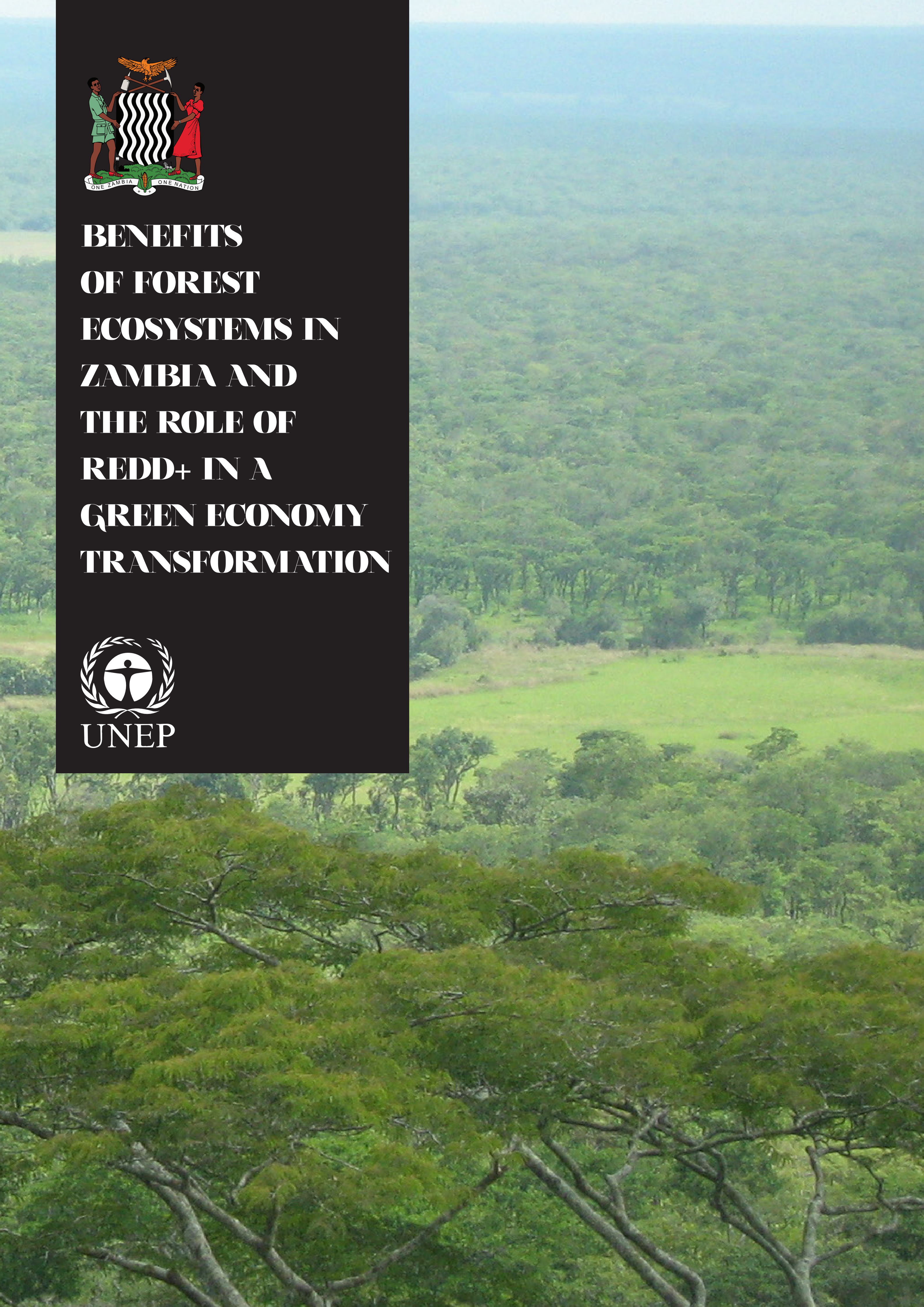
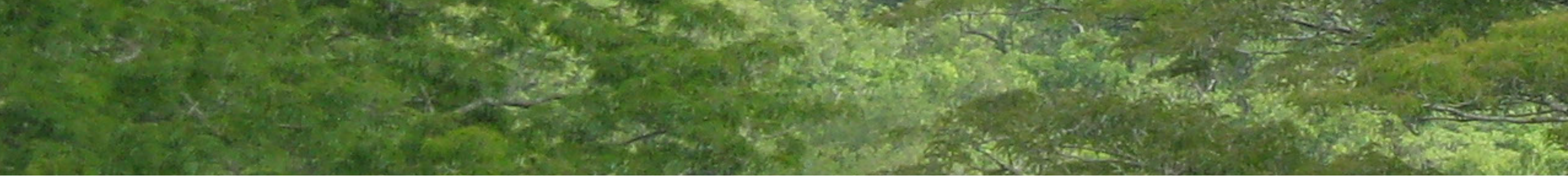
BENEFITS OF FOREST ECOSYSTEMS IN ZAMBIA AND THE ROLE OF REDD+ IN A GREEN ECONOMY TRANSFORMATION

ONE ZAMBIA ONE NATION

UNEP





This is the summary of a report launched in collaboration and consultation with the Government of the Republic of Zambia.

Key messages

- The main objective of the present study was to assess the economic value of Zambia's forest ecosystem services. Preparation of the study forms part of a range of activities under the UN-REDD[1] National Programme. The REDD+ financial mechanism[2] is designed to reward developing countries for their verified reduction or removal of forest carbon emissions measured against a forest reference (emission) level (FREL/FRL) that complies with the safeguards under the 2010 Cancun Agreements.

- Forests are an important component of the natural capital of Zambia and provide benefits critical for rural populations, urban areas, the national economy and the global community. Out of the country's total land area of 75.3 million hectares (ha), estimates of the remaining forested areas range from 39 million ha (CSO 2013) to 50 million ha (Kalinda *et al.* 2008), and even 53 million ha (ZFD 2000).

- Estimates of deforestation rates range from 250,000 ha per year (ILUA study) to 444,800 ha per year (FAO 2005) and some commentators even set these at above 850,000 ha per year (FAO 2001, in Jumbe *et al.* 2008; GRZ 2006a). **Zambia has the second highest per capita deforestation rate in Africa and the fifth highest in the world** (Aongola *et al.* 2009). The main driving forces behind this deforestation are charcoal production, agricultural and human settlement expansion and the illegal exploitation of timber.

- The present study estimates that, when ecosystem services provided by forests are accounted for, **forests make a direct contribution to the national economy equivalent to about 4.7% of gross domestic product (GDP), which rises to 6.3% with the application of multiplier effects.** Data were not available, however, for many goods and services, meaning that the actual figures could be considerably higher than those estimated in this study. For purposes of comparison, in 2010, the following sectors made the largest contribution to Zambia's GDP: agriculture, including forestry (9.9), construction (10.9 %), mining (12.9 %), and the wholesale and retail trade sector (18.9 %).

- According to the present study, the most valuable benefits provided by forests to the Zambian economy consist of charcoal; sediment retention and erosion control; non-wood forest products; and ecotourism and various other services, such as the provision of industrial roundwood, pollination services and carbon storage.

- One of the most important functions performed by forests is their contribution to Zambian livelihoods. **Forests support over 1 million jobs, which means that they support more than 60% of rural Zambian households.**

- The basic REDD mechanism, together with its enhanced version, REDD+, aimed at enhancing forest carbon stock and the conservation and sustainable management of forests, has a significant role to play in catalysing the transition to a green economy and contributing to the country's broader development and attainment of its economic objectives.

- Several measures can help secure the long-term benefits and values provided by forests through mechanisms such as REDD+: these include strengthening forest management and the enforcement of laws on illegal timber harvesting; supporting community land-tenure and strengthening community-based forest stewardship; improving the efficiency and sustainability of agricultural practices; increasing access to incentives and income-generating activities that depend upon forest conservation; and managing the demand for charcoal production.

Importance of forests to the Zambian economy and people

With the growing recognition of the important role of natural capital, there has been a steady shift in the global agenda from the notion of sustainable development to that of the green economy. A green economic path aims to achieve resilient and equitable sustainable development without degrading the environment and losing the services that it provides. Key actions in this regard include preventing the loss of biodiversity and ecosystem services, and promoting energy efficiency, while recognizing human well-being and social equity as core goals (UNEP 2011). To achieve policy shifts in low-income countries in favour of green economic development it will be necessary to demonstrate the costs of the depletion of natural capital – or, conversely, the benefits of securing and restoring natural capital – so that the trade-offs made under different development paths can be fully appreciated.

[1] UN-REDD: United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries.

[2] REDD+, or REDD-plus, is an enhanced version of the mechanism for reducing emissions from deforestation and forest degradation in developing countries (REDD), which emerged in 2008, building in the ideas of conserving and sustainably managing forests, forest restoration and reforestation.

Zambia boasts a wealth of natural resources, which are critical for its people and economic development. The country has committed itself to achieving growth and development to reduce poverty and raise living standards. Forests are important for reaching these goals, because they make up a significant portion of Zambia's natural capital. Figure 1 provides a spatial overview of forest cover in Zambia. Prior to the present study, however, no systematic evaluation had ever been made of Zambia's forests.

The benefits of forests include the provision of products and services, such as timber, raw materials, fuel, food and medicine, that contribute to the livelihoods and income of rural communities. Zambia's forests also provide environmental regulating services, such as carbon storage and sequestration, the regulation of water flows and water quality, erosion control, sediment retention, pollination and disease regulation. They also provide supporting services for tourism, recreational activities and other cultural pursuits. The depletion and degradation of forests will therefore result in the loss of these values, and this loss must be set against any gains that may be made by the competing activities.

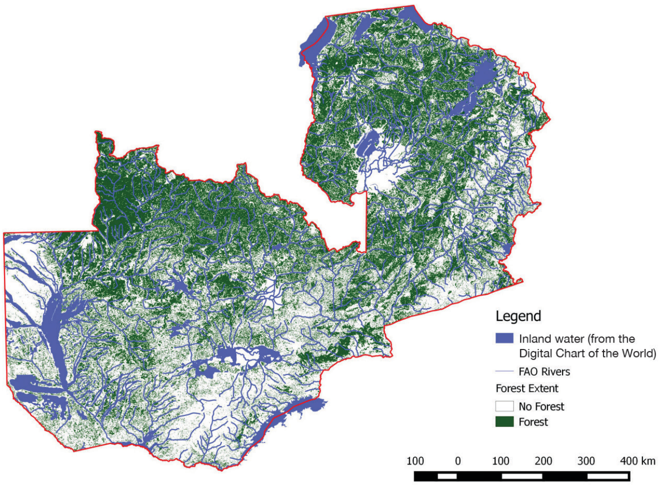


Figure 1: Zambian forest cover. *Source: Map of forest cover by the Zambian Forest Department*

Estimating the economic values of forests to the national economy

The aim of the present study was to undertake a preliminary, rapid assessment of the value of forests in the Zambian economy and the functions that they perform, in support of policy decisions related to development planning, forest conservation and management and the implementation of REDD+ activities in the country.

The study reviewed and synthesized available information gathered through extensive surveys of peer-reviewed publications and academic literature outside official publications – so-called "grey literature" – and from in-country reports and data sources. These data were used to update earlier estimates and to produce preliminary desktop estimates of services that had not been valued previously. Spatial analysis techniques were also used, where possible, to generate estimates of likely variations in the value of ecosystem services and the potential trade-offs involved in forest use and conservation. Based on available empirical and spatial data, in conjunction with assumptions made on the basis of an expert understanding of ecosystem services, preliminary estimates were prepared of the value of a range of forest ecosystem services. Two principal modelling techniques were followed in making these estimates, both of which were limited by the spatial resolution and accuracy of the underlying data:

- Extrapolation of data based on spatial parameters at the resolution allowed by the data (e.g. by vegetation type, biomass, population density or district); or

- Modelling of spatial processes, using an existing spatial modelling platform, the integrated valuation of ecosystem services and trade-offs suite (InVEST), developed by the Natural Capital Project at Stanford University, USA.

The ecosystem services valued, together with the methodologies used and main secondary sources, are highlighted in Table 1.

Results

- The value of **wood production** was estimated at approximately **US$396 million per annum.** There is a spatial mismatch between supply and harvesting, so that certain areas appear to be severely overutilized.

- Estimates of the value of **non-wood forest products** vary considerably, but, based on the assumptions applied in this study, the overall income from such products was estimated at **US$135.8 million per annum.**

- There are various ways in which the value of carbon can be estimated. **The present study estimated the value of carbon** in terms of its damage costs (social cost of carbon emissions). The cost of retaining the remaining carbon stocks would be in the order of US$29 per tonne for the global community, but retraining the remaining carbon stocks for Zambia itself would be very much less costly than this, amounting to some **US$15 million per annum**. Another way to measure the value of carbon is to use prices currently paid in the voluntary carbon market, which are in the range of US$6 per tonne. Depending on location, carbon stocks in Zambian forests are potentially worth about US$150 per ha on average (once off), but range up to US$745 per ha for intact forests. The value of sequestration in degraded areas ranges between are about US$16 and US$30 per ha per year.

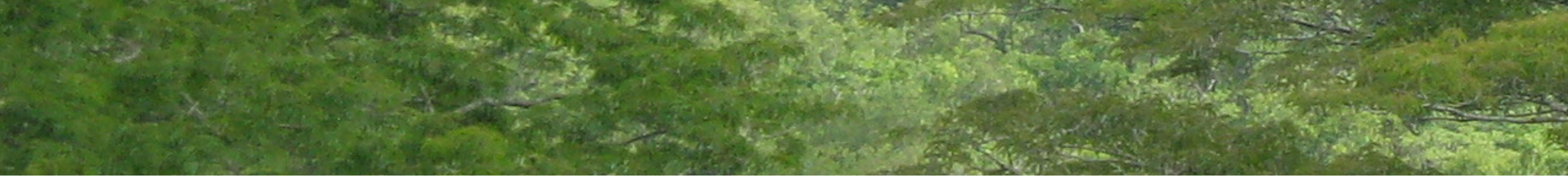


Table 1: Overview of forest ecosystem services valued and methods used to reach these estimates.

Type of ecosystem service	How estimate was reached	Secondary data source
Industrial wood	Value was based on sustainable yield rather than current use. This study uses 1) an existing estimate of the maximum allowable cut (Kalinda *et al.* 2008, 17.5 million m^3), which equates to 0.6% of the estimated standing stock, and 2) Kalinda et al.'s estimate of the proportion of roundwood vs. fuelwood. Using prices per m^3 (Gumbo *et al.* 2013), spatial distribution of this value was mapped based on the distribution of forest biomass.	Puustjärvi *et al.* (2005) Ng'andwe *et al.* (2006) Mukosha and Siampale (2009)
Wood fuel	Using prices per m^3 (Gumbo *et al.* 2013 and CSO 2013), prices per bag or by volume for final products, and conversions was calculated to m^3 equivalents, the resulting figures ranged from $37 to $43 per m^3. Based on conservative price estimates, a final figure for gross value added (GVA) was obtained at 62.5% of gross output. The actual wood fuel production is estimated to be twice the sustainable yield. Spatial distribution of this value was mapped based on the distribution of forest biomass.	Puustjärvi *et al.* (2005) Ng'andwe *et al.* (2006) Kalinda *et al.* (2008) CSO (2013)
Non-wood forest products	Comparable data from earlier studies were analysed using district-level information on forest biomass and rural population density. Cash income from forest products was a function of forest biomass and population density; subsistence income was a function of population density. Using these relationships to estimate income at the district level, and drawing on the findings of earlier studies on contributions of different types of resources to cash and subsistence income, overall income from non-wood forest products was estimated for rural households.	Nkomeshya (1998a & 1998b) Emerton (1998) Turpie *et al.* (1999) Mickels-Kokwe (2005) Jumbe *et al.* (2008) Bwalya (2011) Mulenga *et al.* (2011)
Ecotourism	Estimates of the proportion of forest ecosystem value attributable to nature-based tourism were obtained from an earlier unpublished study and updated using recent tourism statistics of the World Travel and Tourism Council (WTTC). The proportion of nature-based tourism within forested areas was estimated on the basis of the spatial distribution of photo uploads in Google Earth.	Hamilton *et al.* (2007) WTTC (2012)
Erosion control and sediment retention	Soil erosion and transport were modelled for Zambia's catchment areas using the InVEST. This involved estimation of a range of parameters relating to the erodibility of soils, and of the impacts of different types of land use and land cover on the erosivity of the soil and its capacity to trap sediments. These estimates were based on the literature and other similar studies. Estimates of the quantities of sediment that were prevented from reaching dams were computed on the basis of, 1) a conversion of tonnes of sediment to changes in dam volume; and 2) international estimates of the costs of dam sedimentation. The overall value was presented on a spatial scale based on the model outputs of relative contribution of each pixel to this service, irrespective of spatial variation in demand – in other words, assuming that the service is fully demanded.	CSO (2013) Tallis *et al.* (2013) GIS layer on dams Basson *et al.* (2009)
Agricultural support services	Total area and production values were collated for crops dependent on pollination; estimates of the number of hives required per hectare were estimated on the basis of values in the literature for other comparable crops; replacement costs were estimated on the basis of the published cost of hiring hives in South Africa.	GRZ (2011) CSO (2012) Land use/land cover GIS data Allsopp *et al.* (2008)
Carbon storage and sequestration	The value of maintaining current carbon stocks was estimated as the damage avoided that would been caused by deforestation and the resultant climate change impacts, using 1) global estimates of the social cost of carbon; and 2) a very rough estimate of the proportion of that cost that would be borne by Zambia, based on GDP estimates for all countries and the expected relative magnitude of impacts in terms of percentage of GDP for developed versus developing countries. Per hectare values of carbon sequestration were also given, based on published rates of regeneration of degraded forests, and discussed in relation to REDD+ projects. The overall rate of sequestration is unknown, however, as it depends on how both intact and degraded forests are being managed and requires more investigation.	MODIS satellite data

- Based on a model of soil erosion and transport developed through this analysis (using InVEST software), it was estimated that current rates of sediment output are in the order of 250 million tonnes (an average of 2.23 tonnes per ha). **Sediment retention** by forests is in the order of 274 million tonnes, generating cost savings of **US$247 million per annum**.

- Based on the costs of alternative means of pollination, the value of **forest pollination services** was estimated to be in the order of **US$74 million per annum**.

- Estimates of the direct value added by **forest-based tourism** range from **US$110 to US$179 million per annum**.

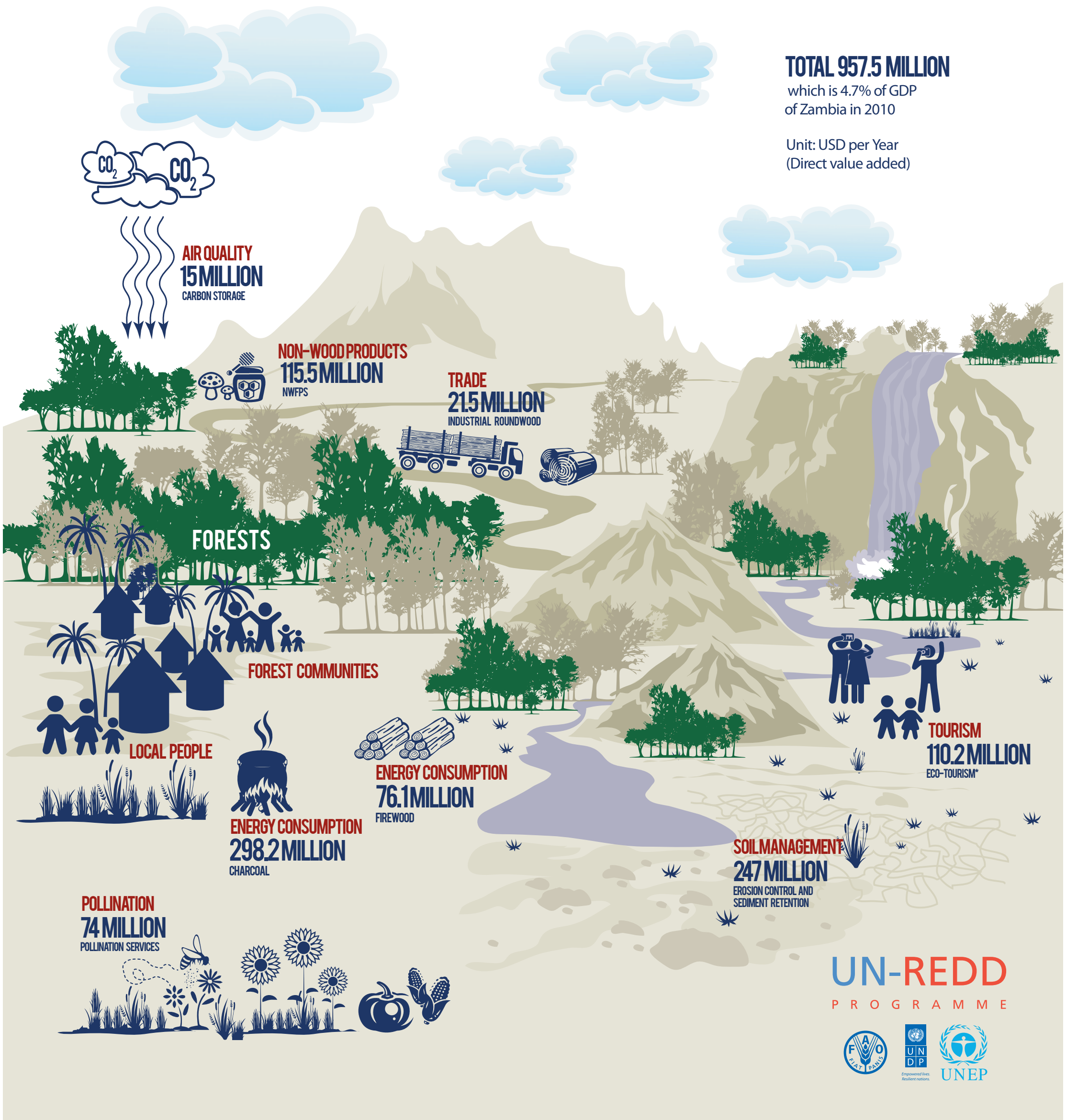
- In summary, the analysis showed that the direct and indirect values of the forests considered under the present study were estimated to make a direct contribution equivalent to some **4.7% of GDP, or US$957.5 million, using 2010 figures.** When, however, the multiplier effects of forestry and tourism-related activities on other sectors are taken into account, the overall or **economy-wide contribution of forests was estimated to be at least 6.3% of GDP, or US$1,277 million.** Table 2 provides a summary of the economic value of forest ecosystem services in Zambia.

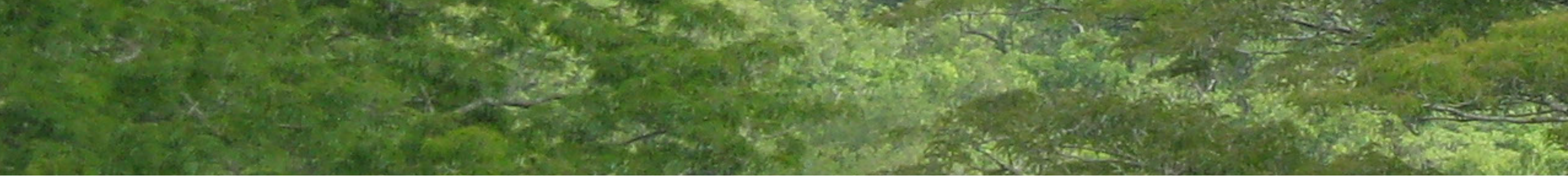
- **Forests are estimated to provide over 1 million jobs, supporting more than 60% of rural Zambian households**, which are heavily dependent upon the use of natural resources to sustain or supplement their livelihoods. Forest resources contribute approximately 20% of household incomes, including the market value of subsistence production. The true value of forests, including flows of goods and services for which no reliable data were available, is likely to be considerably higher.

Table 2: Overview of the economic value of forest ecosystem services and the employment that forest ecosystems generate.

Type of service or value	Gross output or saving	Direct value added	Total value added	Employment
	(US$ million per year)			('000s people)
Industrial roundwood	35.8	21.5	32.0	10.1
Fuel wood (firewood and charcoal)	598.9	374.3	557.7	>500.0
Non-wood forest products	135.9	115.5	172.1	888.8
Subtotal provisioning services	**770.6**	**511.3**	**761.8**	**1 398.9**
Percentage of GDP 2010		**2.5%**	**3.8%**	
Ecotourism*	197	110.2	179.4	16.1
Erosion control and sediment retention**	247	247	247	-
Pollination services**	74	74	74	-
Carbon storage (damage avoided)**	15	15	15	-
Subtotal regulating, supporting and cultural services	**533**	**446.2**	**515.4**	**16.1**
Percentage of GDP 2010		**2.2%**	**2.5%**	
Total	**1 303.6**	**957.5**	**1 277.2**	**1 415.0**
Percentage of GDP 2010		4.7%	6.3%	

* The low-end estimates are used.
** These values are shown without decimals, given the higher level of uncertainty





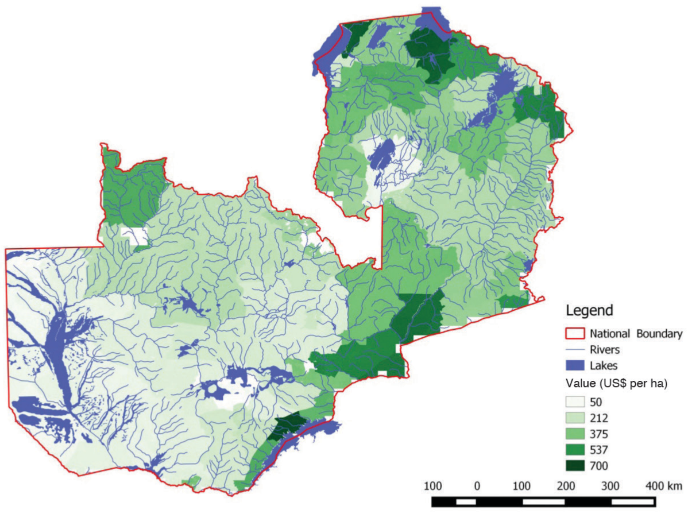


Figure 2: Spatial distribution of the aggregate value of forest ecosystem services (US$ per hectare per year)

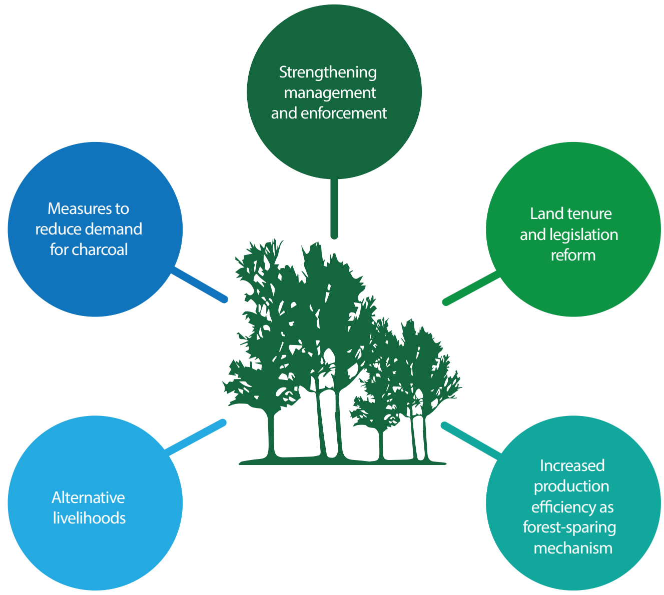


Figure 2 provides an overview of the aggregate economic value of the forest ecosystem services that were assessed as part of this study in terms of United States dollars per hectare per year. As can be seen, the North-eastern and the Southern districts of the country provide the highest economic values per hectare. This type of information would be useful to the Government when prioritizing geographical areas for the implementation of REDD+.

Policy recommendations for investing in REDD+ and implications of such investment

Actions of several types are required to bring about the more sustainable use of forests and to slow the rate of forest loss in Zambia, as outlined below.

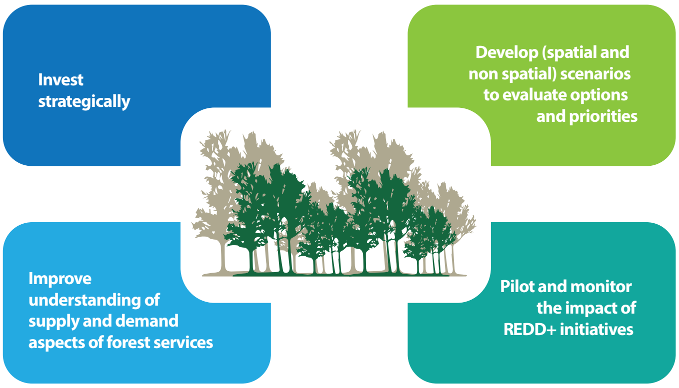
Given the importance of forests to the economy, employment and livelihoods, it is important that cost-effective methods of conserving and sustainably managing forests are implemented to support green growth. Ways of doing this include strengthening and enhancing the management and governance of forests at the local level; introducing measures to reduce urban demand for charcoal; supporting the development of livelihood and income-generating activities that support or rely upon forest conservation and maintenance; and increasing the sustainability and efficiency of agricultural practices. The potential and relative success of each of these strategies depends on the ecological, social, economic and political context in which they are implemented in Zambia. Where appropriate, these approaches should be pursued in concert and can form the pillars of a National REDD+ Strategy in Zambia. The costs and benefits of implementing REDD+ in Zambia will depend heavily on where such implementation is going to take place and the strategies that are employed to reduce deforestation. For forest-based initiatives, given the spatial variation in supply and demand for ecosystem services, projects are likely to have different objectives in different areas. It is recommended that a large proportion of REDD+ investments are used

(a) to address off-site interventions that affect the driving forces behind deforestation; and

(b) to improve forest governance.

The present study suggests that sustainably managed forests yield benefits worth at least US$25 per ha per year on average, although these may be as high as, or even higher than, US$700 per ha. **If these benefits are taken into consideration, REDD+ activities are likely to be more generally viable, and in situ conservation activities will also be viable across a broader spectrum of the landscape.** The consideration of benefits other than carbon, for which this study has made a first-cut estimation, is therefore important in determining the viability of REDD+ initiatives from an economic point of view. It should also be recognized that the carbon income that can be generated through REDD+ initiatives also helps to make public sector investment in forest conservation a more viable prospect.

There is very little precedent in Zambia from which information on implementation costs may be drawn, but the costs of implementing pilot REDD+ projects with a focus on specific project areas range between US$1.7 and US$6 per ha. In the United Republic of Tanzania, on the other hand, project costs are in the range of US$3.9–US$8.9 per ha (UN-REDD 2012). The costs of effective forest management are estimated by the Tanzania Forest Services Agency at US$8.3 per ha (Fisher *et al.* 2011).



In Zambia, the rationale for REDD+ activities and the means by which they are undertaken may differ from province to province and district to district. In North-West Province, for instance, where forests are largely intact and where the potential for timber extraction is highest, the REDD+ priority should be to develop and enforce sustainable forestry, but also to ensure that the energy needs of the large numbers of people migrating into the area are met sustainably. In the more densely populated Central, Southern and Eastern Provinces, where forest cover has already been significantly reduced and degraded and the demand for charcoal is greatest, REDD+ activities must address the issue of charcoal demand. In these areas, where forest ecosystem services contribute substantially to Zambia's agriculture and hydropower production, REDD+ interventions will also need to focus on curbing agricultural expansion.

For several regions of Zambia, success in REDD+ implementation will require examination and planning of the close interlinkages and interdependence between ecotourism, forest conservation and sustainable rural economic development. The regions surrounding the country's eight major national parks show considerable variation in tourism revenues, with the highest per ha rate being those in the regions of the Livingstone, Lower Zambezi, and South Luangwa parks. Clearly, forest conservation efforts maintain the potential for tourism, but it is vital for both the forests and wildlife populations that the communities in those areas obtain tangible benefits from tourism and from forest conservation, in view of the fact that other economic development trajectories (such as agriculture) are not available to them.

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The study was implemented by the Ecosystem Services Economics Unit, Division of Environmental Policy Implementation (DEPI), United Nations Environment Programme (UNEP).

References

Allsopp M.H, de Lange W.J., Veldtman R. 2008. Valuing Insect Pollination Services with Cost of Replacement. PLoS ONE 3(9): e3128.

Aongola, L. Bass, S., Chileshe, J., Daka, J., Dalal-Clayton, B., Liayo, I., Makumba, J., Maimbolwa, M., Munyinda, K., Munyinda, N., Ndopu, D., Nyambe, I., Pope, A. & Sichilongo, M. 2009. Creating and protecting Zambia's wealth: experience and next steps in environmental mainstreaming. Natural Resource Issues No. 14. International Institute for Environment and Development. London, UK

Basson, G. 2009. Sedimentation and sustainable use of reservoirs and river systems. ICOLD Committee on Reservoir Sedimentation. 187pp.

Bwalya, S.M. 2011. Household Dependence on Forest Income in Rural Zambia. Zambia Social Science Journal: Vol. 2: No. 1.

Central Statistical Office 2012. Preliminary Crop Survey Forecast Report 2012/13.

Central Statistical Office 2013. Energy Statistics 2000- 2011. Republic of Zambia.

Emerton, L. 1998. Summary of the local market value of non-timber forest products in Central, Copperbelt and Luapula Provinces. PFAP Publication No. 35 Forest Department, Ministry of Environment and Natural Resources, Government of the Republic of Zambia, Lusaka.

FAO, 2001, Global Forest Resources Assessment 2000. Main Report. FAO Forestry Paper 140. FAO, Rome.

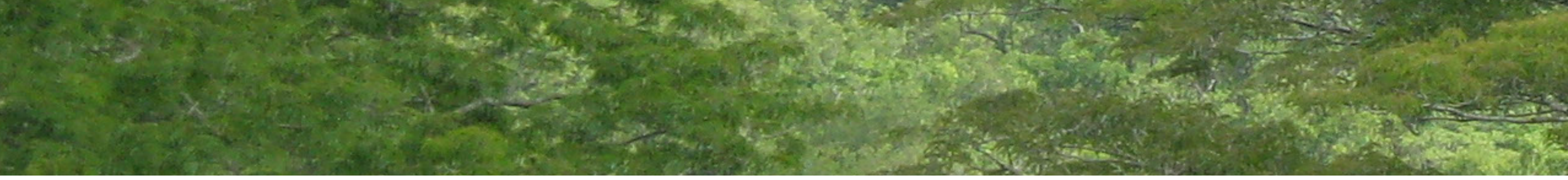
FAO, 2005. Global Forest Resource Assessment 2005. Main Report. FAO Forestry Paper. Rome.

Fisher, B., Lewis, S.L., Burgess, N., Malimbwi, R.E., Munishis, P.K., Swetnam, R.D., Turner, R.K., Willcock, S. & Balmford, A. 2011. Implementation and opportunity costs of reducing deforestation and forest degradation in Tanzania. Nature Climate Change 1: 161–164.

GRZ 2006. Fifth National Development Plan 2006-2010. Lusaka, Government Printers

GRZ 2011. Sixth National Development Plan 2011 - 2015. Lusaka, Government Printers.

Gumbo, D.J., Moombe, K.B., Kandulu, M.M., Kabwe, G., Ojanen, M., Ndhlovu, E. & Sunderland, T.C.H. 2013. Dynamics of the charcoal and indigenous timber trade in Zambia. A scoping study in Eastern, Northern and Northwestern provinces. CIFOR Occasional Paper 86. CIFOR, Bogor, Indonesia.



Hamilton, K., Tembo, G., Sinyenga, G. Bandyopadhyay, S., Pope, A., Guillon, B., Muwele, B., Simasiku, P. & Pavy, J.M. 2007 and 2014. Economic and poverty impact of nature-based tourism. Unpublished report. World Bank, Zambia.

Jumbe, C., Bwalya, S. & Husselman, M. 2008 Contribution of dry forests to rural livelihoods and the national economy in Zambia. Paper to Governing shared resources: Connecting local experience to global challenges. 12th Biennial Conference of the International Association for the Study of Commons, Cheltenham, UK, 14–18 July

Kalinda, T., Bwalya, S., Mulolwa, A. & Haantuba, H. 2008. Use of Integrated Land Use Assessment (ILUA) data for environmental and agricultural policy review and analysis in Zambia. Report Prepared for the Forest Management and Planning Unit of the Forestry Department, FAO & the Zambian Forestry Department, Ministry of Tourism, Environment and Natural Resources, Zambia

Mickels-Kokwe, G. 2005. The economy of forest-dependent households in Zambia. Forest Income in Rural Households. Consultancy report to Indufor Oy for the Zambian Forestry Department and Ministry for Foreign Affairs of Finland.

Mukosha, J., Siampale, A. 2009. Integrated land use assessment, Zambia 2005-2008. Zambia Forestry Department and FAO.

Mulenga, M.P., Richardson, R.B., Mapemba, L., Tembo, G. 2011. The Contribution of Non-Timber Forest Products to Rural Household Income in Zambia. Working Paper No. 54 Food Security Research Project Lusaka, Zambia

Ng'andwe, P., Muimba-Kankolongo, A., Banda, M.K., Mwitwa, J.P. & Shakacite, O. 2006. Forest revenue, concession systems and the contribution of the forestry sector to poverty reduction and Zambia's national economy. FAO and Zambian Forestry Department. 82pp.

Nkomeshya, A. 1998a. Forest utilisation in the fishing households of Luapula Province, Zambia. PFAP Publication No. 46. Forest Department, Ministry of Environment and Natural Resources, Government of the Republic of Zambia, Lusaka.

Nkomeshya, A. 1998b. The role of forests in the livelihood of selected households in Central, Copperbelt and Luapula Provinces Zambia. PFAP Publication No. 48 Forest Department, Ministry of Environment and Natural Resources, Government of the Republic of Zambia, Lusaka.

Puustjärvi, E. Mickels-Kokwe, G. Chakanga, M. 2005. The contribution of the forest sector to the national economy and poverty reduction in Zambia. Forestry department, Zambia and Ministry For Foreign Affairs of Finland.

Tallis, H.T., Ricketts, T., Guerry, A.D., Wood, S.A., Sharp, R., Nelson, E., Ennaanay, D., Wolny, S., Olwero, N., Vigerstol, K., Pennington, D., Mendoza, G., Aukema, J., Foster, J., Forrest, J., Cameron, D., Arkema, K., Lonsdorf, E., Kennedy, C., Verutes, G., Kim, C.K., Guannel, G., Papenfus, M., Toft, J., Marsik, M., Bernhardt, J., and Griffin, R., Glowinski, K., Chaumont, N., Perelman, A., Lacayo, M. Mandle, L., Griffin, R., Hamel, P., Chaplin-Kramer, R. 2013. InVEST 3.0.0 User's Guide. The Natural Capital Project, Stanford.

Turpie, J.K., Smith, B.S., Emerton. L.E., Barnes, J. 1999. Economic value of the Zambezi Basin wetlands. Report to IUCN-ROSA, Harare. 205pp.

UNEP 2011. Toward a Green Economy – Pathways to Sustainable Development and Poverty Eradication. Geneva: Switzerland

UN-REDD, 2012. Estimating the Costs of REDD+ in Tanzania. Policy Brief. Geneva: Switzerland.

WTTC 2012. Travel and tourism economic impact Zambia. World Travel and Tourism Council

Zambia Forestry Department 2012. Audit report 2012

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