

Water supply from wetlands in Tanzania

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Summary

This paper gives a brief discussion on water supply from wetlands in Tanzania. The major drainage basins in Tanzania are described and the status and role of the Division of Water Research in the monitoring of water resources and data collection from wetlands and water sources are highlighted. The role of wetlands in the hydrological cycle, and the utilisation of wetlands as water supply sources are discussed. The need for conservation and protection of wetlands and other water sources is outlined.

Introduction

The definition of wetlands used in this paper follows that of the Ramsar Convention and is found in the Introduction to this volume.

Figure 1 shows that Tanzania is divided into five major drainage basins, classified according to the recipient of the water: the Indian Ocean (Pangani, Wami, Ruvu, Rufiji and Ruvuma Rivers, and Lake Nyasa); internal drainage to Lake Eyasi and Bubu depression complex; internal drainage to Lake Rukwa; drainage to the Atlantic Ocean; and drainage to the Mediterranean Sea (*via* Lake Victoria). Each of these basins includes a network of rivers, lakes and wetlands.

The Division of Water Research, in the Ministry of Water, Energy and Minerals, is responsible for monitoring of all the water resources in Tanzania, both surface and underground. In addition to water resource monitoring, the Division provides the necessary hydrological and hydrogeological expertise to facilitate the design of new water development projects and expansion of the existing schemes such as dams, water supply systems, hydropower development and flood control. The Division is the custodian of the national hydrological and hydrogeological data banks.

In 1971, the government launched a 20 year water supply programme with the primary objective that, by the year 1991, the majority of people would have access

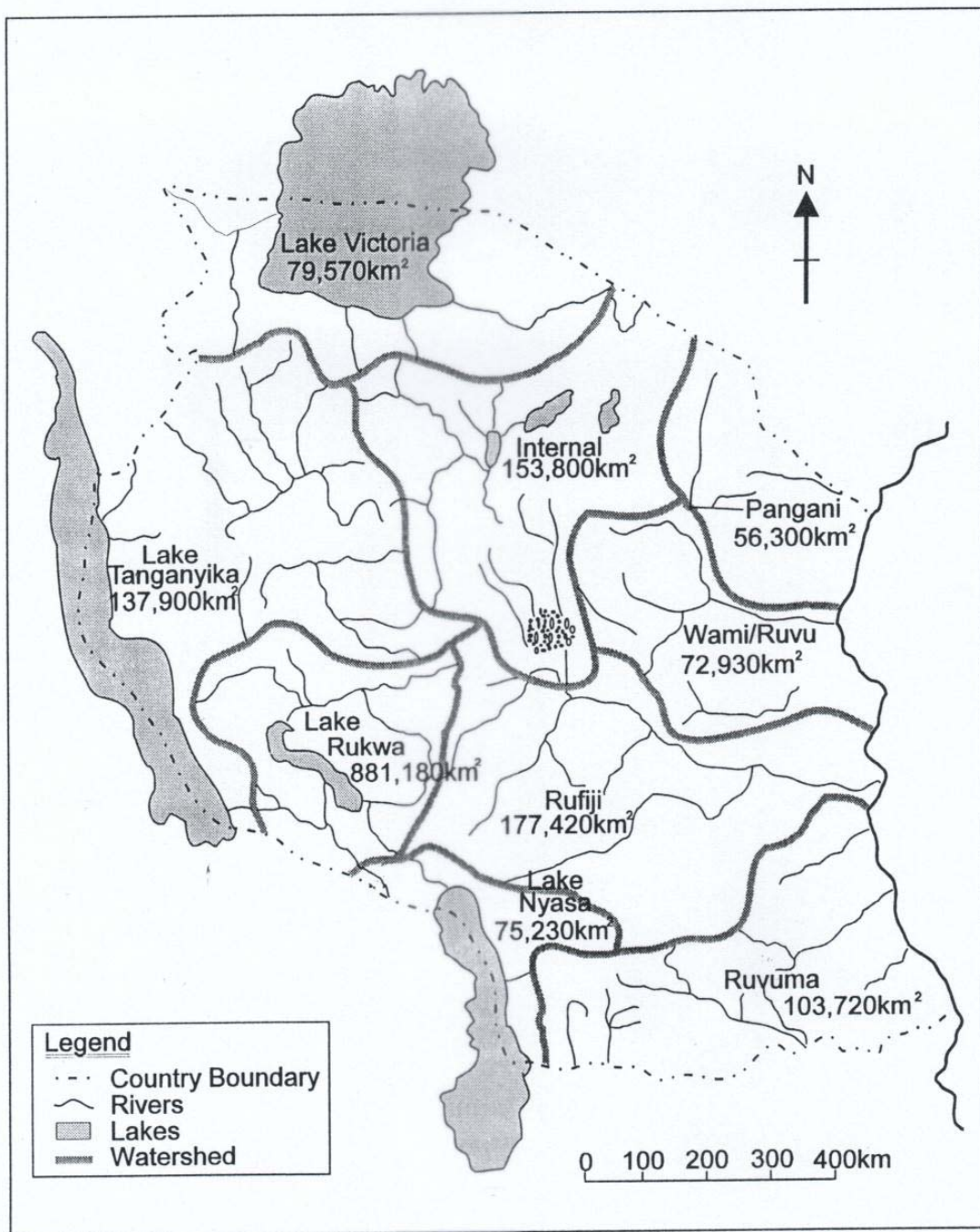


Figure 1 Major drainage basins of Tanzania showing catchment areas in km²

to clean and safe water within 400 m of each household. However, due to financial and other constraints, the planned programmes have had a slow rate of implementation and the government now intends that this goal be attained by the year 2002. Due to the importance of water resource data in the design of projects, several Regional Water Master Plans were initiated by the government in the 1970s. The objective of the plans was to determine Tanzania's water resources, now and in the future. The Division of Water Research was a major participant in the Water Master Plans through its three sections, hydrology, hydrogeology and drilling.

The Ministry of Water, Energy and Minerals has the responsibility for policy development, preparation of long term plans, construction of regional projects, and execution of aU national water projects. The Division of Water Research is responsible for the operation and maintenance of the hydrometric network of stations which are scattered all over the country. At these stations, the quantity and the quality of the water sources are determined and the data is used in the design of water development and related projects.

Hydrometric, rainfall and climatological stations have been established to monitor major water bodies, rainfall and climate. Today, the Division operates 351 hydrometric, 348 rainfall and 89 climatological stations. Wetlands, such as rivers, springs, lakes and reservoirs are covered in the network.

In addition to the rivers, the Division also monitors water level fluctuations in reservoirs, dams and 'charcos' which are, in addition to groundwater, the major sources of water for the arid and semi-arid Regions of Singida, Dodoma, Shinyanga and Tabora. Dams and 'charcos' are widely used in these semi-arid areas of Tanzania for people as well as livestock. Table 1 shows the distribution and uses of dams in Tanzania.

Some reservoirs in the country are in danger of losing their storage capacity, due mainly to the high rate of sedimentation. Many of these reservoirs and dams have never been surveyed to determine actual storage capacity. In this regard, it is difficult to make rational decisions on the utilisation of the water since the available quantity is not known precisely.

Industrial pollution of rivers has occurred in Tanga Region where some sisal estates discharge untreated effluents directly into the rivers, thereby depleting the dissolved oxygen in the water. Another common source of pollution is caused by livestock fouling human water sources.

Hydrology of wetlands

Wetlands play a complex role in the hydrological cycle. Most of the precipitation which falls on the land is derived from oceanic evaporation and the water eventually returns to the sea through the hydrological cycle; lakes are natural reservoirs in which water is temporarily retained during its passage to the sea.

Depending upon the rate of evaporation and the type of soil, the water in wetlands can percolate downwards towards groundwater aquifers, thus recharging groundwater

Table 1
Distribution and uses of dams in Tanzania

Region	Water Uses			
	Domestic	Livestock	Irrigation	Hydropower
Mwanza	80	-	-	-
Arusha	45	2	-	-
Mara	28	2	1	-
Coast	24	-	-	-
Tabora	20	2	5	-
Shinyanga	18	2	-	-
Singida	18	-	-	-
Mtwara	16	-	-	-
Dodoma	15	-	2	-
Tanga	12	6	1	1
Kilimanjaro	6	6	1	1
Lindi	3	-	-	-
Iringa	3	-	-	1
Morogoro	2	-	-	1
Kagera	1	-	-	-
Mbeya	1	-	-	-
Rukwa	1	-	-	-
Total	293	20	10	4

storage. In areas of high recharge and where surface water sources are contaminated, groundwater is a reliable source of potable water. During the wet season, lakes and floodplains fill with water which is released slowly, thereby helping to reduce flooding downstream.

Although Tanzania is endowed with abundant wetland resources, there has been no systematic national programme for monitoring, development and management of the wetland resources. Most village and urban water supply schemes rely on lakes, small rivers, springs, reservoirs, dams or 'charcos'. The Division of Water Research does not monitor all these small rivers and springs, which are abundant throughout the country, due to financial constraints. However, the Division, on request from the respective Regional Water Engineers, carries out research and investigations on how best the villages can be provided with water. There are over 300 dams and 'charcos' throughout the country (Table 1).

Some of the rivers being monitored have water supply schemes constructed on them, for example, the Ruvu River at the Dar es Salaam-Morogoro Road bridge. However, the majority of the other water sources do not have developed water supply schemes. Nevertheless, continuous monitoring of the stations is necessary to facilitate economic designs for new water supply schemes. Much water resource data is collected from the monitoring network but this information and data become useful only if they are processed and analysed to suit the respective user's needs.

Wetland resources play an important role in the recharge of groundwater storage. Water from these wetlands percolates down to recharge underground storage which can be tapped by the drilling of boreholes. Temporary storage of flood waters, by lakes and floodplains, assists in the reduction and prevention of floods. Sediment carried by rivers is trapped in floodplains.

Conservation of wetlands

It is important that a proper national programme for monitoring and management of these natural water resources is initiated. A water policy should emphasise protection and conservation of all water sources throughout the country, including the preservation of trees around water sources and the promotion of better farming and agricultural methods.

Wetlands can be polluted from various sources, including industrial effluents, domestic sewage and agrochemicals. The application of large quantities of fertiliser, pesticides and herbicides poses a serious threat to downstream water users. Domestic sewage is also a serious source of pollution because very few urban areas treat their domestic effluents. Pollution control is essential in order to prevent contamination of surface water.

High sediment loads, as a result of erosion of the upstream catchment, reduce water quality. Sediments from upstream sources are deposited downstream; these sedi

ments bring fertility to agricultural land but excess quantities have adverse effects, such as loss of useful storage volumes of reservoirs.

It is the Division's intention to initiate a sediment monitoring programme for at least 120 river gauging stations so that the data obtained will be useful in the design of various water development projects. A sediment monitoring programme is essential in the determination of water quality changes. Sediment generated from a watershed can be substantially reduced by applying good land use practices, appropriate disposal of sediment from mining and construction activities, river bank protection, and by instituting a correct programme of reservoir operations.

Conclusions and recommendations

Tanzania is endowed with abundant but uneven water resources. While various types of wetlands are found in Tanzania, only major water bodies are monitored. However, other types of wetlands, such as those found around Lake Manyara, and the Kilombero and Rufiji Valleys, deserve special attention.

Therefore, in order to both conserve and use wetlands as major sources of water supply, the following measures are recommended:

1. All major wetlands must be documented and a monitoring programme initiated to include seasonal variation in the quantity and quality of the water and losses due to evaporation and seepage.
2. Water balance studies of the major wetlands should be undertaken, with a view to facilitating rational utilisation of the water.
3. Existing legislation should cater for the protection and conservation of wetlands as unique ecosystems and sustainable sources of water. This includes ensuring that all existing water sources are protected by the planting of trees, the enforcing of better farming methods around water sources, and by ensuring that untreated effluents are never discharged into wetlands.

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