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NOTES
Invasion of Nigerian Waters by Water Hyacinth

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INTRODUCTION

Water hyacinth (*Eichhornia crassipes* (Mart.) Solms-Lamb (Family Pontederiaceae) is a floating aquatic plant with inflated petioles and native to tropical America (Hutchinson and Dalziel 1968). It is believed that the weed originated in Brazil, but is widely spread all over the Southern and Central American countries having been introduced as an ornamental in the 1890's (Penfound and Earle 1948). As of 1961, water hyacinth was outside all territories in West Africa South of latitude 18°N and to the west of Lake Chad, and Fernando Po Island (Hutchinson and Dalziel 1968). It is a major weed in several regions of the world having climatic regions similar to its native habitat. In recent years it has been reported to occur in the tropical regions of Asia, Australia, and Africa where it is reported to be particularly noxious in the Congo River of the Zaire Republic and the White Nile system of the Sudan (Irving and Beshir 1982).

In many countries where it is a pernicious weed, it has been found to interfere with river transportation, irrigation channels, pumps and access to water for riverine settlements and recreational activities. It has been found to drastically increase evapotranspirational losses as well as fish losses (Irving and Beshir, 1982). In Sudan for example, the aquatic weed infested the Nile main stream and adjoining rivers in excess of 3,000 km thereby producing serious problems for the use of the river as a resource (Irving and Beshir, 1982).

Eichhornia natans (P. Beanv.) Solms-Lamb is a less proficient weed and a close relative of *E. crassipes* that was reported in 1961 to be common in Nigeria and several African states like Uganda, Zaire and Zambia (Hutchinson and Dalziel 1968). However, on January 12, 1985, the alarm of the invasion of Nigerian coastal creeks and lagoons by water hyacinth was raised by one of the national dailies. Shortly after this initial announcement, investigations were conducted and the weed was properly identified as a water hyacinth (*E. crassipes*) (Prof. K. Kusemiju, University of Lagos, Personal Communication).

This paper examines the status of the aquatic weed in the Nigerian lagoons and creeks, potential methods of control, utilization options, and the current efforts of the Nigerian government on its control.

STATUS OF WATER HYACINTH IN NIGERIAN WATERS

Water hyacinth has become a major weed in Nigeria having successfully invaded and established itself on the entire Badagary creek, the Yewa lagoon, Ologe lagoon, the Lagos lagoon and the waterways of the riverine areas of Okitipupa (Fig. 1). It was reported in 1982 in the local newspapers as a weed that is spreading fast and paralysing the fishing industry. Since this initial report, the surge in growth has become phenomenal leading to complete coverage of some of the creeks and lagoons mentioned above. As a result of the current invasion, more than one third of Nigeria's local fish supply is now threatened by

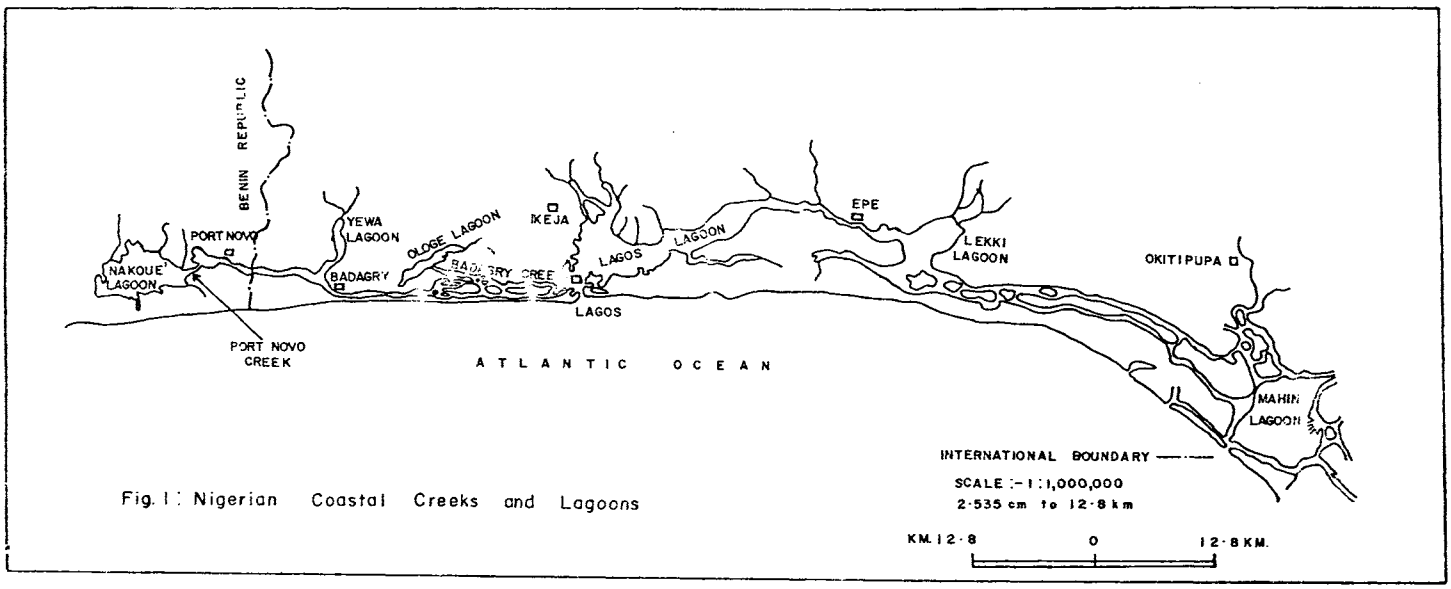

Fig. 1: Nigerian Coastal Creeks and Lagoons

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mats of water hyacinth. More than 20,000 fishermen will be out of jobs thereby losing their means of livelihood. Other attendant problems include increases of between 200 to 300% in the cost of water transportation, and a drastic reduction on the Nigerian border patrol. The above estimates are considered conservative given the prevailing difficulty of obtaining data in developing countries. Even as it is, the adverse effects on the economic activity of the people in the affected areas must be considered grave especially at this period of Nigeria's national economic emergency.

It is believed that the weed found its way into Nigerian waters from a lagoon in the Port Novo area of the Republic of Benin, which opens into the Badagary creek enroute to the Atlantic Ocean. The water hyacinth is believed to be relatively intolerant to salt water, hence during the dry season of 1985 the population was reduced drastically due to the 'burning' effect of the salt waters of the Lagos Lagoon. However, in 1986 the weeds are back and more massive than they were in the previous year. Penfound and Earle (1948) did indicate that water hyacinth does not adjust itself to salt water and indicated that it thrives best in warm climates. They also reported that the plant doubles its number every 2 weeks by means of off-shoots. At this rate they inferred that 10 plants would produce 655,360 plants (i.e. 1 acre or 0.4 ha) in one growing season of 9 months.

It is known in Nigeria for example that the salinity of the Lagos lagoon usually drops drastically during the raining season thereby enhancing a build up of the weeds during the rainy season. The conducive temperature and high rate of reproduction coupled with the seasonally low salinity of the Lagos lagoon made the water hyacinth an especially dangerous threat to the continued use of the affected Nigerian waters as a resource if appropriate and effective control is not introduced forthwith.

METHODS OF CONTROL

A range of mechanical devices are available for the control of water hyacinth; from outright hand harvesting to very sophisticated large floating harvesters (Anon, 1976). Some suggested mechanical devices include a simple boom that diverts weeds from a flowing river to the shore, a mowing boat, airboat, especially designed for harvesting water hyacinth e.g. 'Florida airboat', tractor powered mobile harvester etc. (Anon, 1976). Some of these equipment and devices have been found to be effective in several areas where this aquatic weed has been a major problem e.g. USA, however, the greatest draw back in a developing country is the cost and the problem of maintenance. In spite of this major draw back the Nigerian Institute of Oceanography and Marine Research is now working on the design of a mechanical harvester which would be used to sweep over the waters, collect the weed and transport it to land where it could subsequently be disposed. In the meantime, the age long hand harvesting was engaged for the removal of the weeds. This met with a measure of success in 1985, but as a result of a new surge and phenomenal high rate of reproduction, hand clearing this year has not met with any appreciable degree of success. Other mechanical devices for keeping the weeds in check, e.g. mechanical barriers, have been tried but as yet cannot be evaluated in terms of success or failure.

Chemical control of water hyacinth has been found suitable by a number of countries, and a chemical like 2,4-D has been a prime candidate (Penfound and Earle, 1948; Irving and Beshir, 1982). Aerial and ground applications are used in an attempt to maintain open water access for commercial steamer traffic (Irving and Beshir, 1982). Bad weather will not be a handicap in the humid tropics here although the cost of the annual treatment may make it unattractive to a country whose financial resources are already very strained. An added issue in Nigeria is the controversy that the use of chemicals will generate. Also when chemicals are used and the weeds are killed, the dead debris will still pose considerable problems to fishing, fish growth and other uses of the water. In the meantime, no chemical has been used in Nigeria for clearing the weed, although some research on potential herbicides has been commissioned by the Government.

The biological control of water hyacinth has become more popular of late as researchers have found that the use of biological agents may be very effective, environmentally less controversial and far less expensive than most of the other methods of control. In this regard insects such as *Neochetina eichorniae* (a weevil) and *Orthogalumna terebrantis* (a mite) have been tried either singly or in combination leading to greater damage on water hyacinth in the waterways of Florida in the USA. Some fungi have also been shown to have some destructive effect on water hyacinth. For example spraying water hyacinth with spores of *Acremoniam zonatum* or *Cercospora rodmanii* either singly or in combination with herbicides have led to severe infection causing plants to decline, die and sink; *Uredo eichorniae* a rust fungus has also been tried with varying success in Florida (Conway, 1976; Wapshere, 1977). It is expected that certain or all of these insects and fungi can be experimented in Nigeria for the control of the water hyacinth given the similarities in the climate of West Coast of Africa and Florida. However, such studies are yet to begin in earnest due principally to lack of funds.

UTILIZATION OPTIONS

From the report on an ad hoc advisory panel set up by the National Academy of Sciences, a lot of prospect have been revealed for the conversion of water hyacinth to food, fertilizer, paper and fibre, and energy (Anon 1976). Several fish types e.g. capycara, donkeys, pigs and sheep are recommended for grazing on water hyacinth.

From the nutrient composition of water hyacinth (Abdalla and Hafeez, 1969), it is obvious that the plant can be a good source of fertilizer which incidentally is in critically short supply in Nigeria. Reports have shown that decaying water hyacinth applied to farm lands benefit crops and improve soil texture, and when used as mulch, the moisture content at the soil surface was increased (Anon 1976, Abdalla and Hafeez 1969). Several other uses have been suggested for water hyacinth: processed animal feeds, pulp, paper and fibre, energy and lastly as a waste water treatment option (Anon 1976).

CURRENT NATIONAL EFFORTS

The Nigerian Government in March 1985 set up an Inter Ministerial Committee to find solution to the menace of the water weed. This Committee is comprised of Ministry officials as well as scientists from the Universities of Lagos, Ife, Ibadan and Benin and have been meeting regularly. The Committee has lately gone into sub-committees of mechanical clearance, control and utilization for effective action on the water hyacinth. These sub-committees have begun work in earnest with an initial allocation of about 0.5 million Naira (0.5 million USA) by the Nigerian Government. This level of funding is certainly insufficient for the level of invasion that is presently observed, however it is expected that appreciable progress will be made with this initial sum and hopefully in due course their action will be felt.

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