Status of carbon sequestration projects in Africa:

Potential benefits and challenges to scaling up

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Abstract

International carbon projects in Africa have the potential to provide increased investments and cash flows for poverty alleviation. This review covers 19 carbon sequestration projects across 16 African countries. Beyond the mitigation of greenhouse gas emissions, the potential benefits of these projects include local sustainable development, natural resource conservation, protection of valuable biodiversity, and ecological restoration. However, carbon projects in Africa currently constitute less than three percent of the international trade in carbon offsets. International investors should make greater efforts to identify good projects in the region, while the host countries need to provide mechanisms for more secure property rights, improve institutions for natural resource governance, and build institutional capacity for project design and implementation, in order to attract more carbon investments.

Keywords

Africa, carbon sequestration, CDM, Kyoto Protocol, carbon markets.

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Acronyms

CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
EU-ETS	European Union Emission Trading Scheme
IPCC	Inter-Governmental Panel on Climate Change
LULUCF	Land Use, Land Use Change and Forestry
NTFP	Non-Timber Forest Products
VER	Voluntary Emission Reduction
VER	Verified Emission Reduction
DNA	Designated National Authority

Introduction

This paper reviews African experience with carbon sequestration projects. National governments and civil society groups are looking for ways to mitigate global warming by reducing atmospheric concentration of greenhouse gases (GHG). A viable strategy in this regard is carbon sequestration through forestry activities. Forests can serve as effective sinks by absorbing excess carbon dioxide (CO2) from the atmosphere (IPCC, 2001). For instance, the Kyoto Protocol allows for reduction in carbon emissions through forest based carbon sequestration projects (UNFCCC, 2002). The Kyoto Protocol was adopted by the international community in 2005 and sets mandatory targets for industrialized countries to reduce GHG emissions by an average of 5.2% below their 1990 levels by 2008-12 (UNEP, 2004).

Under its Clean Development Mechanism, one of three market mechanisms (along with Joint Implementation and Emissions Trading) introduced under Kyoto to make climate change mitigation more cost-effective, (CDM), industrialized countries can achieve these targets by investing in emission reduction projects including carbon sequestration through afforestation and reforestation in developing countries (Fenhann, 2005; UNFCCC, 2003). Studies by the Inter-Governmental Panel on Climate Change (IPCC) indicate that the costs of carbon sequestration projects may be much lower in tropical countries than industrialized countries.

The cost of carbon sequestration projects in tropical countries (mainly developing countries) could range from $0.10-$20 per ton of carbon, in industrialized countries it could range from $20-$100 per ton of carbon (IPCC, 2001). Clearly, for industrialized countries, investing in carbon sequestration in the developing world is a much cheaper option. In order to encourage reduction in actual carbon emissions at home, the Kyoto Protocol limits the use of carbon sinks from forestry and other land based activities to only 1% of their base year emissions for each of the five years of the commitment period from 2008-12

Carbon sequestration is one of many valuable environmental services that forests provide. Traditionally society has enjoyed the benefits of environmental services such as clean air, nutrient cycling, and watershed protection without any payment. Such free-riding often leads to underinvestment in management and protection of environmental and natural resources, resulting in their degradation. Global warming due to unchecked emissions of GHG into the atmosphere is a case in point. However, increasing awareness of environmental issues and innovations in market-based instruments has led to the emergence of markets for many environmental services. Private firms and individuals can now buy and sell some environmental services as they do other goods and services, thereby providing an incentive

for their owners to regulate their use (e.g. Pagiola, 2004; Jenkins *et al.*, 2004). Worldwide, exchange of carbon offsets including carbon sequestration through forests represents the most mature example of these new markets for environmental services (Lecoq and Capoor, 2005; Landell-Mills and Porras, 2002).

The first large-scale project to yield carbon offsets through forests was established in 1992. Over its life this project will help sequester 15.6 million tons of carbon dioxide This is equal to 4.25 million tons of carbon (1 ton of carbon being equal to 3.67 tons of carbon dioxide) by regenerating 25,000 hectares of rainforest in Malaysia (Aukland *et al.*, 2002). Since then, several new projects have been initiated. Ecosystem Marketplace estimates that over the last ten years, more than 745,000 hectares of land have been brought under carbon sequestration activities, yielding carbon offsets worth $84 million (www.ecosystemmarketplace.com). Similarly, 154 biomass energy projects, worth millions of dollars and in many cases based on forestry plantations, are in different stages of validation under CDM[1]. Since most of these projects (including all CDM projects) are in developing countries, the trade in carbon offsets represents increased income for them. In addition, the ongoing negotiations for a post-2012 commitment period for the Kyoto Protocol to address global warming indicate the possible inclusion of carbon sequestration through avoided deforestation in tropical forests. If included, this has the potential to further benefit poor countries (Cosbey *et al.*, 2005). Carbon sequestration projects may thus provide a win-win between environmental conservation and increased opportunities for economic development in poor countries (UNEP, 2004; Rosa *et al.*, 2003).

The economic and environmental benefits of carbon sequestration projects are particularly relevant for Africa, the world's poorest region. African countries need increased investment to support poverty alleviation and infrastructure development. With high dependence on land and forests for subsistence, there is also a growing threat of widespread natural resource degradation. Accordingly, efforts to mitigate climate change through carbon sequestration projects can bring in money both to regenerate natural resources and raise local incomes (Kituyi, 2002). However, little is known about the status of existing carbon sequestration projects in Africa;

- What projects have been undertaken and where have they been implemented?
- What has been their impact on poor communities and what potential benefits could accrue in the future?
- What are the potential drawbacks?

[1] For more details on CDM pipeline, see www.cd4cdm.org

- What crucial challenges need to be addressed if the region is to increase its share of international carbon finance?

This paper seeks to answer these questions through a review of carbon sequestration projects in Africa. It is based on field research with selected projects, backed by an extensive review of published reports and project documents. The purpose of the paper is twofold; firstly, to assess the relative status of the forest carbon sector in Africa, and secondly, to draw lessons for scaling up these initiatives. In addition, the review provides useful lessons for international policy making with respect to carbon sequestration projects in poor countries.

The paper is organized as follows: the remainder of section one introduces the general institutional structure of carbon markets. Section two presents carbon sequestration projects in Africa, followed in section three by a review of potential benefits from carbon sequestration projects in Africa, as well as important concerns about possible negative impacts. Section four discusses critical factors that influence carbon investments in the region and ways to increase such investments.

Carbon Markets: Background

In carbon markets, buyers and sellers trade in 'carbon offsets' or 'carbon credits' which are units of carbon emissions reduced at source (for example by reducing consumption of fossil fuels) or units of carbon dioxide that have been absorbed by forests from the atmosphere (Landell-Mills and Porras, 2002). Although this paper focuses on trade in carbon sequestration credits, it also draws relevant lessons from carbon markets in general. Broadly, these markets consist of two types of transactions (Lecoq and Capoor, 2005):

(i) Project Based Transactions occur when a buyer invests directly in a carbon emission reduction or carbon sequestration program and gets emission credits in return, e.g. a company pays money to a local community in a developing country to raise forests and then claims carbon sequestration credits in return. The local community in this case acts as a service provider, being responsible for actually generating the carbon credits. There may even be a contract that specifies the kind of service to be provided (e.g. 'x' number of trees to be planted per hectare per year), and how benefits will be shared (e.g. the investor may own the carbon credits but timber and other non-timber forest products belong to service providers). In project based transactions, compensation to service providers may include direct payment or other development benefits such as provision of social services and infrastructure, in-kind technical assistance and support for commercialization, or even expansion of rights over local natural resources (Rosa et al., 2003; Scherr et al., 2001). Carbon sequestration is just one of the several types of project based transactions. Under Kyoto Protocol, afforestation and reforestation (AR) projects for carbon sequestration are collectively termed as Land Use,

Land Use Change and Forestry (LULUCF) sector. Other transactions include raising energy efficiency, converting power plants from fossil fuels to renewable energy sources, and collecting methane from landfill sites.

(ii) Trade in Emission Allowances refers to commercial trading in carbon offsets under various regimes that have emerged in different parts of the world. These include the European Union Emission Trading Scheme (EU-ETS) under the Kyoto Protocol, and voluntary markets such as the Chicago Climate Exchange (CCX) in the United States. These systems operate like equity markets with buyers and sellers trading well-defined carbon units at particular prices. Buyers do not invest in any particular project; they simply purchase carbon credits from sellers who either generated their own emissions credits or bought them from someone else. In general, apart from buyers and sellers, carbon markets also include intermediaries and supporters. Intermediaries facilitate transactions between investors with service providers. Supporters are institutions or individuals who create an enabling environment and a legal basis for carbon markets to function (Noordwijk *et al.*, 2003). When carbon sequestration projects are taken up with local communities, intermediaries such as non-government organizations (NGOs), government agencies and research organizations frequently assume additional support responsibilities such as capacity building, monitoring and supervision.

Both project based transactions and trade in emission allowances can be either compliant under the Kyoto Protocol (Kyoto-compliant), or operated on a voluntary basis and thus not Kyoto-compliant. Examples of Kyoto-compliant transactions are all CDM activities in the case of project based transactions, and exchange of carbon offsets in the EU-ETS. All carbon credits exchanged through these systems count towards countries' emission reduction targets under the Kyoto Protocol. On the other hand, voluntary, non Kyoto-compliant reductions include projects that yield carbon offsets but are not formally registered under the Protocol, and trades on voluntary exchanges such as the CCX where the carbon credits do not count towards the emission reduction targets under Kyoto. Firms and organizations invest in voluntary carbon projects for several strategic reasons, e.g. as part of their corporate social responsibility, to experiment with these new markets before making a formal entry, influence policy, improve goodwill or public image, or for philanthropic reasons (Gutman, 2003). This discussion yields four possible kinds of transactions as shown in table 1. Quadrant 1 represents project-based transactions that are compliant under the Kyoto Protocol. These include all Joint Implementation and Clean Development Mechanism Projects. Quadrant 2 indicates trading in carbon offsets under regulatory regimes such as European Union Emission Trading System and the United Kingdom Emission Trading System that are Kyoto-compliant. On the other hand, quadrant 3 includes carbon trading in voluntary markets that

are not Kyoto-compliant. Most of these markets, such as the US-based Chicago Climate Exchange and the Australian New South Wales Greenhouse Gas Abatement Scheme, operate in countries that have not signed the Kyoto Protocol. This leaves Quadrant 4, which represents all voluntary, not Kyoto-compliant, project-based transactions in carbon offsets. It is important to note that quadrant 2 and 3 markets exist mainly for industrialized countries that need to reduce their carbon emissions. Since no African countries fall in this category, the region as a whole does not figure in either of these two quadrants. Markets of interest for Africa are therefore project based transactions represented in quadrant 1 and 4.

Table 1: Four major kinds of transactions under carbon markets

	Trade in Emissions Allowances	**Project Based Transactions**
Kyoto-Compliant	Trade in carbon offsets under European Union Emission Trading Scheme, UK – Emission Trading System **2**	All Clean Development Mechanism and Joint Implementation Projects 1
Voluntary, not for compliance under Kyoto	**3** Trade in emission reductions on Chicago Climate Exchange, NSW Greenhouse Gas Abatement Scheme	4 Voluntary Reduction Projects, such as Carbon Sequestration Projects in Africa

Carbon offsets generated by CDM projects (Kyoto-compliant) are called Certified Emission Reductions (CERs). Similarly, carbon offsets from voluntary projects (non-Kyoto compliant) can be termed as Voluntary Emission Reductions (VERs)[2]. CERs carry a much higher price than VERs because countries can use them against their emission reduction targets under Kyoto. The maturity of a carbon market is therefore reflected by the relative proportion of trading in CERs as compared to VERs.

Global extent of the market for carbon offsets

The global carbon market is growing rapidly. In 2005, the total international trade in carbon offsets was worth US$11.75 billion, which was several times more than in 2004 (Point Carbon, 2006).

For trade in emission allowances, four major markets have come up in different parts of the world: the European Union Emission Trading System (EU-ETS), UK Emission Trading System (UK-ETS), New South Wales Greenhouse Gas Abatement Scheme (NSW) and the Chicago Climate Exchange (CCX). The former two are Kyoto-compliant, while the latter two are not. In all, these four markets traded 330 million tons of carbon dioxide (tCO_2) worth $8.3

[2] This term should not be confused with a similar acronym that stands for Verified Emissions Reductions. If voluntary projects attain Kyoto compliance in due course of time then VERs get converted into CERs.

billion in 2005, of which $8.2 billion was traded through the EU-ETS, which is the dominant Kyoto-compliant market (Capoor and Ambrosi, 2006). The UK-ETS ($1.31 million), NSW ($57.2 million), and the CCX ($2.8 million) are tiny by comparison. However, it is important to note that both NSW and CCX, which are voluntary carbon markets, are growing rapidly (Capoor and Ambrosi, 2006; Point Carbon, 2006).
Under project based transactions, 374 million tCO_2 (mainly CERs) worth $2.7 billion were exchanged in 2005 (Capoor and Ambrosi, 2006), compared to 107 million tCO_2 worth $570 million in 2004 (Lecoq and Capoor, 2005). However, this growth in project based transactions remains highly uneven. Asia accounted for the largest share (73%) of contracted volume, followed by Latin America (17%). Africa's share was less than three percent (Capoor and Ambrosi, 2006), which raises strong concerns that international carbon market may bypass the region.

The growth is also uneven with respect to nature of carbon projects. Over the last two years, more than half of all project based carbon credits were produced through destruction of Hydro-fluoro-carbon (HFC) gas, while less than two percent were in the form of carbon sequestration credits (Michaelowa, 2005; Lecoq and Capoor, 2005). This is a conservative estimate as it does not include carbon sequestration projects taken up by businesses under their corporate social responsibility initiatives or those funded by the Global Environment Facility (GEF). Forestry projects funded by the GEF reduce carbon emissions, but carbon offsets from these projects are not necessarily exchanged in international markets (in any case carbon sequestration is a small part of the global carbon market). This is due to long delays on the part of the CDM Executive Board to approve LULUCF projects and a complicated set of guidelines that govern such projects (IISD, 2006). This means that most of the international trade in forest-based carbon sequestration credits is currently confined to voluntary markets.

Overview of carbon sequestration projects in Africa

This review covers 19 carbon sequestration projects from 16 different countries in Africa (see table 1). Project details were collected from a wide range of sources – field research with local communities in Kenya and Mozambique, case studies and other published research, project documents, and international policy updates on carbon markets. The latest information on carbon markets was accessed from www.pointcarbon.com and the www.ecosystemmarketplace.com maintained by the Katoomba Group. Information was also obtained from research institutions such as the World Resources Institute and International Institute for Environment and Development, which maintain online databases on carbon sequestration projects. Finally, websites of multilateral donors such as the World Bank

(www.carbonfinance.org), GEF and FACE Foundation were useful in collecting data on their carbon investments in Africa.

Table 2: Details of Carbon Sequestration Projects in Africa

	Project Title	Host Country	Investor	Fund Invested	Start Year	Implement. Agency	Carbon offsets	Nature of Benefit Sharing	Other details	Sources of Information
1.	The International Small Group and Tree Planting Program (TIST)	Tanzania, Uganda, Kenya	World Bank BioCarbon Fund, USAID, Dow Chemical Company	Dow - $1.2 million, WB's share n.a.	Since 1999	CAAC, I4EI	2.3 mtCO2 # by 2017	Carbon rights transferred to CAAC. All others, viz. timber, NTFPs with community.	No.of Farmers > 3,000 organized in 315 groups. Live trees > 400,000 Seedlings in millions	TIST (www.tist.org); World Bank Carbon Finance Unit (www.carbonfinance.org)
2.	Participatory Rehabilitation of Degraded Lands	Mauritania and Senegal	GEF African Devl. Bank, UNDP, National Govt.	GEF – $7.996m* Co-fin. - $4.370m	Since 2000	National Governments UNOPS	n.a. +	All benefits belong to community. Carbon credits not claimed.	Aims to reach 80,000 people in 100 villages. Target area = 6,000,000 ha.	World Resources Institute (WRI) - (http://climate.wri.org/sequestration.cfm); GEF http://www.gefonline.org/projectDetails.cfm?projID=457
3.	Community based Rangeland Rehabilitation for Carbon Sequestration	Sudan	GEF	GEF - $1.5 million, Co-finance - $0.085 million	n.a.	National Government (Environment Ministry)	n.a.	All benefits including timber and NTFPs belong to local community.	Area covered = 100 hectare.	Near East Foundation (http://www.neareast.org/main/news/article.aspx?id=199); WRI (http://climate.wri.org/sequestration.cfm)
4.	Village-Based Management of Woody Savanna & Estbl. of Woodlots for Carbon Seq.	Benin	GEF	$2.5 million	n.a.	National Government (Environment Ministry)	5.3 mtCO2	Woodlots with all products belong to community. Information on carbon offsets n.a.	176,000 hectares of land under conservation.	WRI ((http://climate.wri.org/sequestration.cfm)
5.	Sustainable Energy Management Project	Burkina Faso	World Bank, Government of Norway, DANIDA	n.a.	1997 – 2003	National Government (Energy Ministry)	1.5 mtCO2	Carbon offsets with World Bank. All other benefits with community.	Project registered as AIJ (Activity Implemented Jointly).	WRI ((http://climate.wri.org/sequestration.cfm)
6.	Forest Rehabilitation in Mt. Elgon & Kibale National Parks	Uganda	FACE Foundation	n.a.	Since 1994	Uganda Wildlife Authority	7.1 mtCO2 over 99 years	Carbon offsets with FACE. All other rights with Uganda Wildlife Authority.	Project registered as AIJ, and has FSC Certification	Face Foundation (www.stichingface.nl): WRI (http://climate.wri.org/sequestration.cfm)

	Project Title	Host Country	Investor	Fund Invested	Start Year	Implement. Agency	Carbon offsets	Nature of Benefit Sharing	Other details	Sources of Information
7.	Nhambita Community Carbon Project	Mozambique	European Union	n.a.	Since 2003	Envirotrade, ECCM, Univ. of Edinburgh	-	Carbon rights with implement. orgs. All others with locals.	Community receives cash payments for carbon sequestration.	Field Work; University of Edinburgh (http://www.miombo.org.uk/)
8.	Plan Vivo Project	Uganda	UK DFID, USAID, START, Tetra Pak UK	€ 1 million (expected)	2003 - 2012	Ecotrust Uganda, ECCM, ICRAF	0.9 mtCO2 by 2012	Timber and other biomass benefits with farmers. Tetra Pak buys carbon credits. 60% of the sale money goes to farmers.	Carbon sequestration through small-scale tree planting on 5,000 ha. In 2003 alone, Tetra Pak bought 14,000 tCO2 from the project.	Plan Vivo (www.planvivo.org): Carbon Neutral Company (http://www.carbonneutral.com/projects/projects.asp?id=13)
9.	Western Kenya Integrated Ecosystem Management Project	Kenya	GEF, Co-financed by National Government, Japan PHRD	GEF- $4.1 m. Co-fin.- $2.7 m	2005	KARI, ICRAF, KEFRI	-	Local community to get all timber, NTFP benefits. Carbon rights yet to be worked out.	The project will promote conservation activities to control sediment and nutrient flow into Lake Victoria.	Field Work; GEF (http://www.gefonline.org/projectDetails.cfm?projID=1362)
10	Sequestration of Carbon in Soil Organic Matter (SOCSOM)	Senegal	USAID	n.a.	1999 - ?	Senegal-USAID, Several Univ. Rockfeller	n.a.	All benefits with local community. Carbon rights not traded.	Pilot project to assess the potential for carbon sequestration in soils.	US Geological Survey (http://edcintl.cr.usgs.gov/carboninfosheet.html)
11	Commercial Plantation Projects	Tanzania and Uganda	Tree Farms AS of Norway (local subsidiaries)	At least $600,000 in Uganda. Tanzania n.a.	Since 1997	Green Resources, Busoga Forestry Company	2.3 mtCO2 expected in Uganda	Commercial plantation, all rights including carbon credits with the company.	SGS Products Certification in Tanzania. 6,500 ha already planted.	Tree Farms AS http://www.saohill.com Norwatch newsletter no. 5, 2000.
12	Carbon from Communities	Mali	NASA	$143,236	2002 - 2005	SANREM-CRSP (USAID),Univ of Georgia, Local Univs.	n.a.	All benefits with local communities.	Mainly a research project.	Virginia Tech University (http://www.oired.vt.edu/resanddev/projects/carbon.htm)
13	Bateke Fuelwood and timber Plantation	DR Congo	World Bank BioCarbon Fund	n.a.	2006	Novacel (a private enterprise)	2.81 mtCO2 by 2017	Timber and other benefits will be with villagers. Carbon credits may belong to World Bank and Novacel.	Afforestation on 8,000 ha of degraded grass savanna for timber production and charcoal making. Will benefit 250 villages.	World Bank BioCarbon (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects&ProjID=9646)

	Project Title	Host Country	Investor	Fund Invested	Start Year	Implement. Agency	Carbon offsets	Nature of Benefit Sharing	Other details	Sources of Information
14	Nile Basin Reforestation	Uganda	World Bank BioCarbon Fund	n.a.	2006	National Forest Agency	0.25 mtCO2 by 2017	Timber benefits shared with locals. Carbon credits with World Bank.	Planting of pine and mixed native species on 2,000 ha. New jobs will be created.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)
15	Acacia Community Plantations	Niger	World Bank BioCarbon Fund	n.a.	2006	Achats Services Int. (ACI) ICRISAT	1.8 mtCO2 by 2017	Gum, firewood and timber to be shared with locals. ASI will sell carbon credits.	Acacia plantations on 22,800 ha. Project will benefit 15,000 farming families in the area.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)
16	Acacia Community Plantations	Mali	World Bank BioCarbon Fund	n.a.	2006	Deguessi Vert, Malian Rural Economic Institute(IER)	0.95 mtCO2 by 2017	Gum, firewood etc. to be shared with locals. Deguessi-IER to sell carbon credits.	Acacia plantations on 14,000 ha. Extension of Acacia Community Plantations in Niger.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)
17	Andasibe-Mantadia Biodiversity Corridor	Madagascar	World Bank BioCarbon Fund, GEF	Part of $150 million grant for biodivrst. conservation	2006	ANGAP, Conservation Int., Ministry of Env, water and Forests.	0.40 mtCO2 (Kyoto) 4.0 mtCO2 (Non-Kyoto) by 2017	Mainly a biodiversity conservation project. Some benefits including carbon payments will be shared with locals.	Afforestation on 5,000 ha and protection of 80,000 ha to conserve biodiversity.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)
18	Green Belt Movement	Kenya	Green Belt Movement, World Bank BioCarbon Fund	n.a.	2006	Green Belt Movement, Community Forest Associations	0.60 mtCO2 by 2017	Farmers will receive payments for carbon sequestration to carry out conservation activities.	Project builds on the thirty year old Green Belt Movement in Kenya.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)
19	Humbo Assisted Regeneration	Ethiopia	World Vision Australia, World Bank BioCarbon Fund	n.a.	2006	Word Vision, Ethiopian Agr., Rural Devl., & Forestry Coord. Office	5.02 mtCO2 by 2017	Biomass benefits will be shared with local communities. Carbon payments to improve local infrastructure and food security.	Restoration of 15,000 ha of biodiverse natural forest in Rift Valley. About 3,000 local households will benefit from the project.	WB BioCarbon Fund (http://carbonfinance.org/Router.cfm?Page=BioCF&FID=9708&ItemID=9708&ft=Projects)

Note: # mtCO2 : million tons of carbon dioxide

* m: million; + n.a.: not available

East Africa is currently the favored destination for international carbon sequestration investors in Africa, with seven out of the 19 African carbon sequestration projects in Kenya, Uganda, and Tanzania. Some projects are jointly implemented by more than one country, such as the Participatory Rehabilitation of Degraded Lands Project in trans-boundary areas of Mauritania and Senegal. Projects range from conservation activities in a small area of about 100 hectares (Community based Rangeland Rehabilitation for Carbon Sequestration, Sudan) to several thousand hectares under the Forest Rehabilitation Project in Mount Elgon and Kibale National Parks, Uganda. Locations span diverse agro-ecological zones and land uses, including rangeland conservation (Sudan), farm forestry (Tanzania), rehabilitation of dense forests (Uganda), and restoration of Lake Victoria basin (Kenya). Many projects follow a multi-sector approach; for example, apart from carbon sequestration, Burkina Faso's Sustainable Energy Management Project aimed to improve the energy situation through a shift from wood fuel and charcoal to non-carbon energy sources such as solar photovoltaics. Some projects are mainly research initiatives on carbon sequestration; in Mali's Carbon from Communities Project, the National Aeronautical Space Agency (NASA) of the United States conducted research to measure the sequestration potential of local crop and pasture management systems.

Prominent investors, service providers and intermediaries in Africa

The World Bank is the biggest carbon investor in Africa. It has launched three carbon funds; Prototype Carbon Fund (PCF), Community Development Carbon Fund (CDCF), and BioCarbon Fund. Out of these, the BioCarbon Fund currently supports eight carbon sequestration projects in Africa. In addition, five projects are supported by GEF (including co-finance for a project with the BioCarbon Fund), two by the United States Agency for International Development (USAID), and one each by the FACE Foundation and the European Union. One project was sponsored under a research grant from NASA and one was paid for by a commercial plantation company – Tree Farms AS of Norway. Some projects were co-financed by UN organizations such as the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP). Moreover, national governments of industrialized countries such as Norway and United Kingdom (Department for International Development) are also funding carbon sequestration projects in Africa. Funding from industrialized countries is expected to increase further with bilateral agreements between several Africa countries (Morocco, Algeria, Egypt, and Mali) and their European partners such as France, Italy and Germany (Point Carbon, 2003).

Local communities act as service providers for most carbon sequestration projects in Africa, indicating that many of these projects focus on community development in addition to making profits for carbon investors. In such projects, intermediaries (such as non-governmental

organizations and local governments) have taken up additional responsibilities for community organization, capacity building of community representatives, monitoring and supervision, as well as obtaining funds from investors. Other service providers include Uganda Wildlife Authority for the Forest Rehabilitation Project in Mount Elgon and Kibale National Parks, Uganda, and local subsidiaries of Tree Farms AS for Commercial Plantation Projects in Tanzania and Uganda.

Most projects are covered under bilateral agreements and managed by host country national governments (respective Ministries of Environment) or other national agencies (National Forest Agencies). Other implementing organizations include private companies or their local subsidiaries (six projects), international and local NGOs (three projects) and projects being jointly implemented by research institutions or universities (four projects). This indicates that many carbon sequestration projects in Africa are taken up as pilot or research initiatives rather than as commercial ventures.

Other institutional components of carbon sequestration projects in Africa

In most African carbon sequestration projects, the rights to benefits such as timber and non-timber forest products (NTFPs) are given to local communities. The only exception was the Commercial Plantation Projects in Tanzania and Uganda, where the implementing organization (Green Resources Ltd.) owned the wood and non-wood products generated by its plantations. In the Forest Rehabilitation Project in Mount Elgon and Kibale National Parks, Uganda, it was difficult to ascertain whether any timber/NTFPs were being harvested from the project sites.

Regarding carbon benefits, evidence of actual or intended transfer of carbon credits was available for 13 of the 19 projects studied. Unless projects are sent for approval to the CDM Executive Board, all of these projects are for voluntary reductions and will produce VERs for their investors. Although these projects use different time lines for their calculations, broad estimates indicate that these 13 projects will sequester 35.23 million tCO2. Carbon credits will be sold in international markets for all World Bank BioCarbon Fund projects. In other projects such as the Forest Rehabilitation Project in Mount Elgon and Kibale National Parks, Uganda, carbon offsets are clearly owned by the investors (in this case the FACE Foundation). Similarly, the Tree Farms AS intends to sell carbon credits to private firms in Norway from its plantations in Tanzania and Uganda. In the Plan Vivo Project in Uganda and the Nhambita Community Carbon Project in Mozambique, the implementing agency – Edinburgh Center for Carbon Management – is selling carbon credits to UK based companies and sharing the carbon revenue with local farmers. However, in some projects, such as

Carbon from communities in Mali, it is not clear whether investors would actually trade these credits or just retain them as voluntary reductions.

Concerning payment mechanisms, most projects provide broad development support to local communities, including technical and financial assistance to adopt conservation activities. Only in a few projects, such as TIST, do the local communities receive specific payments linked to their carbon sequestration efforts.

Potential Benefits from Carbon Sequestration Projects in Africa

The main objective behind any carbon sequestration project is to absorb excess carbon dioxide from the atmosphere and thus help mitigate climate change. This directly benefits global society and generates carbon credits or voluntary reductions for the investor. But what is in it for the host country and the local communities? This section looks at some potential benefits as well as important concerns about carbon plantations.

Sustainable development benefits

Sustainable development is an important issue for carbon sequestration projects. Many researchers have documented the livelihood and other development benefits of various carbon sequestration projects around the world. For some examples see; Rosa *et al.* (2003); Smith and Scherr (2002); and Totten (1999). The Kyoto Protocol stipulates that all CDM projects including carbon sequestration activities should achieve sustainable development benefits for host countries (UNEP, 2004; Olhoff *et al.*, 2004). Although most current carbon projects in Africa are not for compliance under Kyoto, they often follow these broad CDM guidelines.

Research indicates that many carbon sequestration projects in Africa are helping to improve local incomes through the sale of carbon credits. These examples signify the potential to achieve sustainable development and provide increased financial inflows for the host countries. For instance, in the Nhambita Community Carbon Project in Mozambique, local households will receive a cash payment of $242.60 per ha over the next seven years for carbon sequestered by various land-use activities. Although the percentage of money paid to each household will vary from 30% of the total in the first year to 10% of the total in the seventh year, a simple average works out to $34.70 per household per annum (taking an average of one hectare of land per household). This represents a significant increase in cash incomes for most households and addresses their felt need of obtaining access to a regular income source (Jindal, 2004).

Similarly, under TIST in Tanzania, local farmers receive carbon payments on the basis of the number of trees they can manage on their lands. Other benefits include increased access to fruits, timber, and firewood plus any other NTFPs the trees produce (for more details see http://www.tist.org/). These examples suggest that many carbon sequestration projects have potential to contribute to sustainable development in Africa and to provide increased financial inflows for host countries. More objective impact assessment studies will need to be undertaken before the full range and magnitude of benefits and costs is fully understood.

Biodiversity conservation and protection of natural resources

Many natural resource management projects are not viable either because their benefits are uncompensated environmental services or because national governments and other local agencies do not have adequate funds to undertake conservation activities. Carbon projects can address these concerns in two important ways, first by paying for some of the services such as carbon sequestration, and secondly by providing financial assistance to national governments to invest in natural resource projects (Gutman, 2003). This is particularly relevant for Africa where precious natural resources are being rapidly lost for want of conservation investments.

There is evidence that many carbon sequestration projects in Africa have been successful in improving the local resource base and in conserving biodiversity. A case in point is the World Bank BioCarbon Fund's Andasibe-Mantadia Biodiversity Corridor Project, which will protect several endemic species by linking fragmented parts of Malagasy rainforest in Madagascar. Similarly, the Forest Rehabilitation Project began in 1994 and promotes reforestation on 24,000 ha in Mount Elgon and Kibale National Parks, Uganda. The parks were widely deforested during the political strife of the 1970s and 1980s when various ethnic groups sought refuge in them. The Forest Rehabilitation Project seeks to reverse this degradation by planting indigenous tree species and educating local communities on the value of conservation. In addition to carbon sequestration, these activities are helping to conserve the local biodiversity and protect endangered wildlife such as chimpanzees. Project details are available at: http://www.facefoundation.nl/Eng/projectAfrica.html**.** On the other hand, the project may have also adversely affected local livelihoods by moving people out of the parks. This indicates the need to carefully balance the pros and cons of a carbon sequestration project.

Improved land productivity through soil carbon sequestration

Sub Saharan Africa contains large tracts of degraded lands with extremely low agricultural productivity, especially in the Sahel. For instance, average crop yields in sub Saharan Africa are 1.5 t/ha for maize, 0.8 t/ha for sorghum and 0.7 t/ha for millet. This is due to poor soil quality, which occurs when soil organic carbon is lost to the atmosphere, thus leading to

desertification. Estimates of the area of degraded land range from 3.47 to 3.97 billion hectares (Lal *et al.*, 1998). Land degradation processes can be reversed through improved agricultural practices such as conservation tillage, soil erosion control, establishment of appropriate shrubs and woody perennials, soil fertility enhancement, and crop residue management. This not only restores soil quality by increasing its organic content but also aids in mitigating climate change by returning more and more carbon to the soil. Thus, carbon sequestration activities that improve soil carbon content have the potential to improve productivity of large tracts of land in Africa. The SOCSOM Project in Senegal is funded by USAID and implemented by a consortium of several research organizations and universities including Centre Suivi Ecologique (CSE), Senegal, University of Arizona, Colorado State University, Lund University, Sweden, SACRED Africa, and the Rockefeller Foundation; to carry out further research on this issue. There are plans to take up similar projects in Kenya and Cameroon.

Impact on local ecology

Carbon sequestration through afforestation and reforestation can often generate other locally valued ecosystem services such as more regular and higher quality water supplies and control of soil erosion and sedimentation (Scherr *et al.*, 2004). In Western Sudan, for example, a carbon sequestration project has been working towards improving local rangelands. Rangelands are a mainstay of Sudan's economy, covering about 60% of the country and providing fodder for one of Africa's largest concentrations of livestock. However, many rangelands have been badly degraded due to recurrent droughts and overgrazing. The project aims to restore these rangelands through conservation activities such as planting trees and grass to stabilize sand dunes and create windbreaks, and developing participatory rangeland management plans.

Similarly, the Western Kenya Integrated Ecosystem Management Project aims to improve the ecology of Lake Victoria Basin by taking up erosion control and watershed management activities on 900 square km. A key project component is to encourage adoption of agroforestry and other land management techniques that sequester carbon and pay local communities for the carbon credits.

However, it is important to note that carbon sequestration projects may not always benefit the local ecology. Focus on single species plantations or fast growing exotics that are effective in storing carbon, can produce other adverse effects (IUCN and UNEP, 2002). Such plantations can often result in substantial losses in stream flow, and increased salinization and acidification (Jackson *et al*., 2005). For instance, a global study on hydrological effect of forest plantation projects found that annual runoff reduced by as much as 75 percent when

grasslands were converted into eucalyptus plantations (Farley *et al*., 2005). Similarly, monocultures may threaten local biodiversity and destroy native species. In order to avoid such harmful effects, there is a need to plan carbon sequestration projects carefully and to encourage native plant species over exotics. Deciduous indigenous trees that shed their leaves in the dry season can be particularly appropriate for use in water scarce catchments.

Carbon Sequestration Projects in Africa: Challenges to Scaling Up

The global carbon market is on the rise. The annual demand for carbon credits will increase steadily as the first commitment period under the Kyoto Protocol (2008-12) draws near. The last United Nations Climate Change Conference in Montreal also indicated that carbon emission reductions might continue beyond 2012, which will further boost the market. Moreover, the United States and Australia have forged the Asia Pacific Partnership in Clean Development and Climate, which is expected to provide incentive to markets for voluntary carbon credits.

In such a scenario, more and more industrialized countries will look for cost-effective alternatives to achieve emission reductions, including carbon sequestration. The international carbon market is already worth billions of dollars. Econometric models predict that the size of the CDM market itself could be 217 – 640 million tCO_2 per year by 2010 (Haites, 2004). The recent approval of carbon sequestration projects by the CDM Methodology Panel (Capoor and Ambrosi, 2006) raises hope for several more that are in the pipeline. Therefore, even though all the existing carbon sequestration projects in Africa are voluntary, experience with them will be crucial for determining how rules are laid out in the future. There are some projects in Africa that are potentially Kyoto-compliant.

Scaling up carbon investments will require a mix of ‘push’ and ‘pull’ factors. The following section looks at important push factors as well as other challenges that African countries must address to pull more carbon investments. The two important pull factors – the possibility of international carbon reductions to continue beyond 2012 and the future role of the United States as a buyer of carbon credits – are beyond the scope of this paper.

Push by multilateral donors

The Clean Development Mechanism was introduced under Kyoto to enable industrialized countries to achieve their emission reduction targets in a cost effective manner while contributing to the sustainable development needs of developing countries (UNEP, 2004). However, there are strong concerns that CDM investments have been rather skewed with hardly any investments in the least developed countries, including in Africa (IISD, 2006;

Lecoq and Capoor, 2005). The World Bank has attempted to improve the distribution of carbon investments in Africa through its Community Development Carbon Fund and BioCarbon Fund. However, all these investments in Africa still comprise less than 10 percent of $629 million worth of global carbon business managed by the World Bank's carbon finance unit (World Bank, 2006). There is thus a need for other multilateral donors to push for more carbon investments in African countries.

An encouraging start in this regard is the creation of international carbon funds that focus on the least developed countries, especially Africa. Examples include the International Union for Conservation of Nature (IUCN) Climate Fund and the Finnish CDM Program that are mandated to support carbon projects in Africa (UNEP and IETA, 2005a). The United Nations Development Program (UNDP)'s Millennium Development Goals Carbon initiative also seeks to redress this imbalance. Similarly, many European countries such as France, Italy and Germany have signed bilateral agreements with countries like Morocco, Algeria, Egypt and Mali to support carbon projects (Point Carbon, 2003). However, carbon investments in CDM-like projects may continue to be low due to high risk and long time delays in getting approval from the Executive Board. Several recent studies have therefore pointed out the need to reform the CDM approval process, which will help push more carbon sequestration investments in developing regions like Africa (Michaelowa, 2005; Cosbey *et al*., 2005).

Reducing transaction costs

Transaction costs include the costs of negotiating, contracting, implementing, and monitoring a project. In carbon sequestration projects and other CDM-based activities, transaction costs can be a significant component of total project costs; for instance, the World Bank prototype Carbon fund's upfront cost for each project is about $265,000 (UNEP, 2004). Usually, transaction cost per ton of carbon dioxide for large projects is very small or even negligible, while for small-scale projects it is quite high. Similarly, transaction costs are much higher in absolute terms when dealing with multiple parties rather than a single party (Kerr *et al.*, 2006). Gaining information about landowners, contacting them, establishing contracts, and certifying changes in land use, all increase the cost per hectare and per unit of carbon sequestration when working with many small holders (Smith and Scherr, 2003). As a result investors usually prefer large-scale projects with only a few partners rather than dealing with many partners with small pieces of land.

In Africa, most rural people are small landholders. Although many African countries have large tracts of privately held land that present an opportunity for large carbon sequestration projects (White and Martin 2002), sustainable development of poor African communities would instead require projects to be taken up with small landholders. However, the prospect

of high transaction costs associated with small-scale projects makes these ventures unattractive to investors.

This problem can be addressed in two ways – firstly, by simplifying guidelines for design and formulation of carbon sequestration projects, and secondly, by encouraging participation of intermediary organizations with experience in setting up community-based projects. As regards CDM-based carbon projects, the Executive Board of the Kyoto Protocol is already simplifying the guidelines. The recommendations are to simplify requirements (design, validation, registration, and monitoring) for small-scale carbon sequestration projects that target low-income communities and generate emission reduction of less than 8000 tCO_2 per annum (UNEP, 2004) - See www.unfccc.int for all the recent modifications in CDM guidelines. Once finalized, the new guidelines may help reduce transaction costs associated with small-scale CDM projects, thereby inducing more investors to finance Kyoto-compliant carbon sequestration projects in Africa. The move by the CDM Executive Board in December 2005 to approve groups of projects as programs, provides another new opportunity for reducing project-specific transaction costs.

Transaction costs can also be lowered by creating an enabling environment for intermediary organizations to participate in carbon sequestration projects. At present, most carbon projects in Africa are directly implemented by national government ministries. One major limitation of this approach is that these centralized agencies are unfamiliar with local conditions and cannot identify and target small holders effectively. Further, these agencies can take up only a certain number of projects, thereby constraining their expansion. Therefore, African countries need to promote NGOs, research institutions, companies, and other public agencies as intermediaries for carbon sequestration projects. Examples are organizations such as Kenya Agricultural Research Institute (KARI), Kenya Forest Research Institute (KEFRI), and NGOs such as Bureau for Environmental Analysis-International (BEAI), which act as intermediaries in Kenya.

In addition, transaction costs can be greatly reduced by developing projects in communities where local organizations are already active and participatory development processes are in place (Landell-Mills and Porras, 2002). For instance, TIST (Tanzania) has reduced transaction costs by organizing local farmers into small groups of 10-12 people and helping them to take up carbon sequestration activities on their farms. The two project partners – Institute for Environmental Innovation (I4EI) and Clean Air Action Corporation (CAAC) – have registered a local subsidiary called UMET Ltd. (Ukuzaji Maendeleo Endelevu Tanzania), which manages the project. Local groups transfer all carbon credits to UMET Ltd. that sells them on their behalf and pays them quarterly on the basis of the actual number of live trees.

Finally, all activities including monitoring and disbursing carbon payments are performed by UMET's staff drawn from the local population, which further helps to reduce costs.

Securing property rights and land tenure

Tenure security is crucial for implementing carbon sequestration projects. Without clear and defendable rights to land, forest or the sequestration service itself, suppliers cannot make a credible commitment to supply carbon offsets (Gutman, 2003). For projects where local communities act as service providers, it means that unless they have secure rights to the land on which forestry activities are taken up, the investor may have little confidence in financing the project.

Most African tenure systems are characterized by the existence of multiple tenures, that is, several users may have access to different resources on the same piece of land (Lund, 2000). For instance, in the Nyando basin in Kenya, land may be held under individual title but is used communally for grazing and wood collection (Swallow *et al.*, 2001). This can often cause confusion as to whether the land belongs to the group or to specific individuals, and it may be difficult for the investor to identify actual service providers. In general, there exists a duality between customary and statutory land rights in many African countries (Woodhouse, 2003). In Ethiopia, for example, even though all land was officially nationalized in 1974, there continues a system of inheritance and hereditary rights in several parts of the country. This can lead to tenure insecurity, a big impediment for long gestation forest carbon projects.

If carbon sequestration projects are taken up where property rights are unclear, it is also possible that more powerful people may take control over the land and poor people who may have been occupying it not only will not receive any benefits from carbon sales but could even end up losing their access to the land (Kerr *et al.*, 2006). For instance, a 50-year concession, owned by Tree Farms AS of Norway, to raise commercial plantations and generate carbon credits from 5160 hectares of land in Bualeba Reserve, Uganda, continues to threaten the livelihoods of the local poor. As local people do not possess formal land titles, there are strong concerns that the project may threaten eviction of about 8000 people who depend on the area for farming, collection of timber and NTFPs, cattle grazing and fishing (Eraker, 2000).

Solving this problem is not as easy as simply establishing formalized land rights, because many land titling projects in Africa have failed where they were inconsistent with customary practices (e.g. Ensminger 1996). Where local economic systems are more amenable to titling, this can be facilitated through coordination of government departments involved in allocating rights and strengthening dispute resolution mechanisms (Gutman, 2003). Regardless of the

land rights system, countries need to improve their monitoring and enforcement procedures so that rights can be effectively defended when challenged.

One possible way for carbon projects to operate in areas under customary tenure is by working on land held as common property by an entire community, rather than taking up plantations only on privately held land. Project benefits can be shared amongst the entire community. For example, the Nhambita Community Carbon Project (Mozambique) will deposit $40.50 per hectare in a community fund on the basis of the number of hectares that are brought under carbon sequestration. Since all land is registered in the name of the village chief and no household has individual titles, the entire community can gain from these group payments (Jindal, 2004).

Improving governance

Good governance is critical for most market mechanisms to function properly. A stable and well-defined regulatory environment is necessary to promote international carbon investments, just like foreign direct investment. Considering that most carbon sequestration projects have a long gestation period, any investment is liable to be risky unless backed by long-term economic and political stability. Moreover, governments are important buyers and sellers of environmental services and also act as intermediaries (as seen in several projects in Africa). Therefore, in order to attract and sustain international carbon projects, it is essential to have good governance practices at national and local levels.

However, many African countries face political volatility and unpredictable governance systems making carbon sequestration investments a risky proposition. Several Sub-Saharan countries are under the grip of long-term civil strife, making it most difficult for them to attract international carbon sequestration investments. On the brighter side, in many other African countries the political leadership is taking ownership of conflict resolution, good governance and poverty reduction. Substantial improvement in economic governance has taken place across sub-Saharan Africa since the mid-1990s; the gross domestic product in 15 countries grew consistently at the rate of six percent per year. Skilled political leadership, international support, and desire for peace have led to real progress in addressing conflicts in countries such as Uganda, Mozambique and Rwanda (World Bank, 2005). These initiatives are bound to instil confidence amongst investors to invest in carbon sequestration projects in these countries. But there are others where considerable progress still needs to be made.

Building institutional capacity

Facilitating successful implementation of carbon sequestration projects requires having adequate national institutional capacity. The Kyoto Protocol requires each developing country

to establish a Designated National Authority (DNA) to promote carbon projects that are aligned with national development priorities beneficial for local communities, and in support of general sustainable development goals (UNEP, 2004). The DNA serves as the point of contact between international investors and local service providers. One important factor in establishing a DNA is its institutional sustainability, reflected in its capacity to ensure a coherent, justifiable and transparent assessment of carbon projects and to generate enough revenue through these assessments to finance itself.

However, there is a concern that many countries in Africa lack institutional capacity to recognize, package and promote potential opportunities for funding carbon projects. Not only is there an absence of supporting policy and legal frameworks, but some countries even lack a general awareness about carbon payment processes (Kituyi, 2002). Therefore, it is imperative to invest in capacity building of these national governments. Although organizations like UNDP and UNEP are already involved in capacity building initiatives, much remains to be done. One way is to include capacity building as an integral component of each carbon project. For example, the Western Kenya Integrated Ecosystem Management Project includes a comprehensive capacity building phase, supported by Japan PHRD. The aim is to establish a national carbon assessment and certification capacity within Kenya's national research system.

On the other hand, a downside of this strategy is a possible escalation in project overheads, which may be unacceptable to international investors. Therefore, apart from donor led efforts, host countries should also be willing to invest in capacity building. A beginning in this direction can be made through developing national level CDM/carbon programs in line with national development plans and Poverty Reduction Strategy Papers. This would ensure that carbon projects meet the goal of sustainable development for the host countries as well as convey a transparent set of project assessment criteria to investors. The success story of Morocco demonstrates that investments in capacity building can yield long-term economic gains through financial inflows for taking up more carbon projects. After ratifying the Kyoto Protocol in 2002, the country has been actively involved in building institutional capacity to kick-start CDM and other carbon projects. Due in part to the support provided by UNDP and UNEP's CD4CDM project, and to investments made by the national government, Morocco now has an operational DNA (in the Ministry of Land Use Management, Water and Environment), national project evaluation procedures, qualified experts, and different promotional materials for carbon projects in the country. It has also signed formal agreements with France and Italy to take up CDM projects (Point Carbon, 2003). Morocco's overall CDM portfolio now consists of 34 projects, including four afforestation and reforestation projects. Though most of these projects are still in the planning phase, their estimated

potential for total emissions reduction is more than four million tons per year. With this dynamic effort at capacity building, Morocco is currently ranked in the top 10 of international CDM host countries, the first African country to do so (UNEP and IETA, 2005a).

Conclusions

Although the CDM Executive Board is still finalizing methodology for carbon sequestration projects, many international firms and organizations have initiated voluntary projects as part of their social responsibility or to test these new payment schemes for emission reductions. As a result, international carbon projects can offer significant financial inflows for developing regions like Africa. As experience with these voluntary efforts accumulates, it will also help in formulating more formal CDM guidelines for future projects.

However, carbon sequestration projects may not always benefit host countries. There are potential gains as well as adverse environmental and social effects. Single species plantations in particular may have a highly negative impact on the local ecology. This paper advocates the need to plan each carbon sequestration project carefully and to ensure that local communities remain the central focus of such projects. As a policy implication, the paper also supports the idea of including avoided deforestation into the CDM. Apart from reducing carbon emissions related to deforestation, this will also provide an economic incentive to several African countries to conserve their large tracts of tropical forests.

African countries in general need more investments to support poverty alleviation and economic development programs. Although carbon investments cannot fulfil all investment needs of these countries, nevertheless they can make significant contribution towards sustainable development in the region. Review of existing carbon sequestration projects in Africa shows that many projects are already moving towards this goal. However, it will not be easy to scale up such projects. Multilateral donors like the World Bank would need to push for more carbon investments in the region, which may also induce other investors to follow suit. Finally, African countries will also need to remember that carbon projects essentially represent an emerging market and not a grant-in-aid scheme. Only those countries that are well prepared and capable of participating in this competitive market will be able to seize this new opportunity.

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