

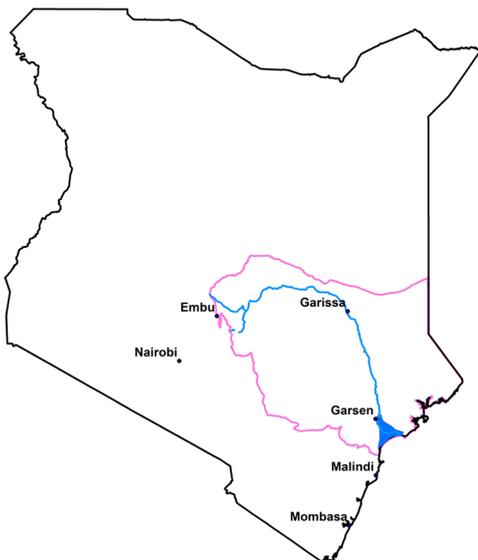
# The Economics of Ecosystem Services of the Tana River Basin

## Mainstreaming the value of Ecosystems and Biodiversity in Development Planning

In a River Basin like the Tana appreciating the relationship between development goals, human well being and ecosystem services is crucial. It can mean the difference between a successful development strategy and one that falls short because of the unexamined consequences or changes in the flow of ecosystem services.

This fact sheet highlights the importance of mainstreaming the values of ecosystem services in development using an example of the Tana River Basin.

### The Tana River Basin.



- The Tana River is located in the south-eastern part of Kenya.
- It springs below the summits of Mount Kenya and the Aberdare Range and discharges at the Indian Ocean.
- Tana River traverses Murang'a, Kirinyaga, Embu, Tharaka, Kitui, Tana River, Lamu counties, as well as parts of Nyeri, Garissa, Kiambu, Machakos and Nyandarua counties.
- The entire Tana River Basin covers an area of about 126,000 km<sup>2</sup>, corresponding to 22% of Kenya's territory.
- It borders Ewaso Ng'iro North Catchment in the north, Somalia and the Indian Ocean in the east and the Rift Valley Catchment in the west.

### One basin with 3 distinct landscapes.

**The upper Tana** has a size of 15,000 km<sup>2</sup> with a high number of perennial and seasonal tributaries including the rivers Thika, Sagana, Thiba, Mutonga and Chania. It has the highest average annual precipitation rate and humid or semi-humid climate during the whole year. The soil is mainly volcanic, rich in nutrients suitable for cultivating coffee, rice, wheat, tea and maize. Dairy production, poultry and sheep farming are also widely practiced (Agwata, 2005). Overall, water resources in the upper Tana are mainly used for agriculture, irrigation and hydropower.

**The middle Tana** covers an area of 15,700 km<sup>2</sup> and registers humid to semi-arid conditions. It is composed of cambisols and alkaline rocks and can therefore sustain the cultivation of cotton, tobacco, beans as well as dryland farming (Agwata, 2005; Knoop et al., 2012).

**The lower Tana** covers approximately 95,000 km<sup>2</sup>. Is mainly semi-arid or arid with local geography under 200m whereas there is a difference in the agro-climatic situation of the Tana delta and the coastal region, which register higher rainfall and humidity (Knoop et al., 2012; Agwata, 2005). It is the main source of livelihood for the population living in the lower basin. The main economic activities in the Tana Delta area are centred around pastoralism, agro-pastoralism and agriculture.

### What are the major ecosystems of the Tana River Basin?

Montane/highland forests; agro-ecosystems (cropland); grasslands; Tana delta; coastal forests; mangroves; small wetlands (lakes and rivers); settlement are the main ecosystems within the Tana River Basin. The Tana Delta biodiversity hotspot is also home to endangered species and was designated as a Ramsar site in 2012.

### What are the major ecosystem services of the Tana River Basin?

These include: drinking water; hydro-electric power; fisheries; agriculture; biodiversity

### What are the threats and challenges to Tana River basin?

- **Poor farming practices** that have led to soil erosion and pollution of the river by agro-chemicals.
- **Overabstraction of water** due to the planned water supply to Nairobi and Lamu port/city and development of a million acres irrigation scheme using water from the High Grand Falls Dam (HGFD). Irrigation will greatly reduce the overall water resources at Garissa to almost a constant level of natural minimum flow with hardly a flood peak left. It will also lead to a considerable drop in the mean discharge by about a third compared to the current situation.



### What is the economic importance of the Tana River basin?

- **Drinking water:** The basin supplies 80% of the drinking water to Nairobi.
- **Food:** Fisheries and agriculture in the basin provide a major source of food.
- **Employment** for the estimated 7 million residents that live in the greater basin area and in other parts of the country.
- **Irrigated agriculture** currently has the potential to produce 64,000 tons of rice and maize per year.
- **Hydropower:** benefits total an annual US\$ 25-43 when compared to an alternative of natural gas and geothermal generation, yet the cost of generating hydropower is also significant.

The upper Tana Catchment Area is home to the largest dam and reservoir capacity in Kenya (Nippon Koei, 2013b). The region has a total installed capacity of 567 MW and the total gross storage of the reservoirs amounts 2,331 million m<sup>3</sup> (Nippon Koei, 2013a). This is enough to deliver about 70% of Kenya's total hydropower generation and 40 to 60% of the total energy production in the country (Odhengo et al., 2012). The installed capacity of the Tana hydropower stations (the Masinga, Kamburu, Gitaru, Kindaruma, and Kiambere dams) also called the Seven Forks Dams can deliver up to 13 GWh/day (about 567 MW) during rainy season, but only 7 GWh/day (about 300 MW) during dry season (Republic of Kenya, 2011a).

### What is the total value of Tana River mangrove ecosystem services?

- A total of 791,338 kg of fish was harvested in 2013 and with modal price of selling 1 kg of fish being Ksh.100, the total, the annual fish values is therefore Ksh.79,133,800 which is equivalent to US\$920,160. This translates to a marginal value of Ksh.48,105 ha/year or US\$559 ha/year
- A total 5,131 poles of mangrove was harvested and sold for building houses in the Tana delta, with modal price of Ksh.100 per pole. The total annual value of building poles is Ksh.513,100 which is equivalent to US\$5,966 translating to a value of Ksh.1284 ha/year or US\$15 ha/year
- A total of 9,149 bundles of firewood were harvested in 2013. Using a prevailing price of firewood of Ksh.100 per bundle gives annual value of firewood at Ksh.914,900 or US\$10,638 which translates to Ksh.2,287 ha/ year or US\$27 ha/year
- Annual value of honey from the mangroves is Ksh.53,400 or US\$621 translating to Ksh.227 ha/year or US\$2.60 ha/year
- The total average value of indirect use services of mangrove ecosystems is Ksh.56,333. or US\$655
- The aggregated annual amount of mangrove ecosystem goods and services in the Tana Delta adds up to Ksh 213 million or US\$2.5 million which implies an average value of Ksh 90,638 per ha/year or US\$ 1,054 per ha/ year.

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<sup>1</sup>This estimation does not include carbon sequestration values, international biodiversity values and local non-use values such as cultural and bequest values.

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