Preserving Biodiversity and Ecosystem Services in West African Forest, watersheds and wetlands: A review of Incentives

Supplementary tables

Table S1. Conservation programs in West Africa.

Source(s)	Project	Location	Year	Land (ha)	Cost (US$)	Sponsors/Partners	ES Good	ES
FAO, 2004, Jindal et al, 2008; Masiga, 2011	Village-based management of woody savannah and the establishment of woodlot for carbon sequestration project	Benin	1992-1997	126,700	2.5 million	United Nations Development Programme (UNDP), Government of Benin, Global Environmental Facility (GEF)	Carbon sequestration	Regulating and Provisioning Service
Jindal, 2008; Masiga, 2012	Senegal Plantation Project	Mali	2006	10,000		World Bank, Mali Institute d'Economic Rural (IRE).	Carbon sequestration and Biodiversity conservation	Regulating, provisioning, and Supporting Services
FAO, 2004; Jindal et al, 2008	Sequestration of carbon in soil organic matter (SOCSOM)	Senegal	2002			United States Agency for International Development (USAID), Centre de Suis Ecologie (CSE), Senegalese Institute for Agricultural Research (ISRA), EROS Data Centre		Regulating Service
Masiga, 2012	Acacia Community carbon plantation	Niger	2006	22,800		World Bank, Senegal Developers-Achats Services International	Landscape beauty	Regulating, provisioning and cultural services
FAO, 2004	Carbon Sequestration and Sustainable Agriculture	Senegal				Centre de Suis Ecologie (CSE), Natural Resource Ecology Laboratory in Colorado, ISRA, EROS, Geographic Institute of Technical University of	Carbon sequestration	Regulating Service

					Copenhagen, Swiss Federal Polytechnic Institute Lausanne.		
FAO, 2004	Carbon Sequestration pilot projects in West African Savannah Optimum	Mali, Benin, and the border between Ghana and Burkina Faso	10,000		Near East Foundation (NEF), SOS Sahel, The Columbia International Earth Sciences Information Network (CIESIN), International Fertilizer Development Centre	Carbon Sequestration and Biodiversity Conservation	Regulating and Supporting Services
Roncoli et al, 2007, Jindal et al, 2008	A sustainable management programme (SANREM).	Mali	2002-2005	143,263	National Aeronautics and Space Administration (NASA), United States Agency for International Development (USAID), Sustainable Agriculture and Natural Resource Management Collaborative Research Support Programme (SANREM CRSP), IRE.	Carbon Sequestration and Biodiversity Conservation	Regulating and Supporting Services
Jindal et al, 2008; Kane et al, 2010	Participatory Rehabilitation of degraded lands	Senegal and Mauritania	2001-2008	4-8 million	UNDP, GEF, Governments of Senegal and Mauritania	Carbon Sequestration and Biodiversity Conservation	Regulating and Supporting Services
Jindal et al, 2008	Sustainable energy management project	Burkina Faso	1997-2003		World Bank, Governments of Norway and Burkina Faso	Carbon Sequestration	Regulating Service
Somda and Nianogo, 2010	Sourou Valley Wetlands valuation project	Burkina Faso	2009		Environment and Agriculture Research Centre (EARC). Economic and Social Policy Centre (ESPC)	Carbon Sequestration, Biodiversity and Landscape Conservati	Provisioning, Regulating, Supporting and

						on, Watershed Conservation	Cultural Services
Katoomba XV, 2009; Asante et al, 2012	The Ghana Cocoa Carbon Initiative (GCCI)	Ghana			Nature Conservation Research Centre (NCRC), Katoomba Group and Forest Trends	Carbon Sequestration	Regulating and Provisioning Service
IUCN, 2015	Guinean Forests Hotspots	Guinea, Sierra-Leone, Liberia, Ghana, Cote 'd' Ivoire, Togo, Benin, Nigeria, Sao Tome and Principe	2001-2011, 2016-2021	17.3 million	World Bank, MacArthur Foundation, GEF, l'agence Francais de Development (AFD), Government of Japan, Conservation International (CI), EU.	Carbon Sequestration, Biodiversity and Landscape Conservation, Watershed Conservation	Provisioning, Regulating, Supporting and Cultural Services
RSBP, 2013	The Gola REDD project	Sierra-Leone	2012	1.6 million	Sierra-Leonan Ministry of Agriculture, Forest and Food Security, Conservation Society of Sierra-Leone, Royal Society for Birds Protection, EU, Winrock International, Climate Focus, Cambridge-Wageningen research group, Green Africa, Welthungerhilfe.	Carbon Sequestration and Biodiversity Conservation	Regulating and Supporting Services
Plan Vivo 2017	Rehabilitation of degraded pasture land	Burkina Faso	2014	7250	Ministry for Animal Resources Burkina Faso, Luxembourg Agency for Development Cooperation (LuxDev), REACH Italia, AGED	Carbon Sequestration, Biodiversity, Watershed	Regulating, Provisioning and Supporting Services

						Conservation	
ITTO, 2015; Appiah et al., 2015	Restoration of degraded forest land projects	Ghana	1995, 2000		International Tropical Timber Organisation, Government of Ghana, United States Department of Agriculture, Forest Service, UK Department for International Development	Biodiversity Conservation and Restoration	Regulating, Provisioning and Supporting Services

Table S2. Conservation programs in West Africa (continued).

Source(s)	Project	Threats/Motivation	Objective(s)	Outcomes	Challenges
FAO, 2004, Jindal et al, 2008; Masiga, 2012	Village-based management of woody savannah and the establishment of woodlot for carbon sequestration project	Deforestation. Slash and burn agriculture	Reverse deforestation. Sequester 5.3 million tonnes of carbon. Combat desertification. Improve soil fertility. Improve socioeconomic condition of villagers	Approximately 610,000 seedlings have been planted with 70% survival rate. About 842,000 tCO2 sequestered. Forest fires declined by 30% . Strengthened social and institutional structure in the villages. Introduced alternative sources of income e.g. beekeeping and planting alternative crops	n/a
Jindal, 2008; Masiga, 2012	Senegal Plantation Project	Increasing degraded forests	Reforest 6,000ha of land. Sequester 300,000 tonnes of carbon by 2017, and	n/a	n/a

			800,000 tonnes by 2035. Improve the socioeconomic condition of participating communities.		
FAO, 2004; Jindal et al, 2008	Sequestration of carbon in soil organic matter (SOCSOM)	Climate change mitigation and adaptation	Determine the carbon sequestration potential of soils. Build the capacity of locals to adapt to climate change. Identify ecological conditions that will enable socioeconomic growth.	They discovered agricultural practices that reduce biomass loss and soil infertility. Identified biophysical factors that encourage carbon sequestration	n/a
Masiga, 2012	Acacia Community carbon plantation	Increasing degraded forests and lands	Reforest 17,000ha of land. Sequestrate 0.24MtCO2e. Improve the socioeconomic condition of participating communities.	n/a	n/a

FAO, 2004	Carbon Sequestration and Sustainable Agriculture	Climate change mitigation and adaptation	Ascertain the importance of soil organic matter to climate change adaptation	n/a	n/a
FAO, 2004	Carbon Sequestration pilot projects in West African Savannah Optimum		Measure the potential of the Savannah climate to store carbon. Test the carbon sequestration potential of different agricultural management systems.	n/a	n/a
Roncoli et al, 2007, Jindal et al, 2008	A sustainable management programme (SANREM).		Determine the carbon sequestration potential of arid and semi-arid soils	Introduced efficient and sustainable grazing practices to participating communities.	Ambiguous outline of roles and jurisdictions among participating stakeholders worsened by diverging stakeholder interests
Jindal et al, 2008; Kane et al, 2010	Participatory Rehabilitation of degraded lands		Restore degraded lands to	Conserved 160,000 ha of land. Reduced	Low technical and knowledge

		conserve biodiversity. Sequester carbon. Improve economic conditions of participating communities	bush burning by 50% and a 119% increase in forest and vegetation cover. 3.3 tonnes/ha of carbon sequestered in two project sites. The reappearance of lost Fauna species. Created micro-credit schemes to finance micro-projects. Increased the income of participating households by 12%.	gap among program participants diminished the impact of diversification activities introduced by the project.
Jindal et al, 2008	Sustainable energy management project	Sequester 1.6MtCO2 over a 6-year period	n/a	n/a
Somda and Nianogo, 2010	Sourou Valley Wetlands valuation project	Identify the socioeconomic and environmental potential of the Sourou wetlands.	n/a	n/a

Katoomba XV, 2009; Asante et al, 2012	The Ghana Cocoa Carbon Initiative (GCCI)	Deforestation. Declining soil fertility	Reduce Deforestation. Improve soil fertility and agricultural yield. Sequester carbon.	Low payments. A legal and cultural system that supports over-exploitation of forest resources. Managing conflicting interests among various stakeholder groups.
IUCN, 2015	Guinean Forests Hotspots	Overexploitation of forest resources. Intensive agriculture. Urbanisation	Protect biodiversity hotspots that house unique flora and fauna species. Improve the socioeconomic condition of participating communities. Promote the rise of environmental civil society organisations.	Low knowledge of emissions accounting among local public and private agencies. Civil and political conflicts e.g. civil wars. Trade-offs between environmental and welfare goals.

RSBP, 2013	The Gola REDD project	Deforestation. Habitat and species loss.	Conserve 68.5K of forested lands. Sequester 19 Million tCO2. Improve the socioeconomic condition of participating local communities. Raise public awareness on environmental conservation matters	Low knowledge of emission accounting.
Plan Vivo 2017	Rehabilitation of degraded pasture land	Increasing degraded pasture lands	Restore 7250ha of degraded pasture lands using original tree and plant species. Sequester 49tCO2e. Raise the awareness of local communities and build their know-how on environmental issues.	Low knowledge of sustainable land-use management activities.

ITTO, 2015; Appiah et al., 2015; Blay et al., 2008	Restoration of degraded forest land projects	Deforestation, Loss of soil fertility due to slash and burn agriculture, Gold mining,	Introduce integrated management systems to restore biodiversity loss and agricultural productivity. Promote the cultivation of indigenous tree species	Provision of alternative sources of income for farmers. Supply of inputs, agricultural extension and equipment to farmers. Creating a platform geared towards environmental conservation and responsible agricultural production that connected stakeholders from different communities. Enhanced the capacity of local farmers regarding establishment of seeds nursery and plantation, and managing	Uneven system for sharing royalties from timber logging firms. Land tenure issues.

					forest fires. Led to establishment of equitable-benefit arrangement that included landless, poor farmers.