The Contribution and Status of Physical Removal in Sustainable Management of Water Hyacinth

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LAKE VICTORIA ENVIRONMENT MANAGEMENT PROJECT
LAVEMP
FOR MAXIMUM SUSTAINABLE BENEFITS

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Introduction

Physical control of water hyacinth consists of removing the plants from the water by hand or machines. It is considered very effective because it involves removing the whole plants from water. The first attempt on physical control was in 1992 when weed infestation was causing serious problems to the fishing communities in Lake Kyoga. The fishermen had problems of accessing the lake as huge masses of mobile weed blocked landing sites. Furthermore, the fishers lost their nets, which were swept away by mobile water hyacinth. As a result, an integrated control strategy involving physical control (manual and mechanical removal) was put in place. Through this method, the fishers were able to open up access routes to fishing grounds even though weed mats often reblocked the access routes. In the infested lakes, manual removal offered remedial relief to fish landings and other access sites. Sites of strategic importance such as hydro-electric power generation dam, water intake points and docking points which had large masses of water hyacinth required heavy machinery and mechanical harvesters were used at these sites.

Manual Control

Manual removal involved use of manual labour and hand tools like wheel barrows, forked hoes, fork spades, slashers, rakes, ditch bank knives and protective wear (gum boots, overalls, gloves, hip waders and life jackets to remove the weed). The WHU has purchased and distributed hand tools and protective gear to communities at landing site in affected districts along lakes Victoria, Kyoga and Albert. Manual removal was also tried at Port bell and Nalubaale dam where retired and retrenched soldiers (veterans) were employed. This was found ineffective due to the huge quantities of water

hyacinth at these sites, and was discontinued. Manual removal at the landings was effected through formation of Beach Management Units (BMUs) and sensitizing communities to manually remove water hyacinth mats at their sites on voluntary basis. These efforts kept fish landings free of the weed. However, hand tools and protective gear distributed to communities through district local administration and community leaders have either broken down or need replacement. It should also be noted that most BMUs relaxed with the near-total disappearance of water hyacinth at the end of 1999. Following resurgence in 2001, efforts to control the weed were again activated at most landing sites. More tools, have since been distributed especially to BMUs at landing sites that are earmarked for fish export as well as to NGOs including women and other groups involved in weed control. Currently, some of the landings on Victoria Nile and Lake Kyoga have substantial amounts of water hyacinth and require more hand tools to manage the weed. More hand tools have been ordered and will be distributed with emphasis on those areas where water hyacinth has persisted. Therefore, manual removal has the capacity to control hyacinth at landings with small quantities of the weed. There is however need to develop mechanisms of sustaining supply of hand tools from local resources at the districts and sub-counties.

5.3. Mechanical control

Mechanical control involves removing the weed using a set of machines, usually harvesters. The machines consist of units which are shore based to tackle the weed which is in shallow waters and near the shoreline and river banks, and those which are fully floating and self propelled to deal with floating masses of water hyacinth. The machines gather the weed onto barges or a series of conveyors and eventually load to dumping trucks. The harvested weed is dumped away at sites where it dries, and it is burnt or buried to prevent further spread. Mechanical control was restricted to affected sites of strategic economic importance namely Nalubaale and Kiira dams, Port bell pier, and the mouth of River Kagera.

By 1996 an estimated 200 ha of water hyacinth had accumulated at the Nalubale and Kiira dam areas. This mass was so thick that one could cross the Dam by walking over the vegetation. The weed interfered with hydro-power generation and led to power cuts. The stoppages of power generation were due to choking of the cooling system by the floating and sinking water hyacinth plants and debris. A shore-based water hyacinth harvesting system has been used to remove water hyacinth at Nalubale. The system consists of 2 push boats, 2 conveyors and 4 dump trucks. The push boats gather the plants and feed the harvester which transfers the weed to a conveyor for loading onto the dump trucks. The dump trucks then carry the weed to dumping sites. The dump truck containers were designed with holes to allow the water to drip through. During peak infestation at least 1400t equivalent to 2.4ha, were harvested per day (10-hour operation) by the two machines stationed at Nalubale Dam. There is currently very little hyacinth flowing to the dam and this is removed after accumulation. These operations have kept the dam area free of the weed and this has reduced interference with power generation attributed to the weed. There is, therefore, capacity to remove any hyacinth accumulating at the Kiira and Nalubale dams. What is required is to keep these mechanical equipments functional. However the boom that had been installed at the new Kiira dam is not effective in stopping water hyacinth from getting to the generators and the same equipment is used to remove the weed from Kiira dam.

Port bell pier, Gaba fish landing site and the Kampala water intake points (Gaba I and Gaba II) are located in Murchison bay. This bay, as indicated earlier, is the main production centre of hyacinth in Uganda portion of Lake Victoria. At peak infestation, there was an estimated 250 ha of stationary water hyacinth and 200 ha of mobile weed. This used to cause a 3-hour delay in ship docking or forced ships to dock at Jinja pier. Three hundred retired and retrenched soldiers (veterans) were deployed to remove the weed manually with no success. The first harvester brought in with assistance from the EU could not harvest the weed due to mechanical deficiency in its design. In 1997, a more robust, water borne system (Plate 5.1) capable of harvesting, transporting ashore and loading hyacinth on dumping trucks was acquired

using a US $ 2 million grant from the Japanese Government and deployed at Port bell. The system consists of one harvesting unit with a harvesting rate of 40 tonnes per hour, four barges, one support boat, one mobile crane, one inspection boat, five four-wheel drive and self loading dumping trucks, eight containers and one excavator. The system started operation in February 1998, handling 40 tonnes per hour. By the end of 1998 the major weed mass had been greatly reduced and docking time improved. However, mechanical removal even with a water-borne system has limitations especially in the shallow nearshore environments. This necessitates alternative approaches to nearshore environments especially in production zones. There is need to integrate the mechanical control currently implemented at Port bell with intensive release of biological control.

The other area requiring major mechanical intervention is Lake Kyoga where, water hyacinth that was displaced by other plants notably hippograss were later dislodged by the El-Nino related floods, and floated down the river where they caused blockage along the Nile (Plate 5.2). Since 1998, lakes Kyoga and part of the Albert Nile have experienced blockages by vegetation comprising of water hyacinth and other aquatic plants especially *Vossia* (hippograss). The weeds were carried down by floodwaters following heavy rains and a rise in water levels of November 1997 and May 1998. The resulting floods displaced fishing communities, disrupted fisheries, destroyed agricultural crops, and farmlands. Since September 2000, mechanical removal of the blockages has been initiated using the Egyptian-donated equipment. The equipment consists of two long-arm excavators, each of which is mounted on a ferry to excavate the sudds. The equipment is currently used to remove accumulated vegetation at the outlet of Lake Kyoga, and re-opening of blocked fish landing sites This is being done as an interim measure to relieve the water pressure upstream. Massive removal of the sudds at the Lake Kyoga outlet will take place after an EIA as required by NEMA. Terms of Reference for the EIA have already been developed.

During the survey of 2000, the Pakwach bridge had also been blocked by water hyacinth and *Vossia*. By March 2002, water hyacinth and other

vegetation that had blocked the Pakwach bridge had been swept away downstream leaving a small section in one corner as indicated in Chapter 2. The clearance of the blockade followed continuous disturbances by the fishing community trying to pave way through the blockage. Severe succession has been observed along the river and floating islands have began to form. There are therefore high chances for reblocking the bridge, the river systems, and other landing sites. The equipment being procured using a grant from Egypt is expected to handle this scenario.

The other area that has required mechanical intervention has been River Kagera. The Kagera head waters which rise in the highlands of Rwanda and Burundi have continued to discharge large masses of water hyacinth into Lake Victoria. This weed has been traced upstream as far as Nyabarongo River in Rwanda where it is thought to originate. It is estimated that about 0.8ha of water hyacinth are still discharged into Lake Victoria daily. In 1997, an NGO, Aquatics Unlimited, through a USAID Grant installed a boom and take-out conveyor and the government provided dumping trucks at the mouth of River Kagera. The system operated 8 hours a day and had the capacity to harvest up to 40 tonnes daily. In 1998, during the El Nino, the boom system was swept away. However, the conveyor is still in good working condition awaiting redeployment. The weed harvesting operations at the site are expected to resume once the Uganda Aquatic Weed Control Project becomes fully operational. Some of the equipment being procured through the Egyptian Grant are expected to be deployed for removal of hyacinth on Lake Victoria including the mouth of River Kagera. The equipments include two mobile harvesting systems for Lake Victoria, on mobile unit for Albert/Albert Nile, one dredger for lake Kyoga and two take-out elevators for River Kagera and Entebbe water works. Biological control efforts upstream are also expected to reduce the mass of hyacinth reaching the lake.

Plate 5.1. Water based mechanical harvester for water hyacinth in Murchison

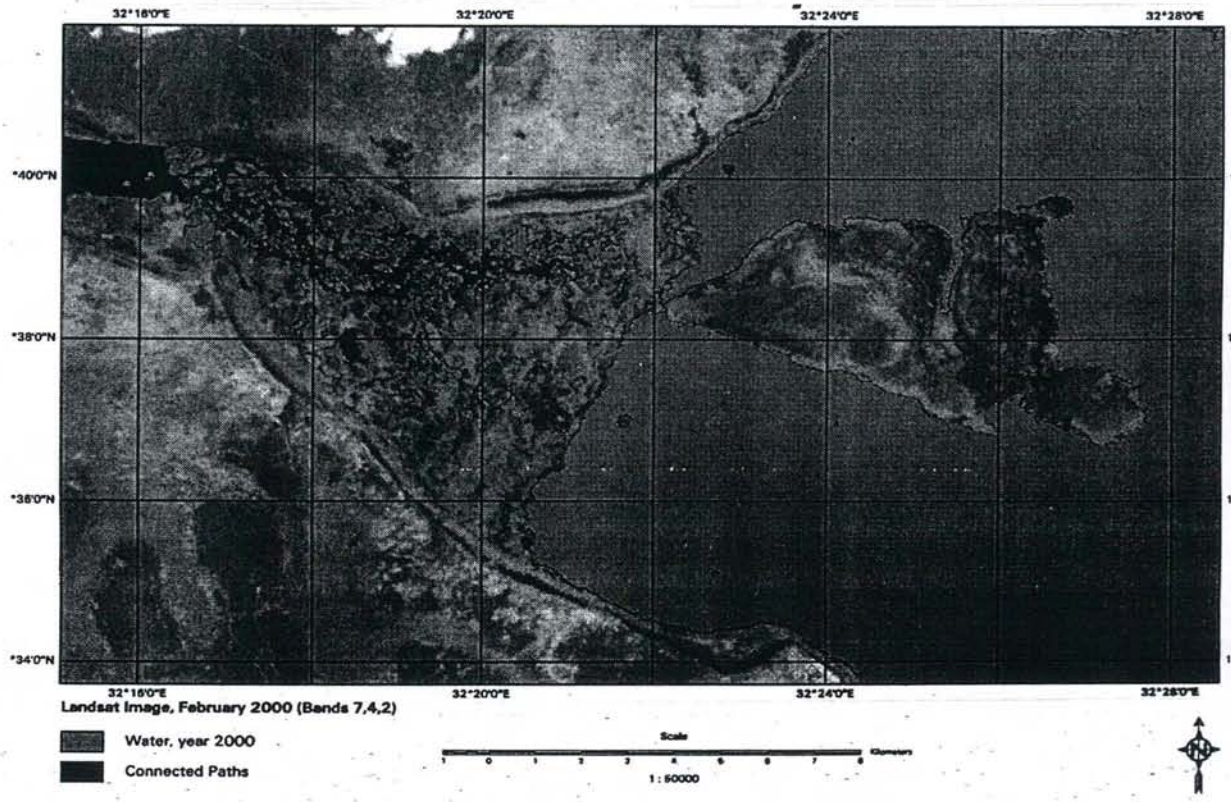

Plate 5.2. Satellite image of the blockade at the outlet of Lake Kyoga as at February 2000 (Based on image from the Egyptian Ministry of Water Resources and Irrigation)