Payments for Environmental Services as Incentive Opportunities for Catchment Forest Reserves Management in Tanzania

By
Zahabu, E., Malimbwi R.E., and Ngaga, Y.M.

Abstract
Catchment forests occupy a total of 2.8 million hectares in Tanzania. This is about 8% of the total forested land in Tanzania. While catchment forests offer both direct tangible benefits and indirect benefits of which some are perceived as environmental services, they are threatened by prevailing high rate of deforestation and general degradation. Traditionally the management of catchment forests focused on expanding the area under state tenure by excluding local communities. This approach has resulted in greater forest degradation as a result of increasing demand for forest products by local communities due to population increase and lack of alternative sources of income. Inadequate government resources in terms of manpower and funding to effectively manage catchments forests and other forests also contributed to the failure. This reason and others have led to the emergence of Participatory Forest Management (PFM) in its varying facets reflecting varying degrees of involvement of local communities in the management of forest resources. PFM has two main scenarios in Tanzania, Joint Forest Management (JFM) where by villagers and the government jointly manages the forest, and Community Based Forest Management (CBFM) whereby management of the forest is vested wholly in the hands of the local communities. JFM is adopted in catchment forests because of their sensitive nature. The total forest area which is under PFM or is in the process of changing is 2,975,919 ha of which 1,890,613 ha are under JFM.

The last decade has witnessed an overwhelming popularity of PFM in most developing countries with varying levels of success. A well managed catchment forest normally benefits a wide range of stakeholders, normally far away from the forest in the form of water for domestic use, hydroelectricity, tourism and carbon sequestration among others. It is logical that these stakeholders should pay for the outcomes of good forest management as incentives to the managers, the local communities. In a study carried out with respect to catchment forest reserves in Tanga, Morogoro, Arusha and Kilimanjaro regions the actual Total Economic Value (TEV) of the forests was rated at USD 496 million per year. A fraction of this value should be ploughed back to the local communities as payment for environmental services. Various benefit sharing mechanisms have been explored in this paper as incentives for improved forest management.

1. Introduction

While catchment forests offer both direct tangible benefits and indirect benefits of which some are perceived as environmental services, they are threatened by prevailing high rate of deforestation. In the past both the Tanzania government and the international community joined hands in addressing the problem of deforestation through forest resources management focusing at conservation. It is presently realized that the continuing deforestation is due to the failure of the past conservation approaches that aimed to bring more forests under state tenure and protection as reserves or parks (Kiss, 2004). That approach had a great impact of excluding local communities from forest management, the consequence of which was increasing deforestation. This reason and others have led to the emergence of Participatory Forest Management (PFM) in its varying facets reflecting varying degrees of involvement of

local communities in the management of forest resources. The recent approach of PFM however, also appears to have some problems including lack of incentives for the participating communities (Malimbwi, 2002, Kiss, 2004).

It is proposed by neo-market natural resources economists that, new ways and institutional set-ups to supply for such required incentives have to be developed (Winrock International, 2004). This implies that for environmental services to be provided for by local actors, financial incentives have to be made available by international, national/regional and local actors. These required financial incentives for environmental services generation are referred to as *Payments for Environmental Services* (PES*).* The PES initiatives are expected to complement past forest reforms thereby contributing to generation of incentives for forest management by PFM projects. Under PFM, local communities that are managing natural forests by avoiding deforestation have to be compensated for their management efforts in order to reinforce their commitment to conserving natural forests and, in turn, safeguard their livelihoods.

This paper highlights the major features of forest endowment in Tanzania, and then examines values accruing from catchment forests. An attempt has been made to attach economic values to services and products from catchment forests. Finally the paper explores the opportunities available for PFM to benefit from PES initiatives. The PES initiatives are expected to complement past forest reforms thereby contributing to generation of incentives for forest management by PFM projects. Under PFM, local communities that are managing natural forests by avoiding deforestation have to be compensated for their management efforts in order to reinforce their commitment to conserving natural forests and, in turn, safeguard their livelihoods. The incentives are expected to motivate local communities to participate in forest management at a much large scale than those of today and therefore provide forest services at a far better quality and at a wider scale.

2 Forest endowment in Tanzania

According to the Tanzanian forest policy the country has an area of 33.5 million hectares of forests and woodlands. Out of this total area, almost two thirds consists of woodlands in the public lands, which have no clear management guidelines. About 13 million hectares have been gazetted as forest reserves. Industrial plantations cover approximately 80,000 hectares while 1.6 hectares are water catchment forests (URT 1998). These statistics are the official figures often quoted but their reliability today is questionable due to fragmented and outdated sources of information, and emerging management strategies, which affect both tenure status and extent of the forest land.

In an attempt to address the status of the forestland in Tanzania, the Tanzania Forestry Conservation and Management Project (TFCMP) (Malimbwi 2001) attempted to take stock of all the forests under central government, local authorities, and private or village forests, and their functional roles. As a result of that study, the summary of the forest status in Tanzania, by ownership and use categories is shown in Table 1. The total forest land area is estimated at 34,368,742 hectares after removing 1.1 million hectares of degazetted forest reserves.

Productive forests constitute a total of 30.6 million hectares (88% of the total forest land) while protective forests have a total of 3.8 million hectares. In productive forests controlled harvesting of timber, poles and charcoal making is allowed. Protective forests are usually

located in sites with steep slopes, which serve as water catchment areas and are prone to soil erosion if disturbed. Such forests include the Eastern Arc mountain forests, which are recognized globally as biodiversity hotspots worth protecting. Harvesting is not allowed in protective forests but in practice illegal harvesting is in progress. A recent forest inventory report in 11 districts of Eastern and Southern Highland Zones (Malimbwi *et. al.,* 2005) showed that all forests including catchment forests are under pressure of exploitation.

Table 1. Summary of the distribution of forest land area by use and ownership in Tanzania as of 2001

Ownership	Productive		Protective		Total	
	No.	**Area (Ha)**	**No.**	**Area (Ha)**	**No.**	**Area (Ha)**
Declared Forests						
- L.A.	95	1,356,204.2	74	231,470.4	169	1,587,674.6
- C.G	223	9,292,844.9	225	2,986,862.4	448	12,279,707.3
- P.F.	3	20,547.8	1	23,188.0	4	43,735.8
Subtotal	**321**	**10,669,596.9**	**300**	**3,241,520.8**	**621**	**13,911,117.7**
General land forest						
- P. L. A.	20	64,018.8	43	102,558.8	63	166,577.6
- P. C. G.	15	352,557.3	50	443,367.0	65	795,924.3
- V.F.	54	178,995.6	24	7,296.9	78	186,292.5
Subtotal	**89**	**595,571.7**	**117**	**553,222.7**	**206**	**1,148,794.4**
- Unreserved		19,308,830.2				19,308,830.2
Total Gen. For.	**89**	**19,904,401.9**	**117**	**553,222.7**	**206**	**20,457,624.5**
Grand Total	**410**	**30,573,998.8**	**417**	**3,794,743.4**	**827**	**34,368,742.2**

Key: L.A.= Local Authority; C.G.= Central Government; P.F= Private forests; P.L.A. = Proposed Local Authority; P. C. G. = Proposed Central Government; V.F= Village Forests

Source: Malimbwi 2001

The total number of forest reserves is 827 with a total area of 15.05 million hectares, out of which 621 are declared forest reserves occupying13.9 million hectares against 206 proposed forest reserves with a total of 1.15 million hectares (Table 1). Declared forest reserves are forest reserves which have been gazetted and their identity is recognized by the legislation. Declared forest reserves therefore include gazetted forests under the central government, local government, private forests and those under Participatory Forest Management (PFM) which have secured title deeds from the government. Proposed forest reserves are those forests which have been surveyed and may have their maps prepared but have not been gazetted. Proposed forest reserves are not therefore covered by legislation. Few forests under central and local governments have a "proposed status".

Forest tenure in Tanzania falls into five major entities;
(i) Central government forest reserves
(ii) Local government forest reserves
(iii) Private forests
(iv) Village forest reserves,
(v) General land forest - non reserved

Central government forests

Central government forest reserves have a total area of 12.3 million hectares (81.5% of the total area of forest reserves) and they are mostly declared. These include 223 productive forest reserves (9.3 million hectares), and 225 protective forest reserves with 3 million hectares of which 115,000 hectares are mangroves and 83,000 hectares are industrial

plantations. The remaining 2.8 million hectares are mainly catchment forest reserves. URT (1998) reports 1.6 million hectares of catchment forests.

Local government forest reserves

Local government forest reserves managed at the level of District Councils under local governments. By 2001 there were 169 forests reserves under local governments with an area of 1,588,000 hectares. This is only 5% of the total forest area in the country. Local government forest reserves are regarded as a major source of revenue from charcoal and timber extraction in the districts; most of them are therefore degraded, even those under protective role.

Private forests

There are three private forests covering a total of 60,959 hectares in Tanzania (Table 2)

Table 2. Private forest plantations in Tanzania as of 2001

Region	District	Name of Reserve	Ownership	Area (ha)	Main products
Iringa	Njombe	(TANWAT)	(TANWAT)	17,800*	wattle bark, firewood and logs for the factory, power station and sawmill
Iringa	Mufindi and Kilombero	Escarpment Forest Cooperation	Tree Farms	15,000**	Timber and poles; carbon trading
Morogoro	Kilombero and Ulanga	(KVTC)	(KVTC)	28159	Teak
Total				**60,959**	

Source: Malimbwi 2001 *only 2862 ha planted by 2001; ** only 1446 hectares planted by 2001

Village forests

Village forests reserves are forests under Participatory Forest Management (PFM) and they are categorized into two main entities CBFM and JFM forests. By 2001 there were only 78 village forest reserves with a total of 186,292 ha in Tanzania. Today there are a total of 994 PFM areas involving 2009 villages with a total area of about 3 m ha (Table 3). CBFM forests are mainly general land forests that are now being managed by local communities. This shifts the free access nature of general land forests to the control of villagers for better conservation. JFM forests on the other hand are national or local government forest reserves, which are now jointly managed by the villagers and the government (local or central government). Most forests under JFM are catchment forests.

Table 3 PFM areas in Tanzania

	Type of PFM		Total
Attribute	CBFM	JFM	
Number of villages	1484	525	2009
Number of forests	957	37	994
Area Ha	1,085,306	**1,890,613**	**2,975,919**

Source: PFM Working Paper II, and reports and questionnaire from districts, 2002

The majority of village forests are in Iringa region. Others are in Arusha, Shinyanga, Costal (Pwani), Singida, Tabora and Mtwara regions. Because of the high cost involved in establishment of a village forest reserves, most of the villages have been formed through donor support. Table 4 shows the various sources of support to PFM in Tanzania.

Table 4. Sources of support to PFM by regions in Tanzania

Region	Area under CBFM (ha)	Area under JFM (ha)	Total area under PFM (ha)	Main sources of support
Arusha	199000	80511	279511	LAMP,DBO,CFP,GEF
Dodoma		72566	72566	FBD
Iringa	76888	868749	945637	MEMA, HIMA
Kagera	411	29031	29442	GEF, GTZ
Kilimanjaro	2153	122,889	125042	CFP, NRBZ, GEF
Lindi	66000	36602	102602	RIPs, UTUMI
Mara	4877	86112	90989	Vi
Mbeya	3607	103245	106852	EC
Mtwara	73121	90209	163330	RIPs
Morogoro	26006	85576	111582	WCST, FBD, CFP
Mwanza	35000	5421	40421	FRMP
Coastal (Pwani)	3553	100324	103877	WWF, TFCG, WCST, REMP
Rukwa	14263		14263	NORAD
Shinyanga	400000	3758	403758	HASHI
Singida	170067	17882	187949	LAMP
Tabora	7660	168806	176466	FRMP, AFRICARE
Tanga	2700	18932	21632	NRBZ, EUCAMP,CFP
Total	**1085306**	**1890613**	**2975919**	

Source: PFM Working Paper II, and reports and questionnaire from districts, 2002

Although PFM is considered the most viable option to conserve Tanzanian forest land, plans to expand the strategy should address the cost element adequately.

General land forests

The general land forest, formerly known as public forestland is non gazetted or non reserved and it covered about 20.5 million hectares by 2001 (60% of all forest land). Proposed central and local government forests and village forests were in this category. These forests are "open access" characterized with insecure land tenure, shifting cultivation, harvesting for wood fuel, poles and timber, and heavy pressure for conversion to other competing land uses, such as agriculture, livestock grazing, settlements, industrial development in addition to wild fires. The rate of deforestation in Tanzania which is estimated at between 130,000 to 500,000 hectares per annum (MNRT, 1998) is mostly impacted in the general land forests.

With the emerging trend of PFM the forest area in general land is now reduced to about 18 m ha. Future existence of forests in the general land hinges on the ability of the government to reverse the open access situation through the promotion of PFM. Areas that are considered to have catchment, biodiversity or amenity values should be identified and managed under (JFM) between village communities and central government or local authorities. Traditional forest areas/trees for worshipping and other cultural activities should be enhanced as these have high conservation role.

3 Management of catchment forests

3.1 Historical perspective and extent

The management of catchment forests in the country was initiated towards the end of the nineteenth century (1888) when the importance of conserving water sources was noted by the Germans (Hermansen *et. al.,* 1985). Between 1888 and 1920, efforts were made to reserve as much as possible of those catchment forests, which still existed. This brought about reservation of a chain of mountain areas from Mbulu to Mbeya totalling 5,200 km^2. The protected areas included: Nou, Marang, Ngorongoro, Monduli, Mt. Meru, Mt. Kilimanjaro, Chome, Shume-Magamba, Shagayu, North Nguru, Ukaguru, Uluguru and Rungwe (Msangi 1986).

The British administration (1920-1961) followed up by protecting the catchment forests as well as reservation of more catchment and other forests bringing the total reserved areas into 13,369 km^2 (Msangi 1986). After independence, efforts were made to re-survey and demarcate old reserves while few new ones were created and some degazetted. Today the area under catchment forests is around 2.8 million ha. Figure 1 shows the distribution of major catchment forests in Tanzania.

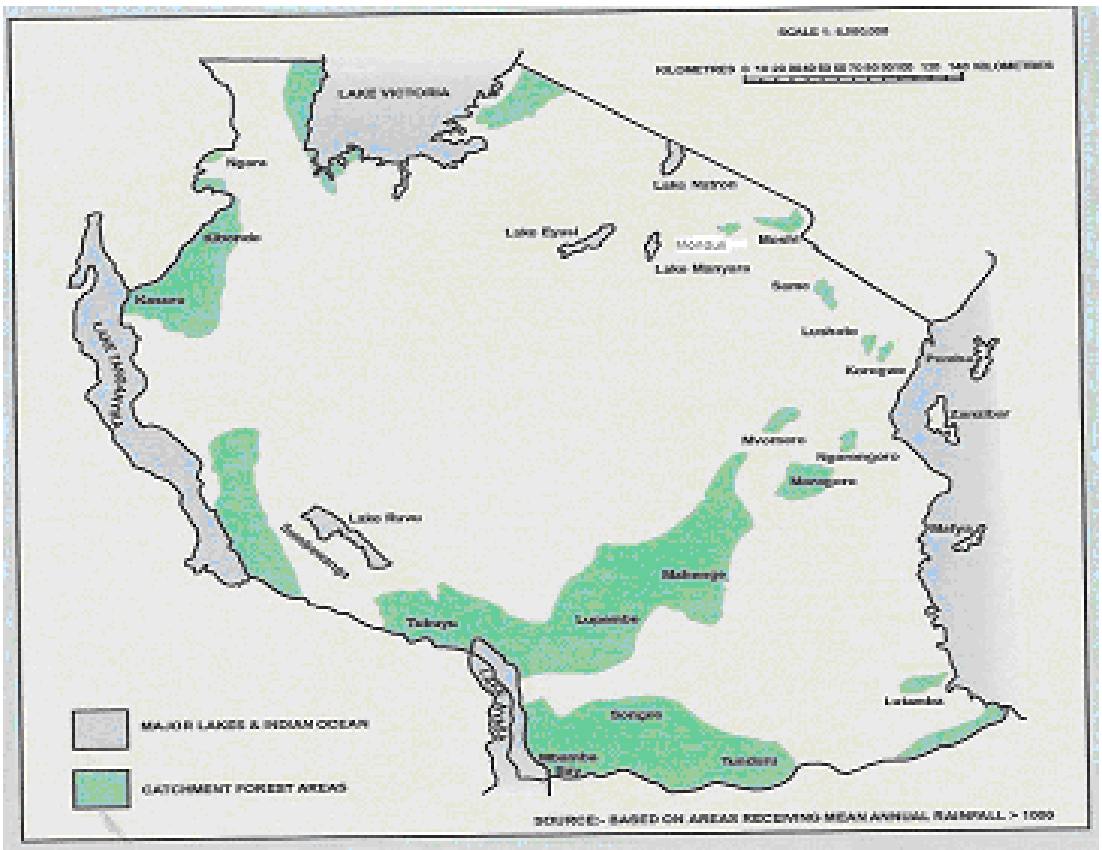

Figure 1. Major catchment areas in Tanzania

3.2 Institutional Management of CFR

The ongoing decentralization process is creating an unclear institutional process. The majority of catchment forests are supposed to be managed by the central government. However only four regions have been receiving full support from the Catchment Forest project under NORAD support and these are Arusha, Kilimanjaro, Morogoro and Tanga. The total area of forests in these regions is 783,500 ha, about 28% of total area under catchment

forest. It is in these regions where Regional and District Catchment Forest Officers are employed. These have received substancial amounts of NORAD fund since 1988 mainly targeted to:

- Establish supportive and effective project administration
- Establish effective managemnt of catchment forests
- Promote relevant research in the catchment forests
- Promote awareness and participation of communities in forest catchment management
- Set in place sustainable funding and framework for CF Management
- Initiate modalities for expanding the project activities to other regions
- Develop management plans

By 1996, most of these outputs were partially or not achieved. Most catchment forest reserves did not have maps and their boundaries were not clear. Today NORAD support in these regions has been reduced to cover only 32 out of 150 forest reserves whereby concentration is on preparation of management plans and promotion of PFM. Fourteen Management plans have so far been prepared in the Project region, but have not yet been approved, indicating a heavy task still ahead.

In the non project regions the day to day management of CFs is done by Regional Natural Resources Officers (RNROs) who receive little financial support from the central government for patrolling, boundary clearing and eviction of dwellers in the forest reserves.

3.3 Threats to Catchment Forests

The major threats to Catcment forests are; illegal harvesting; encroachment for agriculture, settlements, and mining and forest fires. There is also a problem of poor record keeping in most forest offices.

During the *G8* summit from 17th –18th March 2005 in Derbyshire delegates came up with the following statement "We agree that working to tackle illegal logging is an important step towards the sustainable management of forests and sustainable development. We recognize the impacts that illegal logging, associated trade and corruption have on environmental degradation, biodiversity loss, and deforestation and hence climate systems. Illegal logging also damages livelihoods in the poorest countries, causes loss of revenues to Governments, distorts markets and trade, and sustains conflicts". A recent forest inventory showed that illegal timber harvesting is in progress in all forest reserves including CFs, and most forests have either outdated or no maps and the boundaries are not clear (MNRT 2005). The average rate of deforestation in CFs in the four regions is estimated at 23,000 ha (1970s-2000s), but the yearly rate tends to decrease with time possibly due to the impact of the project and depletion of free access forest land (Mbilinyi *et al* 2005).

Fire is a long standing problem in Tanzanian forestry. While fire is part of the ecosystem in miombo woodlands, it is now common in plantations and CFs with serious consequences. Records show that all forest plantations have had at least five incidences of fire causing a total loss of Tshs. 8,800,079,441/= during the period 1990 – 2000 (excluding Sao Hill).

In catchment forests most incidences have been recorded in the Eastern Arc Mountains together with Kilimanjaro and Meru. The period 1996/97 had most incidences in Kilimanjaro. In addition to causing losses in timber and biodiversity in these renown hot spots, the catchment value of the forest is reduced resulting in hydrological imbalance which is reflected in reduced water in

rivers and streams during the dry seasons and floods during the rain seasons.

3.4 Values of catchment forests

The contribution of catchment forests to biological and gene pool conservation of both the flora and fauna is enormous as they possess high degree of endemism in plant and animal species. The biodiversity value of the Eastern Arc Mountains (i.e. the mountains running in an arc from the North Pare Mountains, through South Pare, West and East Usambaras, Nguru, Uluguru, Ukaguru, Rubeho and Udzungwa ranges which are all catchment forests) in terms of the total number of endemic species and the density of these endemics, is exceptional in world terms (MNRT 2001). For example, of about 15 wild coffee species which grow in Tanzania, 8 occur exclusively in Eastern Arc Mountain catchment forests (Bridson and Verdcourt 1988 in Nsolomo et al. 1997). Also out of Tanzania's 450 indigenous tree species which are above 20 m height, 150 occur exclusively in Eastern Arc catchment forests and 38 of them are endemic to these forests (Pocs 1988). Some endemic animal species also occur in catchment forests of Tanzania including two monkey species *Colubus badius gordonorum* and *Cercocebus galeritus* occurring in Mwanihana catchment forest in Morogoro region (Wasser 1993 in Nsolomo et al. 1997). On the other hand, the volcanic mountain catchment forests (Meru and Kilimanjaro) which are only a few million years old have not evolved many endemic species and hence their value is not as great as the Eastern Arc (MNRT 2001).

The catchment capacity of a forest (interception, re-evaporation, through fall, stem flow, infiltration, percolation and runoff) depends highly on the structural elements of the canopy and other vegetation layers as well as on meteorological factors (frequency and intensity of rain, temperature and moisture regimes etc) (Pocs 1988). A non degraded catchment forest has the ability to maximize water storage in the ground by facilitating infiltration and also regulates the flow such that water is released over a long period of time. The maintenance of a forest canopy reduces soil erosion and maintenance of surface ground cover slows surface runoff.

The presence of epiphytes in most of the mountain catchment forests has been shown to intercept significant amounts of rain, leading to better conservation as the epiphytic cover minimizes the water loss through excess surface runoff, then supplies water continuously ensuring good infiltration and saturation of the ground, at the same time protecting the soil from erosion and desiccation. On Mt. Uluguru, Pocs (1988) found at 2120 m asl, 13,000 kg of epiphyte per ha capable of intercepting 60,000 litres of water per ha during a single rain.

The major river basins in Tanzania have their origins in the catchment forests (Table 5). These provide water for hydro-power stations, irrigation, and domestic and industrial use. The destruction of the original, highly differentiated natural forest cover in a catchment area always has negative effects on the catchment capacity. Generally, surface runoff and soil erosion increases while stream flow shows much greater seasonality.

3.5 Economic valuation of Catchment Forest Reserves (CFRs)

A study was commissioned by the Tanzanian Ministry of Natural Resources and Tourism (MNRT) to explore the value to Tanzanian society as a whole, with respect to catchment forest reserves (CFRs) in the Tanga, Morogoro, Kilimanjaro, and Arusha Regions of Tanzania (MNRT 2003).

Table 5. Economic and environmental importance of river basins supported by catchment forests

SN	Region	Area (ha)	Rivers supported	Major economic and Environmental importance
2	Arusha	118,920	Pangani River Basin	▪ Tourism on Mount Meru, Arusha National Park ▪ Wildlife habitat ▪ Hydropower, irrigation ▪ Environmental flows ▪ Water for domestic and industrial use
8	Kagera	144,614	Kagera River Basin	▪ Lake Victoria Fisheries ▪ Irrigation ▪ Transport ▪ Environmental flows
4	Iringa	155,000	Ruaha River Basin	▪ Hydropower, irrigation, grazing ▪ Water for domestic and industrial use ▪ Tourism in Ruaha National Park ▪ Wild life habitat ▪ Environmental flows
1	Kilimanjaro	138,078	Pangani River Basin	▪ Tourism on mount Kilimanjaro ▪ Water supply for hydropower (Nyumba ya Mungu Dam, irrigation (coffee and sugarcane plantations) ▪ Fishing Nyumba ya Mungu dam, lake Jipe ▪ Environmental flows (water for the environment) ▪ Water for domestic and industrial use
9	Mara	4,511	Mara River	▪ Lake Victoria Fisheries ▪ Environmental flows ▪ Tourism Serengeti National Park
3	Mbeya	103,268	Ruaha River Basin	▪ Hydropower, irrigation, grazing ▪ Water for domestic and industrial use ▪ Tourism Usangu plains
5	Morogoro	367,000	River basins of Rufiji, Ruvu, and Wami	▪ Ramsar Sites of Kilombero Valley, Rufiji-Mafia-Kilwa ▪ Hydropower and irrigation ▪ Environmental flows ▪ Fisheries ▪ Rufiji delta ecosystem
7	Ruvuma	45,000	Ruvuma River Basin	▪ Fisheries ▪ Mnazi Bay Marine Park ▪ Transport ▪ Environmental flows
6	Tabora	971,823	Malagarasi-Moyovozi River Basin	▪ Lake Tanganyika Fisheries ▪ Malagarasi-Moyovozi Ramsar site ▪ Gombe National Park ▪ Environmental flows
10	Tanga	165,494	Pangani River Basin	▪ Hydropower ▪ Irrigation ▪ Domestic
Total		**2,213,708**	-	-

Source: MNRT 2005. Tanzania Catchment Forests. Hidden Treasure, brochure

The CFRs in these regions cover in aggregate of around 715,000 hectares. The CFRs, like other forest types in the country, have only been valued for their direct use benefits such as wood

products in the form of timber, poles and woodfuels. Some of the direct use values such as medicinal plants, fruits and other non-wood products have not been valued. Also, indirect use benefits such as stabilisation of water flows, stabilisation of climate, biodiversity, and non-use values and option values have been taken for granted and not quantitatively included in the valuation process to provide the Total Economic Value (TEV) of CFRs. TEV is an accounting equation that sums up use and non-use values of natural resources such as CFRs. The potential role of CFRs in Tanzania is generally underestimated.

The methodology used to estimate the various components differed. Actual use values were based on a survey in each of the four regions; values for water stabilization were based on replacement cost methods; tourism values were derived from data on the number of visitors to various areas; carbon sequestration values were based on growth and biomass figures from the literature; erosion control figures were based on data on downslope agricultural areas and soil loss equations for Tanzania; biodiversity and non-use figures were derived from the wider literature, with Tanzanian values calculated as a share of global values.

The value of the benefits from current use of the catchment forests – both legal and illegal values supplied by the forests were estimated based on values of year 2001. In calculations of potential values a discount rate of 10 percent, the rate recommended by the World Bank was used. The main sources of data were household questionnaires in villages surrounding CFRs, checklists and interviews with important stakeholders. A total of 160 households were interviewed. In addition literature data and expert evaluations were used.

Results indicate that the values can be aggregated in terms of potential value and in terms of "actual" values. The two resulting TEVs will differ only with respect to direct use values in this analysis. Potential and "actual" TEVs are aggregated in Table 6.

Table 6: Aggregate potential and "actual" TEV

Item	***Potential TEV, USD***	***"Actual" TEV, USD***
Timber and timber-related goods	445,010,000	67,612,498
NTFPs	33,927,110	287,075,461
Water	54,100,000	54,100,000
Soils	18,701,275	18,701,275
Tourism	11,878,330	11,878,330
Carbon	50,872,507	50,872,507
Option value/biodiversity	4,035,262	4,035,262
Non-use	1,834,210	1,834,210
Sum	**620,358,694**	**496,109,543**

Source: MNRT 2003.

Thus, the potential – which here means sustainable – value of the CFRs is estimated to be some USD 620 million, while the "actual" value – which here means unsustainable – is estimated to be some USD 496 million indicating some sustainable use.

Even though the sustainable yield of timber products is not exploited, this does not mean that current practices are sustainable. While extraction might have been sustainable if were distributed over wider areas, it is the nature of deforestation that harvesting and extraction often occur in concentrated areas and pockets.

Thus, the "current" or "actual" TEV estimate given here is included more as an illustration – an illustration of the distortions that will invariably ensue when standard methods are used. For general purposes, we recommend the use of the potential TEV.

The most valuable component – as much as 70 percent of the total – in the potential TEV is indeed timber and timber-related goods, indicating the importance of these products to the local people, a paradox since such harvesting is illegal in all CFRs. Option and existence values are relatively modest since only the value to the Tanzanian population is counted; on a global scale, these values would increase by a factor of 20.

The TEV represents a considerable sum. While such a sum may give an indication of the overall value of the CFR resources, however, it must be recalled that the figure is based on a thought experiment - the sudden destruction of the resource. In practical terms, because it sheds light on the loss of value involved in a gradual rather than a cataclysmic conversion of forest resources, marginal figures are perhaps of greater interest and use.

4. Benefit sharing in CFRs Management

The recent approach of CFM in Tanzania has a problem of lack of incentives for the participating communities. It is proposed that, new ways and institutional set-ups to supply for such required incentives through the market based environmental services payments have to be developed. Payment for Environmental Services (PES) evolved on the idea that sound forest management practices generate a number of environmental services that their consumers may be willing to pay for their sustainable generation. The services are: carbon sequestration, biodiversity conservation, watershed protection, and landscape beauty. These benefits can excite far-reaching effects at a global scale or have immediate effects at national/regional as well as at a local level. For example a molecule of carbon dioxide, regardless of where it is emitted, can be anywhere on the planet in little more than a week (Trexler, 2003). Similarly, a reduction of greenhouse gas emissions has the same effect on the atmosphere no matter where the reduction occurs. On the other hand sound management of water catchment in upland areas can reduce soil erosion, landslide, sedimentation and flooding and provide clean water for downstream user at national/regional and local levels (Winrock International, 2004). Markets for environmental services are therefore expected to be at international, national/regional and local levels. An exploration of general sources of funds for forests conservation and empirical examples of market based payment systems are given hereunder.

4.1 Funds for the environmental conservation in developing countries

While concern on environmental conservation is long in the history, serious international alert started in the seventies when there were heightened concern about environmental destruction and loss of biodiversity. The United Nations Environment Programme (UNEP) was formed in 1972 where a number of regional and international agreements to tackle specific issues, such as protecting wetlands and regulating the international trade in endangered species were signed. These agreements have helped to slow the tide of environmental destruction along with controls on toxic chemicals and pollution. Also in 1970 the United Nations (UN) through the General Assembly resolution has set a target of 0.7% of Gross National Income (GNI) of developed countries as Official Development Assistance (ODA) to developing countries. ODA comprises of loan, grant or technical assistance in the form of bilateral or multilateral agreements for the purpose of supporting infrastructure

development, technology improvement, capacity building and, environment conservation and removing structural barriers. The ODA is short of its commitment as the average ODA/GNI ratio is only 0.22% for the Organization for Economic Co-operation and Development (OECD) countries (FAO 2004). Since ODA support is very important for the developing countries, stringent mechanism need to be put in place for the developed countries to meet their commitment.

Many international development agencies and financial mechanisms provide funds for conservation through available ODA support and other dedicated fund sources. These are mostly development banks and foundations from the United States and Europe that solicit funds from developed countries and through international agencies to implement conservation projects in developing countries. Food and Agriculture Organization (FAO) of the United Nations through participation with the Collaborative Partnership on Forests (CPF) and the National Forest Programme Facility (NFPF) has established an online source book on funding for sustainable forest management (CPF, 2005). The major component of the sourcebook is the database of funding sources that provides efferent way to locate global funding sources for sustainable forest management.

Conservation activities may also get funds from the Debt-for-Nature Swaps (DfNS). This is a method by which debt owed by a developing country can be renegotiated with the creditor to fund conservation activities. Usually these funds are made available through conservation intermediaries who are non-profit organizations but can also be research/academic institutes, United Nations agencies, conservation trust funds or private foundations. Conservation intermediaries normally originate the deal, as they have access to information on international debt and on local projects in debtor countries. DfNS have been an important source of funding for conservation trust funds, many of which have made significant impacts in funding conservation in their own countries and worldwide as well as contributing to increased civil society and public sector interest in the environment.

During the 1980s, there were increasing concerns about global environmental changes. It is until 1992 in Rio de Janeiro at the United Nations Conference on Environment and Development (UNCED) where world leaders agreed on a comprehensive strategy for sustainable development: meeting our needs while ensuring that we leave a healthy and viable world for future generations. Some of the key agreements adopted at Rio were the Convention on Biological Diversity (CBD) and the United Nations Framework Convention on Climate Change (UNFCCC). This pact among the vast majority of the world's governments sets out commitments for climate change control and maintaining the world's ecological systems as we go about the business of economic development. The CBD establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources (UNEP, 1994).

It was clear from the CBD that the ability of developing countries to take national actions to achieve global biodiversity benefits would depend on financial and technical assistance from developed nations. As such bilateral and multilateral support for capacity building and for investing in projects and programmes was essential for enabling developing countries to meet the Convention's objectives. The Global Environment Facility (GEF) was thus established with projects, supported by the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the World Bank, to help forge international cooperation and finance actions to address four critical threats to the global environment:

biodiversity loss, climate change, depletion of the ozone layer, and degradation of international waters. Developing countries that have ratified the CBD treaty are eligible to propose biodiversity conservation projects. Private sector, NGOs and other civil society organizations that are doing conservation activities are also eligible to some sources of funds. By the end of 1999, the GEF had contributed nearly $ 1 billion for biodiversity projects in more than 120 countries (CBD, 2006).

4.2 The emergence of international market-based funding systems

The above mentioned funding sources for biodiversity conservation are not market based financial mechanisms. Market financing mechanism for biodiversity conservation requires that, conservation becomes a product that can be purchased directly and provided according to clearly established criteria. There have however been a few cases of international market funding mechanisms for biodiversity conservation such as 'conservation concession agreement' and 'purchase of nature'. These are the initiatives practiced by a United States-based, international organization, Conservation International (CI) and the Netherlands Committee for the International Union for the Conservation of Nature (NC-IUCN) for promoting nature conservation around the world. Under a 'conservation concession agreement', governments or local resource users agree to protect natural ecosystems in exchange for a steady stream of structured compensation. The opportunity costs of foregoing natural resource exploitation, including lost employment and government revenue from taxes, may serve as a basis for determining the amount of the payment. This may apply for example in timber harvesting after a timber concession, whereby a logging company pays the government for the right to extract timber from public forestlands. Rather than log the concession area, the conservation investor would pay the government for the right to preserve the forest intact. Up to 2001, the CI was practicing 'conservation concession agreement' with the governments of Guyana, Indonesia, and Peru (Rice, 2002). On the other hand NC-IUCN is (co-)financing local nature conservation projects in the framework of small grants programmes for the 'purchase of nature'. This provides financial support to local NGOs for strategic purchase of nature areas in tropical countries. In principle, nature areas should not be for sale according to the viewpoint of NC-IUCN, for these areas belong to everyone. In practice however, purchase appears to be a strong instrument in saving highly threatened nature areas from destruction. A number of projects are implemented by NC-IUCN funding in Poland, Costa Rica, Ecuador and Guiana Shield area that covers the countries of Suriname, Guyana, French Guyana and parts of Colombia, Venezuela and Brazil (Blom, e*t. al*., 2002). The Shield is one of the oldest geological formations in the world, containing unique flora and fauna.

On the other hand an international forest carbon trading system is developing fast through the Clean Development Mechanism (CDM) of the Kyoto protocol of the United Nations Framework Convention on Climate Change (UNFCCC). The CDM provides market mechanism for the sale of carbon credits whereby developed countries are required to meet their greenhouse gases reduction commitments and get Certified Emission Reduction Credits (CERs) by investing in certain kind of tropical forestry. Under the CDM developing countries in the tropics may establish forest project activities resulting in CERs whereby developed countries may use the CERs accruing from such project activities to contribute to their CDM commitments. In the Kyoto protocol developed countries, are required to reduce their emissions of greenhouse gases to about 5% of their 1990 levels by the years 2008 – 2012. These countries can meet their reduction targets for CO_2 emissions in a variety of ways: through improved energy efficiency; by substituting fuels that produce less CO_2 and by using

renewable energy sources. Using forests to 'lock up' or sequester carbon was also promoted as another means by which CO_2 emissions could be offset. However, it has been agreed that in the first CDM commitment period (2008-2012), activities involving land-use, land-use changes and forestry activities will be limited to afforestation and reforestation projects only.

To be internationally valid, Kyoto Protocol itself had to be ratified not only by 55% of all UNFCCC members but also enough Annex 1 countries so that 55% of all carbon emissions are covered. At present although United State of America has not yet ratified, the ratification of Russian in later 2004 made it possible for the protocol implementation from February 2005. There are also in place prepared guidelines for National Greenhouse Gas Inventories integrated with the Good Practice Guidance. These provide standards for monitoring, verification and eligibility of offsets (IPIECA, 2006). As such currently carbon trading is already emerging around the world.

Having ratified the Kyoto protocol since 2002, Tanzania is eligible to benefit from the forest carbon trading under the CDM. Also it can benefit from 'non-compliance' markets. Green house emission reduction projects may currently be supported from various sources of funds such as the Prototype Carbon Fund, The Netherlands Clean Development Facility, BioCarbon Fund, Community Development Carbon Fund and the Dutch FACE foundation. In the future more opportunities are also expected since the carbon market is still developing.

1.1.3 National market for environmental services

Most beneficiaries perceived environmental services as *public good*[1] traits and as such it is regarded as the governments' role to maintain and provide them. Governments are seen to use tax mechanism from forest products and are also increasingly starting to encourage policies that involve local communities in sustainable management of natural resources. Therefore, since the governments' role on resources management is partly done by local people practicing CFM, the governments can provide direct compensation to them as the spending in forestry management is greatly minimized through reduced number of permanent employment of forestry staff. However, since the government financial capacity is limited, some alternative sustainable market based financial mechanisms for compensating conservation should be explored for adoption.

Like any other biological resources, forests have both *public good* aspects and *private good* aspects. The *private good* aspects can be packaged into products and services that can be sold. These include ecotourism, timber extraction for various purposes and visit to protected areas for camping, picnic and research. If the supply of these products and services is sustainable, then the revenue earned from their sale can be used to finance forests conservation through retained earnings. However, in order to have important link between the conservation efforts and the revenue generated, the revenues raised for conservation should be closely related to the product and services provided.

[1] A *public good* is a term used by economists to refer to a product (i.e., a good or service) of which anyone can consume as much as desired without reducing the amount available for others.

It is the opposite of a *private good*, which is any product for which consumption by one person reduces the amount available for others, at least until more is produced.

Several examples of revenue sources whose earnings may be retained to finance particular conservation areas exist. In Tanzania protected areas authorities are charging sizeable entrance fees to parks and reserves and structuring lucrative lease agreements with hotels and tour operators. Hunting concessions and harvesting contracts are also offered to potential businessman and tourists. Tourism and forestry sectors contributed to about 18% (i.e. USD 2,600) of GDP in 1997 (URT, 1998, 1999). The contributions are currently on an increase but little to nothing is left for the conservation of the particular areas from where they are derived from.

There is also a possibility of getting revenues from bio-prospecting. Bio-prospecting is the search for new chemicals in living things that will have some medical or commercial use. Indigenous peoples of the world possess a vast store of knowledge about the properties of many native plants and animals. Pharmaceutical companies and agribusiness use indigenous knowledge as a precursor to screening of useful commercial substances. A country may therefore be able to sell bio-prospecting rights to international companies, in sectors such as pharmaceuticals, cosmetics, and agriculture. However, this is happening with little regard for the protection of indigenous intellectual property and with no equitable sharing of profits.

The earnings from these sources could be retained to fund those specific forest areas from which they are derived. However, the ability of the forest projects to generate and retain revenue depends on their institutional structure and the policies established by Governments. There should be strong political will towards conservation and clear guidelines on the establishment of structures that generate incentives to conserve through retaining revenues from the sustainable use of forest resources. A mechanism to distribute such revenues to relevant stakeholders, such as local communities that may absorb many of the opportunity costs associated with forest conservation also need to be developed. Mainstreaming revenue sharing mechanisms in the recent approach of community involvement in forest management should therefore be made for the retention schemes to be meaningful to the local communities.

In Tanzania, currently the main sources of finance for forest management are: charges levied on the major forest products and services; state budget allocation to the forestry administration and; donor grants and loans for forestry projects (Whiteman, 2002). The Tanzania Forest Fund was also recently established (URT, 2002). This fund consists of 2% of every fee and a levy of 3% of any royalty apart from grants and donations from donor organizations. The purpose of the fund is basically promotion of forests management and to assist in enabling the country to benefit from international initiatives and funds directed towards forests management. However, the Forest Fund has not yet identified innovative financing market mechanisms to attract new sources of investment in forest management outside the traditional channels.

Costa Rica seems to be succeeding in implementing innovative financial market mechanism of payments for environmental services through legislative measures. The country has defined its national market for environmental services by creating the demand through legislative measures and determining the value of services by political decision. In 1996 Costa Rica adopted a new forestry law, (Law no. 7575), which explicitly recognizes four environmental services of forests: carbon fixation, hydrological services, biodiversity protection and provision of scenic beauty. The law permits landholders to be compensated for providing these services through forest protection, forest management, reforestation, and tree plantations. Implementing rules for the new law were adopted in 1997. These defined

sources of financing that is primarily from domestic tax on fossil fuels and rules for disbursing, environmental services payments. Funds were to be channeled through the National Forestry Fund (FONAFIFO), which had been established in 1991 to handle an earlier generation of incentives for reforestation. Between 1997 and 2002, the program covered more than 300,000 hectares and total payments exceeded US$80 million with 70% going for forest protection (Rosa, *et al*, 2004). The World Bank and the Global Environment Facility (GEF), through the Ecomarkets Project, have provided, respectively, a credit line of US$32.6 million and a grant of US$8 million to help finance the programme of payments for environmental services and to strengthen FONAFIFO, SINAC and the local non-governmental organizations involved in the implementation of the programme (Rodriguez Zuñiga, 2004).

The established Tanzania Forest Fund is a good idea but still is financed from traditional sources of funds. The fund is also suggested to be put for forest management practices that are not aiming at provision of incentives to those who directly participate in conservation activities. The success stories of PES from Costa Rica can therefore be given enough thought for their application in Tanzania. Currently, the country's road infrastructure is benefiting to an excellent level from tax imposed on fuels (TFGRTD, 2003). In 1991, the Roads Fund financed primarily by fuel levy was established through Parliamentary Resolution. The fund administered through the Road Fund Board is now succeeding on maintaining and developing road network that was deteriorated before its establishment. This provides enough evidence that in Tanzania such innovative financing system works. What is needed is political and legislative support together with awareness rising among different stakeholders.

4.3 Local market for environmental services

It is for long accepted that sound natural resources management in upland areas, provide environmental benefits to beneficiaries downstream, such as hydroelectric facilities and clean irrigation and domestic water. The beneficiaries of these services can be asked to compensate the upland landowners for the services they are receiving. This mechanism provides self-sustaining markets for environmental services at the local level. Similarly the recreational use of forests and their contribution to scenic beauty are effectively and widely sold through ecotourism enterprises, the revenues whether collected by the government or landowners themselves can be used as direct incentives for forest conservation.

People in urban areas are in most cases the main beneficiaries of water services and can compensate for watershed management through their municipal or town councils in order to avoid negative consequences of bad land management in upland areas. For example, New York City gets about 1.4 billion gallons of water per day from the Delaware, Catskill, and Croton watersheds. Rather than investing about $6 billion to construct filtration plants and $300–500 million more for annual operating costs, city commissioners developed a far more cost-effective and comprehensive watershed protection program. The city agreed to invest $1–1.5 billion within ten years, financed by additional taxes on water bills, bonds, and trust funds. Under the Watershed Agricultural Program, a voluntary locally administered program, the City funds are used to implement environmentally friendly practices on watershed farms. Participating farmers receive technical assistance to develop a 'Whole Farm Plan', a comprehensive strategy for controlling potential sources of pollution on the farm. New York City authorities cover the costs associated with the implementation of new practices (Perrot-Maitre and Davis 2001 in Winrock International, 2004; Rosa, *et al* 2004).

Private and public hydroelectricity companies are also the beneficiaries of water services. Empirical examples show that there are voluntary agreements between some hydroelectricity companies that compensate for watershed management by direct payments to the upland landowners. In Costa Rica, a hydropower company La Esperanza agreed with a conservation organisation Asociación Conservacionista Monteverde since 1998 to pay for watershed management. The company pays 10 US$/ha per year to the NGO for hydrological services of forests in the Peñas Blancas watershed (Reyes *et al,.* 2002*).* Watershed management agreements are also done between individual landowners (even without land titles) and the hydroelectricity companies. The Compañía Nacional de Fuerza y Luz signed an agreement in 2000, where 47 US$/ha per year is compensated to landowners with or without land title during 10 years in three watersheds (Reyes *et al,.* 2002*).*

All these examples suggest that agreements for payments for water services provision include a whole watershed area with improved different land uses such as agricultural field, forests and general lands. Although legal framework is needed to institutionalise such agreements, most of them are voluntary and locally made initiatives with little government interventions or sometimes the government can be an intermediary. For the voluntary mechanism to work there should be consumers' willingness to pay for the services. Consumers' willingness to pay is driven from: the increased awareness on the economic importance of environmental services; growing awareness of threats to supply environmental services; and improved methods for monitoring status, impact and consumption of environmental services (Landell-Mills, 2003).

Tanzania has abundant water resource, which serve many uses including not only supply to urban and rural areas but also harnessed to produce hydroelectricity. However, the country's water resource has in recently years started to diminish with increasing water supply and sanitation demands (Kabudi, 2005). Frequent water shortages for both the urban users and the hydroelectricity companies are a common feature in the country especially during the dry seasons apart from periodic outbreak of water born diseases such as typhoid and cholera. Water supply infrastructures and reservoir dams are also frequently blocked and filled up by silts. All these are signs of bad land management in upland areas supplying water downstream. This may not be acknowledged by most of the people due to their low level of awareness on environmental threats. Local communities already practicing PFM are aware of environmental issues and could therefore be very much influential in conservation activities in upland areas if they are adequately compensated for their efforts.

5 Concluding Remarks

- Collaborative Forest Management in Tanzania entails forest resource management by, for and with the local community.
- Collaborative Forest Management Strategy in its double faces: Joint Forest Management and Community Based Forest Management reverses top-down, centre-driven management strategy by focusing on the people who bear the costs of conservation.
- Advocacy for collaborative forest management is driven by several perceptions: the importance of areas outside direct state control for biodiversity conservation; the inability of state agencies to manage these conservation areas; the potential for cost effective local management based on social convenience; the need to draw on detailed local knowledge of ecological dynamics; and enhanced motivation to conserve forest resources when this creates economic benefits.

- Economic improvement as advocated by this paper is both morally imperative and essential for environmental stability.
- Previous economic growth and environmental protection were carried out in isolation from each other and from the local level, often resulting in accelerated degradation.
- Thus the deeper agenda, for contemporary foresters in Tanzania is to make forests and forest products meaningful to rural communities.
- As far as local communities are concerned, the agenda is to regain control over forest resources, and through collaborative management strategies, improve their economic well being
- The ultimate output of PFM and PES is sustainable forest management manifesting in the form of; halted deforestation and forest degradation, sequestered carbon and conserved biodiversity, protected watershed, conserved soil and water and available tangible benefits to local poor communities
- Although funding opportunities may be available from international conservation agents, concerted government and NGOs interventions are required to support local arrangements between communities in upland areas and water users such as the municipal council, hydroelectricity companies and irrigation schemes in downstream, to sep up a compensation scheme for environmental conservation in upland areas.
- Different land uses such as agriculture, forests and general land have to be included and improved in order to provide water at desired quantity and quality. A proportion of proceedings from water users, starting with the Ministry of Water and Livestock Development should go back to compensate the guardians of water sources. In places where legislation fails to work such generated funds may be used to buy off individuals who are cultivating in water sources

REFERENCES

Brand, D. 2002. Investing in the Environmental Services of Australian Forests. In: Pagiola, S., Landell-Mills, N. and Bishop, J. (Eds.) (2002) *Selling Forest Environmental Services: Market –based Mechanism for Conservation and Development,* London: Earthscan. Pp234-245.

Brown, K., and Corbera,E,. (2003). *A Multi-Criteria Assessment Framework for Carbon-Mitigation Project: Putting 'development' in the center of decision-making*, Tyndall Centre for Climate Change Research working paper 29.

Brown, S. 1999. Land-Use and Forestry Carbon-Offset Projects Winrock International, 1611 N. Kent St., Suite 600, Arlington, VA 22209, USA.

Collaborative Partnership on Forestry (CPF). 2005. Web Document assessed on 9th May 2005. http://www.fao.org/forestry/foris/webview/cpf/index.jsp?geoId=0&langId=1&siteId=2225

FAO. 1997. *State of the World's Forests, 1997*. Rome: FAO. Website document accessed on 20/05/2005: http://www.fao.org/docrep/W4345E/w4345e0b.htm#forestry%20funding.

FAO. 2004. *Collaborative Partnership on Forests: Sourcebook on Funding for Sustainable Forest Management.* Rome: FAO. Web Site: www.fao.org/forestry/site/7148/en accessed on 20/05/2005.

Kabudi, P.J. 2005. Challenges of legislating fro water utilization in rural Tanzania: drafting new laws. A paper presented at the International workshop on "African Water Laws: Plural Legislative Frameworks for Rural Water Management in Africa", 26-28 January 2005, Johannesburg, South Africa.

Kiss, A, 2004. Making biodiversity Conservation a land use priority. In: getting Biodiversity Project work: Towards more effective Conservation & Development. T. Mcshane & M. Wells, eds. Columbia University Press, New York.

Landell-Mills, N. 2003. Developing markets for forest environmental services: an opportunity for promoting equity while securing efficiency? In Ian R. Swingland. Capturing Carbon & Conserving Biodiversity: The market approach. Earthscan, Landon, 272-282 pp.

Malimbwi, 2002. Forest extent and ownership in Tanzania. Consultancy report, Tanzania Conservation and Management Project (TCMP), Forestry and Beekeeping Division, Dar es Salaam Tanzania.

Mero, D. C. 2002. Financing reforestation for improved watershed management in the Philippines. European Tropical Forest Research Network (ETFRN) News No. 35.

MNRT 2000 (a). Woodfuel strategy draft report. Pp90.

MNRT 2003. Resource Economic Analysis of Catchment Forest Reserves in Tanzania. Ministry of Natural Resources and Tourism, Forestry and Beekeeping Division, Dar es Salaam. 222pp.

MNRT, 2000 (b). List and summaries of reserves in Tanzania mainland. Forest Conservation and Management Programme, Dar es Salaam, Tanzania. 38 pp.

Perrot-Maitre, D. and P. Davis. 2001. *Case Studies of Markets and Innovative Financial Mechanisms for Watershed Services from Forests.* Forest Trends. Washington, D.C.

Reyes, V, Segura, O & Verweij, P. 2002. Valuation of hydrological services provided by forests in Costa Rica. European Tropical Forest Research Network (ETFRN) News No. 35.

Rodriguez Zuñiga, J.M (2004). Paying for forest environmental services: the Costa Rican experience. Unasylva - No. 212. Vol. 54 2003/1.

Rosa, H, Barry, D, Kandel, S., and Dimas, L., (2004). Compensation for Environmental Services and Rural Communities: Lessons from the Americas. Paper presented at the International Conference on Natural Assets, Tagaytay City, Philippines, January 2003, 33 pp. Revised July 2004 http://www.umass.edu/peri/pdfs/WP96.pdf

TFGRTD, 2003. The Role Of Rural Transport In Poverty Reduction. Tanzania Forum Group for Rural Transportation and Development in Cooperation with The International Forum for Rural Transport and development, A Poverty Watch Publication, Dar es Salaam. 56 pp.

The Convention on Biological Diversity (CBD) website documents visited on 10th May 2005. http://www.biodiv.org/convention/default.shtml

The World Bank, 2005: *Carbon Finance Booklet, Overview of the World Bank Carbon Finance Business*, World Bank, Web Document assessed on 22nd June, 2005. <htpp://carbonfinance.org/docs/CFBrochure1.pdf>

Trexler, M.C. 2003. The role of the greenhouse gas market in making forestry pay In *Unasylva: making forestry pay* Vol 54 No 212, FAO, Rome.

United Republic Of Tanzania (URT), 2002. Forest Act. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. 1281 pp.

Whiteman, A. 2002. Fiscal policies in support of the forestry sector in Africa. European Tropical Forest Research Network (ETFRN) News No. 35.

Winrock International, 2004. Financial Incentives to Communities for Stewardship of Environmental Resources: *Feasibility Study.* Winrock International, 1621 North Kent Street, Suite 1200 Arlington, Virginia 22209 USA, www.winrock.org. 50 pp.