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WATER AND SANITATION FOR ALL: PARTNERSHIPS AND INNOVATIONS

Impact of water hyacinth on Lake Victoria

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UNTIL THE LOCAL fishing industry in and around Lake Victoria was visibly affected, the killer weed – water hyacinth (*eichhornia crassipes*) had been overlooked. The problem reached such alarming proportions within such a short time that the population around the lake must now face the grim reality of survival after almost all their lives have been touched in one way or another (JEAN, Vol. 1, No. 1). The immediate casualties being felt in the area of fisheries, water supply, human health, transport, agriculture and loss of biodiversity. In this article we discuss the infestation of the water hyacinth in Africa and give an appraisal of its elimination efforts from the Kenyan side of Lake Victoria.

Origin of water hyacinth

It is widely reported that water hyacinth is indigenous to Brazil having been first described from wild plants collected from the Fransico River in 1824 (MONSANTO, 1996). On the African continent, water hyacinth was first reported in Egypt between 1879 and 1893; in South Africa in 1908; Zimbabwe (1937); Zaire and Sudan (1957); Senegal (1964); Nigeria (1983) and Uganda (1987). It is now popularly believed that water hyacinth entered Lake Victoria via the Kagera River which drains the Rwanda and Burundi water catchments in 1990 (OSIENALA, 1990). One theory is that water hyacinth actually escaped from an ornamental pond in Rwanda into the Kagera River, which is a major tributary of Lake Victoria. Ironically water hyacinth is also well known for its very attractive blue flowers! From the late 1980's and early 1990's the water hyacinth has spread very rapidly to virtually every country in Africa and it is feared that before long all fresh water bodies in Africa are likely to be infested by this 'killer' weed as manifested by its numerous negative consequences.

The fishing industry was the first to be affected by the weed. This photo shows the desperate situation of local population who do not know what to do next.

Photo 1. Loss of fishing activities

WEED EVERYWHERE . . . Boys rest in an abandoned boat at the Winam Gulf where the water hyacinth weed has severely affected fishing activities. — Picture by James Odare

Negative consequences of water hyacinth

Water hyacinth has a multitude of direct and indirect effects on almost all aspects of human life once a water body on which man so much depends is invaded and covered by the weed mats (Schneider, 1996): fisheries; water supply; hydroelectric power generation; human health; agriculture; transport; biodiversity; evapotranspiration and increased cost of water treatment are some of the adverse effects.

Once the water body is covered by the water hyacinth fishing activities will be curtailed as landing sites would be inaccessible Photo 1. Furthermore breeding sites will be reduced and fishermen take longer to reach fishing grounds. Water supply will be affected as intake works would be clogged and the irrigation canals will be clogged or their hydraulic efficiency drastically reduced. Transport by ships or boats will be hindered. Also, evapotranspiration is increased as loss of biodiversity in the water body covered by the water hyacinth.

The cost of purifying water tainted by water hyacinth will be increased tremendously. Hydroelectric power production will be affected since turbines would be clogged resulting into expensive repair, overhaul and maintenance. Human health will be affected in many ways: shoreline mats are habitats for certain snails (*schisostomia vectors*) and mosquitoes which spread malaria. Agriculture will be adversely affected.

Favourable conditions

Water hyacinth spreads in water environments such as bays and inlets with the following conditions: quiescent water; shallow depths (< 6m); bed surface covered with deposited sediments rich in organic matter and availability of key mineral elements namely nitrogen and phosphorus in the nutrients.

Chemical composition

Water hyacinth comprises 95 per cent water and only 5 per cent dry matter of which 50 per cent is silica, 30 per

cent potassium, 15 per cent nitrogen and 5 per cent protein. From the unique chemical content of the water hyacinth, its beneficial uses are limited. The water hyacinth cannot be used as a livestock feed because it contains too much silica, calcium oxalate, potassium and too little protein. It cannot be directly used as a fertilizer because its C:N ratio is too high necessitating addition of N-fertilizer. Because its fibre length is too short, it is a poor raw material for paper, mats or ceiling boards.

A few beneficial uses have been identified but the large scale production is uneconomical when compared with the negative effects attributed to the water hyacinth field. Such beneficial uses include biogas production and removal of heavy metals from industrial pollution when water passes and is sieved by the water hyacinth fabric.

Characteristics of water hyacinth

Under favourable conditions the population of water hyacinth doubles between 5 – 15 days. If completely undisturbed its biomass weighs 25kg per square metre or 400 tonnes per hectare.

Each flower produces a seed pod which can contain upto 200 seeds. The seed can remain viable for upto 15 years in water, silt or mud. The plant can also propagate vegetatively by sending out runners into the water which produces daughter plants that can reproduce at about the 2-week stage.

In dense stands, the plant can grow to over a metre in height although plants 20 – 30 cm high are common. Leaf size is an accurate indicator of the nutrient level of the water body - in fact experience from Zambia has shown that water hyacinth itself displays a poor showing as a flower in a pot filled with clear tap water ! This may well be the clue to its complete eradication. The evapotranspiration rate is about 1.02 - 13.4 (average 2.5) times that from open water mass.

Removal of water hyacinth

It is clear from the foregoing that water hyacinth is one weed which man had better do away with. Three of the methods have been discussed and adopted in various regions in the world: mechanical, chemical and biological removal.

In Kenya, mechanical removal has been tried first and recently followed by biological means under the Kenya Agricultural Research Institute (KARI). The chemical means have been deferred.

Though not frequently mentioned, but the fourth method which may actually hold the key to its complete eradication addresses the root cause of the sustainability and spread of water hyacinth. In this approach, favourable conditions for the spread of the weed must be eliminated. Other than water quiescence and depth which are characteristic of every water body, all other factors that favour the growth of water hyacinth are artificial and man-made. With proper approach, they can therefore be reversed to the detriment of the water hyacinth. The key issue to be addressed is lowering of the nutrient level in the water bodies. This is to say that appropriate standards must be observed for the dumping of both industrial and domestic wastes into receiving waters. The high level of sediments in the inflow rivers should also be reduced by implementing a number of sedimentation control measures such as proper farming methods and construction of sediment trap reservoirs.

At present only Lake Victoria has been invaded by water hyacinth in Kenya. Effort must be made to quarantine the weed in the Lake Victoria catchment so that its entry into other river catchments is restricted. In particular, the weed must not enter the Tana and Athi river systems which hold the lifeline of many Kenyans for hydroelectric power production, irrigation and major sources of urban water supply.

Regional effort

The water hyacinth on Lake Victoria is a regional problem affecting the East African Countries of Kenya, Tanzania and Uganda. Individually, each country is making effort towards its elimination.

A regional project under the Global Environment Facility (GEF) is in the process of implementation which ensures a coordinated effort in the fight against the water hyacinth. It is also hoped that such effort will have a positive impact given the recently renewed spirit of the East African Cooperation.

A number of problems identified so far must however be ironed out if such initiatives must succeed. For example in Kenya, the local involvement has not yet been perfected yet they are the local population whose livelihood has been adversely affected.

Needless to say, if there is concerted effort by all those concerned and with proper coordination, the water hyacinth can be managed as has been proven elsewhere in the world.

References

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