

NORWAY PROVIDES SUPPORT TO CONSERVATION ACTIVITIES IN THE EASTERN ARC MOUNTAINS

DESCRIPTION OF THE PROJECT

The Royal Norwegian Embassy (RNE) and the Eastern Arc Mountains Conservation Endowment Fund (EAMCEF) have signed an agreement for a project aimed at supporting conservation activities in the Eastern Arc Mountains. Under this agreement Norway will provide financial support of US\$ mil 5.9 to EAMCEF to implement a five years project from 2011 to 2016. EAMCEF in collaboration with Forest and Beekeeping Division and District Councils within the Arc have been providing support to projects on Community Development, Biodiversity Conservation and Applied Research which promote the biological diversity, ecological functions and sustainable use of the natural resources in the Eastern Arc Mountains of Tanzania. This project is aimed at enhancing such initiatives.

The goal of the project is to enhance conservation of the forests within the proposed Eastern Arc Mountains in Tanzania with four components which includes:

Funding activities that improve the management of the Eastern Arc Mountains Nature Reserves and National Park; Build the capacity of the Eastern Arc Endowment Fund Secretariat to take advantage of new funding opportunities; support the Eastern Arc Endowment Fund offices in Morogoro and field stations; and funding the costs of the Eastern Arc Endowment Fund Secretariat

ABOUT THE EAST ARC MOUNTAINS

The Eastern Arc Mountains is a range of 13 mountain blocks encompassing an area of some 23,000 km². Together they form a broad arc shape of some 600 km in length. Twelve of the 13 mountain blocks are found in eastern Tanzania within 15 Districts and 5 Regions. The other mountain block (Taita Hills) is found in Kenya. This arc of mountains is geologically ancient, dating back at least 30 million years and possibly 100 million years, and individual blocks are isolated from each other.

The remaining natural forest on the Eastern Arc Mountains was around 3,500 km² in the year 2000. This has declined from around 4,750 km² in 1955 and perhaps as much as 18,000 km² in historical times. Updating of the forest cover analysis to 2008 by scientists at Sokoine University of Agriculture shows that forest loss has continued. The largest recent areas of loss are believed to have occurred in sub-montane forests in the Uluguru and East Usambara, and in montane forests in the Ukaguru and Rubeho ranges. Elsewhere forest loss has been small.

Detailed analysis of the remote sensing data shows that about 0.9% of the forest area was been lost (1,910 ha) between years 1990 and 2000 across Eastern Arc Mountains region. This is an annual rate of loss of around 0.1% per annum. Preliminary analysis suggests that loss has continued until the present time, but that the rates have slowed as reserve boundaries are reached.

There are threats affecting the Eastern Arc Mountains. Most threats are related to human activities. The main human activities include uncontrolled fire; conversion of natural habitats to agriculture, illegal logging, unsustainable collection of firewood and building materials; and inappropriate mining practices.

THE ECOSYSTEM SERVICES

Services provided by the Eastern Arc Mountains (EAM) are very important at local, national and internal levels. These services are related to water catchment, support to community

livelihood, biodiversity conservation and carbon sink

Catchment Values of the Eastern Arc Forests

The Eastern Arc Mountains provide critical water supply functions for downstream users in cities and industrial irrigated farms. They are also critically important for adjacent communities for domestic use and they also provide the source of water supply for some of the most important power generation facilities in the country.

Water Supply to Towns and Agriculture

The rivers flowing from the Eastern Arc Mountains supply many large towns in eastern Tanzania with their drinking water. This includes Dar es Salaam, Tanga, Morogoro, Iringa, Hakara, Lushoto, Mwanza, Same, Korogwe, Soni, Kilosa, Muheza, Kibaha, Mpwapa, Turiani, Mvomero, Gairo, Mikumi, Chalinze, Kilindi, Handeni and Kilolo. Many of these towns are either Regional or District administrative centres, and Dar es Salaam is the economic power of the nation. At least 10% of the total population of Tanzania, and perhaps as many as 25%, get their water from these rivers.

A rough estimate of the value of this water is as follows:

- Total population of Tanzania = 34,443,603 people (2002 census)
- Average size of a household = 4.9 (household budget survey)
- Percentage of Tanzanian population living in towns receiving water from Eastern Arc = 10% (2002 census)
- Estimated annual cost of water per urban household = US\$ 100 (Norconsult 2002)
- Percentage of households paying for water in these towns = 25% (estimated)
- Therefore total annual value of Eastern Arc water to town people = $34,443,603/4.9 \times 10\% \times US\$ 100 \times 25\% = US\$ 17,573,226$ per annum

Published predictions indicate that the catchment function in the Eastern Arc (interception, retention and slow release) might be reduced through forest loss and degradation by an estimated 50%. Such a reduction is predicted to quadruple the cost of water by 2020. The value of keeping the Eastern Arc forests intact may therefore be the difference between current water costs and potential future costs, some hundreds of millions of dollars. Engineering replacements of the lost natural storage of water in catchments if forest and woodland cover is destroyed will also cost hundreds of millions of dollars, and may even be unaffordable.

Hydro Electrical Power

Hydropower is the major source of commercial electrical supply in Tanzania. The major hydropower plants that use Eastern Arc water are outlined in the table below.

Major hydropower stations in Tanzania and relation to Eastern Arc Mountains

Power Station	River	Installed capacity (MW)	Reservoir volume (million m³)	Input from Eastern Arc Mountain blocks
Kidatu	Great Ruaha	204	125	Rubeho and Udzungwa supply part of the input
Mtera	Great Ruaha	80	3,200	Udzungwa supplies part of the input
Kihansi	Kihansi	180	1.0	Udzungwa supplies all of the input
Pangani Falls	Pangani	68	0.8	North and South Pare and West Usambara supply part of the input
Hale	Pangani	21	0.46	North and South Pare and West Usambara supply part of the

Power Station	River	Installed capacity (MW)	Reservoir volume (million m3)	Input from Eastern Arc Mountain blocks
				input
Nyumba ya Mungu	Pangani	8	875	Some input from North Pare via Lake Jipe

The water sources for these reservoirs are even more critically important during the dry periods of the year when water flow from lowlands into rivers is zero and the only remaining water inputs are from the cooler, damper, and more forested catchments on the higher mountain regions.

Hydropower has been estimated as 62 percent of the total electrical supply of Tanzania (559 MW of 892 MW). Deducing hydropower generated from water originating outside the Eastern Arc, we estimate that around 50% of Tanzanians' electricity is provided by water flowing from the Eastern Arc mountain forests. The forests are particularly valuable in maintaining water flow in the dry season and hence allowing the hydro-electrical facilities to continue generating power. A rough calculation of the value of the Eastern Arc in terms of electricity supply to households is as follows:

- Total population of Tanzania = 34,443,603 people (2002 census)
- Average number of people per household = 4.9 (household budget survey 2002)
- Proportion of Tanzanian households electrified = 10% (household budget survey)
- Approximate household use of electricity = 225 KWh per annum (46 KWh per capita x 4.9 people; www.tzonline.org)
- Basic cost of each unit of power = 120 Tsh/KWh (0.1 USD; TANESCO)
- Proportion of electricity generated using hydropower from Eastern Arc = 50%
- Therefore total annual value of Eastern Arc electricity to domestic users
 $34,443,603 / 4.9 \times 10\% \times 225 \text{ KWh} \times 0.1 \text{ USD} \times 50\% = \text{US\$ } 7,907,970$ per annum

Carbon storage

As far as the carbon storage and sequestration services are concerned, the EAMs store carbon in the majority of the landscape. Quantification of the magnitude of this carbon store has only recently commenced, but research suggests that African tropical forest systems store a large portion of terrestrial carbon and have likely been increasing their rate of sequestration (i.e. becoming a bigger sink) to the point that this increase may represent a large portion of the world's "missing" carbon sink.

The biodiversity services

The Eastern Arc Mountains is one of the world's most important areas for biodiversity. This importance was first recognised by work undertaken in the 1970s and in the pioneering work on the identification of global biodiversity hotspots. Based on systematic analyses of available species data, the importance of the Eastern Arc Mountains has been recognised in the following analyses of global biological priority:

- Global 200 Ecoregion (WWF: Olson and Dinerstein, 1998);
- Part of a global biodiversity hotspot (Conservation International: Mittermeier et al., 1998; 2004); and
- Part of an Endemic Bird Area (BirdLife International: ICBP, 1992; Stattersfield et al., 1998).

A map showing Districts of the Eastern Arc in Tanzania

