

Markets for Forest Environmental Services

Preliminary findings

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Service	Cases*	Funded**	Countries**
Carbon sequestration	37	31	Africa: Uganda Asia: Australia, Malaysia Latin America: Argentina, Belize, Bolivia, Brazil, Costa Rica, Ecuador, Honduras, Mexico, Panama, Paraguay North America: Canada Europe: Czech Republic, Poland, Russia
Biodiversity conservation	73	58	Africa: Cameroon, Cote d'Ivoire, Ghana, Nigeria, Uganda Asia: Australia, Bhutan, China, Fiji, India, Indonesia, Laos, Pakistan, Vietnam Latin America: Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guyana, Jamaica, Mexico, Peru, Philippines, Suriname North America: Bahamas, USA Europe: The Netherlands, Russia, Switzerland
Watershed protection	60	38	Africa: Malawi Asia: Australia, China, India, Pakistan, Vietnam Latin America: Brazil, Colombia, Costa Rica, Ecuador, El Salvador North America: USA Europe: -
Landscape beauty	10	10	Africa: Rwanda, South Africa Asia: China, India, Indonesia, Nepal, New Zealand, Philippines Latin America: Chile, Costa Rica, Peru North America: - Europe: -

* Includes descriptions of multiple initiatives within one country, as well as some regional or international initiatives.

** Excludes feasibility studies and proposals, and global initiatives.

Key questions:

- What form do markets take?
- How do markets evolve?
- What are the costs?
- What are the benefits?
- How are costs and benefits distributed?

Definitions & Scope

- “markets” interpreted broadly as payments or transfers to influence land management
- four “environmental services” - carbon sequestration, biodiversity conservation, watershed protection, landscape beauty
- “forests” range from semi-arid woodlands to moist evergreen formations

Collecting the data

- Since January 2000
- Literature review
- Internet searches
- Interviews
- Correspondence

What form do markets take?

- Participants (state, private, NGO)
- Competition
- Payment mechanism
- Geographical scope of trading
- Institutional context
- Maturity

Payment mechanisms

- Bilateral transactions
- Intermediary-based (e.g. Trust Funds)
- Pooled transactions
- Internal trading
- Over-the-counter
- Retail-based transactions
- Exchange-based trades

Bundling environmental services with existing goods and services

- Certified wood products
- Eco-tourism
- “Salmon-Safe” food products
- “Shade Coffee”
- “Climate Care” warranties on fuel, cars

Market maturity defined by:

- period since first transactions
- degree of price discovery
- market participation and liquidity
- sophistication of payment mechanism

Biodiversity values

- Ecosystem maintenance (e.g. pest control)
- Potential future uses (option value)
- Resilience to shocks (insurance value)
- “Choice value”
- Existence value

“Commoditizing” Biodiversity	Cases	Countries and companies
Biodiversity credits/offsets	4	Australia, Brazil, Netherlands
Biodiversity company shares	7	Australia, Brazil <i>Terra Capital Fund, Eco-enterprises Fund, Global Environment Emerging Markets Fund, Environmental Enterprise Assistance Fund</i>
Bio-prospecting rights	12	Australia, Cameroon, China, Costa Rica, Ecuador, Fiji, India, Nigeria, Suriname, USA, Vietnam, Laos
Conservation easements	1	Australia
Biodiversity management contracts	3	Austria, Mexico, Switzerland
Protected areas	15	Bahamas, Belize, Bhutan, Brazil, Colombia, Costa Rica, Fiji, Guyana, India, Indonesia, Malawi, Pakistan, Russia, Uganda
Land acquisition	2	Belize, Philippines
Land lease/conservation concession	3	Costa Rica, Guyana
Logging / development rights acquisition	1	Bolivia
Debt for Nature Swaps	7	Bolivia, Costa Rica, Ecuador, Ghana, Jamaica, Philippines
Biodiversity-friendly products	11	Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Peru, Ghana, <i>Earthcall Ltd.</i>

Markets for biodiversity

Participants	Buyers	Sellers	Intermediaries
Private individuals	8	17	0
Private corporations	37	7	3
National governments	11	23	5
Donor agencies	28	0	0
International NGOs	34	2	4
Local NGOs	3	15	9
Communities	0	35	1
Trust funds	0	0	20

Markets for biodiversity

Payment mechanism	Cases
Direct negotiation/project-based	21
Intermediary-based transaction (NGOs, government)	10
Intermediary-based transaction (trusts)	23
Pooled transaction	18
Joint venture/venture capital	5
OTC trading	5
Clearing House mechanism	3
Retail-based market	9
Exchange-based trades	1

Markets for biodiversity

Geographical scope	Countries
Local	6
National	4
Regional	5
International/global	54
Undefined	4

Market maturity	Countries
Proposed	4
Nascent/pilot	19
Emerging	25
Mature	21
Uncertain	2

Retail markets for biodiversity:

Conservation International & “shade cocoa”

- combine cocoa w/ native trees in W. Africa
- target Upper Guinea forest (70% of supply)
- combine research, enterprise development, marketing
- claim stable productivity hence no need to clear new land, plus better weed control, soil improvement, less need for agro-chemicals, increased supply of NTFPs
- CI offered 5% above government recommended prices for cocoa, plus a post-harvest bonus
- 650 tonnes in 1998 (roughly doubled in 1999)

Constraints on developing markets for biodiversity

- What is the commodity? Most proxies are area-based
- Unstable / incoherent policy and institutions
- Lack of mechanisms and capacity for negotiating benefit-sharing agreements with local communities
- Property rights poorly defined and enforced (e.g. access rights for bio-prospecting)
- Availability of substitutes (e.g. synthetic drugs)

Markets for watershed services

Land use	Soil erosion (tonnes/ha/yr)
Multi-storied tree gardens	0.1
Shifting cultivation during fallow period	0.2
Natural forest	0.3
Plantation	0.6
Tree crop with cover crop/mulch	0.8
Shifting cultivation during cropping period	2.8
Agricultural intercrop in young forest plantation	5.2
Tree crop, cleaned and weeded	48
Forest plantation, litter removed or burned	53

Source: Bruijnzeel (1990)

Watershed protection services being marketed			
Service	Commodity	Cases	Countries
Water quality	Watershed protection/BMP to improve water quality for drinking	6	Romania, USA (New York, Maine, Minnesota, Pennsylvania, Oregon)
	Water quality credit trading	4	USA (North Carolina, Minnesota, Idaho, Wisconsin)
	Land acquisitions	4	USA (New York, Maine, Washington, Utah)
	Conservation easements	2	USA (New York, Utah)
Water table regulation	Salinity credit trading	1	Australia (New South Wales)
	Transpiration credit purchase	1	Australia (New South Wales)
	Salinity-friendly products	1	Australia (New South Wales)
	Stream flow reduction licenses	1	South Africa
Aquatic habitat protection	Forest aquatic benefits/BMP	3	USA (Oregon, Colorado, Connecticut)
	Salmon Safe certification	1	USA (Pacific Rivers Council)
	Leasing of forest aquatic environments	1	USA (Maine)
	Salmon habitat restoration	1	USA (Oregon)
	Salmon habitat credits	1	USA (Pacific Northwest)
	Water rights and land acquisition	1	USA (Oregon)
Soil contaminant control	Ecolotree plantings	1	USA
Water quality and regulation	Payments for watershed protection/restoration	20	Brazil, China, Colombia, Costa Rica, Ecuador, India, Indonesia, Jamaica, Malawi, Pakistan, Panama, Vietnam, Zimbabwe
	Protected area	10	Argentina, Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Malawi, Panama, Philippines
	Water right trading	2	Chile, India
	Land acquisition	4	Colombia, Ecuador
	Watershed lease	1	China

Markets for watershed services

Participants	Buyers	Sellers	Intermediaries
Private individuals/landowners	24	43	0
Private corporate	25	6	0
Government	21	16	10
Public enterprise/ quasi-public	9	0	1
NGOs	4	6	15
Communities	1	3	5
Trusts	0	0	2

Markets for watershed services

Payment mechanism	Cases
Direct negotiation / project-based	9
Intermediary-based transaction (NGOs/CBOs)	13
Intermediary-based transaction (government)	9
Intermediary-based transaction (trusts)	2
Pooled transaction	11
Internal trading	7
OTC trading/user fees	9
Clearing house mechanism	3
Retail-based market	1

Markets for watershed services

Geographical scope	Countries
Watershed/basin	41
State-wide/provincial	2
Inter-state	3
National	7
International/global	2
Undefined	6

Market maturity	Countries
Proposed	15
Nascent/pilot	14
Emerging	21
Mature	7
Uncertain	4

Constraints on developing markets for watershed services

- Poorly or undefined property rights
- Land use - water relation often uncertain
- Negotiations can involve many participants
- Lack of capacity to administer trading
- Disjointed regulatory frameworks
- Little or no legal guidelines

General observations

- Lack measurable / tradable proxy for environmental services (especially for biodiversity)
- Interaction among forest services remains unclear
- Uncertainty about direction & magnitude of benefit (especially for watershed services)

- Wide range of different payment mechanisms
- Prices for services not always well-founded
- Distribution of costs and benefits undocumented
- High transaction costs favour large producers

Impacts on the poor from carbon sequestration

CARFIX, Costa Rica (USIJI 1999): Small landowners will benefit from a new source of income for carbon and increased security since the income will be reliable. In addition advance timber harvest payments should smooth income fluctuations. Small landowners who participate will also benefit from land registration and increased tenure security. This should benefit about 40% of landholders.

Biomass power generation, Honduras (JIQ 1996; Totten 1999; USIJI 1997): There is concern that wood waste is a source of domestic fuel and income for locals who use it to produce secondary wood products for sale. If this is true the diversion of wood waste to the biomass plant may have negative impacts on local welfare.

Agroforestry in Scolel Te, Mexico (USIJI 1997; Totten 1999): The project is designed to support indigenous communities in poor areas of Mexico. 75% of project inputs are destined for 5 Tzeltal (lowland Mayan) villages and 4 Tojolobal (highland Mayan) villages. Special efforts are made to improve female welfare, e.g. through the promotion of fruit trees and ornamental plants and women's involvement in tree nurseries.

Poverty impacts of carbon continued

Community silviculture in Sierra Norte, Oaxaca, Mexico (USIJI 1997): The project will mainly benefit local communities who are disadvantaged.

Commercial reforestation in Chiriqui Province, Panama (USIJI 1997): People in the area are poor, hence employment and other social benefits are likely to contribute to poverty alleviation.

Norwegian Tree Farms sale of carbon offsets to a power company, Uganda (Eraker 2000): Loss of livelihoods for families living inside the leased areas, who have been, or are being, evicted. An estimated 8,000 people living in or near the reserve leased to Tree Farms depend on the land for farming, collection of timber and NTFPs, cattle grazing and fishing. Potential project benefits are mainly from employment (only 43 people to date) and the introduction of the taungya system whereby local farmers are contracted to plant and care for seedlings and in return are permitted to inter-crop on the company's land. Local communities living in or near the plantation leases are poor. These people are described as benefiting little from the carbon investment, since the revenue is paid to the government, and locals are forced to pay for access to farmland.

Planning for poverty reduction

Biodiversity:

INBio bioprospecting permits, Costa Rica (Aylward et al. 1993; Comision de Servicios Ambientales 1998; Espinoza 1999; Simpson 2001; ten Kate 1999): Benefits to the poor accrue where projects involve local communities. For example, the contract between INBio and some pharmaceutical companies such as Merck & Co., and the cosmetic company Givaudan Roure, incorporates local communities and members of peasant families as parataxonomes, increasing family income.

Watersheds:

Tradable water rights and user fees, Sukhomajri, India (Kerr 1992; Patel-Weynand 1997): A feature of the institution set up to implement watershed protection was the emphasis on equity and the need for all villagers to gain from the initiative. Landless and farmers with marginal land were able to gain from the sale of water rights and access to increased fodder from Forest Dept. lands.

What are the scarce factors for supplying forest environmental services?

- Land
- Labour
- Capital
- **Technology / information**
- **Institutional framework**
 - property rights
 - transaction costs
 - enforcement