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# Carbon Sequestration Projects in Africa: Potential Benefits and Challenges to Scaling Up

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Carbon sequestration is the process of removing excess carbon dioxide ($CO_2$) from the atmosphere (3.67 tons $CO_2$ = 1 ton sequestered carbon). The Kyoto Protocol's Clean Development Mechanism (CDM) recognizes carbon sequestration through forestry as a way to mitigate global warming and also allows industrialized countries to offset their carbon emissions by investing in forestry projects in developing countries (UNFCCC, 2003). In addition, many private organizations are voluntarily promoting carbon sequestration projects to reduce their carbon emissions. Globally, carbon sequestration projects are now worth millions of dollars (see http://www.ecosystemmarketplace.com), including financial inflows for many developing countries. Thus, carbon sequestration projects present mutual benefits for environmental conservation and economic development opportunities in poor countries (UNEP, 2004; Rosa et al., 2003).

Carbon sequestration projects' economic and environmental benefits are particularly relevant for Africa, the world's poorest continent. African countries need increased investment to support poverty alleviation and infrastructure development. With a high dependence on land and forests for subsistence, these countries also require effective strategies to combat the growing threat of widespread natural resource degradation. Accordingly, efforts to mitigate climate change through carbon sequestration projects could bring in money both to raise local incomes and regenerate natural resources (Kituyi, 2002).

However, there are strong concerns that the growth in international carbon projects may bypass Africa, which contributed just three percent of the total global trade in carbon offsets in 2003-2004 and a negligible share in 2004-2005. This compares poorly with Asia and Latin America, which contributed 43 percent and 35 percent, respectively, during 2003-2004 (Lecoq and Capoor, 2005). Attracting more carbon investments to Africa is critical. The analysis of existing carbon sequestration projects in Africa may provide insight toward achieving this objective.

## Carbon Sequestration Projects in Africa

This review covers 19 carbon sequestration projects in 16 countries in Africa *(Table 1)*. Project details were collected from various sources: field research with local communities in Kenya and Mozambique, case studies, project documents, policy updates, and online databases of the World Resources Institute (http://climate.wri.org/sequestration.cfm), and the World Bank (http://www.carbonfinance.org). The latest information on carbon markets was obtained from Point Carbon (http://www.pointcarbon.com) and Katoomba Group's Ecosystem Marketplace (http://www.ecosystemmarketplace.com).

Of the 19 carbon sequestration projects in Africa, seven are based in Kenya, Uganda or Tanzania. This indicates that East Africa is currently the preferred region for international carbon investors. Project locations, however, span diverse agro-ecological zones and land uses, including rangelands (Community-Based Rangeland Rehabilitation for Carbon Sequestration, Sudan), farms (The International Small Group and Tree Planting Program, Tanzania), dense forests (Forest Rehabilitation Project in Mount Elgon and Kibale National Parks, Uganda), and Lake Victoria basin (Western Kenya Integrated Ecosystem Management Project). The adaptation of carbon sequestration projects to different climatic conditions can be both beneficial as well as harmful for the local ecology (see below). Many projects also follow a multi-sector approach, aiming to generate benefits in addition to carbon sequestration; examples include improving the energy situation in Burkina Faso (Sustainable Energy Management Project) or conserving biodiversity in Madagascar (Andasibe-Mantadia Biodiversity Corridor).

World Bank's BioCarbon Fund is currently the biggest investor of carbon sequestration projects in Africa *(Table 1)*. Other prominent carbon investors in Africa are the Global Environment Facility (GEF), the United States Agency for International Development (USAID), the Forest

Absorbing Carbon Emissions (FACE) Foundation, and the European Union.

Information regarding the actual amount of carbon sequestered is available for 13 projects. Although these projects use different time lines, broad estimates indicate a total potential of approximately 35 million tons of $CO_2$. Many projects will thus be able to generate carbon credits or offsets under the provisions of the Kyoto Protocol equal to the amount of carbon dioxide they sequester. The prevailing international prices for carbon credits range from $3.50 per ton $CO_2$ at Chicago Climate Exchange to $15.80 per ton $CO_2$ in various European markets. Carbon credits from carbon sequestration projects in Africa are therefore worth millions of dollars. At present, the Plan Vivo Project in Uganda and the Nhambita Community Carbon Project in Mozambique are already selling carbon credits to United Kingdom-based companies and sharing their carbon revenues with local farmers.

## Potential Benefits

Carbon sequestration projects benefit global society by absorbing excess $CO_2$ from the atmosphere. They also provide several additional advantages for the host country.

**Sustainable Development:** The Kyoto Protocol stipulates that all CDM projects, including carbon sequestration activities, should achieve sustainable development benefits for the host country (UNEP, 2004). Many researchers have subsequently documented livelihood and other development benefits of various carbon sequestration projects around the world (Rosa et al., 2003; Smith and Scherr, 2002). Most current carbon sequestration projects in Africa, however, were not created for compliance with the Kyoto Protocol, although they often follow broad CDM guidelines.

Major developmental benefits for local communities from these projects include an increased number of timber and non-timber forest products from regenerated forests, employment opportunities from forestry activities, and increased incomes from the sale of carbon credits. For instance, in the Nhambita Community Carbon Project in Mozambique, each participating household will receive a cash payment of $242.60 per hectare over the next seven years (or $34.70 per annum) for carbon sequestered by various land-use activities. This represents a significant increase in most household incomes and, additionally, provides access to a regular income source (Jindal, 2004). Similarly, in the International Small Group and Tree Planting Program, Tanzania, local farmers receive regular payments on the basis of the number of trees they can manage on their lands (for details, see http://www.tist.org). These examples demonstrate that carbon sequestration projects have the potential to achieve sustainable development in Africa—providing increased financial inflows for host countries while promoting environmental conservation.

**Biodiversity Conservation:** 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 sequestration projects can address both these concerns by paying for some of the services (such as carbon sequestration) and 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, including biodiversity, are being rapidly lost due to a lack of conservation investments.

There is evidence that many carbon sequestration projects are able to provide necessary financial assistance for biodiversity conservation in Africa. For example, the Forest Rehabilitation Project is helping to conserve Mount Elgon and Kibale National Parks in Uganda (for details, see http://www.stichtingface.nl/). These 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.

**Ecological Restoration:** Carbon sequestration through afforestation and reforestation can often generate other locally-valued ecosystem services such as improved water quality and reduced soil erosion and sedimentation (Scherr et al., 2004). For example, the Western Kenya Integrated Ecosystem Management Project aims to improve the ecology of Lake Victoria Basin by taking responsibility for erosion control and watershed management activities over an area of 900 square kilometers. A key project component is to encourage adoption of agroforestry and other land management techniques that sequester carbon and pay local communities for carbon credits.

It is important to note, however, that carbon sequestration projects may not always benefit local ecosystems. A global study on

the hydrological effects of forestry projects found that annual runoff reduced by as much as 75 percent when grasslands were converted into eucalyptus plantations for carbon sequestration purposes (Farley et al., 2005). Considering that many parts of Africa are rain deficient, there is a need to locate carbon sequestration projects carefully and to encourage native plant species, which require less water, over exotics.

**Improving Soils and Land Productivity:** 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 tons per hectare for maize, 0.8 tons per hectare for sorghum, and 0.7 tons per hectare for millet (as compared to about 2.5 tons of maize per hectare in many other parts of the world). This is due to poor soil quality, which occurs when soil organic carbon is lost to the atmosphere, leading to desertification. Estimates of the affected area range from 3.47 to 3.97 billion hectares (Lal et al., 1998). The process 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. These not only restore soil quality by increasing its organic content but also aid in mitigating climate change by returning 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 USAID funded Sequestration of Carbon in Soil Organic Matter (SOCSOM) Project in Senegal is carrying out further research on this issue *(see Table 1)*.

## Constraints To Scaling Up

As stated earlier, Africa's share of international carbon business is much lower than many other developing regions. This section looks at constraints to scaling up carbon projects in Africa.

**Tenure Insecurity:** Tenure security is crucial for carbon sequestration projects. Without clear land rights, suppliers cannot make credible commitments to supply carbon offsets (Gutman, 2003). However, most African tenure systems are characterized by multiple tenures where several users may have access to different resources on the same piece of land (Lund, 2000). This can cause confusion as to who owns the sequestration rights from this land. In general, a duality often exists between customary and statutory land rights in many African countries (Woodhouse, 2003), making carbon investments risky. If carbon sequestration projects are taken up where property rights are unclear, more powerful people may take control of land occupied by poor people. The poor may not receive benefits from carbon sales and could even end up losing access to their land (Kerr et al., 2006).

Solving this problem is not easy; many land titling projects in Africa have failed where they were inconsistent with customary practices (e.g., Ensminger, 1996). One possible solution is working on common lands and sharing project benefits with the entire community. For example, the Nhambita Community Carbon Project in Mozambique deposits $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 gains from these group payments (Jindal, 2004).

**Transaction Costs:** The transaction costs associated with negotiating, implementing, and monitoring small-scale carbon sequestration projects are usually high; transaction costs per ton of $CO_2$ for large projects are typically much smaller. In addition, transaction costs increase when multiple parties are involved (Kerr et al., 2006). As a result, investors usually avoid small-scale projects and dealing with many small landowners. However, in Africa, most rural people are small landholders. Although many African countries have large tracts of privately held lands that present an opportunity for large carbon sequestration projects (White and Martin, 2002), sustainable development in poor African communities require carbon sequestration projects to be taken up with small landholders, despite their financial unattractiveness to investors.

The CDM guidelines are currently under revision to reduce transaction costs for small projects. The recommendations are to simplify the requirements for small-scale carbon sequestration projects that target low-income communities and generate emissions reductions of less than 8000 tons $CO_2$ per annum (UNEP, 2004). Once finalized, the new guidelines may help reduce transaction costs associated with small-scale projects, enticing more investors to finance carbon sequestration projects in Africa. However, it is equally important for African countries to complement this effort by promoting local organizations as carbon intermediaries that can work directly with local communities. Costs can also be lowered by developing projects in communities where participatory development processes are already in place (Landell-Mills and Porras, 2002). For instance, the International Small Group and Tree Planting Program has reduced

transaction costs by building upon previous community forestry initiatives in Tanzania.

**Governance:** Similar to other kinds of foreign investment, a stable and well-defined regulatory environment is necessary to promote international carbon investments. Considering that most carbon sequestration projects have a long gestation period, investments can be risky unless backed by long-term economic and political stability. 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 countries face long-term civil strife, making international carbon sequestration investments difficult. Despite this, substantial improvement in economic governance has taken place across sub-Saharan Africa since the mid-1990s. Skilled political leadership, international support, and desire for peace have led to progress in addressing conflicts in countries such as Uganda, Mozambique and Rwanda (World Bank, 2005). These initiatives increase the confidence of investors, who may, as a result, plan more carbon sequestration projects in these countries.

**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 support general sustainable development goals (UNEP, 2004). One important factor in establishing a DNA is its ability to ensure a coherent, justifiable, and transparent assessment of carbon projects and to generate enough revenue through these assessments to finance itself. However, many governments in Africa are unable to do so due to an absence of the necessary political and legal frameworks. Some countries even lack a general awareness about carbon payment processes (Kituyi, 2002).

Although organizations like the United Nations Development Programme and the United Nations Environment Programme are already involved in training relevant government staff to identify, design, and implement new carbon projects, as well as other capacity building initiatives, much remains to be done. One possible solution is to include training and awareness building as an integral component of each carbon project. Therefore, apart from donor-led efforts, host countries should also be willing to invest in the training of their own staff. A downside of this strategy is a possible escalation in project overheads, which may be unacceptable to international investors.

Morocco's success story shows how such investments can yield higher carbon financial inflows. Since ratifying the Kyoto Protocol in 2002, Morocco has been actively involved in building institutional capacity. Its carbon portfolio now consists of 34 projects, including four sequestration projects. Although most projects are still in the planning phase, their estimated potential for carbon emissions reduction is about four million tons a year. Morocco is currently the first African country to be ranked in the top 10 international CDM host countries (UNEP and IETA, 2005).

## Conclusions

The global demand for carbon credits will increase steadily as the first commitment period under the Kyoto Protocol (2008-12) draws near. Countries are exploring cost-effective measures to reduce carbon emissions and carbon sequestration is a viable option. The total market for carbon sequestration could be worth $300 million annually (Scherr et al., 2004). This represents a significant opportunity for economic development in Africa.

Although many African carbon sequestration projects are beneficial, expanding them beyond a few pilot schemes will be difficult unless challenges such as tenure insecurity, high transaction costs, political instability and a lack of institutional capacity, are addressed. Finally, it is worth noting that international 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 fully take advantage of this new opportunity.

*About the author (June, 2006): Mr. Jindal holds a M.Sc. in Resource Management (University of Edinburgh, UK) and is currently pursuing a Ph.D. in Environmental and Resource Economics at Michigan State University. He has conducted research projects for the World Agroforestry Center, Kenya, the University of Edinburgh, Natural Resource Institute, UK, and for NGOs in India. His research interests include the interface between economic development and environmental conservation and the emerging markets for environmental services and their impact on rural poor.*

## Table 1: Details of Carbon Sequestration Projects in Africa

| | Project Title | Host Country | Investor | Funds Invested | Project Years | Implementing Agency | Carbon offsets | Nature of Benefit Sharing | Other details |
|---|---|---|---|---|---|---|---|---|---|
| 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; World Bank - n.a. | 1999-Present | CAAC, I4EI | 2.3 $mtCO_2$ by 2017 | Carbon rights transferred to CAAC. All others, viz. timber, NTFPs with community. | Number of farmers > 3000, organized in 315 groups. Live trees > 400000. Seedlings in the millions. |
| 2 | Participatory Rehabilitation of Degraded Lands | Mauritania and Senegal | GEF, African Dev. Bank, UNDP, National Govt. | GEF - $7.996 million; Co-finance - $4.370 million | 2000-Present | National Governments UNOPS | n.a. | All benefits belong to community. Carbon credits not claimed. | Aims to reach 80000 people in 100 villages. Target area = 6000000 ha. |
| 3 | Community-based Rangeland Rehabilitation for Carbon Sequestration | Sudan | GEF | GEF - $1.5 million; Co-finance - $0.085 million | n.a. | National Government (Environmental Ministry) | n.a. | All benefits including timber and NTFPs belong to local community. | Area covered = 100 ha. |
| 4 | Village-based Management of Woody Savanna & Establishment of Woodlots for Carbon Sequestration | Benin | GEF | $2.5 million | n.a. | National Government (Environmental Ministry) | 5.3 $mtCO_2$ | Woodlots with all products belong to local community. Information on carbon offsets n.a. | 176000 ha of land under conservation. |
| 5 | Sustainable Energy Management Project | Burkina Faso | World Bank, Govt. of Norway, DANIDA | n.a. | 1997-2003 | National Government (Energy Ministry) | 1.5 $mtCO_2$ | Carbon offsets with World Bank. All other benefits with local community. | Project registered as AIJ (Activity Implemented Jointly). |
| 6 | Forest Rehabilitation in Mt. Elgon & Kibale National Parks | Uganda | FACE Foundation | n.a. | 1994-Present | Uganda Wildlife Authority | 7.1 $mtCO_2$ over 99 years | Carbon offsets with FACE. All other rights with Uganda Wildlife Authority. | Project registered as AIJ (Activity Implement Jointly), and has FSC Certification. |
| 7 | Nhambita Community Carbon Project | Mozambique | European Union | n.a. | 2003-Present | Envirotrade, ECCM, Univ. of Edinburgh | - | Carbon rights with implementing organizations. All others with local community. | Community receives cash payments for carbon sequestration. |

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| 8 | Plan Vivo Project | Uganda | UK DFID, USAID, START, Tetra Pak UK | € 1 million (expected) | 2003 - 2012 | Ecotrust Uganda, ECCM, ICRAF | 0.9 $mtCO_2$ 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 5000 ha. In 2003 alone, Tetra Pak bought 14000 $tCO_2$ from the project. |
| 9 | Western Kenya Integrated Ecosystem Management Project | Kenya | GEF, Co-financed by National Government, Japan PHRD | GEF - $4.1 million; Co-finance - $2.7 million | 2005-Present | KARI, ICRAF, KEFRI | - | Local community to get all timber and NTFP benefits. Carbon rights yet to be worked out. | The project will promote conservation activities to control sediment and nutrient flow into Lake Victoria. |
| 10 | Sequestration of Carbon in Soil Organic Matter (SOCSOM) | Senegal | USAID | n.a. | 1999-? | Senegal-USAID, Several Universities, Rockfeller | n.a. | All benefits with local community. Carbon rights not traded. | Pilot project to assess the potential for carbon sequestration in soils. |
| 11 | Commercial Plantation Projects | Tanzania and Uganda | Tree Farms AS of Norway (local subsidiaries) | At least $0.6 million in Uganda; Tanzania - n.a. | 1997-Present | Green Resources, Busoga Forestry Company | 2.3 $mtCO_2$ expected in Uganda | Commercial plantation, all rights including carbon credits with the company. | SGS Products Certification in Tanzania. 6500 ha already planted. |
| 12 | Carbon from Communities | Mali | NASA | $0.14 million | 2002-2005 | SANREM-CRSP (USAID),Univ. of Georgia, Local Universities | n.a. | All benefits with local communities. | Mainly a research project. |
| 13 | Bateke Fuelwood and timber Plantation | Dem. Rep. Congo | World Bank BioCarbon Fund | n.a. | 2006-Present | Novacel (a private enterprise) | 2.81 $mtCO_2$ by 2017 | Timber and other benefits will be with villagers. Carbon credits may belong to World Bank and Novacel. | Afforestation on 8000 ha of degraded grass savanna for timber production and charcoal making. Will benefit 250 villages. |
| 14 | Nile Basin Reforestation | Uganda | World Bank BioCarbon Fund | n.a. | 2006-Present | National Forest Agency | 0.25 $mtCO_2$ by 2017 | Timber benefits shared with locals. Carbon credits with World Bank. | Planting of pine and mixed native species on 2000 ha. New jobs will be created. |
| 15 | Acacia Community Plantations | Niger | World Bank BioCarbon Fund | n.a. | 2006-Present | Achats Services Int. (ACI) ICRISAT | 1.8 $mtCO_2$ by 2017 | Gum, firewood and timber to be shared with locals. ASI will sell carbon credits. | Acacia plantations on 22800 ha. Project will benefit 15000 farming families in the area. |
| 16 | Acacia Community Plantations | Mali | World Bank BioCarbon Fund | n.a. | 2006-Present | Deguessi Vert, Malian Rural Economic Institute (IER) | 0.95 $mtCO_2$ by 2017 | Gum, firewood and timber to be shared with locals. Deguessi-IER to sell carbon credits. | Acacia plantations on 14000 ha. Extension of Acacia Community Plantations in Niger. |

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| 17 | Andasibe-Mantadia Biodiversity Corridor | Madagascar | World Bank BioCarbon Fund, GEF | Part of $150 million grant for biodiversity conservtion | 2006-Present | ANGAP, Conservation Int., Ministry of Environment, Water and Forests. | 0.40 $mtCO_2$ (Kyoto); 4.0$mtCO_2$ (Non-Kyoto) by 2017 | Mainly a biodiversity conservation project. Some benefits including carbon payments will be shared with locals. | Afforestation on 5000 ha and protection of 80000 ha to conserve biodiversity. |
| 18 | Green Belt Movement | Kenya | Green Belt Movement, World Bank BioCarbon Fund | n.a. | 2006-Present | Green Belt Movement, Community Forest Associations | 0.60 $mtCO_2$ 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. |
| 19 | Humbo Assisted Regeneration | Ethiopia | World Vision Australia, World Bank BioCarbon Fund | n.a. | 2006-Present | Word Vision, Ethiopian Agr., Rural Devl., & Forestry Coord. Office | 5.02 $mtCO_2$ by 2017 | Biomass benefits will be shared with local communities. Carbon payments to improve local infrastructure and food security. | Restoration of 15000 ha of biodiverse natural forest in Rift Valley. About 3000 local households will benefit from the project. |

Notes: $mtCO_2$ = million tons carbon dioxide; n.a. = not available

## REFERENCES

Ensminger, J. 1996. "Culture and Property Rights," in Rights to Nature: Ecological, Economic, Cultural, and Political Principles of Institutions for the Environment, eds. Hanna, S., C. Folke, and K.-G. Maler. Washington: Island Press. p.179-203.

Farley, K. A., E.G. Jobbagy, and R.B. Jackson. 2005. Effects of afforestation on water yield: a global synthesis with implications for forestry. Global Change Biology. 11: 1565–1576.

Gutman, P. (ed.) 2003. From Goodwill to Payments for Environmental Services: A Survey of Financing Options for Sustainable Natural Resource Management in Developing Countries. World Wide Fund for Nature. Washington DC: WWF.

Jindal, R. 2004. Measuring the socio-economic impact of carbon sequestration on local communities: An assessment study with specific reference to the Nhambita Pilot Project in Mozambique, unpublished. University of Edinburgh, U.K.

Kerr, J., C. Foley, K. Chung, and R. Jindal. 2006. Sustainable Development in the Clean Development Mechanism: Constraints and Opportunities. Journal of Sustainable Forestry. In press.

Kituyi, E. 2002. "Attracting Clean development Mechanism Projects: Prerequisites for African Governments," in Clean Development Mechanism, Volume 1, Number 1, July 2002. African Centre for Technology Studies, Nairobi, Kenya.

Lal, R. et al. 1998. Potential Soil C Sequestration in Sub-Saharan Africa. Paper presented at the Workshop on Carbon Sequestration in Soils and Carbon Credits: Review and Development of Options for Semi-Arid and Sub-Humid Africa, 1999. United States Geological Survey (USGS) EROS Data Center, South Dakota, USA.

Landell-Mills, N. and I.T. Porras. 2002. Silver bullet or fool's gold? A global review of markets for forest environmental services and their impact on the poor. International Institute for Environment and Development (IIED), London, UK.

Lecocq, F. and K. Capoor. 2005. State and Trends of the Carbon Market in 2005. International Emissions Trading Association, Washington DC.

Lund, C. 2000. African land tenure: questioning basic assumptions. Issues Paper #100. International Institute for Environment and Development (IIED) Dryland Program, London, UK.

Rosa, H., S. Kandell, and L. Dimas. 2003. Compensation for Environmental Services and Rural Communities: Lessons from the Americas and Key Issues for Strengthening Community Strategies. PRISMA, El Salvador. Online at http://www.prisma.org.sv.

Scherr, S., A. White, A. Khare, M. Inbar, and A. Molar. 2004. For services rendered: The current status and future potential of markets for the ecosystem services provided by forests. International Tropical Timber Organization (ITTO). ITTO, Technical Series No. 21.

Smith, J. and S. Scherr. 2002. Forest Carbon and Local Livelihoods: Assessment of Opportunities and Policy Recommendations. Occasional Paper Number 37. Centre for International Forestry Research (CIFOR), Jakarta, Indonesia, and Forest Trends, Washington DC, USA.

United Nations Environment Programme (UNEP). 2004. CDM Information and Guidebook, Second edition. Edited by M.-K. Lee. Contributors–J. Fenhann, K. Halsnaes, R. Pacudan, and A. Olhoff. UNEP Riso Centre on Energy, Climate and Sustainable Development, Riso National Laboratory, Denmark.

United Nations Environment Program (UNEP) and International Emissions Trading Association (IETA). 2005. Carbon Market Update for CDM Host Countries. Issue No.1, May, 2005. UNEP and IETA. Online at http://www.cd4cdm.org/CMarket/CMarketMay05.pdf.

United Nations Framework Convention on Climate Change (UNFCCC). 2003. Caring for Climate: A Guide to Climate Change Convention and the Kyoto Protocol. Bonn, Germany: UNFCCC. Online at http://unfccc.int/resource/docs/publications/caring_en.pdf.

White, A. and A. Martin. 2002. Who owns the world's forests? Forest tenure and public forests in transition. Forests Trends and Center for International Environment, Washington DC, USA.

Woodhouse, P. 2003. African Enclosures: A Default Mode of Development. World Development. 31(10): 1705-1720.

World Bank. 2005. Africa's Development Indicators 2005. The World Bank Africa Database. Washington DC: World Bank.