Artificial wetlands and artesian waters of Namibia

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ABSTRACT

Due to the arid conditions of Namibia, major water supply and irrigation impoundments in Namibia are classified as possible wetlands. The importance of waste water treatment by artificial wetlands and the use of treated waste water are briefly mentioned. The artesian wetlands as potential places to gain information as far as climatic changes are concerned are presented.

INTRODUCTION

Due to climatological and topographic factors there are no natural lakes and wetlands of any size in the interior of Namibia. Because of high evaporation rates and river flow that are subject to wide variation, the purpose of this article will be to discuss (a) "wetlands" where an excess of water is the dominant factor, and (b) artesian "wetlands".

The Cowardin et al. (1976) definition of wetlands will be used in this paper, that is: Land where an excess of water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface.

ARTIFICIAL "WETLANDS"

State dams

Since 1963 the Department of Water Affairs has built 10 major water-supply and irrigation impoundments in Namibia. These impoundments are built on the major central rivers of Namibia. Assuming that the entire impoundment is a wetland, their total water storage capacity is 580 mm^3 with a total surface area of 75 km^2 (Fig. 1 and Table 1).

Some of these impoundments are turbid while others are clear. In some of the clear impoundments, major stands of rooted submerged aquatic plants occur. Examples of these are *Potomageton* sp. and *Najas pectinata*. In Swakoppoort dam, *Spirodella*, a small floating aquatic plant, forms large shifting mats. As a result of evaporation and utilization of the water, the water level in these impoundments varies. Fluctuating water levels are not conducive to the establishment of aquatic vegetation like *Phragmites*.

While dams are built on impervious rock formations, wetlands normally form in the seepage water below the major impoundment walls. These wetlands are shallow marshes with wetland plants like sedges, reeds and grasses.

Most of these impoundments are controlled by the Department of Water Affairs and because of this these wetlands occur on Government-owned property. As such, no problems should be experienced in their conservation.

FARM DAMS

A fairly large amount of the surface water in Namibia is stored in farm dams. At present there are about 400 farm dams smaller than 20 000 m^3. They are mainly used as stock drinking facilities, soil erosion structures and for recharging groundwater.

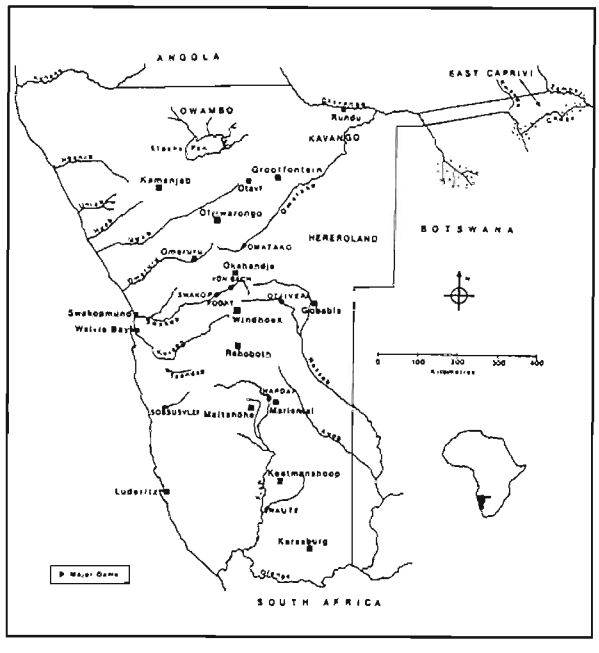

FIGURE 1: Major rivers and rivers with impoundments

TABLE 1: Hydrological characteristics of the impoundments in Namibia

Name of dam / Year of completion	Catchment area (km^2)	Full supply capacity (Mm^3)	Surface area at full supply (km^2)	Length of reservoir basin upstream of damwall (km)	River
Hardap 1962	13 600	297.733	28.77	22.5	Fish
Naute 1971	8 630	83.580	11.55	11.2	Löwen
Omatako 1981	5 320	45.118	13.01	13.5	Omatako
S von Bach 1970	2 920	49.949	4.89	8.1	Swakop
Swakoppoort 1977	4 800	69.063	7.80	9.0	Swakop
Otjivero Silt 1984	2 070	7.795	3.16	4.6	Nossob
Otjivero Main 1985	2 070	9.808	1.54	2.8	Nossob
Dreihuk 1978	2 120	15.493	3.49	4.1	Ham
Friedenau 1970	201	6.722	0.80	2.8	Kuiseb
Daan Viljoen 1958	5 300	0.429	0.13	1.8	Nossob
Tilda Viljoen 1958	Negligible	1.224	0.19	0.7	Nossob

These impoundments are normally fairly small and do not retain their water throughout the year. Because of this, in many of them no plants and animals will be able to establish themselves and they are not very important wetlands. They do provide a stop over for some birds for short periods (few days).

WETLANDS FOR WASTE WATER TREATMENT

Artificial wetlands can be effectively used for waste water treatment. "They are generally very effective in reducing (by up to 95%) the concentration of nitrogen, pathogenic bacteria and heavy metals" (Rogers 1983). In most places in Namibia stabilization ponds are used in waste treatment. Large stands of *Typha* (Katima Mulilo) and *Phragmites* (Grootfontein) occur in these ponds. At Katima Mulilo the water of the last pond in the system is used for the irrigation of maize. In most cases where the water is used for irrigation, it is used for crop growing. At Arandis, Rössing Mine and the Department of Water Affairs are experimenting with using treated waste water to irrigate vegetables. In semi-arid regions such as Namibia making use of treated waste water is very important.

ARTIFICIAL SALTWORKS

Nowadays salt is mostly produced by the evaporation of seawater. This involves the construction of a system of evaporation dams with its associated extensive earth works. The artificial saltworks at Swakopmund provides a rich feeding environment for shorebirds. According to Williams (1988) these wetlands are important in both a southern African and a continental context. The Swakopmund saltworks measure up to the criteria for a wetland reserve of international standing in that it supports more than 20 000 shore-birds and more than one per cent of the world or subcontinental population of one or more species or subspecies (Williams 1988).

ARTESIAN "WETLANDS"

In Namibia, warm artesian water occur at Gross Barmen, Klein Barmen, Rehoboth Spa, Warmbad, Sesfontein and in the Outjo district. An artesian wetland formerly existed in Windhoek. The wetland at Gross Barmen, which is the largest, is about one hectare in size. This wetland is a shallow marsh with few open water areas. *Phragmites* is the major aquatic plant occurring there. Further information on Gross Barmen and the wetlands of Windhoek was documented by Schoeman & Archibald (1988) and Cholnoby (1963). Artesian springs also occur at Stampriet where the water table has been lowered by pumping for irrigation, and by invasive alien trees (*Prosopis*).

In Namibia very little is known about the vegetation history during current and earlier times. Since these artesian wetlands which preserve fossil pollen and swamp deposits are very scarce in Namibia, as in other relatively arid and semi-arid regions of the world, successful pollen analysis of sediments has not been possible in Namibia. Efforts to gain information as far as vegetation and climatic changes are concerned from these artesian wetlands should enjoy high priority.

Very little information is available on artesian wetlands and to take a decision on their conservation, utilization or management is very difficult.

DISCUSSION AND RECOMMENDATION

A perennial river can turn into a seasonal flow of muddy water, in which natural refuges of the biota, such as pools, become filled and impoundments on the river have their capacity, and thus their value, severely reduced. As a result of farming and other practices during the past 150 years, many wetlands have eroded away, often forming large dongas in the process. Wetlands tend to reduce the force of floods and the transport and loss of topsoil.

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