UN-REDD
PROGRAMME

What are the ecosystem-derived benefits of REDD+ and why do they matter?

UN-REDD PROGRAMME

1 October 2010

Multiple Benefits Series **1**

The UN-REDD Programme, a collaborative partnership between FAO, UNDP and UNEP, was created in response to, and in support of, the UNFCCC decision on REDD at COP 13 and the Bali Action Plan. The Programme supports countries to develop capacity to reduce emissions from deforestation and forest degradation and to implement a future REDD mechanism in a post-2012 climate regime. It builds on the convening power of its participating UN agencies, their diverse expertise and vast networks, and "delivers as One UN".

The United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) is the biodiversity assessment and policy implementation arm of the United Nations Environment Programme (UNEP), the world's foremost intergovernmental environmental organization. The centre has been in operation since 1989, combining scientific research with practical policy advice.

The United Nations has proclaimed 2010 to be the International Year of Biodiversity. People all over the world are working to safeguard this irreplaceable natural wealth and reduce biodiversity loss. This is vital for current and future human wellbeing. We need to do more. Now is the time to act.

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Citation: Dickson, B., Osti, M. 2010. What are the ecosystem-derived benefits of REDD+ and why do they matter? *Multiple Benefits Series* **1**. Prepared on behalf of the UN-REDD Programme. UNEP World Conservation Monitoring Centre, Cambridge.

Acknowledgements With thanks for comments and input to Lera Miles, Emily Dunning and all the participants of the UN-REDD workshop on 'Identifying and promoting ecosystem co-benefits from REDD+', held from 27-29 April 2010 in Cambridge.

Summary

The paper provides an analysis of the ecosystem-derived multiple benefits of REDD+.

The terminology around multiple benefits is not yet clear cut. Here, the different terms in use are reviewed and suggestions are made about how terms can be used in a consistent way.

The range of different ecosystem-derived benefits is surveyed and the most important ones identified. There is the risk of environmental harms as well as benefits from REDD+. Some of the benefits are closely related to each other, and tend to co-occur. Benefits are delivered at different scales; some are primarily local while others may be national or global. Different REDD+ activities may give rise to different benefits and risks.

Assessing the magnitude of the benefits from REDD+ is often not easy; nevertheless, in some cases it may be possible to provide an estimate of the economic value of the ecosystem-derived benefits. In all cases, the monitoring of benefits can play an important role.

A number of equity issues arise in connection with ecosystem-derived benefits which should be addressed in the implementation of REDD+.

Que sont les bénéfices écosystémiques de la REDD+ et pourquoi sont-t-ils importants? : Résumé

Ce document contient une analyse des bénéfices multiples de REDD+ provenant des écosystèmes.

La terminologie au sein de REDD+ sur ces bénéfices n'est pas encore formellement déterminée. Ici, nous discutons des divers termes qui sont utilisés et suggérons comment ils pourraient être utilisés d'une manière plus cohérente.

Nous énumérons les divers bénéfices provenant des écosystèmes et examinons lesquels sont les plus importants. Il y a aussi un risque que des dommages environnementaux surviennent de REDD+. Certains bénéfices sont très liés et surviennent donc souvent ensemble. Les bénéfices sont livrés à plusieurs échelles ; certains d'entre eux sont principalement d'origine locale pendant que d'autres sont livrés à l'échelle nationale ou mondiale. Différentes actions de la REDD+ engendreraient des bénéfices et des risques différents.

Déterminer l'ampleur des avantages de REDD+ n'est pas toujours facile ; toutefois, dans certains cas, il pourrait être possible d'estimer la valeur économique de ces bénéfices écosystémiques. Dans tous les cas, le monitoring de ces bénéfices peut jouer un rôle important.

Un nombre de questions d'équité en rapport avec des bénéfices écosystémiques surviennent et devraient être réglées durant l'exécution de la REDD+.

¿Qué son los beneficios de REDD+ derivados de los ecosistemas y por qué importan? : Resumen

Este documento contiene un análisis de los beneficios múltiples de REDD+ provenientes de los ecosistemas.

La terminología relacionada con los beneficios múltiples no está bien definida. Aquí se revisan los distintos términos en uso y se hacen sugerencias sobre cómo se pueden usar los términos de forma consistente.

Se enumeran los distintos beneficios provenientes de los ecosistemas y se identifican los más importantes. Además de los beneficios, también existe el riesgo de daños ambientales causados por REDD+. Algunos de los beneficios están estrechamente relacionados entre sí, y suelen darse juntos. Los beneficios se producen a diversas escalas; algunos son principalmente locales mientras que otros pueden ser nacionales o globales. Distintas actividades REDD+ pueden resultar en distintos beneficios y riesgos.

Evaluar la magnitud de los beneficios derivados de REDD+ es a menudo difícil; no obstante, en algunos casos puede resultar posible proporcionar una estimación del valor económico de los beneficios derivados de los ecosistemas. En todos los casos, el monitoreo de los beneficios puede jugar un papel importante.

En relación a los beneficios derivados de los ecosistemas, surgen un número de cuestiones sobre equidad que deberían ser tratadas durante la implementación de REDD+.

Apakah yang dimaksud dengan manfaat REDD+ yang diperoleh dari ekosistem dan mengapa hal tersebut penting? : Ringkasan

Paper ini memberikan analisis tentang multi-manfaat REDD+ yang diperoleh dari ekosistem *(ecosystem-derived multiple benefits)*.

Terminologi di seputar multi-manfaat itu sendiri belum mempunyai batasan yang jelas. Paper ini mengulas berbagai istilah yang berbeda yang digunakan saat ini dan memberikan masukan tentang bagaimana istilah- istilah tersebut dapat digunakan secara konsisten.

Survei dilakukan terhadap sejumlah manfaat yang berbeda yang diperoleh dari ekosistem dan kemudian dilakukan identifikasi terhadap beberapa yang dianggap paling penting. Selain memberikan manfaat, REDD+ juga memiliki resiko yang dapat merugikan lingkungan. Beberapa dari manfaat tersebut sangat terkait erat satu sama lain, dan cenderung terjadi pada waktu yang bersamaan. Manfaat-manfaat tersebut dihasilkan pada skala yang berbeda-beda; sebagian besar pada skala lokal, sementara yang lainnya mungkin pada nasional atau bahkan global. Aktifitas-aktifitas REDD+ yang berbeda dapat memunculkan manfaat dan resiko yang berbeda-beda pula.

Mengukur besarnya manfaat REDD+ itu sendiri bukanlah hal yang mudah; namun demikian, dalam beberapa kasus dimungkinkan untuk membuat estimasi nilai ekonomi dari manfaat-manfaat yang

diperoleh dari ekosistem. Sementara itu, monitoring terhadap manfaat-manfaat tersebut dapat memegang peranan yang sangat penting dalam setiap kasus.

Sejumlah isu-isu keadilan muncul dalam kaitannya dengan manfaat yang diperoleh dari ekosistem, yang mana hal tersebut perlu mendapat perhatian serius di dalam pelaksanaan REDD+.

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1 Introduction

The primary aim of REDD+ is to contribute to the mitigation of global climate change by maintaining and enhancing forests in developing countries. But the REDD+ mechanism, if successfully implemented, is likely to provide significant additional benefits. Many of these forests contain high levels of biodiversity and provide a range of ecosystem services. Thus, REDD+ is likely not only to contribute to the mitigation of global climate change, but also to generate gains for biodiversity and ecosystem services. These ecosystem-derived benefits of REDD+ are the subject of this paper.

The REDD+ mechanism will provide financial incentives for several different activities, from reducing deforestation to enhancing forest carbon stocks. It will be implemented in different countries, in different social, economic and ecological circumstances. So the identity of the ecosystem-derived benefits will vary from case to case. In some instances REDD+ activities may carry a significant risk of harms to ecosystems. Our understanding of the magnitude of the likely benefits (and harms) is incomplete; and because the distribution of benefits and harms will vary, there will be important equity issues to be taken into account as well.

The conservation of biodiversity is not only be a benefit that flows from REDD+. There is evidence that forests with high levels of biodiversity are more resilient to climate change and other pressures. Therefore, such forests will be more successful in contributing to the mitigation of climate change over the longer term. In this sense, biodiversity is not only a benefit *from* REDD+, but also an *enabling condition* that contributes to the success of REDD+.

In implementing REDD+, countries will have the option of using policies and tools to enhance ecosystem-derived benefits and to safeguard against harms. They will be able to do so in ways that are, to a greater or lesser degree, effective, efficient and equitable. These measures are the subject of the second paper in this series (Miles *et al.* 2010). The purpose of this paper is to provide an initial clarification of some of the key issues. Specifically, it will examine three questions.

- What are the ecosystem-derived benefits and harms likely to arise from REDD+? (Section 3)
- How important are the benefits and harms? Can we assess their magnitude? (Section 4)
- What are the important equity issues that arise in relation to ecosystem-derived benefits? (Section 5)

Before embarking on these questions one preliminary issue should be addressed. This is the terminology that is used in discussing multiple benefits.

2 Terminology

A number of different terms are used in discussions of the benefits (and possible harms) that may flow from REDD+. At the UNFCCC meeting in Bali in 2007, Decision2/CP.13 recognised that reducing emissions from deforestation and forest degradation in developing countries can promote co-benefits. Some favour the use of the term 'co-benefits' because it emphasises that the primary aim of REDD+ is to contribute to the mitigation of global climate change. Co-benefits are understood as the benefits that arise from REDD+ that are in addition to the contribution to climate change mitigation. However, the expression 'multiple benefits' is preferred here (Myers 2008; UN-REDD 2009). This term encompasses all the benefits that will flow from a successful REDD+ mechanism. That is, it includes *both* the global climate mitigation benefits from REDD+ *and* the other benefits. Part of the motivation for using this term is that it does not treat the non-mitigation benefits as secondary; it suggests that the other ecosystem and social benefits may be just as important as the contribution to climate change mitigation. The use of this term may also be seen as helping to promote an integrated approach to implementing REDD+ which does not focus only on the contribution to the mitigation of climate change.

A distinction can be drawn between two main types of benefit. There are the benefits that arise directly from maintaining and enhancing forests. These are biodiversity and the ecosystem services provided by forests; they can be termed the 'ecosystem-derived benefits' and they are the central topic of this paper. They are discussed further in Section 3. There is another type of benefit. In order to reduce deforestation rates, a range of institutional changes will have to be put in place in order to address the causes of deforestation. These changes are part of the implementation of REDD+ and can themselves have additional, beneficial effects. The implementation of REDD+, if carried out in appropriate ways, could result in greater clarity of land tenure, in improved forest governance, and in the empowerment of local communities. The flow of REDD+ finance could, depending on the distribution mechanisms put in place, contribute to poverty reduction. All of these changes can be described as part of the benefits of REDD+, but they do not arise directly from the ecosystem itself. While REDD+ may give rise to different sorts of benefit, it may also generate harms. Possible risks to ecosystems from REDD+ activities are discussed in Section 3. Potential social harms are not the subject of this paper, but many authors have noted their existence (Forest Peoples Programme 2009; Peskett *et al.* 2008). There are significant risks for Indigenous Peoples and local communities that REDD+, rather than generating benefits, could actually lead to a loss of access to and control over forests and a loss of income, as other actors compete for access to REDD+ revenues.

A term that has recently gained prominence in the draft decision text on REDD+ is 'safeguards' (UNFCCC 2009b). These safeguards concern, *inter alia,* issues such as governance, stakeholder participation, the knowledge and rights of Indigenous Peoples and local communities, biodiversity, ecosystem services, the risk of reversals and the risk of displacement of emissions. These last two items are connected directly the effectiveness of REDD+ as a mechanism for mitigating global climate change. But the other safeguards address, in effect, the multiple benefits of REDD+. The use of the term 'safeguard' has the advantage of drawing attention to the possible risks as well as the potential benefits. Overall, the safeguards can be seen as addressing a number of issues including, but not restricted to, multiple benefits.

3 The ecosystem-derived benefits of REDD+

The REDD+ mechanism, as currently proposed, is made up of five different activities. These are: reducing deforestation, reducing degradation, conservation of forest carbon stocks, sustainable management of forests, and forest carbon stock enhancement. Not all of these activities have yet been precisely defined, but it is assumed here that forest carbon stock enhancement includes both reforestation and afforestation. The identity of the ecosystem-derived benefits of REDD+ will depend, in part, on which REDD+ activities are in question.

Table 1: Forest ecosystem services (based on Millennium Ecosystem Assessment 2003); these, together with biodiversity, are the potential ecosystem-derived benefits of REDD+.

Ecosystem services	Examples for forest ecosystems
Provisioning	**The goods or products obtained from ecosystems**
Food	Edible non−timber forest products (NTFPs) such as fruits, berries, and bush meat
Fresh water	Around 4.6 billion people depend on forests for all or some of their water supplies
Wood & fibre	Timber, and non-timber forest products such as silk, rubber, bamboo
Fuel	Fuel wood
Genetic resources	Wild species and genes used for animal and plant breeding and biotechnology
Biochemicals & natural medicines	Many commercial and traditional medicines are derived from forest species
Regulating	**The benefits obtained from an ecosystem's control of natural processes**
Climate regulation	The regulation of the global carbon cycle through carbon storage and sequestration, in addition to local and regional climate regulation (albedo effects, regional rainfall etc)
Flood regulation	The reduction and slow down of surface water run−off
Disease regulation	Intact forests reduce the occurrence of standing water, reducing the breeding area for some disease vectors and transmission of diseases such as malaria
Water regulation	Forest systems are associated with the regulation of 57% of total water runoff, and play a large role in the hydrological cycle
Pollination	Crops, such as coffee, that are close to forests receive more visits from pollinators
Cultural	**The non-material benefits obtained from ecosystems**
Aesthetic & inspirational	The scenery and landscapes provided by forest, both for their own beauty and as an inspiration for art
Spiritual & religious	Indigenous peoples and others attach spiritual significance to forests
Educational	Research, education and training in forests
Recreational	Ecotourism in forest areas
Cultural heritage & sense of place	Some cultures place high value on particular landscapes or species
Supporting	**The natural processes that maintain the other ecosystem services**
Nutrient cycling	Forests are extremely efficient at maintaining nutrient flows through atmosphere, plants and soils
Soil formation	Forests on slopes hold soil in place and can prevent degradation
Primary production	The total organic matter produced as a result of photosynthesis and nutrient uptake from the soil

3.1 Ecosystem-derived benefits of REDD+

One can gain an initial overview of the types of ecosystem-derived benefit that may be generated by REDD+ activities by looking at the range of ecosystem services provided by forests. Table 1, from the Millennium Ecosystem Assessment, provides such a list. If one adds biodiversity (which underpins all the services) one arrives at a list of the potential benefits that may be achieved if REDD+ is successful in maintaining and enhancing forests.

Pagiola and Bosquet (2009) suggest that it has been common to exclude the on-site benefits from the category of co-benefits; this would mean that timber and non-timber forest products would not count as co-benefits. Here, timber and non-timber forest products are treated as among the potential multiple benefits of REDD+.

From the long list of potential ecosystem-derived benefits of REDD+, the following six have been most prominent in the literature: biodiversity; regional and local climate regulation; water supply and water regulation; soil conservation; timber; and non-timber forest products.

3.2 Harms as well as benefits

REDD+ activities can lead to harms to biodiversity and ecosystem services as well as benefits. Much will depend on how the activity is implemented and in what circumstances. It has been suggested that if sustainable management of forests recognises the need for use of forest resources alongside maintenance of forest values (Campbell *et al.* 2009; Robledo & Blaser 2009) the effects on ecosystem-derived benefits may be positive. Similarly, as Harvey *et al.* (2009) make clear, if sustainable management of forests includes activities which reduce depletion of carbon stocks and enhance forest resiliency, biodiversity and ecosystem services could benefit if implemented in forests with unsustainable rates of harvest, but could be harmed if implemented in old growth forest areas (Putz et al. 2008; Putz and Redford, 2008).

Similarly, activities may have positive effects on some ecosystem services and negative effects on others. Measures to reduce deforestation and forest degradation are likely to have positive effects on biodiversity, but if the measures include restrictions on timber extraction, then that provisioning services will be reduced. On the other hand, in some circumstances a reduced level of timber extraction will contribute to the long term sustainability of extraction. If the measures also include more general restrictions on access to forest resources, then the availability of non-timber forest products will also be reduced.

The REDD+ activity that has given rise to the greatest concerns about possible harms to biodiversity and ecosystem services is forest carbon stock enhancement, particularly where this takes the form of afforestation or reforestation. The development of plantation forests may lead to the loss of biodiversity that was formerly present, and to the reduction in water regulatory services. However, impacts can be less negative, or even positive if plantations are comprised of diverse, native species (Harvey *et al.* 2009), planted in appropriate places, and contribute to ecosystem restoration as opposed to monoculture landscapes (Brockerhoff et al. 2008)

Particular concerns have been expressed about the possibility that the overall effect of the REDD+ mechanism will be to incentivise the replacement of natural forests with plantation forests. The

safeguard that REDD+ activities should not lead to the conversion of natural forests, which is included in the draft UNFCCC negotiating text on REDD (UNFCCC 2009b), addresses this concern.

In addition to the direct harms that REDD+ activities may cause for biodiversity and ecosystem services, a successful REDD+ mechanism may have indirect negative impacts through indirect land use change. The REDD+ mechanism, by reducing the conversion rate of forests (and by increasing afforestation and reforestation) will mean that land that might otherwise have been available for purposes such as agriculture, will no longer be available. This, in turn, may increase the conversion of other land (such as savannah and wetlands) to agriculture, with the consequent loss of the biodiversity and ecosystem services provided by those lands (Miles & Kapos 2008).

3.3 Connections and disconnections

It has just been noted that the ecosystem service of global climate mitigation may be enhanced by actions that have negative effects on other ecosystem services. A similar point can be made about the multiple benefits themselves. A REDD+ activity that enhances biodiversity may not have a positive effect on water regulation, and vice-versa. In general the management of land for one ecosystem service may not enhance other ecosystem services (Egoh *et al.* 2008).

3.4 Scale issues

Another aspect of ecosystem-derived benefits is that they are delivered at different scales. Ecosystem services are generated and delivered at a wide range of geographical (Hancock 2010) and temporal scales. For example, a single forest may deliver some benefits that are global in nature (e.g. biodiversity conservation), others that are regional (e.g. water regulation) and others that are essentially local (e.g. food for forest dwellers). Additionally, some of a forest's services, such as the provision of water supply, may operate on shorter time scales and be more consistent in availability (e.g. daily), whereas others, such as the provision of selected food, may operate on longer timescales and be available less frequently (e.g. seasonally). The different scales associated with different ecosystem services are still relatively under-studied (Hein et al. 2006; MEA, 2003; Turner et al. 2003;), and remain an area where further research is needed (Hancock, 2010).

The fact that not all benefits are delivered at the local scale increases the likelihood that the landholders who may bear some of the costs of supplying the service may not be amongst the beneficiaries of that service. This opens up the possibility that the beneficiaries may be in a position to compensate the landholders if the service is guaranteed; it may also raise issues of equity, especially where that compensation is not paid.

3.5 Summary

We have seen that although, in general terms, REDD+ is likely to deliver ecosystem-derived benefits, the picture is more complex when examined in more detail. Depending on which REDD+ activities are in question and how they are implemented, they may cause ecosystem harms as well as benefits; ecosystem-derived benefits do not always occur together; and these benefits may be delivered at very different scales.

4 Are ecosystem-derived benefits important?

How important are ecosystem-derived benefits? There are a range of potential benefits and harms that may arise from REDD+. But if all the potential benefits and harms are small, then the reasons for doing anything about them, either enhancing benefits or avoiding harms, are correspondingly weak. Two aspects of this issue are examined in this section. We look first at whether ecosystem-derived benefits are *regarded* as important, by Parties to the UNFCCC and by other stakeholders (Section 4.1). We then consider attempts to assess the magnitude and, in some cases, the economic value of the benefits (Section 4.2).

4.1 Importance of ecosystem-derived benefits in UNFCCC and amongst other stakeholders

In the on-going REDD+ negotiations in the UNFCCC, there is evidence that in the past two years Parties have given an increased importance to multiple benefits, including ecosystem-derived benefits. The Decision passed by the Bali Conference of the Parties on reducing emissions from deforestation in developing countries included a reference to the significance of co-benefits. The preamble recognised:

> that reducing emissions from deforestation and forest degradation in developing countries can promote co-benefits and may complement the aims and objectives of other relevant international conventions and agreements. (Decision 2/CP.13, UNFCCC, 2007)

After the Bali COP, the discussions on REDD+ have taken place in two streams: within the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA); and in the Subsidiary Body for Scientific and Technological Advice (SBSTA). The latter body was focused on methodological issues relating to REDD.

The SBSTA work was the first to result in a decision. A decision on 'Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries' [1] was adopted by the COP on the 18th of December 2009. Like Decision 2/CP.13, the preamble includes a paragraph addressing co-benefits. This recognizes 'the importance of promoting sustainable management of forests and co-benefits, including biodiversity, which may complement the aims and objectives of national forest programmes and relevant international conventions and agreements'.

The negotiations under the AWG-LCA have not been concluded. The Chair of the AWG-LCA prepared some text to facilitate negotiations among Parties in May 2010 (UNFCCC, 2010). Paragraph 2 of the section on REDD+ addresses safeguards. It states that such safeguards should be 'promoted and supported'. With regard to ecosystem-derived benefits the most relevant safeguards are:

(a) Actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;

(e) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in paragraph 3 below are not used for the conversion of natural forests, but are instead used to incentivise the protection and conservation of natural forests

[1] FCCC/SBSTA/2009/L.19/Add.1

and their ecosystem services, and to enhance other social and environmental benefits; (UNFCCC, 2010)

Paragraph 7 of the text requests developing country Parties 'when developing and implementing their national strategy or action plan...to address, inter alia... the safeguards...' (UNFCCC, 2010).

While recognising that this is still only draft text and has not yet been codified into a decision, two very marked changes from the decision in Bali are worth noting. First, the text referring to ecosystem-derived benefits is now in the operational part of the text, rather than the preamble. Second, rather than just mentioning co-benefits, there is specific reference to types of benefit (and risks to them) and a general specification of what is required of Parties. If text such as this is ultimately endorsed it would mark a very significant shift from the Bali text, with greater importance being given to multiple benefits, including ecosystem-derived benefits.

To date, there has been little acknowledgement within the UNFCCC negotiations of the role of biodiversity as an enabling condition of REDD+. Other stakeholders have been quicker to recognise this point. These stakeholders have also accorded importance to the ecosystem-derived benefits from REDD+. The Parties to the Convention on Biological Diversity passed a decision that noted that REDD could provide multiple benefits for biodiversity and reducing greenhouse gas emissions (CBD 2008). The same decision also established an Ad Hoc Technical Expert Group (AHTEG) on climate change and biodiversity. The report of the AHTEG noted that REDD would have a positive impact on biodiversity conservation (SCBD 2009).

The UN-REDD Programme and the Forest Carbon Partnership Facility (FCPF) are both assisting developing countries to prepare for participation in a future REDD mechanism. The UN-REDD Programme supports the development of tools and analyses to promote multiple benefits from REDD. The FCPF supports projects on the basis of defined criteria including a 'focus on innovative and/or advanced concepts of monitoring, reporting and remote sensing of forest degradation, biodiversity protection and social benefits', and seeks to achieve poverty reduction and biodiversity conservation benefits as well as climate change mitigation (FCPF 2008).

The Community and Biodiversity Alliance (CCBA) is currently working with Care International, to develop standards for use in relation to national REDD programmes. The REDD-plus Social and Environmental Standards are being designed to ensure that REDD programmes and funding mechanisms respect the rights of indigenous peoples and local communities and generate significant social and biodiversity benefits.

A number of international conservation organisations are running on-the-ground projects addressing multiple benefits from REDD. For example, the Wildlife Conservation Society (WCS) is running a programme to sell carbon credits from Makira Forest in collaboration with the Government of Madagascar through the Makira Carbon Company, with funds from carbon credits being used to support biodiversity conservation.[2] The Nature Conservancy (TNC) along with the Fundación Amigos de la Naturaleza (Foundation for Friends of Nature) initiated the Noel Kempff Mercado Climate Action Project in Bolivia in 1996, which has to date protected 1.5 million acres of forest in land

[2] See http://www.cbd.int/doc/programmes/areas/forest/makira-carbon-project-en.pdf

critically threatened by deforestation and timber harvesting. The project includes a biodiversity monitoring programme which assesses key species populations within the forest.[3]

Indigenous Peoples' organisations, including the Indigenous Peoples Forum on Climate Change, have noted that forests are much more than carbon and that REDD should address multiple forest values (McLean 2010).

Thus, the view that ecosystem-derived benefits are important is endorsed not only by the Parties to UNFCCC, but also by a range of other stakeholders. The next question is whether this view is supported by objective assessments of the significance of ecosystem-derived benefits.

4.2 Magnitude and value of ecosystem-derived benefits

A number of authors have emphasised the difficulty of establishing the magnitude and value of the ecosystem-derived benefits of REDD (Pagiola & Bosquet 2009; Strassburg *et al.* 2009). Where judgments have been made they are often based on general assessments of the biodiversity found in and the ecosystem services provided by tropical forests.

The Millennium Ecosystem Assessment stated that 'Forests play a key role in the provision of biodiversity (as well as other non-carbon ecosystem services), harbouring at least 50% of the global terrestrial richness in species, mainly in the tropics' (MEA, 2005). Evidence such as this is then used to support the claim that REDD+ will have a significant impact on biodiversity (Harvey *et al. 2010;* Karousakis 2009). Similarly, the TEEB study has provided initial and highly provisional estimates of the economic value of services produced by tropical forests (Table 2).

If the figures in the TEEB estimates were to be supported by further work, they would provide some initial evidence that a successful REDD+ mechanism would deliver ecosystem services of considerable value. The high figure for water regulatory services is particularly noteworthy.

Table 2: Values of ecosystem services in tropical forests (TEEB 2009)

TROPICAL FORESTS	Value of ecosystem services (in US$/ha/year – 2007 values)		
Ecosystem Service	**Average**	**Maximum**	**Number of Studies**
Provisioning Services			
Food	75	552	19
Water	143	411	3
Raw Materials	431	1,418	26
Genetic Resources	483	1,756	4
Medicinal Resources	181	562	4
Regulating Services			
Improvement of air quality	230	449	2
Climate regulation	1,965	3,218	10
Regulation of water flows	1,360	5,235	6
Waste treatment / water purification	177	506	6
Erosion prevention	694	1,084	9
Cultural Services			
Opportunities for recreation and tourism	381	1,171	20
TOTAL	**6,120**	**16,362**	**109**

Note: these estimates are based on ongoing analyses for TEEB (See chapter 7 TEEB D0 forthcoming). As the TEEB data base and value analysis are still under development, this table is for illustrative purposes.

[3] See http://www.nature.org/initiatives/climatechange/work/art4253.html

It has been suggested that the delivery of multiple benefits in effect reduces the real opportunity costs of REDD+ and that where the multiple benefits of REDD+ are high, the costs of REDD might, from a country's perspective, become negative (Pagiola & Bosquet 2009). Other work has been undertaken on the potential trade-offs between the climate mitigation role of REDD+ and biodiversity benefits (Venter *et al.* 2009; Strassburg *et al.* 2009).

As long as the magnitude and value of ecosystem-derived benefits from REDD+, whether at a global or national level remains uncertain, there will be a need for further work in this area. The information provided by the monitoring of ecosystem-derived benefits of REDD+ would provide an important input into this work.

5 Equity

It is important to recognise that equity issues arise in connection with ecosystem-derived benefits. The equity issues that are raised by the primary role of REDD+ in mitigating global climate change have already received some attention. They include:

- Is it equitable for developed countries to bear the burden of mitigating climate change? In particular, should developed countries be able use REDD+ to offset some of their own emissions through the carbon market?
- Will the distribution of REDD+ revenues be equitable, particularly for Indigenous Peoples and local communities?
- Will some of the measures used to implement REDD+ result in unfair harms to Indigenous Peoples and local communities, for example through loss of tenure or loss of access rights to forests?

With regard to ecosystem-derived benefits, it has been seen that REDD+ may produce a range of benefits and harms. The outcomes in any particular case will be shaped by the ecological characteristics of the forests, the type of REDD+ activity in question and how those activities are implemented. The outcomes will be also be influenced by any measures that are adopted to enhance benefits or safeguard against ecosystem harms. In all cases the outcomes can be assessed for their impacts on equity. For example:

- Where REDD+ delivers a global benefit (biodiversity conservation is sometimes regarded in this light) there is a view that those who pay the costs associated with generating benefit (typically the local landholders in REDD+ countries) should, on grounds of equity, be compensated by the global community. As with other benefits of REDD+, there may be a close link here between effectiveness and equity. A more equitable solution may also be an effective on, in the sense of providing incentives to ensure this benefit is safeguarded and enhanced.
- If a Payment for Ecosystem Services scheme is used to compensate, say, suppliers of water regulatory services, there may be questions about the equity of the payment distribution system.
- It is likely that REDD+ implementation will limit the access to ecosystem services such as timber and non-timber forest products. Depending on how such decisions are made and whose access is restricted, there may be equity issues.

In all these issues, questions about the magnitude of the benefits and harms that are in question will be of significance. In general terms, because of the potential scale of carbon finance, the equity issues around ecosystem-derived benefits may not be as pressing as those in the case of the other benefits of REDD+. However, that is not to say that they may not be significant in some cases. It is important that, as REDD+ strategies are devised and implemented, the equity aspects of ecosystem-derived benefits are addressed.

6 Conclusions

The following points have been made in this paper:

1. The ecosystem-derived benefits of REDD+ are made up of biodiversity and the ecosystem services delivered by forests in developing countries. Some of the most important of these ecosystem services are local and regional climate regulation; water regulation; the provisioning services of forests (timber and non-timber forest products); and soil conservation.

2. In some instances REDD+ activities may, directly or indirectly, cause harms to biodiversity and ecosystem services. In planning REDD+ implementation, it is important that both the potential harms and the potential benefits are taken into account.

3. Biodiversity conservation is not just one of the potential benefits of REDD+. It is also an enabling condition for the success of REDD+ as a climate change mitigation policy.

4. There are other sources of complexity in addressing ecosystem-derived benefits. They include:

    a. REDD+ comprises five different activities, each of which may be associated with different potential benefits and harms,
    b. The different benefits do not have a simple relationship to one another. Enhancing one benefit, my not enhance other benefits.
    c. Different benefits (and harms) may be delivered at different scales. Some are primarily global, others are regional, national or local.

5. The importance of ecosystem-derived benefits (and harms) has been increasingly recognised by the Parties to UNFCCC and other stakeholders.

6. It is difficult to generalise about the magnitude and value of ecosystem—derived benefits and harms. In some cases they will be significant.

7. Monitoring of key ecosystem-derived benefits and harms, as REDD+ is implemented, will be important both to improve understanding of the magnitude of the benefits and to inform decision-making.

8. The beneficiaries of ecosystem-derived benefits, as well as those who suffer from ecosystem harms, will vary from case to case. The equity dimension of ecosystem-derived benefits is important.

9. The identity of the ecosystem-derived benefits and harms of REDD+, their magnitude and their recipients will depend, in part, of the policies and tools that are used to address multiple benefits. These policies and tools are the subject of the companion paper (Miles *et al.* 2010).

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