

Management for a Sustainable Future – a fragile ecosystem and human interaction in Tanzania.

Sustainable development has become a buzzword in geographical studies but do you really know what it means? More importantly how does it apply to real world examples? In this case study you will examine Mkomazi Game Reserve in Tanzania and learn about management options for its sustainable future.

In 2002 there was a World Summit on Sustainable Development (see <http://www.johannesburgsummit.org/> for information and other examples of sustainable development in action). Here decision-makers from around the world gathered to discuss how the needs of the present could be met without compromising the ability of future generations to meet their own needs.

Meeting the needs of people today means that decision-makers must take into account everyone's:

- economic needs.
- environmental needs.
- political needs.
- social, cultural and health needs.

By considering the needs of future generations decision-makers must encourage everyone to:

- minimise the use or waste of non-renewable resources.
- use finite renewable resources in a sustainable way.
- not overtax the capacity of ecosystems to absorb or break down wastes.
- protect natural processes and climatic systems, including not overtaxing the capacity of global systems to absorb or dilute wastes without adverse effects.
- create political and institutional structures within nations and internationally which support the achievement of the above.

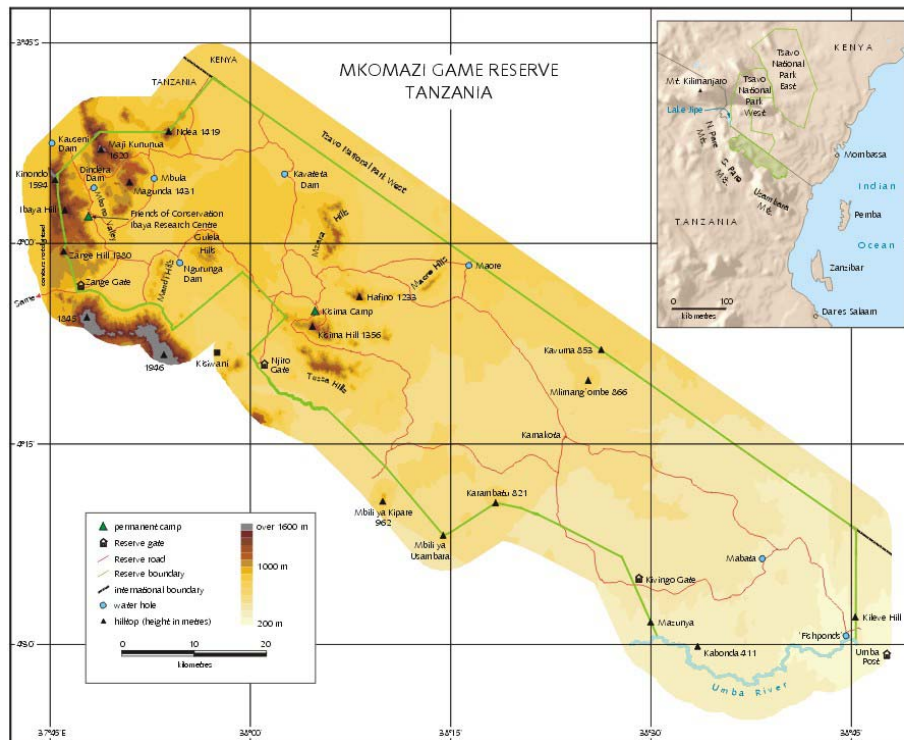
One project that the RGS -IBG have been involved with since 1988 is researching the Mkomazi Game Reserve in Tanzania. While being a Less Economically Developed Country, Tanzania also has biodiversity priorities. (For information on Tanzania see <http://www.worldbank.org/tz/data.htm> and http://www.worldbank.org/data/countrydata/aag/tza_aag.pdf).



Map of Africa showing the location of Mkomazi Game Reserve in Tanzania. Source <http://www.mkomazi.com/map.htm>

A total of 28% of Tanzania's surface area is protected. However, the population has risen from 8.7 million in 1957 to 35.2 million in 2002. This has clearly put the protected areas under a lot of pressure. How is Mkomazi going to withstand this pressure and reverse any damage already incurred?

Mkomazi Game Reserve Facts



Map of Mkomazi Game Reserve. Source: Coe et al 1999

- Mkomazi Game Reserve was established in 1951 when Tanzania was under British administration. Tanzania was never technically a colony but was mandated to Britain by the League of Nations after World War 1
- Game Reserve status doesn't offer as much protection as National Park status (e.g. Serengeti) but it does mean that human access and activities are by special permission only.
- 3,276 km² in area.
- Mkomazi protects the habitat of over 1,300 plants species (over 10% of Tanzania's total) and has records of over 400 bird species.
- Biologists found six bird species not previously recorded in Tanzania and two small mammal species new to science, while up to 30% of insect species collected are likely to be new to science too: there could be as many as 90,000 insect species in the Reserve.
- The Uмба River is the only naturally occurring and permanent water source.
- The highest point is Maji Kununua at 1,620m (altitudinal range is 230m-1,620m).
- Tribes using the resources in Mkomazi include the Maasai, Pare, Sambia, Kamba and Parakuyu. Their usage of the Reserve was restricted from 1951, although unofficial uses such as cattle grazing, burning, habitation and hunting continued. Semi-permanent settlements within Mkomazi were cleared in 1988.
- In the centre and west large basins contain 'black-cotton' soils (eroded alluvial material with a high clay content), separate by isolated mountains.

Mkomazi Climate Facts

- Temperature range (of monthly means at 800 m altitude) is 17.5°-29°C and mean annual temperature is 23°C.
- Potential evapotranspiration is greater than rainfall, making water scarce.
- Annual rainfall varies according to altitude, ranging from over 800 mm each year in the north west to about 250 mm in south and central areas.
- The 'short rains' typically arrive in October to December and the 'long rains' arrive in March to May. However, the El Niño Southern Oscillation affects year to year variations in the short rains.

In 1988 the Tanzanian Government invited the RGS -IBG to research the ecology of the Mkomazi Game Reserve, collecting baseline information to help understand and monitor the area more fully. This would help the Tanzanian government to plan and manage the area more effectively. The government believed that the environment in Mkomazi was suffering from overgrazing, loss of ground cover, long term degradation of productive capacity, cutting and burning of forests and loss of woody vegetation due to fires. Some of these perceptions are disputed, and have been analysed further: see http://www.ucl.ac.uk/herg/east_africa_mkomazi.htm)

Why is Mkomazi so special?

This is a protected landscape on the southern most edge of the Sahel in East Africa. Together with the Tsavo National Park across the border in Kenya, it creates a dry season refuge for wildlife. This means it also becomes part of a

unique 40,000km² ecosystem (one of the largest protected tracts of land in Africa).

There are three distinct habitats. The semi-arid savanna grassland (see http://www.panda.org/news_facts/education/virtual_wildlife/wild_places/grasslands.cfm for a general background and <http://www.runet.edu/~swoodwar/CLASSES/GEOG235/biomes/intro.html> for the more in depth information), is dominated by a grass called *Pennisetum mezianum* and supports, for example, buffalo, zebra, eland, gazelle, kongoni and steinbuck, as well as rarer animals such as lesser kudu and gerenuk.

In the west of the Reserve are the remnants of moist forest on isolated hilltops, close to the Usambara and Pare Mountains that support diverse and regionally specific flora and fauna.. If these forests were destroyed they would be lost forever because the plants are responsible for the moisture that sustains them. These forests are also the source of water for people and agriculture next to the Reserve. So, Mkomazi is special because of this simple equation: the variability in the physiography and environment means that there is a great diversity of habitat types. This means that there is rich floral diversity which in turn supports diverse wildlife.

The dynamics of Mkomazi's ecology are dominated by three main factors:

1. Seasonal change – responses of plants to the rains, along with insect and herbivore activity
2. Fire – a natural part of savanna dynamics is fire caused by lightning strikes at the end of the dry season. Human activity also causes fire by three ways: pastoralists want to encourage new growth on the grassy plains for their livestock; fire can spread into Mkomazi from outside; and illegal hunters find it easier to stalk their prey and set snares if the vegetation cover is reduced.
3. Human activities – the people who live around Mkomazi are pastoralists, cultivators or a combination of the two.

Since being established in 1951 Mkomazi had suffered from a lack of funds. If the reserve made any income it did not even cover the costs of its administration let alone produce a surplus that could benefit local communities. Mkomazi faced the following problems in 1988:

1. Poaching meant that the black rhino population had entirely disappeared and elephant numbers were greatly reduced.
2. Because the elephant population was reduced there was a change in vegetation types in bushland and savanna areas
3. There was a huge increase in cattle, goats and sheep using the reserve for grazing and drinking water.
4. An increase in the number of fires started by humans meant that the vegetation had become fragmented and threatened the moist forest by spreading up the hillsides when fanned by the wind.
5. Resentment among the people whose access to the reserve had been limited since 1951. They felt that their exclusion was subsidising the reserve while they did not benefit from its presence. Village economies

were claimed to be suffering due to a land shortage from when the Game Reserve was established (see an account of legal action taken by the Maasai

http://www.minorityrights.org/WorkshopReports/work_rep_chapterdetail.asp?ParentID=5&ID=31). This also meant that there were few employment opportunities for young people and so some saw poaching and theft of livestock as an inevitable outcome.

Management Options

In order to plan for a sustainable future at Mkomazi the views of all stakeholders were taken in to account. The table below outlines those stakeholders and their views on the reserve.

Stakeholder	Stakeholder's 1. use of: 2. impact on Mkomazi 3. needs in relation to:
Tribes	<ol style="list-style-type: none"> 1. Access to cultivable land. 2. Water resources. 3. Access for beehives. 4. Grazing. 5. Gathering fuelwood, wild foods and medicines. 6. Mining gemstones. 7. Ritual use of sacred and ceremonial sites.
Entrepreneurs	<ol style="list-style-type: none"> 1. Livestock service industry (e.g. truck drivers, bars, restaurants). 2. Illegal hunting, mining, timber extraction.
Local Government	<ol style="list-style-type: none"> 1. Resolving conflict over Mkomazi. 2. Monitoring activities and protecting the area 3. Planning.
National Government	Ministry of Tourism Natural Resources and Environment is very powerful. Tourism is Tanzania's biggest foreign income earner. Laws have been put in place to protect Mkomazi from encroachment and illegal use.
Politicians and Non-Governmental Organisations	Can shift their position on conservation and human use of Mkomazi to gain votes.
International Organisations	Invited by other groups to work there e.g. George Adamson Wildlife Trust, World Wide Fund for Nature etc.

Also, in order to manage Mkomazi effectively any action taken must be designed to achieve the long-term maintenance of biodiversity. Tanzania is a Party to the Convention on Biological Diversity which means it must use biodiversity in a sustainable way.

Why is biodiversity so important? Essentially, biodiversity enables ecosystems to function normally and so provide humans with 'goods' and

'services' upon which they depend. 'Goods' are resources, for example, food, medicine, industrial materials and recreational exploitation i.e. the **use value** of biodiversity. 'Services' mean the things that produce the 'goods' e.g. nutrient cycling, pollination, climatic regulation i.e. the **passive use value** of biodiversity. The **non-use value** of biodiversity means its more intangible values such as aesthetic pleasure derived from it and the knowledge of its existence even if it has never been experienced.

Managing the biodiversity in Mkomazi in a sustainable way must take a long-term view which limits the rates of consumptive use and also ensures that local communities receive some kind of economic benefit. The following are summaries of examples of how Mkomazi Game Reserve is being managed in a sustainable way:

1. Restrict use of resources.
The Mkomazi Outreach Programme (M.O.P.), an initiative of the George Adamson Wildlife Protection Trust, operating with the support of the reserve management, aims to create a responsible attitude towards the reserve amongst the tribes that surround it. For example the programme will educate the tribes to improve farming and animal husbandry practices in order to stop overgrazing (for further information about the M.O.P. (see <http://www.georgeadamson.org/projects/mkomazi/outreach.htm>). Also deterrents are in place to reduce illegal use of reserve resources (see http://www.gcci.org/mkomazi/mkomazi_poachers.html)
2. Change ecological processes.
Managing fires started by humans through the M.O.P.
3. Manage water.
As most crops grown by tribes around Mkomazi are rainfed the M.O.P. attempts to improve agricultural practices regarding this. There are issues for outside organisations working within the reserve, as this article points out <http://www.savetherhino.org/php/news.php?id=169&item=2>.
4. Reintroduce locally extinct species.
The black rhino and wild dog have been re-introduced to the reserve by the George Adamson Wildlife Trust (see http://www.savetherhino.org/our_projects_in_africa_asia/mkomazi/how_i_s_save_the_rhino_supporting_mkomazi.phtml and <http://www.mkomazi.com/programs.htm>)
5. Manage tourism.
Mkomazi is now offered as a rather select and unique place to go on safari by many tour operators. There are still no purpose built tourist facilities within the reserve. Any tourists who do stay overnight to view the wildlife have to camp. Here is just one example of what they have to say http://www.atalii.com/Kilimanjaro/Mkomazi_Game_Reserve.htm. Of course, the M.O.P aims to help local communities to gain from this kind of marketing of the Mkomazi.

Further investigations:

1. Design a logo for the Mkomazi Game Reserve to reflect the way the reserve is being managed?

2. During which season would fire be the greatest hazard? Give reasons for your answer.
3. What are the advantages and disadvantages of each of the management options for each stakeholder?

Bibliography

Coe, M. et al, *Mkomazi: The Ecology, Biodiversity and Conservation of a Tanzanian Savanna*, RGS (IBG) 1999.
Outreach Programme for the Mkomazi Project. Private paper.

Resources

<http://www.serc.org/livinglabs/curriculum/mkomazi.asp> for an extensive history, background and reports on species re-introduction and efforts to improve tourism in Mkomazi.

<http://www.geography.btinternet.co.uk/biome.htm> for a list of lots of web sites to help you understand biomes and biodiversity.

<http://www.geography.btinternet.co.uk/sustainability.htm> for lots of web sites on sustainable development.

<http://users.ox.ac.uk/~biommm/> Details of mapping undertaken in Mkomazi, with data that can be downloaded into a geographical information system.