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Tanzania Environment and Climate Change Policy Brief¹

2010-10-27

This Environment and Climate Change Policy Brief aims to summarise the main environmental challenges, constraints and opportunities related to poverty reduction and economic development for Tanzania and the Swedish government's thematic priority Environment and Climate which includes four focus areas; (i) climate change adaptation, (ii) energy, (iii) environment and security, and (iv) water. The concept *environment* is seen in a broad sense, including *i.a.* ecosystem services, climate change, and disaster risk reduction. The Policy Brief is serving as an input to the Swedish Poverty and Development Assessment (PDA) process for Tanzania, which in turn will provide the point of departure for the upcoming Swedish Cooperation Strategy for Tanzania.

Table of Contents

Executive Summary.....	2
1. Introduction.....	2
2. Key environmental challenges and their causes	3
3. What are the effects of the environmental challenges?	5
3.1 Impacts on Poverty (vulnerability, security)	5
3.2 Impacts on Public Health.....	8
3.3 Impacts on Economic Development.....	9
4. Key actors and policy framework for environmental management.....	11
4.1 Key actors.....	11
4.2 Legal framework, national policies and environmental mainstreaming.....	12
4.3 Governance, implementation and enforcement	13
5. Constraints and Opportunities.....	15
5.1 Constraints.....	15
5.2 Opportunities	15
6. Discussion on linkages to other thematic priorities	18
References	20
Annex 1: Climate Change in Tanzania.....	23
Annex 2: The Millennium Ecosystem Assessment in brief	26
Annex 3: Shares of GDP and Export earnings by kind of Economic Activities	28

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Executive Summary

Environmental degradation is starting to have visible effects on livelihoods, public health, human security, and economic growth in Tanzania. Environmental degradation and loss of ecosystem services is a constraint to development. In addition, poverty is one consequence of environmental degradation, as poor people to a large extent depend on natural resources and ecosystem services for their livelihoods, and have less capacity to adapt to changes and external shocks. When environmental resources are degraded, the livelihood opportunities are reduced. A majority of the rural poor in Tanzania derive their income from agriculture, hunting and forestry; most of the rural population obtain their main source of protein from wildlife; and a vast majority use wood fuel as their main source of energy. Poor people are especially vulnerable to changes in availability and quality of these natural resources, and climate change is expected to add on to already existing stresses.

Tanzania's economic growth sectors (such as agriculture, mining, tourism, water, and energy) rely on a healthy environment and are negatively affected by environmental degradation, but are at the same affecting the environment through pollution, land-use changes, and loss of ecosystem services. One important aspect in Tanzania is that the value of the natural resources is largely underestimated. Large amounts of money are lost leaving a large, untapped potential for treasury income, which could have been used for development investments.

Tanzania has adequately mainstreamed environmental concerns into key national plans and policies and climate change is increasingly taken note of. However, there is still lack of implementation of these policies, for instance due to unclear mandates for environment as a cross-cutting issue combined with weak inter-sectoral coordination, inadequate capacity for monitoring and enforcement, a gap between MKUKUTA-priorities and resource allocation, and lack of good governance.

Improved capacity for monitoring and enforcement at all government levels is important. Furthermore, national environmental priorities should be reflected in budget allocation. Improving good governance is potentially a viable vehicle also for improved environmental management. Increased transparency of payments for and revenues from natural resources is good entry point, as it is of great importance and demanded by the public. Likewise, transparency related to allocation of concessions and licenses for mining, logging, and biofuel production, and related contracts are important features of good governance related to natural resources.

1. Introduction

The United Republic of Tanzania has shown a steady economic growth since 1993, and a slightly increased household consumption.² In the 2009 Human Development Report, Tanzania is ranked in the bottom 20% (151 out of 182 countries), although the HDI index shows a steady increase. There has been a sharp reduction in infant and under-five mortality, albeit with large regional differences, and educational indicators show improvements. HIV statistics provide signals of optimism, with an increase in HIV testing and a decreasing trend of reported cases of tuberculosis. Maternal health is the exception to the positive health trends in Tanzania.³ Despite this positive trend, the country is amongst the bottom 10 countries in the world in terms of per capita income. Income inequality has remained largely unchanged

² Tanzania NBS, 2007

³ Tz PHDR, 2007

the last decade, with a Gini coefficient of 0.35.⁴ Corruption is widespread and continues to be a prominent feature of the Tanzanian public sector.⁵ Tanzania has about 42 million inhabitants, of which about a third falls below the basic needs poverty line⁶. The population growth is high, around 2.9% per year⁷. A quarter of the population live in urban areas, and the urbanisation rate is very high (4.2%).⁸

The above mentioned facts impact on Tanzania's policymaking, which must aim for economic growth to lift millions out of poverty while simultaneously grappling with climate change and the need to preserve the environment and ecosystem services. Until recently, environmental management (including ecosystem services, climate change, and disaster risk reduction) was perceived as a constraint to development, or an issue that was not central to development. However, this view is changing in Tanzania. As some of the environmental problems have grown so bad so they are now visible and the degraded environment is starting to show effect on livelihoods and economic growth, it is becoming more important to consider environment in policy making.

2. Key environmental challenges and their causes⁹

Tanzania, situated just below the equator, is endowed with rich biodiversity and abundant natural resources. While the mainland's 800 km long coastline in general is flat, the greater part of the inland forms a plateau. Mountain groups rise in the northeast and southwest. The key environmental challenges in Tanzania include (further detailed below): *water scarcity and pollution, land degradation, loss of biodiversity, deforestation, air pollution and climate change*. Some of these environmental challenges are interlinked and mutually enforced.

Water scarcity and pollution: Although Tanzania is blessed with abundant water resources, and shares three of Africa's largest freshwater lakes and two of the largest rivers with its neighbours, water scarcity remains one of its most important challenges. Water is unevenly distributed in time and space, and the groundwater potential and development varies in different localities. The reasons for water being perceived as a scarce resource include: inadequate storage capacity and inadequate capacity to manage the water resources.¹⁰ The main part of the water resources are used for agriculture and domestic purposes, but also for watering livestock, electricity production and industry. Despite efforts by the Government of Tanzania (GoT), the water quality is affected by municipal, industrial, and agricultural pollution, from Tanzania as well as neighbouring countries. It is worth noting that the fast growing mining sector has many negative environmental consequences, including pollution to surface and groundwater. In most urban areas, wastewater enters the water resources still untreated. Furthermore – although industrial development in Tanzania is limited – untreated industrial waste (agro-industries, chemical factories, breweries, soap and steel manufacturing) cause significant levels of localised pollution. The water resources cross national borders and

⁴ A Gini-coefficient of 0 implies equally distributed income, and 1 implies total inequality. As a comparison, Sweden has a Gini-coefficient of 0.23; South Africa 0.65; and Kenya 0.42.

⁵ Transparency International website

⁶ The food poverty line represents the cost of obtaining sufficient food to meet calorie needs with a consumption pattern typical of the poorest 50 percent of the population. The basic needs poverty line includes an additional allowance for non-food essentials. They stand at TSh 10,219 and TSh 13,998 respectively (NBS, 2007).

⁷ Ministry of Finance and Economic Affairs, 2010

⁸ CIA World Factbook website.

⁹ In this section Blinker et al. (2006) is used as the main reference, if no other source is cited.

¹⁰ GoT PHDR, 2007.

quantity and quality challenges are shared by the riparian countries, which is why water resources should be managed jointly by the riparian countries.

Land degradation: Land degradation is a serious problem in Tanzania. Features of land degradations include soil erosion (occurring in over 60% of the land area), desertification, and salinisation. The areas around Dodoma and Singida and parts of Mwanza, Shinyanga, Mara, Iringa and Arusha regions are seriously threatened by desertification. Land degradation is caused by overexploitation of natural resources and aggravated by climate change and natural disasters such as floods and droughts. Main causes of land degradation include deforestation, overgrazing, wild fires, cultivation of marginal land and inappropriate agricultural practices. Land degradation poses a threat to food security.

Loss of biodiversity and ecosystem services: Ecosystems provide different types of life-supporting services that are vital for livelihoods and economic development and provide resilience to natural disasters and climate change (see Annex 2 for more information). A rich biodiversity underpin ecosystem services. Tanzania has a very rich biodiversity and is host to one of the world's biodiversity hotspots. This biodiversity has important economic, technological and social implications. The terrestrial biodiversity is threatened by *inter alia* demographic changes (e.g. population growth and influx of refugees), land-use changes (e.g. expanding economic activities mainly agriculture), and land degradation. Aquatic resources are threatened by pollution, destructive fishing (e.g. dynamite, poisoning, beach-seining), unregulated coastal tourism, trophy collection (coral and shell), over-exploitation of aquatic resources, erosion and silting due to deforestation and over grazing, and loss of habitat due to development activities (e.g. construction of dams, mining, irrigation). Wetlands (over 7% of the land area) provide important ecosystem services. Mangrove ecosystems, for instance, provide feeding, breeding, and nursery areas for fish, prawns and shellfish. Furthermore, mangroves have many direct and indirect uses to the communities, for house building, fuel wood, boat building and poles. Yields are higher from the fisheries in the mangrove-fringed coastal waters than in areas where there are no mangroves. The wetlands are threatened by increasing population, land clearance and deforestation of swamp forest and surrounding woodlands, poaching, pollution and eutrophication, and modification of natural flow regimes. The ecosystem services are impaired by infestation of alien species, declining fish populations, habitat destruction, and loss of biodiversity.

Deforestation: Forests provide valuable ecosystem services, such as purification and regulation of water, climate regulation, and carbon sequestration; it also provides food, building material and wood fuel. According to the World Bank, close to 40% of Tanzania's land area consists of forests, and the average annual deforestation rate is very high: around 1.1%¹¹ (which is more than twice the global average of 0.5%). Deforestation and forest degradation are contributing to global climate change, through emissions of greenhouse gases. On the local level, it causes land degradation and erosion, siltation, affects water run-off and loss of ecosystem services. Almost half of the forested area are reserved forests or national parks, while the other half is 'general land', which in practice is the same as open-access areas, which implies insecure land tenure where nobody has the power or legitimacy to enforce rules of law. The result of open access is in general depletion of resources. Causes of deforestation are uncontrolled economic activities such as unplanned agricultural expansion, illegal logging, mining, and fuel wood extraction.

¹¹ WB, Little Green Data Book, 2009

Air pollution: Outdoor air pollution is currently not a major problem in Tanzania, but left unchecked it may become a local problem in the future due to increasing number of motor vehicles (especially old vehicles), industries, power generation, and combustion of fossil fuels. Indoor air pollution, mostly due to the use of fuel wood and charcoal for cooking, is a serious health problem especially for women and children.

Natural disaster risks and Climate Change: Between 1974 and 2003, floods and droughts were by far the most pertinent natural disaster risks in Tanzania. Both the number of events and the number of people affected, appear to be increasing.¹² The climate in Tanzania ranges from tropical to temperate in the highlands. Tanzania has two rainfall regimes¹³. Climate change scenarios show that the temperature is expected to increase slightly more than the global average in Tanzania. The rainfall patterns are likely to change, with less precipitation in some regions and more in others (see Annex 1 for a more details on climate change). Changes in rainfall and soil moisture due to changes in temperature will impact river flow, with the Ruvu and Pangani expected to see a decrease in annual flow and the Rufiji will increase in flow¹⁴. The intensity of rainfall and number of extreme rainfall events is expected to increase which could increase flooding, especially if coupled with El Niño events which frequently lead to flooding in Tanzania¹⁵. Besides posing a direct risk to people, intense rains and floods may destroy infrastructure, such as roads and buildings. There is also a risk for prolonged droughts. Besides increased intensity and frequency of natural disasters, (e.g. floods, droughts and landslides), climate change is expected to have adverse impacts on insect pests and disease epidemics, and aggravate all the above mentioned environmental challenges.

3. What are the effects of the environmental challenges?

3.1 Impacts on Poverty (vulnerability, security)

The rural and urban poor are the most vulnerable to environmental degradation, natural disasters and climate change, due to their high dependence on natural resources for their livelihoods and low capacity to adapt to changes. The sectors most vulnerable to climate change are agriculture, water resources, and energy production.

Poverty and vulnerability: According to the Household Budget Survey (2007)¹⁶, there are signs of slight increases in household income and diversification of economic activities at the household levels, for both female- and male headed households. One example of this is that the structure of dwellings has improved and assets increased. More household are headed by women compared to six years ago, but they appear not to be poorer than households headed by men. The majority of household income is used for food, including the value of home-produced food. Despite these slightly positive trends, the *absolute number of people living in poverty has increased* due to population growth.

¹² A total of 38 natural disasters were recorded in Tanzania between 1974 and 2003, killing or affecting close to 13.5 million people. Of the total 38 natural disasters, 11 related to droughts, 23 to floods, 1 to windstorms, and 3 to geological disasters (Guha-Sapir, et al., 2004).

¹³ The unimodal rainfall refers to the southern and western regions of Tanzania, which receive one rainy season from around November to April, whereas the northern part of Tanzania has a bimodal rainfall with two rainy seasons: the short 'vuli' rains from October-December, and the longer 'masika' rains from March-May.

¹⁴ Mwandosya, et al., 1998.

¹⁵ World Bank Climate Portal. Accessed 07/10/10

¹⁶ NBS, 2007.

For a developing country like Tanzania, poverty and environment are closely interconnected: the poor may, due to lack of alternatives, be a cause of environmental degradation for example by overexploitation of resources, or because of a lack of capital to perform necessary investments for protecting or improving the asset (such as agricultural land). On the other hand, a degraded environment may increase poverty, e.g. through decreased access to natural resources and ecosystem services. The environment matters greatly to people living in poverty, and the poor are most affected by environmental degradation due to their vulnerability, high dependence on natural resources, and low capability to cope with external shocks, such as floods and droughts.¹⁷ Climate change may worsen both the country's poverty reduction efforts *and* its drive for economic development, as well as severely impact the environment.

Poverty remains mainly a *rural* problem. Poor households, especially in rural areas, derive their livelihood income from natural resources (for example, land resources for agriculture and water resources for fishing). *The poorer the household, the greater the share of its income derive from environmental resources.*¹⁸ Poor people often lack other resources than common property resources, indicating the importance of forests and fishery resources for the poor in providing income, food and employment. Hence, overexploitation of these resources will increase the vulnerability of the poor. A vast majority of the rural households depend on fuel wood as their main source of energy for cooking. Also non-timber forest products are important as sources of food and medicine. 95% of the rural population claim that wildlife is their main source of protein.

Most Tanzanians still depend on rainfed agriculture for their livelihood: some 68% of employed adults are in agriculture, hunting, and forest industry. *Households that depend on sale of food and cash crops, or earn a living from natural products, are more likely to be poor* than those being a part of the formal sector and receiving an income.¹⁹ Food crops currently provide the main source of cash income for 40% of the households. Lack of infrastructure, such as all-weather roads, inhibits access to rural areas, hence poses difficulties in delivering farm inputs and accessing markets, negatively affecting household income. Climate change will require adaptation measures as it is expected to reduce agricultural yields; for instance maize, the most important food crop, is expected to decline considerably in yield. The rural poor and especially smallholder farmers will be hit hardest.

Water and the environment have a dual relationship: on the one hand, the environment is a water using sector, which requires sufficient and good quality water for survival and productivity. On the other hand, the environment provides ecosystem services that maintain and purify the water. Water, a key factor for life, to obtain socio-economic development and poverty reduction, needs good husbandry for maintained quality and quantity. Lack of access to water, or changing rainfall patterns will *affect the agricultural sector hard*. There will also be other negative impacts on *public health, quality of natural resources* (such as land and forests), *energy production and industrial activities*.

Artisanal mining is an essential activity in developing countries where economic alternatives are limited. Compared to agriculture, there are low thresholds to enter the artisanal mining

¹⁷ Kulindwa et al., 2010.

¹⁸ Ibid.

¹⁹ Other poverty features include large families with many dependents, low education, or if the family head is economically inactive (NBS, 2007).

sector, due to low capital investments needs. In Tanzania, more than half a million artisanal miners (of which about only 4,000 are registered²⁰) make a living next to the large mining companies. Artisanal mining contributes to various kinds of health and environmental problems, including soil erosion and pollution of water due to uses of chemicals and heavy metals. Mercury, for example, is used for gold panning, which poses significant health risks to the informal miner and is dangerous to the environment. Better techniques could reduce negative impacts on both the miner and the environment.

Urban areas are often associated with environmental problems, exacerbated by inadequate planning, climate change, and poverty. However, urban areas are also driving economic development and present an opportunity to improve energy and economic efficiency and reduce poverty. The slight improvements of different aspects of poverty in Tanzania, is believed to be associated with increased urbanisation²¹. On the other hand, a high urbanisation rate is problematic as the *needs of a fast growing urban population can go beyond government's ability to meet them*. Climate change is expected to pose both direct and indirect threats to urban areas: increased temperature and intense rains may aggravate drainage problems, causing floods, destruction of infrastructure, and health problems, especially in unplanned areas. Indirectly, climate change may impact on agricultural yields, resulting in increased food prices, which will affect the urban poor adversely.

Security: Insecurity is one manifestations of poverty. The main environment-related security issues in Tanzania are related to *decreasing resilience of ecosystems, unreliable access to food and water, lack of secure natural resource tenure, lack of access to resource-based safety-nets such as goods and services from the ecosystems (forests, fish, etc), low ability of households to accumulate assets including natural capital, climate change, and existence of conflicts over resources*. Women are disproportionately at risk from environmental degradation, conflicts, and natural disasters, due to gender roles, and historic, cultural and socio-economic reasons.

Security is an important aspect of productivity and livelihoods; agricultural output depends, amongst others, on secure access to land and water. Artisanal miners depend on access to land areas without being harassed. Herders need access to grazing land and water. However, *ownership of farming land and livestock appears to have declined since 2001, the latter quite dramatically, possibly due to losses during droughts*.²² Half of the country's forested area has unclear property rights and are in practice open-access areas, where pressure from competing land uses contributes to degradation of forests, land and water, which affects productivity and thus food security. Insecure tenure provides negative incentives for investment in improved livelihood, and vice-versa: *tenure security promotes long-term investments to increase productivity*.

Tanzania shares the Victoria, Tanganyika, and Nyasa lakes with its neighbour countries and is a riparian of both the large Nile and Zambezi rivers. *Shared waters require joint management to be sustainably, equitably and efficiently utilised*. To jointly manage shared water resources is already a daunting task, which will be further complicated by climate change. Increased temperature will constrain water resources as reduced river flows will hamper access to safe drinking water. As water demand increases, i.a. due to higher living standards, urbanisation,

²⁰ Communities and Smallscale Mining, website.

²¹ NBS, 2007

²² Ibid.

irrigation and industrialisation, and the availability of water decreases, i.a. due to climate change and inadequate governance, *water-related tensions between nations may increase*; one example is the unresolved border dispute between Tanzania and Malawi, related to the Nyasa lake. Furthermore, *competition between water-using sectors will increase*.

3.2 Impacts on Public Health

Access to water and sanitation together with good nutrition, is crucial to sustain health and remain productive, especially for people living with HIV and AIDS. In Tanzania, 52% of the population has access to a protected water source (a modest increase from 46% in 1991), and 34% has access to piped water (most commonly in urban areas). The distance to a drinking water source is often long; for almost a quarter of the rural households (i.e. women) collecting water requires more than one hour. 93% of the population report to have access to a toilet.²³

WHO estimates that there are more than 56 000 annual deaths in Tanzania due to diarrhoea caused by polluted water/bad hygiene²⁴, indoor air pollution and outdoor air pollution. See Table 1 below for comparison with neighbouring countries Kenya, Mozambique and Zambia. The DALY²⁵ for diarrhoea is relatively low in Tanzania, while the DALY for indoor air pollution (caused primarily by use of wood fuel and charcoal for cooking) is relatively high and mainly affect women and children.

Country	Water, Sanitation & Hygiene		Indoor air pollution		Outdoor air pollution	
	Diarrhoea deaths/year	Diarrhoea DALYs/1000 capita per year	Deaths/year	DALYs/1000 capita per year	Deaths/year	DALYs/1000 capita per year
Kenya	21 800	23	13 000	12	600	0.2
Mozambique	26 900	47	9 700	16	900	0.6
Tanzania	28 200	26	27 500	24	1 000	0.4
Zambia	13 700	42	8 600	27	1 100	1.5

Table 1. Estimated deaths and DALY's attributed to selected environmental risk factors (Source: WHO, 2007)

In Tanzania, there is a high risk of being infected by vector borne and water borne diseases, such as malaria, bacterial diarrhoea, typhoid fever or schistosomiasis. Climate change is expected to increase the environmental risk burden, hamper access to safe drinking water and increase the risk for water-borne illness. A changing climate may also adversely impact health through the possible expansion of the mosquito population to the country's highlands²⁶, potentially bringing higher rates of malaria, as well as increases in cholera during periods of increased precipitation or flooding. Again, it is the rural poor, who lack adequate healthcare facilities, which will be hardest hit by these changes.

²³ NBS, 2007.

²⁴ This figure only includes diarrhoeal diseases. Other water related diseases e.g. river blindness are not included. Hence, the total number of deaths related to hygiene, water and sanitation is higher.

²⁵ The Disability Adjusted Life Year or DALY is a health gap measure that extends the concept of potential years of life lost due to premature death to include equivalent years of "healthy" life lost by virtue of being in states of poor health or disability.

²⁶ Yanda et al., 2005.

3.3 Impacts on Economic Development

There is a strong correlation between poverty reduction and economic growth; economic growth has been the main driver of poverty reduction for many countries, and *reduction of absolute poverty necessarily calls for highly country-specific combinations of growth and distribution policies*.²⁷ The natural environment plays two key roles in relation to economic growth. First, they provide natural resources, as inputs to production of economic goods and services. Second, they provide resilience and a buffer to the effects generated by production and consumption patterns (such as absorbing pollutants). Unless adequate policies are in place economic growth often goes hand-in-hand with depletion of natural resources and increased pollution. If the functions of the ecosystem are seriously impaired, economic production can slow down, or even be negative.²⁸ There are inevitable policy trade-offs between poverty alleviation, short-term growth and environment, which often are difficult to make and require adequate capacity.

IIED estimates that the costs for degradation of forestry, fisheries and wildlife resources in Tanzania, amount to US\$1 billion annually²⁹ (equivalent to 4-6% of GDP). If climate change is added, the figures would be substantially higher.

The Tanzanian economy depends heavily on agriculture, which currently contributes with 25-30% of the GDP and provides around 25% of exports earnings (see Annex 3)³⁰. Tanzania's economic performance relies heavily on access to water. Droughts and water shortages negatively affect agriculture, manufacturing, livestock and energy sectors, and it is estimated that the 2003 drought cut growth by 10%³¹. Climate change is expected to hamper agricultural productivity and cause GDP to decline by 0.6-1% by 2030; by 2085, depending on the severity of climate change impacts, the decline in GDP could range from 5% up to 68%³².

Since the mid 1990s, mining, fisheries and tourism have been the most dynamic economic sectors. However, fish catch is reported to be decreasing and over exploitation, and the use of illegal methods, threaten the long-term productivity of the resource. Tourism is increasingly important; revenue rates grew on average 30% per year between 1994 and 2004.³³ The tourism sector is very dependent on healthy ecosystems and maintained wildlife, as well as functioning infrastructure. The mining sector (dominated by diamonds, gold, and iron) is the fastest growing economic sector; in 2009 mineral exports contributed with over 40% of total exports (see Annex 3), however with a modest contribution to GDP (3.5% in 2005)³⁴. The mining industry provides about 8000 formal jobs plus an estimated additional 500 000 jobs in artisanal mining³⁵, but the contribution to the national economy could be significantly higher than it currently is (due to tax reductions, low royalties and other levies). Furthermore, the mining sector is associated with large environmental impacts, in terms of chemical pollution (e.g. mercury and cyanide), water use and energy (fuel wood).

²⁷ Collier, 2007; Bourguignon, 2004.

²⁸ Millenium Ecosystem Assessment, 2005

²⁹ Assey et al., 2007, page 6 in "Environment at the heart of Tanzania's development: Lessons from Tanzania's National Strategy for Growth and Reduction of Poverty (MKUKUTA)".

³⁰ Ministry of Finance and Economic Affairs, 2010.

³¹ Assey et al., 2007; the World Bank, 2008.

³² Chambwera and MacGregor, 2009

³³ Luttrell and Pantaleo, 2008.

³⁴ The World Bank, 2008; Blinker et al., 2006; and CIA World Factbook.

³⁵ Yager, 2010

Access to reliable energy is very much associated with socio-economic development. *Hydropower* production currently represents 50-60% of commercial energy in Tanzania; the Central Bank of Tanzania estimated that in 2007, the economy grew 1.1% slower than expected due to electricity shortages³⁶. Lower or more variable rainfall would negatively impact *hydropower* production and economic growth. *Bio-fuel* production is rapidly increasing in Tanzania, providing both a large opportunity for economic growth and income, as well as providing a substitute for costly oil imports, but also a fear of decreasing food production, increasing food prices, land grabbing and loss of ecosystem services. There are also plans in Tanzania to expand the search for hydrocarbons for instance more *coal* resources and *fossil gas*³⁷, which will increase emissions of green-house gases, contributing to climate change.

Tanzania's natural resources sustain livelihoods and significantly contribute to Tanzania's economic development. However, it is estimated that the value of the natural resource extraction is largely underestimated. Tanzania (along with Nigeria and Zimbabwe) has one of the largest informal economies; in fact, the scale of the informal economy in Tanzania is estimated to be over 58% of the formal GNI, which leaves significant unaccounted production values in major sectors.³⁸ It is a *large, untapped potential of treasury income* that could be used for development investments in the country. The hidden economy is made up of different kinds of activities: activities that are profit driven (large-scale illegal logging, illegal marine fisheries, etc.), and activities that are mainly poverty driven, such as fuel wood collection, non-licensed small scale fishery or wildlife consumption. Although focus is often placed on the poverty-driven activities, the scale of the profit-driven illegal activities is often equally important, and relates to international trade and consumption patterns. One example of this is the Chinese logging ban, which is effectuated to stop deforestation in China. The logging ban, coupled with large demand for natural resources including timber, has increased timber imports to China, amongst others from Tanzania. As an indication of the magnitude of unrecorded values of natural resources, Chinese trade statistics from 2004 show that China imported 10 times more timber products from Tanzania than appear on Tanzania's own export records.³⁹

Natural resource abundance can be a "*blessing*" or a "*curse*". Some resource rich countries with weak institutional capacity and/or inadequate policies have shown to have lower economic growth than neighbouring, resource scarce countries.⁴⁰ Volatile world market prices can generate boom and bust circles that can destabilise the economy and negatively affect growth. However it has been shown that the "*curse*" is not inevitable, it can be addressed through good governance and sound economic policies.⁴¹

³⁶ VPO, 2007 (NAPA).

³⁷ Kyaruzi, 2009

³⁸ The World Bank, 2008.

³⁹ Other examples of underreporting or lost revenue collection in Tanzania include: an estimated revenue loss of 97% from the Forest and Be-keeping Division amounting to TSh40 billion; A single shipment of illegal ivory valued at US\$200 million left Tanga port; Fishing in the Exclusive economic zone in 2004 contributed in excess of US\$300 million to foreign coffers, but less than 2% found its way back to Tanzanian hands. Half a million artisanal miners make a living in the shadows of their larger corporate counterparts, with most of the small-scale production leaving the country un-noticed and untaxed (Luttrell and Pantaleo, 2008)

⁴⁰ Atkinson and Hamilton, 2003; OECD DAC, 2008.

⁴¹ OECD DAC, 2008

4. Key actors and policy framework for environmental management

4.1 Key actors

Government actors: The lead government entity charged with coordinating environmental mainstreaming, climate change, and disaster risk reduction is the Vice President's Office (VPO), at the Division of Environment and Disaster Management Division. Environment is seen as a cross-cutting issue, to be implemented at each sector ministry. Important governmental actors related to environment and climate change include: Ministry of Water and Irrigation; Ministry of Agriculture, Food Security and Cooperatives; Ministry of Natural Resources and Tourism; Ministry of Energy and Minerals; Ministry of Infrastructure; Ministry of Industry, Trade and Marketing; and the Tanzania Meteorological Agency.

There is also a National Environmental Management Committee (NEMC), and a National Climate Change Steering Committee (NCCSC), chaired by the VPO Division of Environment. The NEMC has the mandate to undertake enforcement, compliance, review and monitoring of Environmental Impact Assessments (EIA), research, facilitating public participation, awareness raising and the collection and dissemination of information.⁴² Local authorities are the principal executive agencies of environmental policies and regulations⁴³.

The secretariat of the NCCSC is held by the Centre for Energy, Environment, Science and Technology (CEEST). However, there has been some criticism of the NCCSC as a national-level entity only: a need for replication at the regional and district levels has been identified⁴⁴. Furthermore, the National Environment Management Council has a broad mandate to oversee environmental management issues.

Development partners: The donor community is both quite large and strong in Tanzania. Most donors provide financial support to Tanzania based on the poverty reduction and growth strategy MKUKUTA. In 2007, budget support contributed around 15% of the budget, while all types of aid contributed with 42% of the total budget⁴⁵. However, the Government of Tanzania has a strong control of the policy process, and effective donors have shifted to a supporting position, pursuing a high level of donor harmonisation and alignment⁴⁶.

Many development partners (such as Norway and EU) are funding climate change issues and the donor coordination appears to be quite good. It seems to be a gap related to climate change mitigation (beyond REDD⁴⁷ activities) and adaptation funding. With new proliferation of climate change funds and more money in this field, issues of ownership, alignment and donor harmonisation are becoming more important. In *natural resource management* (NRM), there are also many donors involved, although it appears less well coordinated. Available funding for governance issues in NRM, especially related to hunting blocks licensing, logging licenses, and revenues from NRM, seems inadequate. Finland is currently active in this field, giving priority to forestry and environment, agriculture and bio-energy. Environmental management is currently under-funded. Other bilaterals (DfID, Germany, Ireland, USAID and CIDA) and multilaterals (World Bank and AfDB) are currently focusing largely on health, governance issues and promotion of the private sector.

⁴² Luttrell and Pantaleo, 2008.

⁴³ Pallangyo, 2007.

⁴⁴ FAO, Government of Tanzania and Embassy of Finland, 2010

⁴⁵ Luttrell and Pantaleo, 2008.

⁴⁶ Assey et al., 2007

⁴⁷ Reduced Emissions from Deforestation and Degradation, REDD.

Civil Society: The Civil Society Organisations have an increased role in many areas of development. The more established NGOs (such as the WWF and IUCN) that used to focus on conservation have increasingly engaged more on development and poverty reduction issues. Local authorities have begun to better understand and manage environmental issues, largely due to local government reforms and decentralisation. The local authorities should cooperate with NGOs and community-based organisations (CBOs), which are coordinated by the VPO and the Tanzania Association of NGOs.

Private investors: The foreign direct investment has been increasing, and there is a growing interest from foreign private investors in establishing biofuel projects (currently 38 companies are engaged in biofuel production in Tanzania). As experiences from other sectors in Tanzania have shown, communities should be supported to increase their ability to negotiate with biofuel investors on their own behalf. Also mining and tourism sectors are getting increased attention from foreign investors.

4.2 Legal framework, national policies and environmental mainstreaming

Tanzania's National Strategy for Growth and Reduction of Poverty (the MKUKUTA I) subscribes to the principles of sustainable and equitable development, and has an impressive coverage of poverty-environment linkages and associated indicators. The MKUKUTA I was developed through a highly participatory process, led at the highest political level, with parliamentary and political engagement and broad stakeholder participation. The main instrument for dialogue and monitoring of government performance is the Performance Assessment Framework (PAF). The Medium-Term Expenditure Framework (MTEF) is a consultative process, setting activities around a sector's strategic outcomes assigned to MKUKUTA clusters. The MKUKUTA II, recently endorsed, has made efforts to further address climate related risks and integrated adaptation. Now, the challenge of implementation remains.

Key environmental policies in Tanzania include the National Environmental Policy (NEP, 1997), the National Environmental Action Plan (NEAP, 1997), the National Adaptation Programme of Action (NAPA, 2007) and a number of sector policies *inter alia* for forestry, fisheries, and mining. The Environmental Management Act (EMA, 2004) is the legislation governing environmental aspects and is covering diverse aspects including the legal and institutional framework for sustainable management of environment, prevention and control of pollution, environmental compliance and enforcement, etc. According to the EMA, an Environmental Impact Assessment (EIA) shall be undertaken for all proposed activities that are likely to have significant adverse impacts on the environment. EMA furthermore provides for Strategic Environmental Assessments (SEA), which is a systematic process to analyse environmental impacts of policies, plans or programs. The focus is currently more on EIA than on SEA.⁴⁸

Related to climate change mitigation, the major issues for Tanzania are related to its land use and forestry sector. The NAPA proposes activities to reduce deforestation and investing in improved or alternative energy sources such as biodiesel or more efficient charcoal and wood stoves. *Any mitigation activity should have clear benefits for poverty reduction, economic growth or existing national development priorities.* Related to climate change adaptation, Tanzania's NAPA highlights four factors as critical to livelihoods and economic growth:

⁴⁸ Kulindwa, et al., 2010; Pallangyo, 2007

adequate food, good health, access to safe drinking water, and sufficient energy for households and industry. After consultations with stakeholders at all levels, the NAPA identified 14 priority projects for adaptation. Not surprisingly, given the dominance of *agriculture*, that sector was ranked the top priority for adaptation measures. *Water* and *energy* were co-ranked second and third; thereafter *forestry*, and *health*. However, funding for these projects has not been forthcoming, in part due to a perception among donors that the NAPA is weak. The VPO has indicated its intention to prepare a National Climate Action Plan, which could serve to operationalise the NAPA.

Two recent studies, performed by the University of Dar es Salaam and the Ministry of Finance and Economic Affairs, have analysed the poverty-environment linkages and environmental mainstreaming of key policies in Tanzania⁴⁹. It appears that environmental concerns are adequately mainstreamed into key plans and policies, although there are conflicts of interest between some policies; for instance, the agricultural-, livestock-, and natural resource policies are in conflict in terms of priorities and policy implementation. The researchers note the inevitable policy trade-offs between environment and economic activities, such as industrial production vs. pollution, or agricultural expansion vs. deforestation, or agricultural intensification vs. water scarcity. It is noted that although some interventions are good in the short run, the consequences on the environment may be long-term and non-reversible. *Managing trade-offs between growth, environmental sustainability, and poverty reduction is of vital importance*, and can partly be achieved through appropriate design of fiscal measures.

Tanzania also has to relate to, and be proactively engaged in, regional cooperation. As a member of the East African Community (EAC) and the Southern African Development Community (SADC), and part of the joint water commissions related to the great lakes and the Nile and Zambezi rivers, regional protocols and agreements should be adhered to and integrated with national legislation.

4.3 Governance, implementation and enforcement

Implementation of EMA is challenged by unclear mandates, inadequate monitoring and enforcement, a gap between MKUKUTA-priorities and funding, and lack of good governance. Environmental management is suffering the same lack of clarity as other cross-cutting issues; who bears responsibility for implementation? EMA mandated *each ministry to establish a unit for coordinating implementation of the EMA* in that respective ministry. In 2008, the only ministry that had formed such a unit was the Ministry of Infrastructure, supported by donors⁵⁰. It highlights the difficulties associated with the reliance on the sectors ministries for the operationalisation of the EMA and the importance of political willingness and clear leadership related also to cross-cutting issues.

The *dialogue* between government and development partners on environment and climate change is also obstructed by the lack of an integrated, holistic, approach to cross-cutting issues. Environment and climate change is today under the mandate of the MKUKUTA 'Cluster 2' (Social issues) thus a part of their dialogue. However, environmental and climate change issues are also related to other clusters, including 'Cluster 1' (Growth). As a mainstreaming issue, environment and climate change should be a part of the dialogue in all relevant clusters, yet that is not the case.

⁴⁹ Kulindwa et al., 2010; and Rutasitara et al., 2010.

⁵⁰ Luttrell and Pantaleo, 2008.

In Tanzania, implementation, enforcement and monitoring of existing policies and regulation provide key challenges at all levels. For instance, there is a lack of different types of capacity at district level, and the majority of environmental officers are dealing with agricultural and forestry resources, leaving environmental issues unattended⁵¹. The lack of implementation is *inter alia* linked to *resource allocation, monitoring and enforcement capacity*, and *weak inter-sectoral coordination* resulting in significant overlaps as well as lost opportunities to benefit from synergies⁵².

Currently, the *resource allocation* does not portray policy priorities. The government allocates flat rate fund to all ministries for the implementation of the EMA, instead of providing funds according to needs and priorities.⁵³ There is also a gap between the sector-based MTEF process and the priorities in the MKUKUTA, hence no clear linkage between environmental policy priorities and the budget. Furthermore, the wealth of environmental indicators in the MKUKUTA is not reflected in the PAF.⁵⁴ In order to have an impact, resources must be allocated together with responsibilities.

Traditionally, Tanzania enforces environmental protection through negative sanctions, rather than economic instruments. *Policy instruments* (tax, levies, subsidies, etc.) can be used to steer behaviour, to promote more sustainable resource use by taxing “environmental bads” and subsidising “environmental goods”. However, due to Tanzania’s difficult budgetary situation in 2007, the IMF, World Bank and other donors were strongly against both tax reliefs and government subsidies, which have made this type of policy instruments difficult to introduce.⁵⁵ Tax and non-tax revenues are not fully explored, which, according to Rutasitara et al. (2010) is “an area for serious consideration in the MKUKUTA II”.

There is increasing attention towards community-based natural resource management CBNRM, especially related to forestry (participatory forest management, PFM). Civil society organisations and community-based organisations are advocating for CBNRM, and government policies are providing openings. CBNRM could enable communities to exert control over and benefit from the resources, with opportunities for improved monitoring and management.

There are also governance problems identified. Recent studies have highlighted the under-reporting of revenue in the natural resource sectors resulting in loss of government revenues and growth potential, and unsustainable environmental management. The Ministry of Natural Resources and Tourism (MNRT) emphasises the need for strengthening revenue collection; the *MTEF however, gives relatively little attention to revenue and governance related issues*. In particular for revenue collection in the mining sector, the *Extractive Industries Transparency Initiative* (EITI) provides a process and label to strengthen accountability and to signal Tanzania’s commitment to transparency. EITI, a global standard that promotes revenue transparency, requires companies to publish what they pay and governments to publish what they receive. Tanzania has embarked on the road to endorse the EITI once the process is adapted to the Tanzanian context. As a response to risks of land grabbing and illegal logging, greater transparency of decisions related to land-use could be enhanced. FAO is leading a process to develop *Voluntary Guidelines for Responsible Governance of Land*

⁵¹ Kulindwa et al., 2010.

⁵² Rutasitara et al., 2010.

⁵³ Kulindwa et al., 2010.

⁵⁴ Lutrell and Pantaleo, 2008.

⁵⁵ Pallangyo, 2007.

and other Natural Resources. There is also an ongoing process lead by the African Union, the UN Economic Commission for Africa, and the AfDB to develop a *Framework and Guidelines for Land Policies in Africa*. Both these processes provide relevant steps towards increased transparency and improved governance.⁵⁶

To manage the noticeable negative impact of industries to people and the environment, the EMA requires industries to perform an EIA before it is established. Currently, EIAs are not conducted as required and *NEMC does not have enough capacity to perform its duties*. The EIA-processes could be more inclusive and transparent.⁵⁷ As some industries already existed when the law came into force, performing EIA has been impractical, why environmental audits are required instead. However, without baseline information environmental auditing is difficult. Another problem with the EIA requirement is that sometimes industries provide EIA for one activity, but expand without performing an EIA for the new activities.⁵⁸ Opportunities with SEA could be further developed.

The growing interest in biofuels production sparked a heated national debate in 2009⁵⁹, highlighting a lack of scientific evidence needed to inform national policy. Lastly, there is also a gap in data on the impact of climate change on ecosystem services and how this might in turn affect the Government of Tanzania's poverty reduction and economic development goals.

5. Constraints and Opportunities

5.1 Constraints

If the environment and natural resources were managed sustainably, there would be opportunities for poverty alleviation, economic development and improved climate change resilience. Based on the above sections, it is clear that ***a degraded environment and inadequate provision of ecosystem services is a constraint to development***. Climate change adds further stress on the natural resources and constraints to development. ***Inadequate access to water, energy and road infrastructure*** are other constraints to development in Tanzania. Traditionally, Tanzania has seen water scarcity as a constraint to, rather than an enabler of, growth. It is recognised that water scarcity is most of the times not a physical scarcity, but rather a governance challenge.

Causes of environmental degradation have been identified, including: lack of capacity to implement policies, and to monitor and enforce regulations; lack of good governance; inadequate management practices and overexploitation of resources; expanding economic activities e.g. leading to land-use change; demographic changes; weak institutions; and unclear property rights. As poverty, environment and climate change are intertwined one can also say that poverty is a constraint to development. These challenges and binding constraints need to be addressed in order for Tanzania's transition towards a sustainable development.

5.2 Opportunities

Tanzania's abundant natural resources provide an opportunity for economic growth and poverty reduction, provided these resources are managed in a sustainable, equitable and efficient way and that the political will remains to balance the need for short-term gains with

⁵⁶ Cotula et al., 2009.

⁵⁷ Mwamila et al., 2009

⁵⁸ Kulindwa et al., 2010.

⁵⁹ The Guardian (Tanzania), 2009a; The Guardian (Tanzania), 2009b; and East African News (2009)

long-term sustainable development. There is a continued need for good governance, effective implementation and enforcement of policies, environmental and social safeguard and protection of rights, and increased flow of investments.

Good governance: Good governance encompasses issues such as accountability, transparency, the rule of law, and stakeholder participation. There are large risks for corruption related to extraction of natural resources, especially high-value minerals, forests and land. There are opportunities to strengthen governance related to the environment in Tanzania, to enhance transparency of i.a. land-use decisions, procurements, concessions, licenses for exploitation and biofuel production, revenues from natural resources, and hold institutions accountable. *Steps to enhance transparency*, such as complying with the EITI requirements and implementing other voluntary guidelines for land use, forestry, marine resources, etc, could be taken.

Environment-dependent stakeholders (women and men) could be given more influence in decision making, which would entail a shift in power towards local levels. This is where the needs and impacts are felt. With decentralisation, there is need for adequate human, financial and technical capacity also at local level. *Delegated responsibilities should be followed by mandates and resources*. There is a large opportunity in Tanzania to expand community-based natural resource management and participatory forest and wildlife management. This would require support to local government agencies to mobilise local actors.

Information should be available and easily accessible, with effective systems in place to monitor contracts related to natural resource use (mining, logging, biofuel production, etc.). Support can be provided to government agencies at all levels, as well as to communities and CSO to negotiate contracts and get a fairer deal.

When there are unclear property rights these should be revised in a pro-poor fashion, to improve access to, control over, and benefits from natural resources (forests, land, water, fishery, etc.).

Good institutional capacity for integrated management of natural resources: Managing cross-cutting issues, such as environmental, climate change or disaster risk concerns, requires an integrated approach, cross sectors and at different levels of society. Institutions should be in place (also to manage transboundary resources); sector policies should have goals and priorities that are striving towards the same end, and conflicts of interest must be managed. The set priorities should be reflected in the budget and investment decisions, and reflected throughout the MTEF-process.

Now when environmental legal and policy framework is in place, it is time for implementation to take off. For this, systems for and capacity to monitor progress and enforce regulations must be in place. The capacity of NEMC should be strengthened, in order for them to be able to effectively and efficiently fulfil its duties. The EMA-mandated environmental monitoring system could be developed and linked to the poverty monitoring system, perhaps through a set of poverty-environment indicators.

Informed decisions: In order for decision makers to proactively integrate environmental concerns, there needs to be a public demand for it, and an understanding of how improved environmental management can contribute to the overall development objective of poverty alleviation. One way to do it is to assess the economic and distributional benefits of improved

environmental management and how it impacts on other policy objectives such as economic growth and improved public health. Researchers, NGOs and CSOs can contribute with evidence on the environment-poverty linkages but their contributions can greatly be enhanced if sufficient *environmental data* is available and accessible, which is often not the case in Tanzania.

SEA and EIA can provide important information for decision makers. SEA is a participatory process applied at an early stage of decision making, to assist in formulation of policies, plans and programmes, and to assess the potential development effectiveness and sustainability⁶⁰. The EIA is used for projects, once the strategic plans are in place. It is important that all sustainability aspects are included, such as ecosystem services, climate change, and disaster risk reduction.

Tanzania needs to appropriately address climate change as a cross-cutting issue, and develop risk assessment capacity. Improved risk assessment is necessary to inform decision makers on impacts from climate change, and prepare adaptation measures. Stakeholder participation will engage actors to update and adapt priorities, mobilise resources and build capacity for interdisciplinary research and implementation.

Reliable access to energy: Electrification is crucial for poverty reduction and enhanced productivity. It is also closely associated with environmental issues and emissions of greenhouse gases. Care should be taken to develop the energy options that are best in the long perspective. There are plenty of opportunities in Tanzania to develop low-carbon energy sources, such as hydro, geothermal, and solar power options.

Reliable access to water: Water is different from many other natural resources, due to its fluidity and the multiple and often overlapping uses and users. Often, it is a shared resource, and it is interconnected to other natural resources such as land and forestry. These features call for an integrated approach, in order to balance different needs and allocate the resource both geographically and between different water-using sectors. Integrated water resource management provide opportunities for improved health, increased agricultural productivity and food security.

Reliable access to road infrastructure: Availability of a road network will e.g. facilitate access to markets, and thus potentially enhance livelihood opportunities. Transportation is in many way also linked to the environment as it is associated with increased pollution, indirect land-use changes, for instance increased logging, and possibly increased risk for HIV prevalence.

Investment flows: The global attention to climate change is expected to result in large amounts of climate finance, including funds for adaptation and low carbon growth, and increased attention on biofuels. To attract these funds it is of utmost importance that the national systems for e.g. public financial management can be trusted, that the rule of law is applied, with high degrees of transparency and accountability and low risk of corruption. There must also be capacity available to assess, access, and prioritise the different alternatives available and most suitable for Tanzania.

⁶⁰ OECD DAC, 2006.

Investments can be obtained from foreign direct investments or from different funds. Another option is *payment for environmental services (PES)*: A well managed ecosystem provides benefits to a wide range of stakeholders, often far beyond the location, in the form of carbon sequestration, water purification, hydroelectricity, and tourism among others. It can be argued that the stakeholders that benefit from these services should pay for them. In a study carried out on catchment forest reserves in Tanga, Morogoro, Arusha and Kilimanjaro regions the actual Total Economic Value of the forests was rated at USD 496 million per year.⁶¹ PES would mean that (a part of) this value should be ploughed back to the local communities as payment for environmental services. Reduced Emissions from Deforestation and Land Degradation (REDD) could provide an opportunity to preserve the forests and reduce emissions of greenhouse gases while benefitting economically. Sustainable forest management will generate adaptation co-benefits. REDD is anticipated to become a part of the new (post Kyoto) climate regime and concerns payments for reduced deforestation and land degradation, and may be included in climate change mitigation funding. The challenge with PES (including REDD) is to have a pro-poor approach, whereby the local communities actually benefit from it. Some legal changes are required, and issuing of property rights and land titles to communities or individuals, in order for the communities to benefit from the payments.

6. Discussion on linkages to other thematic priorities

Poverty is one consequence of environmental degradation in Tanzania, as poor people to a larger extent than more well off people, are dependent upon environmental resources and ecosystem services for their livelihoods and have less capacity to adapt to changes. When these resources are degraded, the livelihood opportunities will be reduced. A majority of the rural poor (68%) derive their income from agriculture, hunting and forestry; 95% of the rural population claim that wildlife is their main source of protein; and a vast majority use wood fuel as their main source of energy. Poor people are especially vulnerable to changes in availability and quality of the natural resources and ecosystem services, and it is expected that climate change may affect both.

Access to good quality natural resources is important for poverty reduction, improved public health and economic growth. Tanzania is endowed with abundant natural resources (both renewable and non-renewable) and has a very rich biodiversity, which constitute important opportunities for long-term development provided these resources are managed in a sustainable, equitable and efficient way, that there is good governance, and adequate social and environmental safeguards.

Environmental challenges, constraints and opportunities are linked to other cross-cutting issues or thematic priorities, such as democracy, human rights, gender, and power relations.

Democracy involves aspects such as possibilities for people to choose their leaders and hold them accountable; to participate in decision making; to enjoy their rights, and to trust that the rule of law is applied and equal to all citizens. Lack of good governance lie behind many environmental challenges, and improved governance can lead to improved management of the environment and, indirectly, to poverty reduction. Corruption is a driving force for environmental degradation and depletion of natural resources, while reducing revenues that could be used for poverty reduction or environmental management efforts. Lack of

⁶¹ Zahabu et al., 2005

transparency and accountability are other aspects linked with environmental degradation, concessions and natural resource use.

Often, decisions are best taken at the lowest levels, that is where the needs are felt and the effects are visible. However, often decisions relating to natural resources are taken at central levels, far from the possible impacts. When decisions are taken at local levels, there is often a lack of capacity and resources to adequately address cross-cutting issues such as the environment. In order for people to be able to participate in decision making and to hold the government accountable, transparent and accessible information must be available related to natural resource use and revenues. Transparent information on *i.a.* criteria for giving out land rights or mineral/logging licenses and a trust that the rules and regulations are adhered to; information on how large the contracts or profits are; how large volumes that will be extracted; what the effects will be on local communities in terms of access to these resources, and capacity to negotiate fair contracts, all are of profound importance to local communities.

The *human rights* to food, work, shelter, health, and water, entitle everyone to adequate nutrition, livelihood opportunities such as secure tenure, and sufficient, safe, accessible and affordable water for personal and domestic uses. Fulfilment of these rights is challenged by environmental degradation and climate change, especially for the rural poor.

Human *security* is sometimes said to encompass “freedom from want and freedom from fear”. Environment-related security is manifested in resilient ecosystems, reliable access to food and water, adequate and sustained supply of essential natural resources, gradual accumulation of assets including natural capital, enhanced natural resource management, access to resource-based safety-nets such as goods and services from the natural commons (forests, grazing lands, marine resources, etc), and private and/or communal insurances.

Women are disproportionately at risk to environmental degradation, conflicts, and natural disasters, due to gender roles, and historic, cultural and socio-economic reasons. It is a fact that applying *gender* sensitivity is important related to environment. It is the women that, amongst others, work the fields, collect water, fuel wood, provide and prepare food, and care for family members that are sick. Longer distances to collect potable water or fuel wood, droughts or floods that affect agricultural yields, or increasing environmental health risk factors, all increase the burden on women and lowers the possibilities of empowerment and participation in decision making. Furthermore, it is often the girls that help their mothers with household tasks, sometimes at the expense of school attendance. Participatory approaches to natural resource management are crucial, but participation must include all groups of society, including women.

Power relations are also important to consider in relation to the environment, and especially related to high-value natural resources (including minerals, forests, land). Who owns or controls the natural resources; who stands to lose or gain from transparent revenue records or allocation of mineral or logging licenses; why is implementation of environmental safeguards so difficult to accomplish – is it because of lack of enforcement and monitoring capacity, or is it a lack of clear guidance and political will? The Vice-President’s Office has been identified as a champion for change towards improved environmental sustainability in Tanzania. Other champions might be identified, in government agencies, civil society or the private sector.

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Annex 1: Climate Change in Tanzania

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25 October 2010.

Climate change trends and projections

Climate change scenarios developed using General Circulation Models show that in Tanzania the mean average daily temperature is expected to rise by 3°C-5°C and the mean annual temperature is expected to increase 2°C-4°C by 2075⁶². The outlook for rainfall is mixed and less certain: bimodal areas are predicted to see an increase of 5%-45%, while unimodal areas are expected to experience a decrease of 5%-15%⁶³. The changes for the unimodal areas are less certain than for the bimodal regions. Changes in rainfall and soil moisture due to changes in temperature will impact river flow, with the Pangani expected to see a decrease of 6%-9% in annual flow and the Ruvu a decrease of 10%, while the Rufiji will increase in flow by 5-11%⁶⁴. The intensity of rainfall and number of extreme rainfall events is expected to increase which could increase flooding, especially if coupled with El Niño events which frequently lead to flooding in Tanzania⁶⁵.

Climate change impacts on poverty, economic development and public health

In the 2009 Human Development Report, Tanzania ranked in the bottom 20% (151 out of 182 countries). Its GDP per capita is \$496 and over one-third of its population lives in poverty⁶⁶. These facts impact Tanzania's policymaking, which must aim for economic growth to lift millions out of poverty while simultaneously grappling with climate change and the need to preserve the environment and ecosystem services. Yet climate change may worsen both the country's poverty reduction efforts *and* its drive for economic development, as well as severely impact the environment. Poverty in Tanzania is largely rural, stemming from a reliance on rainfed agriculture: a sector which will be hardest hit by lower rainfall. Impacts on agriculture will constrain economic development, since agriculture accounts for about half of the national income and 75% of merchandise exports⁶⁷. Modelling of general equilibrium effects of climate change on agricultural productivity in Tanzania produces estimates that climate change will cause GDP to decline by 0.6% to 1.0% by 2030; by 2085, depending on the severity of climate change impacts, the decline in GDP could range from 5% up to 68%⁶⁸. Increased temperatures will also constrain water resources as reduced river flows will further hamper efforts to supply all citizens with a safe source of drinking water. Lack of safe drinking water will also negatively impact economic growth and poverty reduction efforts through labour days lost due to water-borne illness. Changing climate may also adversely impact health through the possible expansion of the mosquito population to the country's highlands⁶⁹, potentially bringing higher rates of malaria, as well as increases in cholera during periods of increased precipitation or flooding. It is the rural poor, who lack adequate healthcare facilities, that will be hardest hit by these changes. Lower or more variable rainfall would also negatively impact hydropower production, which represents 80% of commercial energy; the Central Bank of Tanzania has estimated that in 2007 that economy grew 1.1% slower than expected due to electricity shortages⁷⁰.

Sectors and groups most vulnerable to climate change

Agriculture will be affected the most by rainfall changes. While there will be gains for some crops (such as coffee, cotton and rice) in bimodal climates where rainfall is expected to increase, this will be counteracted by an increase in pests and diseases, which for example is expected to reduce coffee

⁶² Mwandosya, Nyenzi and Luhanga (1998)

⁶³ Ibid. Bimodal rainfall regimes occur in the north of the country, with rainy seasons from Oct-Dec and Mar-May

⁶⁴ Ibid.

⁶⁵ World Bank Climate Portal. Accessed 07/10/10

⁶⁶ www.worldbank.org

⁶⁷ www.tanzania.go.tz/agriculture.html

⁶⁸ Chambwera and MacGregor (2009)

⁶⁹ Yanda and Kangalawe (2005)

⁷⁰ VPO, 2007 (NAPA)

yields by 20%⁷¹. Further, the most important food crop – maize – is expected to decline 33% in yield on the national level, while declining as much as 83% in some regions of the country⁷². With three-quarters of Tanzanians living in rural areas⁷³ and 80% of Tanzanians employed in the agricultural sector⁷⁴, the rural poor and especially smallholder farmers will be hit hardest by the lower yields. Further, if the price of staples such as maize rises due to lower production, the urban poor will also be adversely affected. Tanzania's **water resources** will also be impacted by climate change. As noted above, two rivers are expected to see reduced flow: the Pangani, on which the urban areas of Arusha and Moshi rely, and the Ruvu, which supplies drinking water to Dar es Salaam. Urban dwellers in these areas will be affected by this, with the poorest forced to rely on water vendors, which typically cost from 2-10 times more than piped water⁷⁵. With four-fifths of Tanzania's energy generated through hydropower, **energy production** is another sector that will be affected by rainfall changes. For example, the reduced flows of the Pangani will impact the 17.4% of the country's hydropower generated in that basin, while the increased flows in the Rufiji basin may cause damage to the Mtera and Kidatu hydropower installations, which generate 50.3% of the country's hydropower⁷⁶. The reduced flows in the Pangani and the Ruvu rivers are especially likely to negatively impact the economy, as hydropower from those rivers supplies the most important areas in terms of industrial production, such as Dar es Salaam, Tanga and Arusha⁷⁷.

Institutional framework

Tanzania signed the UN Framework Convention on Climate Change (UNFCCC) in 1992 and ratified it in 1996; the country became a signatory to the Kyoto Protocol in 2002. Tanzania prepared its Initial National Communication in 2003; a National Adaptation Programme of Action was presented in January 2007. The lead government entity charged with climate change is the Vice President's Office (VPO), Division of Environment. Other governmental actors in the sector are: Tanzania Meteorological Agency; Ministry of Energy and Minerals; Ministry of Water and Irrigation; Ministry of Industry, Trade and Marketing; Ministry of Agriculture, [Food Security and Co-operatives](#); and Ministry of Natural Resources and Tourism. There is also a National Climate Change Steering Committee (NCCSC), which is chaired by the VPO Division of Environment; the secretariat of the committee is held by the Centre for Energy, Environment, Science and Technology (CEEST), a highly-respected NGO whose former director undertook a groundbreaking study in 1998 of the impacts of climate change on Tanzania and is now serving as Tanzania's Minister of Water and Irrigation. However, there has been some criticism of the NCCSC as a national-level entity only: a need for replication at the regional and district levels has been identified⁷⁸.

Response to climate change: mitigation

While Tanzania is responsible for only a very small fraction of the world's greenhouse gas emissions (in 2004, its CO₂ emissions were 0.1 metric tonnes per capita, low even for sub-Saharan countries), its major problem in terms of mitigation is land use and forestry. Its forest cover has decreased steadily, with a loss of 403,000 hectares a year from the period 1990-2010 and a 2005-2010 forest cover change of -1.16%⁷⁹. There are multiple drivers of deforestation: clearing for agriculture and settlement; overgrazing; wildfires; charcoal production and commercial exploitation of timber⁸⁰. Relevant activities proposed in the NAPA include activities to reverse deforestation and investing in improved or alternative energy sources such as biodiesel or more efficient charcoal and wood stoves. Any

⁷¹ Mwandosya, Nyenzi and Luhanga (1998)

⁷² Ibid.

⁷³ UNESA, World Population Prospects: the 2008 Revision

⁷⁴ www.tanzania.go.tz/agriculture.html (hydropower data); VPO, 2003.

⁷⁵ Kjellén (2006). Results of study in Dar es Salaam.

⁷⁶ www.tanesco.co.tz

⁷⁷ VPO, 2003

⁷⁸ FAO, Government of Tanzania and Embassy of Finland (2010)

⁷⁹ www.fao.org

⁸⁰ VPO, 2007 (NAPA)

mitigation activities should have clear benefits for poverty reduction, economic growth or existing national development priorities.

Response to climate change: adaptation

Tanzania's NAPA highlights four factors as critical to livelihoods and economic growth: adequate food, good health, access to safe drinking water, and sufficient energy for households and industry. After consultations with stakeholders at all levels, the NAPA identified 14 priority projects for adaptation. Not surprisingly, given the dominance of agriculture, that sector was ranked the top priority for adaptation measures, with increasing irrigation to raise maize production across all regions the most urgent goal. Water and energy were co-ranked second and third; adaptation responses for the former focus on increasing water harvesting and storage and for the latter the emphasis was on developing alternative clean energy sources. Forestry was fourth, with various mechanisms to combat deforestation given prominence, and health was fifth, with the adaptation response focusing on capacity building. While coastal and marine resources ranked ninth overall, the NAPA identified construction of artificial structure to protect Tanzania's 800 km of coastline as one of the top 14 projects for adaptation. However, funding for these projects has not been forthcoming, in part due to a perception among donors that the NAPA is weak. The VPO has indicated its intention to prepare a National Climate Action Plan, which could serve to operationalise the NAPA and could also be seen as an important tool for mainstreaming climate issues more thoroughly in the next MKUKUTA⁸¹.

Activities of other donors

With deforestation a huge issue for Tanzania, the Government of Norway has pledged US\$100 million for work related to Reducing Emissions from Deforestation and Forest Degradation (REDD). The Government of Denmark is also a major donor to Tanzania, with DANIDA's work in Tanzania focusing in part on improving the environment. Aid from Finland prioritizes forestry and environment, agriculture, and bio-energy. The EU has provided €8 million to support energy and climate research in Tanzania. There appears to be a financing gap related to climate change mitigation (beyond REDD activities) and adaptation. As noted above (sections 3.3, and 4.3), there is also a heated national debate about biofuels production in Tanzania, which has highlighted a lack of scientific evidence needed to inform national policy. Lastly, there is also a gap in data on the impact of climate change on ecosystem services and how this might in turn affect the Government of Tanzania's poverty reduction and economic development goals.

⁸¹ National Strategy for Growth and Reduction of Poverty

Annex 2: The Millennium Ecosystem Assessment in brief

By: Göran Ek, SwedBio

The Millennium Ecosystem Assessment (MA) was called for by the United Nations Secretary-General Kofi Annan in 2000. Initiated in 2001, the objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The MA has involved the work of more than 1,360 experts worldwide. Their findings, contained in five technical volumes and six synthesis reports, provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources) and the options to restore, conserve or enhance the sustainable use of ecosystems.

There is a growing understanding of the fundamental role ecosystems and the services they provide play for human welfare, see Fig. 1 describing the linkages between biodiversity, ecosystem services and human well-being.

Key findings of the Millennium Ecosystem Assessment⁸², finalised in 2005 and the so far most comprehensive survey of the ecological state of the planet, include:

- 60% of world ecosystem services have been degraded
- Of 24 evaluated ecosystems, 15 are being damaged, see Table 1.
- About a quarter of the Earth's land surface is now cultivated.
- People now use between 40 percent and 50 percent of all available freshwater running off the land. Water withdrawals have doubled over the past 40 years.
- Over a quarter of all fish stocks are overharvested.
- Since 1980, about 35 percent of mangroves have been lost
- Nutrient pollution has led to eutrophication of waters and coastal dead zones
- Species extinction rates are now 100-1,000 times above the background rate

The degradation of ecosystem services is hence already a significant barrier to achieving the Millennium Development Goals, contributes to growing inequities and disparities across groups of people, and is sometimes the principal factor causing poverty and social conflicts.

Figure 1. Links between biodiversity, ecosystem services and human well-being

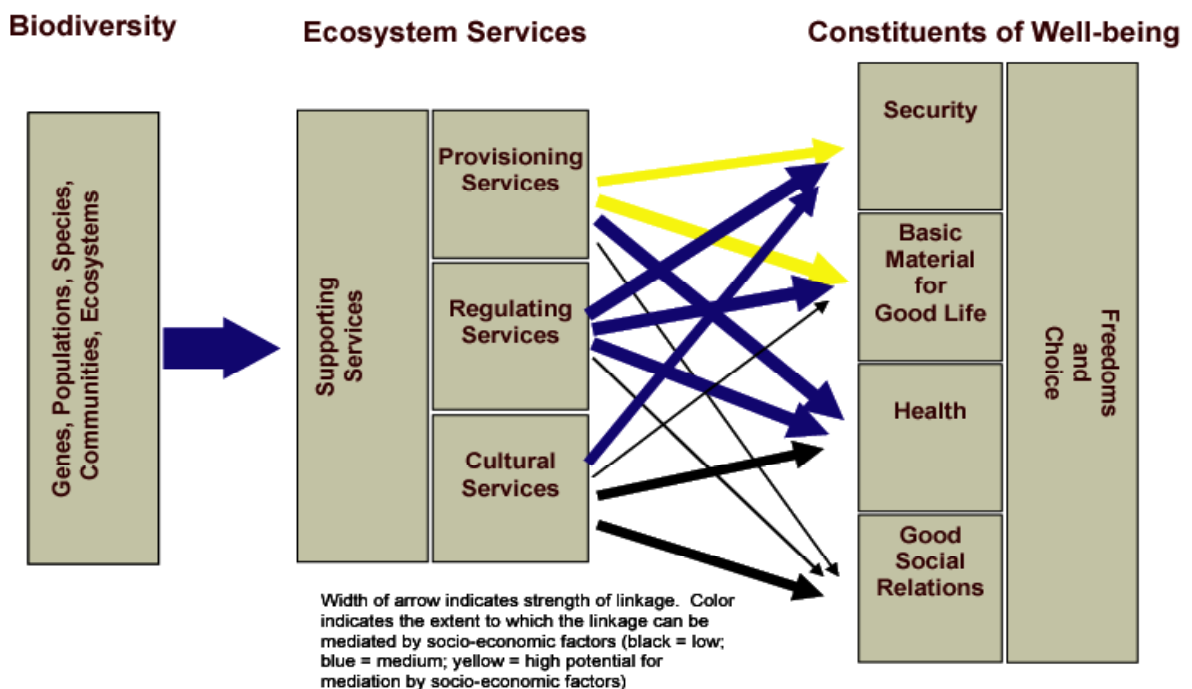
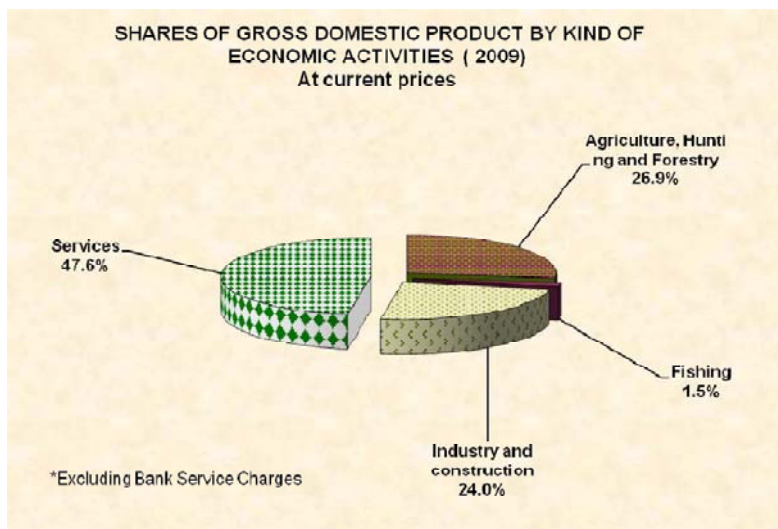


Table 1: Global condition of Ecosystem Services Examined by the Millennium Ecosystem Assessment

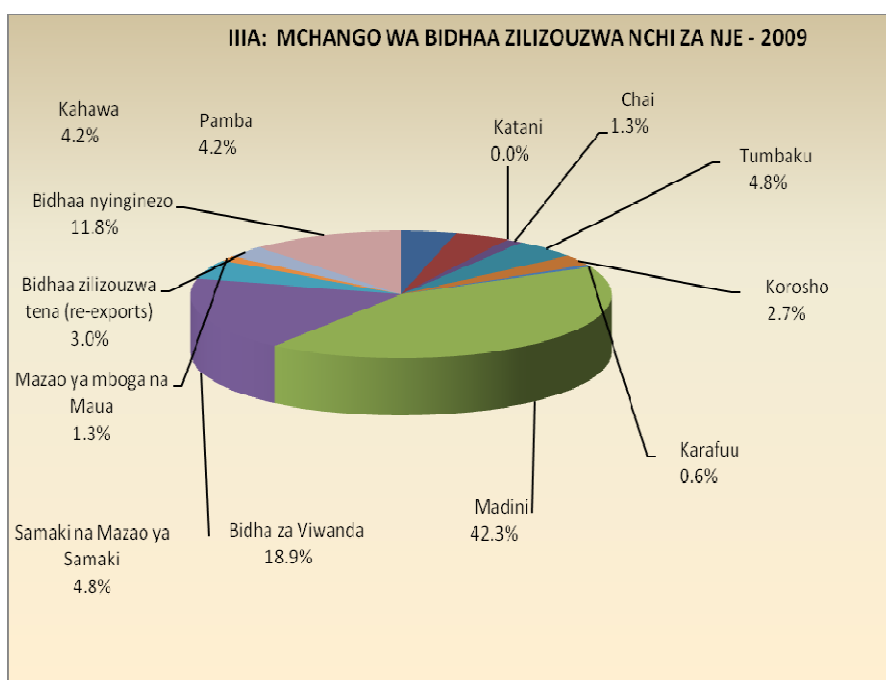
Ecosystem Services	Enhanced	Mixed	Degraded
Provisioning	Crops Livestock Aquaculture Carbon	Timber Fiber	Capture fisheries Wild foods Wood fuel Genetic resources Biochemicals Fresh Water
Regulating	Carbon sequestration	Water regulation Disease regulation	Air quality regulation Regional & local climate regulation Erosion regulation Water purification Pest regulation Pollination Natural Hazard regulation
Cultural		Recreation & ecotourism	Spiritual & religious Aesthetic values

For additional information on the MA including presentation materials etc, see <http://www.maweb.org>

Annex 3: Shares of GDP and Export earnings by kind of Economic Activities



Shares of GDP by kind of activity activity (source: Ministry of Finance and Economic Affairs, 2010)



Percentage, contribution of export by economic activity (source: Ministry of Finance and Economic Affairs, 2010)

Translation:

Katani – Sisal;

Chai – Tea;

Tumbaku – Tobacco;

Korosho – Cashew nuts;

Karafuu – Cloves;

Madini – minerals;

Bidha za Viwanda – Industrial products;

Samaki na Mazao ya Samaki –

Fish and fish products;

Mazao ya mboga na Maua –

Horticultural products;

Bidhaa zilizouzwa tena – re-exports;

Bidhaa nyinginezo – Other products;

Kahawa – Coffee;

Pamba – Cotton.