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## Neighbours' scramble for water threatens Serengeti ecosystem

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In Summary

The concentration of wildlife in one spot, their impulsive bursts of energy and thundering hooves in their trail, culminates in an adrenalin rush as tens of thousands of beasts plunge into the crocodile-infested waters.

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The concentration of wildlife in one spot, their impulsive bursts of energy and thundering hooves in their trail, culminates in an adrenalin rush as tens of thousands of beasts plunge into the crocodile-infested waters.

It is estimated that about 1.5 million wildebeest, accompanied by large numbers of zebras, Grant's gazelles, Thomson's gazelles, elands, and impalas, make an enormous loop every year between the Serengeti in Tanzania and Maasai Mara in Kenya, in search of food.

The event, naturally, has become an icon of the East African safari. Baptised the Eighth Wonder of the World— others call it the World Cup of Wildlife — it bestows Kenya's and Tanzania's important tourism industry with significant economic value. Tourists start to camp by the river weeks before the event, anxious to witness the frantic herds and scenes of panic, confusion and triumph.

In the last two financial years leading up to July 2017, according to Kenya Tourism Cabinet Secretary Najib Balala, Nairobi spent Sh2 billion on marketing the Maasai Mara abroad. This figure alone points to the significance of the event to the regional tourism industry.

But of note is how crucial the Mara-Serengeti — or Mamase — ecosystem, stretching 25,000 square kilometers wide, is to the survival of these herbivores. Due to their size and habits, wildebeests shape the ecosystems in which they live and move, making them one of what zoologists consider a “keystone species”. It is also an important ecological phenomenon that provides food to predator populations that include lions, leopards, cheetahs, hyenas, and African wild dogs, among others.

And that explains the trepidation over the threat to this famed ecosystem straddling Kenya and Tanzania with only one year-round river — the Mara — a trans-boundary river shared between Kenya upstream and Tanzania downstream that is formed by the confluence of the Amala and Nyangores rivers. It runs 395 kilometres through the Maasai Mara Game Reserve on the Kenyan side and the Serengeti National Park on the Tanzanian side before spitting its waters into Lake Victoria. Originating in the western side of the Mau Escarpment, River Mara covers an area of 13,750 square kilometres, with the upper 65 per cent (8,941 square kilometres) in Kenya and 35 per cent in Tanzania.

### Masterplan

The trouble for the ecosystem is contained in a 2002 masterplan that plans to transfer some bulk volume of water from the Amala River to the Ewaso Ngiro South River in the Rift Valley catchment area. The project will transfer 2.6 cubic metres of water per second per day for domestic as well as irrigation use.

Already, according to a report by Kenya’s Water Resources Management Authority (WRMA) titled Draft Water Allocation Plan, Mara River Basin, Kenya (2017-2022), irrigation is a major consumer of water resources, utilising an estimated 70 to 80 per cent of the total water.

That has caught the attention of conservationists in Tanzania, who have warned that the Kenya dams pose a direct threat to the Serengeti and may cause irreversible damage to the Mara-Serengeti ecosystem.

They also argue that 75 per cent of the world’s lesser flamingos born around Lake Natron in Tanzania will be affected by the diversion of River Mara’s waters into Ewaso Ngiro, which empties its waters into Natron, as the higher water volumes will flood their birds’ nesting sites.

A report by Oryx, a quarterly journal on conservation published by Cambridge University, argues that the Mara River will also be dry on entering the Serengeti if the dams on the Kenyan side are built.

As of now no construction has started, according to Kenya’s acting director of trans-boundary waters at the Ministry of Water, Ms Gladys Wekesa, who adds that Kenya is not planning to divert all the water from the Mara, and that the project was conceived under mutual understanding and interest between the two countries.

The East African Community Treaty, to which Tanzania and Kenya are signatories, calls for the promotion of sustainable utilisation of the natural resources of the partner states and the taking of measures that would effectively protect the natural environment.

Ms Wekesa says the Amala Dam is still only part of the water resources development plan, while the Norera Dam, on which a mini-hydropower plant on a scale suitable for local community of 90KW is proposed, will have a storage capacity of 450,000 cubic metres.

“Unesco had written to the Ministry of Culture to voice its concerns, but we have given them all the facts from findings of the feasibility studies carried out in 2016,” she says, adding that Kenyan parties involved in the project understand the ecological aspects downstream which the government would not want to jeopardise.

“Because it is this same ecology that sustains the basin, the people, animals and tourism industry, they need it for their survival. The problem would only arise if the damming affected dependents downstream,” she says.

She insists the projects were planned and agreed upon by both Tanzania and Kenya, and wonders why the turnaround by Tanzanian officials.

“Both Kenya and Tanzania have projects planned on the river. Tanzania, too, has the Borenga Dam. It was meant to be a win-win for both countries sharing the trans-boundary resource.

There was even a project office in Musoma, Tanzania to do preparation of project studies. Meetings have been taking place since 2006 between the two countries.

“And for all the projects there have been environmental impact assessments done to ascertain that whatever water is drawn for the projects does not affect the users downstream,” she says. The dam, Ms Wekesa explains, was found to be useful in controlling the flooding of the river during heavy rains, “and during the drought seasons it still assures of consistent flow”, she adds.

According to her, the Norera project has gone past the design stage and an impact assessment study has already been done for the project to take off. However, no commencement date of the construction has been given. On the Kenyan side, no work has been done on Amala or the other sites either.

#### Trans-boundary resource

Kenya's Water Resources Management Authority notes that the Mara River Basin is a trans-boundary resource and the two riparian countries are obliged to share the water equitably. Nairobi, therefore, has an obligation to ensure water is available on the Tanzanian side.

Development of a Water Allocation Plan started in 2014 as a result of water shortage

especially in the dry periods, and therefore it is necessary to monitor water use to ensure that abstractions do not exceed a certain amount of supply. “This should be done in a precautionary way to ensure that not only are priority water uses in Kenya allocated, but that enough is also left for the downstream users in Tanzania so as to avoid conflicts between the two countries,” says the authority in a note to the Nation.

But Bakari Mnaya and Mtango Mtahiko of the Tanzania National Parks, and Prof Eric Wolanski of James Cook University, Townsville, Australia, contend that based on available water volumes, current demands can be comfortably met in all the sub-basins without necessarily violating the reserve.

And, they add, there is no guarantee of the available water meeting future demands, especially during the dry periods, if countries insist on expansion of irrigation projects or inter-basin transfers. For them, this means future projects have to be carefully planned and allocations controlled while closely and regularly monitoring the resource.

“The Norera Dam would release a minimum environmental flow of 100 litres per second, only a third of the Mara River minimum environmental flow of 300 litres recommended by the Lake Victoria Basin Commission of the East African Community,” they argue.

“That same water would then flow through 30 kilometres of intensive irrigation farming, and thus the Mara River would be dry on entering the Serengeti. The Norera Dam would receive 39 per cent of its water from the Nyangores River; the two irrigation dams on the Nyangores (Mungango and Silibwet) would decrease the low flow by 100 litres per second, but this impact was not included in the Norera Dam proposal and doubles the chances that this dam will not release the minimum environmental flow,” reads their report.

They warn that damming of the rivers in an area already threatened by diminishing resources would greatly affect the wildebeest population and hamper the entire migration cycle that sustains the Maasai Mara-Serengeti ecosystem.

Prof Wolanski notes that the Norera proposal is based on a mean annual flow calculated over 22 years of data, but in a dry year the annual flow is only 51 per cent of the mean flow, and thus in such a year the operator has only half of the water expected.

“Being short of water, the Kenyan operator has either to release (water) for the Serengeti and kill the irrigation fields and hurt the local community, or retain the water for irrigation and kill the Serengeti. This becomes a local political decision, with Tanzania having no say. The World Bank Safeguard Policies have been breached twice by the proposal, which states incorrectly that the Mara River is not an International Waterway and that the development does not affect the forests,” notes the professor.

He adds that the total annual storage and use would be 115 to 158 per cent of the annual flow in a drought year, and hence the dams require more water for irrigation than is available. The Amala High dam would destroy the Mau forest, and this would further

decrease the Mara River dry season flows.

During the dry season in a drought year there would be zero minimum environmental flow for the Masarua swamp, where the river empties its waters into Lake Victoria at Musoma, in Tanzania.

#### Feasibility report

The authors of the final feasibility report of Norera dam, which we have perused, say “regarding the river discharge, it has been assumed that they will not change due to climate change”.

But probably another reason for those downstream to worry is the fact that highest values of rainfall, averaging 1,500mm annually, are recorded upwards from the middle of the Mara basin to around the Mau forests, which are also the sources of Nyangores and Amala rivers. The lower parts of the basin receive less precipitation, averaging to 700 mm per annum and below. Amala River is one of the main tributaries for the Mara river.

If the wildebeests cannot use the Mara River, their only water resource in the dry season in a drought year, 80 per cent may die, leaving behind a much-impooverished ecosystem, warn the researchers.

“To save the Serengeti ecosystem, an international effort is needed to enable Tanzania to be involved as an equal partner with Kenya in the decision-making about managing the Mara and Ewaso Ngiro Rivers and, if that is not possible, to prevent the financing of these dams,” they add.

Yet the Mau Escarpment, from which the basin derives its waters, is wrought with imminent problems caused by the loss of forest cover in the upper catchments. Matira Bush camp boss, Antony Tira, a wildlife researcher and conservationist, told the Daily Nation in July that water in the Mara River had already reduced drastically because of destruction of the Mau Forest.

Tour operators and hoteliers have already raised the red flag over high human population growth rate, which has resulted to excessive exploitation of natural resources within the core areas of the Mara River basin. They are wary of what loss of this great migration could do to tourism.

And their concern is not at all far-fetched. A wildlife migratory corridors and dispersal areas report — a Vision 2030 flagship project aimed at securing wildlife migratory routes and corridors — released in July by Cabinet Secretary for Environment and Natural Resources, Prof Judi Wakhungu, told of how vast herds of zebra and Thomson’s gazelle that once migrated between Kenya’s Lake Nakuru-Elementaita region and Lake Baringo in the early 20th century had collapsed.

The report warned that the Mara-Serengeti ecosystem faces similar challenges related to

land-use changes in adjacent areas that serve as wildlife dispersal areas during the dry seasons. Declining wildlife numbers in the region are attributed to, among other factors, increasing loss of pasture in the dispersal areas to expanding agriculture and fences and human settlements, along with poaching in some areas.

#### Animal movements

The study was undertaken by the Department of Resource Surveys and Remote Sensing. It is supposed to help policy makers understand animal movements and connectivity, and how human activity is affecting wildlife.

Kenya, in concluding its report, says that the water resources of the Amala sub-basin are insufficient to sustain the future additional water demands arising from the envisaged inter-basin transfer (estimated at 225,000 m<sup>3</sup>/day), and 2,000 ha of new irrigation development at Norera if the additional water requirement should come from base flow during December, January and February.

“The Amala water resources could sustain irrigation development, provided the irrigation water requirements during the dry season could be met by harvesting and storing the water resources of the river during the wet season through off-river storage.”