGOs (CCMSS, ERA, FORO Chiapas, SAO)	Potential project and promote "carbon" capacity building activities at local level; Interested in future projects certification activities	MODERATE-LOW. Some have been key actors in forestry projects in Mexico, conducting certification and monitoring activities	Develop new investment programmes in their organisations
ACADEMIA (UNAM, COLMEX, UAEM, UIA, ECOSUR)	Academics are potential co-developers of carbon projects as ECOSUR researchers in the case of *Fondo Bioclimatico*; They can also participate in teams for projects evaluation	MODERATE-LOW. Influence as projects and government advisors will increase as this new economy develops	Capture funds for new research activities in ecological services valuation
MULTILATERAL OR DEVELOPMENT LENDING AGENCIES and INVESTORS (The World Bank, UNDP, USAID, Ford Foundation)	Support inter-governmental cooperation through private financial flows and new investment frameworks	HIGH. Investment levels will determine whether new carbon projects develop in Mexico during the next years	Promote environment and development sound investment
NATIONAL INVESTMENT SECTOR	If Mexico adopts UNFCCC commitments or consolidates a national system for environmental services, they will progressively participate in carbon-trading schemes	LIMITED. An oil governmental corporation has started to support forestry projects and to experiment with emissions trading	Future carbon trading and/or environmental publicity

We used a Multi-criteria analysis framework to explore the different dimensions, including the development impacts, of forest carbon projects with these different stakeholders. The objective is to design an evaluative framework which takes account of the perspectives, priorities and preferences of different stakeholders, ranging from government officials, investors and local producers. Multi-criteria techniques have been applied in decision analysis, management systems and planning and have recently been applied in resource management and environmental decision-making (Brown *et al.* 2002; Bojorquez-Tapia, 1994; Strijker *et al*., 2000). Multi-criteria techniques have also been suggested to evaluate and appraise JI (Jackson *et al*., 2002) and CDM options (Markandya and Halsnaes, 2002) and attempt to operationalise what Munasinghe (2001) has termed a 'sustainonomic transdisciplinary framework' of analysis. They have not been tested in the context of forestry carbon-mitigation projects.

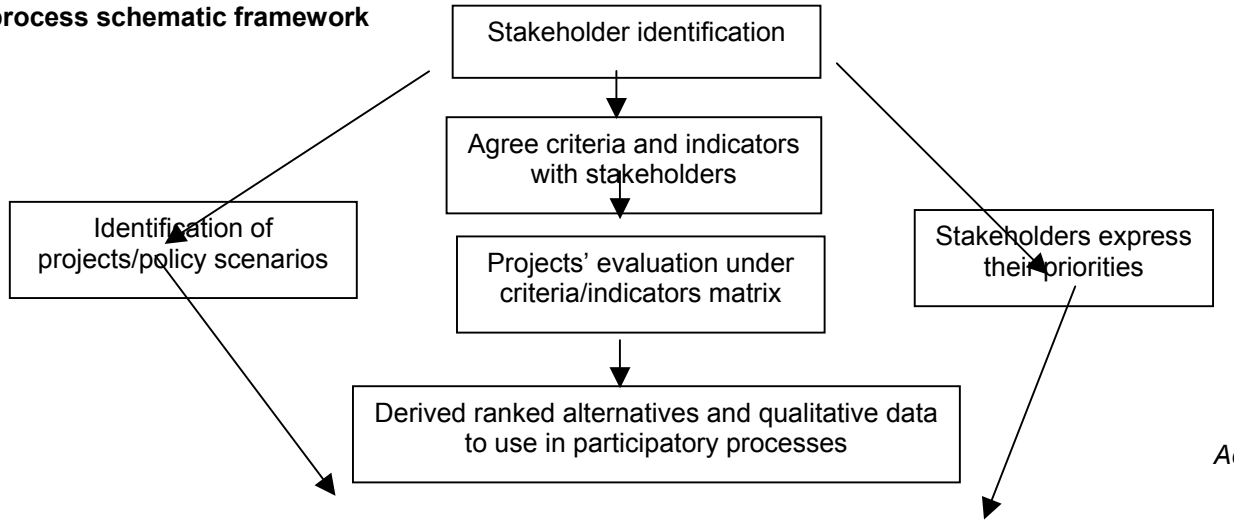
We constructed a simple multi-criteria exercise consisting of the interviewee's qualitative evaluation of a set of sustainable development indicators for project assessment and monitoring, which reflect the carbon, ecological and social dimensions of forestry carbon projects. The interviewee was asked to value these criteria using a set of qualitative techniques (ranking, qualitative scales and percentage weighting). The interests and expectations of each individual can were then mapped. The indicators were derived from workshops in the UK with specialists in forestry, development and climate change, and interviews key informants in Mexico. The indicators include sixteen qualitative and quantitative indicators, grouped in carbon, ecological and social criteria categories as shown in Table 4. Although other studies develop more complex lists of criteria, for example for CDM project evaluation (Kolshus *et al*., 2001), we suggest that fewer indicators facilitate their evaluation by a range of stakeholders who possess diverse kinds of knowledge. The research schematic framework is drawn in Figure 1.

There are four indicators to reflect carbon criteria: net carbon sequestered; project internal rate of return; risk; and eligibility under CDM framework. These correspond the aspects of carbon management that are important for stakeholders. Ecological criteria are also important as the claims for win-win synergies rely of projects generating ecological or environmental benefits other than carbon sequestration. The indicators are the overall ecological value of the region; the extent to which the project activities could contribute to maintaining continuity; species richness; water availability; erosion; and soil fertility. Six indicators reflect the impacts of the project on social development: changes in income; changes in property rights; access to forest resources by poorer households; involvement of community-based formal and non-formal organisations in project design, management and decision-making; participation by local people in project activities and perceived benefits; and investment in education, health services and capacity building. In discussing these criteria and indicators with different stakeholder and seeking their priorities and preferences through scoring and ranking exercises, their interests, views and roles can be explored.

Table 4: Criteria to assess forest carbon projects

Carbon criteria	Ecological criteria	Social Development criteria
• Net carbon sequestered • Internal rate of return • Risk of leakage and natural hazards • Eligibility for CDM	• Regional ecological value • Impact on habitat contiguity • Species richness • Impact on hydrology • Erosion processes • Soil fertility	• Household income • Clarification of property rights • Forest resources access to poorest households • Involvement of community-based formal and non-formal organisations in project design, management and decision-making • Number of local people participating in project activities and who perceive benefits • Investment in education, health services and capacity building.

Figure 1: Research process schematic framework



Adapted from Brown et al. (2002)

Stakeholder perspectives on development of the carbon economy

Our interviews and analysis confirm the growing significance of the carbon economy in Mexico. These developments are widely seen as a strategy to capture foreign investment, either from future Clean Development Mechanism (CDM) or other mechanisms such as the various World Bank funds or through voluntary investments. The expectation that marketing carbon sequestration and other ecological services has the potential to broaden the economic opportunities of the poor is tempered by scepticism about the current levels of investment in the forestry sector. Most interviewees recognise that investments so far have been disappointing, but they still expect the CDM and other voluntary markets to develop rapidly.

In anticipation of the expanding carbon economy, a number of new institutions are being formed. Firstly, the National Secretariat for the Environment and Natural Resources (SEMARNAT) and the Energy Secretariat (SENER) are leading the process to establish a CDM National Authority, which will be responsible for approving and assessing CDM forestry projects. The participation and roles of the different governmental agencies has not yet been agreed and the process to set up the Authority has proved slow and difficult. Divergences exist between SENER, which is developing potential CDM-energy projects in cooperation with UNDP and international investors, and SEMARNAT, which has to resolve internal politics to decide who is represented in the Authority and its functions.

Secondly, the National Forestry Commission (CONAFOR) recently launched the Mexican Forestry Fund (MFF), which will be operational by June 2003 and will support carbon mitigation and other ecological services projects. It is funded from both public and private sources. The MFF is also designed to capture funds for the Commission, which was recently decentralised from SEMARNAT. The MFF was developed by a Mexican private consultancy, which consulted with various forestry actors across the country. CONAFOR officials indicated that MFF supported carbon projects are expected to accrue CDM-compliant carbon credits but, at this time, the project approval, monitoring and evaluating procedures are not established. It is still unknown whether the MFF and the CDM Authority will hold compatible procedures for the evaluation and assessment of CDM projects and for assuring their contribution to sustainable development.

Outside the government sector, various NGOs and academics are able to find roles as project developers or project certifiers and the emerging carbon market is seen as a potential niche for action and accessing resources. But they have very divergent views of how the various mechanisms should work. The government favours internationally recognised firms as the most credible and experienced institutions to conduct certification of projects. NGOs expect to participate in the decisions and to provide advice to government institutions, but as yet such a role remains to be defined by either CONAFOR or SEMARNAT.

The stakeholder multi-criteria exercise reveals differing perspectives on the carbon, ecological and social development criteria. Most government stakeholders gave the carbon criteria, particularly net carbon sequestered, investment rate of return, and eligibility under the CDM, the highest weightings. This wider consensus at government level contrasts with the different weightings attributed to the social development criteria by the non-government stakeholders. Opinions are mixed on ecological and social criteria although only one interviewee ranked ecological considerations above social development. Of the different indicators of social development, change in income was seen as most important, then participation in project design, then forest resources access by the poorest households.

The stakeholders interviewed hold different perspectives on the potential of forest carbon projects to contribute to poverty alleviation. They cite unclear property rights, low investment levels, and the communities' ability to organise and participate in project decision-making as the most important factors. There was a recognition that communities where clear property rights already exist, where organisations for forest management and managerial capacity exist, are more likely to be beneficiaries of carbon projects.

These priorities and perspectives may change over time. In the case of the *Fondo Bioclimatico* project the early emphasis was on the improvement of traditional productive systems, and the carbon sequestration added value to these systems. Interests were balanced between carbon, ecological and social aspects of management of forest and farming systems, reflected in early studies and

assessments (Montoya et al., 1995; Soto-Pinto et al., 2001). Non-carbon related development activities, such as women's welfare and promotion of fruit trees, were central to project framework.

This early focus as a community-development project has shifted towards a carbon bank since 1998, in which the primary goal became to market carbon because the interests of the project broker prevailed over other stakeholders (Nelson and de Jong, forthcoming). The project broker still remains in control of negotiating carbon prices with international investors although AMBIO members have gained more control over project activities. They have put substantial efforts in developing accounting procedures and establish clear collaborative agreements between producers, organisations and the trust fund *Fondo Bioclimatico*. But lack of funds squeeze investments in non-carbon aspects. AMBIO is now trying to raise funds and expand non-carbon activities including some of the originally envisaged tree nursery, capacity building and conservation related actions. Thus they seek to make links with other funding agencies both in the government and international organisations.

The evolution of these institutional frameworks in response to the carbon markets is continual and adaptive. The non-government sector has responded more quickly and with greater flexibility. Stakeholders have different priorities, revealed by the weightings they give to the criteria. Government officials focus more on carbon criteria than non-government stakeholders. Income generation is seen as the most important social development impact, although lack of clearly defined property rights is recognised as a constraint to effective development benefits at a local level.

Can the new carbon economy support equitable and sustainable development?

The framework presented in this paper has proved successful in highlighting the diverse range of stakeholders and interests involved in forest carbon projects. In addition, it has served as a platform to engage experts, government officials, NGOs and communities in the discussion of indicators for assessing projects' contribution to sustainable development. All stakeholders' interests have been made explicit and, particularly, those of the local poor that are usually neglected in project planning. Evidence suggests that, in the case of Mexico, establishing regulatory and management frameworks, and defining criteria for projects, has been slow and problematic. The process has exposed conflicts of interest between different institutions and sets of stakeholders. This paper helps to recognise that the needs of the poor differ from those of government agencies and investors. In this sense, the role of NGOs to negotiate and monitor projects under such a participatory and analytical approach appears as a key factor for an equitable future distribution of projects and benefits in Mexico.

Our findings also provide insights into two dimensions of equity in forest carbon projects, which influence the ability of these projects to bring about sustainable development. First, we argue that access to carbon markets and to their benefits depends critically on clear and well-defined property rights. This complexity of rights in forestry and their social embeddedness mean that only some rights are legible and fit into formal frameworks imposed by international global regimes and government. Some sectors of society depend on less formal rights to access forest resources. This is especially true of poor households and women-headed households. Access to carbon markets is thus socially differentiated in a number of ways. There are indications from Mexico that middle-income communities may be favoured in setting up forest carbon markets. The experience of marketing groups for other forest products indicates that local elites can seize control and become further empowered through outsider led initiatives (Agrawal and Ostrom, 2001).

The second dimension of equity involves the ways in which different stakeholders can engage in and influence decision-making and the extent to which representative and inclusive institutions can be built. In the case of forest carbon projects negotiations take place between diverse stakeholder with different power, knowledge, information and even languages. Edmunds and Wollenberg (2001) maintain that it is unreasonable to expect consensus and synergy when the 'partners' are so unmatched in terms of power and access to resources. So far it has proved difficult to establish effective government institutions to mediate these relationships and development criteria and frameworks for negotiation and monitoring of projects. Thus negotiation processes can easily be dominated by more powerful players. The diversity of interests and organisations makes negotiations cumbersome and potentially excludes less articulate and powerful stakeholders.

The two aspects of equity are of course linked in reality. This is demonstrated in for example, in Boyd's study of impacts of Noel Kempff forest carbon project in Bolivia, which indicates that women

may be disadvantaged and marginalized in decision-making processes and in terms of direct and indirect benefits such as income and employment (Boyd, 2002). There are indications of similar gender inequities in the case of *Fondo Bioclimatico*. There are lessons in the literature about setting up robust cross-scale institutions to manage complex natural resources which insure access and benefits are equitably shared (Berkes, 2002). Smith and Scherr (2002: 7) propose a set of enabling conditions to enhance local livelihood benefits of forest carbon projects, but these still fundamentally depend on secure rights and access to markets, and equitable local social institutions and organisations being in place. In many cases in forests, as we have shown, these conditions do not apply, and the danger then is that forest carbon projects, whilst seeking to bring development benefits which are poorly defined may exacerbate existing societal inequalities.

Our findings also inform broader discussions about the development of CDM and other Kyoto mechanisms. A number of authors have suggested means by which these can be constructed to ensure anti-poverty and pro-poor development benefits. There are disparities between countries, for example with only a handful of countries likely to gain most investments. Rowlands (2001) suggests that geographical quotas are necessary to ensure that CDM activities take place throughout the developing world which would enhance more equitable benefits for society and opportunities for facilitating adaptive management. There may be opportunities for creating niche markets for ethically motivated CDM investments, where sustainable development benefits are prioritised above carbon benefits (Huq, 2002). This is the thinking behind the Community Development Carbon Fund launched by the World Bank at WSSD in Johannesburg last year.

However even with these reforms and adaptations to flexible mechanisms and particularly CDM, there is relatively limited scope for forest carbon projects. Demand is by no means assured. For example, many projects in Mexico and elsewhere established without *a priori* agreed investment are currently on hold or under funded. Bernoux et al. (2002) argue that the value of the potential market of LULUCF-CDM is just US$876 million. This market is potentially open to more than 145 non-Annex 1 parties over a period of 12 years and represents a very small proportion of the ODA transfers from OECD in 2000 (approximately US$53 billion, and a smaller fraction of private investment flows). The authors argue that ‘the LULUCF-CDM market may be most important as a statement of an emerging global partnership between developed and developing countries to address the global climate change issue rather than a windfall of money to the developing world’ (2002: 385). Other voluntary markets outside the CDM will develop, such as those promoted by consumer-oriented organisations that will try to capture revenues from individuals or companies to finance carbon projects. Such voluntary investment can be channelled through new frameworks or the CDM non-compliant windows of the World Bank Prototype or Biocarbon Fund, as well as the national institutions being established for environmental services. It seems the carbon economy is likely to continue to grow, but whether it is able to effectively deliver equity or sustainability remains to be proved.

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