

# WATER HYACINTH INFESTATION OF RIVER NIGER AND KAINJI LAKE, NIGERIA

K. KUSEMIJU\*, T.A. FARRI\*\*, F.D. CHIZEA\*\* and E. EKERE\*\*\*

\* *Department of Biological Sciences, University of Lagos, Lagos, Nigeria.*

\*\* *NASENI, Federal Ministry of Science & Technology, Lagos.*

\*\*\* *Marine Police, Forces Headquarters, Lagos.*

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## INTRODUCTION

Water hyacinth, *Eichhornia crassipes* (Mart) is a serious aquatic pest in many parts of the world. Its rapid growth has clogged major waterways and created problems associated with navigation, national security, irrigation and drainage, water supply, hydro-electricity and fishing in many countries.

The first surge of the weed in Nigeria was noticed in September, 1984 along the Badagry Creek in Lagos State where the weed formed a 'mat' over the water surface. By January 1985, it had spread to the creeks and lagoons in Lagos and its environs. The invading weed entered the Nigerian coastal waters through the Porto-Novo Creek in the Republic of Benin (Kusemiju *et al*, 1988). Fear was expressed then that the weed might spread to other water bodies in Nigeria.

By 1986, the weed had crossed the Lagos Lagoon and has since covered most of the intricate system of waterways made up of rivers, lagoons and creeks in Lagos, Ogun, Ondo, Edo, Delta and beyond. The

weed is spreading fast along the coastal states of Nigeria.

## PRELIMINARY INVESTIGATIONS IN RIVER NIGER

Following the report from the Executive Governor of Kebbi State on the occurrence of an aquatic weed suspected to be water hyacinth which was constituting a menace in the River Niger, the Chairman of the National Agency for Science & Engineering Infrastructure (NASENI) directed an immediate investigation of the area. The investigation team accompanied by an official of Kebbi State Fisheries Department toured the State extensively and met a surge of water hyacinth in the River Niger at Yauri, Headquarters of Yauri Local Government Area, Kebbi State. Since Yauri was quite close to Kainji Lake, it was noted then that the weed posed a threat to the lake. It was also suspected that the water hyacinth in the River Niger entered Nigeria via the Niger Republic. It was agreed that the team should carry out a detailed survey of the affected areas and the extent of the infestations.

## FIELD INVESTIGATIONS

Following the directive of the Chairman of NASENI, the team carried out a detailed survey of water hyacinth infestation in the River Niger from 20<sup>th</sup> – 23<sup>rd</sup> December, 1992. The field trip covered the entire length of the River Niger from the Niger Republic border to Warra end of the Kainji Lake (Fig. 1).

Water hyacinth was seen flowing into Nigeria through Dolekaina, a village some 15 minutes drive by boat from Lolo. Between Dolekaina and Lolo, a large population of Water hyacinth was seen entangled by *Panicum maximum* (grass family) and *Polygonum lanigerum* (Polygonaceae). Strands of water hyacinth were also seen floating downstream on the river. Enquiries from the Marine Police located at Lolo indicated that major inflow of water hyacinth from the Niger Republic is during July and August and the surge started in 1989. The concentration was low in November/December since most of the weeds were already carried downstream to Nigeria by the fast current of the river. The River Niger from Lolo downstream was surveyed estimating also the level of water hyacinth infestation.

At Bagudo, a bridge is built across the River Niger. The Bagudo bridge is located mid-way between Dolekaina and Yauri and is about 1 km long. From Bagudo to Yauri, the same pattern of distribution was observed with a large proportion of the weed massed along the shores of the river.

## ECONOMIC AND ECOLOGICAL IMPLICATIONS

Kainji Lake with a surface area of about 1250 km<sup>2</sup> provides a highly suitable site for the proliferation of water hyacinth. According to Khan and Thyagarajan (1988), under the most favourable conditions, 10 plants can multiply to 600,000 in only eight months. If immediate action is not taken, we may soon expect the whole of the lake to be covered by the weed. Water hyacinth cover is detrimental to fish due to lowered dissolved oxygen, inhibition of phytoplankton production and restriction of the larger fish.

One of the most insidious effects of water hyacinth infestation is the loss of great deal of water through evapotranspiration. According to Baruah and Singh (1984), water loss by evapotranspiration from water hyacinth-covered waters has been reported to be up to 9.84 times higher than evaporation from open water. This water loss may reach serious proportion in areas of water shortage like the River Niger and the Kainji Lake. Water hyacinth also reduces the water storage capacity of reservoirs by displacing large volumes of water. It is said that 405 hectares of water hyacinth displaced 1.22 x 10<sup>6</sup> m<sup>3</sup> of water in Lake Rio Kenoa in El Salvador (Gopal and Sharma, 1981). The indication of all the above is that Nigeria now has a major problem on hand with regard to navigation, fishing and the Kainji hydro-electric dam which generates power to most parts of Nigeria and other countries in the ECOWAS sub-Region.

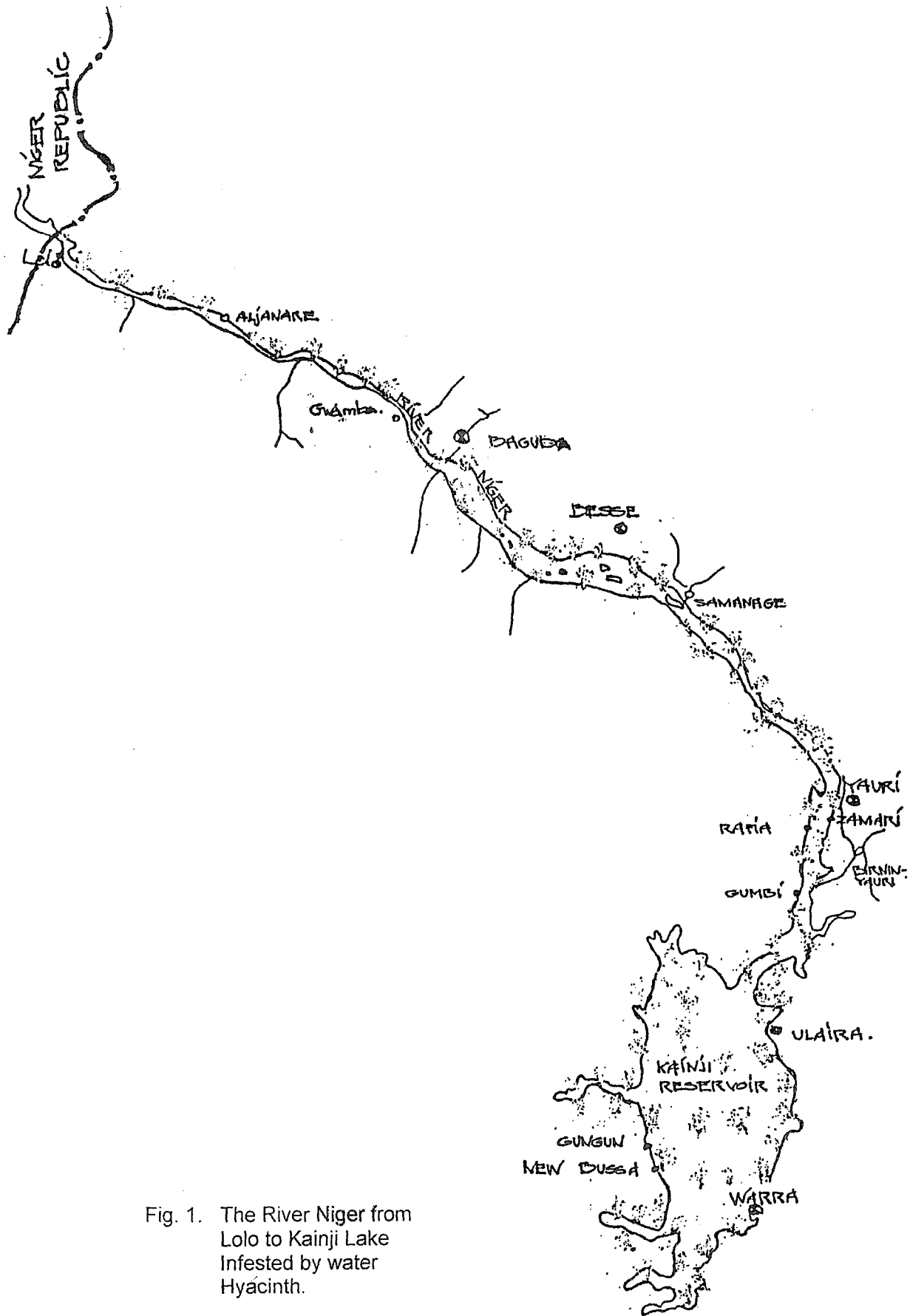


Fig. 1. The River Niger from Lolo to Kainji Lake Infested by water Hyacinth.

Economic losses caused by water hyacinth infestation is considered to be quite substantial. Economic losses due to damage of cultivated crops by water hyacinth in West Bengal, India amounted to \$24 million in one year (Baruah and Singh, 1984). According to USAID (1971), the losses in the United States due to aquatic weeds including water hyacinth range up to \$110 million annually and this figure does not include losses due to crop failure, interference with navigation, deterioration of wildlife and fish habitat and effect on public health. From the foregoing accounts, it is quite obvious that immediate action must be taken to check and control the growth on water hyacinth in the River Niger and Kainji Lake.

### CONTROL STRATEGIES

Water hyacinth problem in River Niger presents a different setting from the experience in Lagos area. The usual mechanical harvesting so far employed in Nigeria cannot be adopted in the Kainji Lake, neither can one think of immediate biological or chemical control in the lake bearing in mind the scattered nature of the weed. Along the River Niger from Dolekaina through Lolo, Bagudo and Yauri to Ulaira, mechanical harvesting will remove the other weeds that presently help to trap water hyacinth and therefore open the river course and indeed the Kainji Lake to heavier infestation. The long-term solution to the water hyacinth problem from Dolekaina to Ulaira and in the Kainji Lake is biological control using weevils when the short-term measures suggested below would have been initiated. The following short and long term strategies are submitted as control measures:

### Immediate And Short Term Measures

1. Two barriers should be erected at the border near Dolekaina and near Yauri to hold back water hyacinth originating from Niger Republic and prevent further incursion of the weed into the Kainji Lake
  - Near Dolekaina, the length of the barrier will be approximately 1 km.
  - Upstream near Yauri, the approximate length will be 1.5 km.
  - Allowance is made for flooding on both sites on the River Niger.
2. There should be manual clearance of water hyacinth starting from the Niger Republic border at Dolekaina up to Ulaira or to the second barrier at Yauri. In clearing the water hyacinth, deliberate effort should be made not to clear along with it the other local weeds that presently serve the useful purpose of entrapping water hyacinth.
3. Immediate step should be taken to mop up the water hyacinth strands scattered all over the Kainji Lake. The edges of the lake should also be manually cleared of the weed. At least 20 boats must be deployed for this exercise.
4. Biological control efforts should immediately be initiated.

### Long Term Solution

Biological control should be initiated as a long-term solution to the water hyacinth problem in the River Niger and Kainji Lake. The weevils (*Neochetina eichhorniae* and *N. bruchi*) and fungal pathogens can easily be introduced behind the two barriers at Dolekaina and Yauri and along the River Niger where water hyacinth is held in place by the local weeds; and along the edges of the Kainji Lake.

It is suggested that a main Biological Control laboratory for the weevils be established at the NIFFR (New Bussa) and field insectary at Yauri.

### Enabling Studies

Enabling studies on the biology of the weevils including:

- Study of the biology of the weevils
- Study of the carrying capacity of the weevils and measurement of the impact of weevil damage on Water hyacinth.
- Host specificity to include laboratory studies on host specificity and field evidence of specificity.

The basic studies will help in deciding the various ways to establish the weevil in the field and monitor what it does to the target pest. The implementation of planned biological control programme in Nigeria for water hyacinth has been stalled in the past by lack of funds.

### Proposal for Use of Grass Carp and other Aquatic Animals

Water hyacinth is both a menace and resource. It constitutes a free crop of great potential value – a highly productive crop that requires no tillage, fertiliser or cultivation and has potential for exploitation as fish feed. The pilot project now proposed explores the biological control of water hyacinth by use of identified fish species namely, the grass carp, *Ctenopharyngodon idella* and other aquatic animals. The grass carp has been shown to be a very effective method of water hyacinth control in several countries including Indonesia, Philippines and Guyana. The grass carp is a fast growing fish that feeds voraciously on many aquatic plants. In the process, the weed is cleared and one gets sizeable fish thereby contributing to fish production and improving the economy of the riverine people who now regard water hyacinth as a menace. According to Soerjani (1984) in Indonesia, in water hyacinth monoculture, fish of 6 – 8 cm with a density of 4 – 16,000 fish/ha reduced water hyacinth population of about 1200 tons/ha with 48 – 83% compared to the potential growth in two weeks.

### CONCLUSION

This survey confirmed that the source of water hyacinth in the River Niger and Kainji Lake is from the Niger Republic. The infestation of Kainji Lake poses a major problem to the Kainji Dam and indeed the hydro-electricity supply of Nigeria and other countries in the West African Sub-Region. This is a new dimension to the water hyacinth problem in Nigeria and it must immediately be

tackled. Bilateral initiatives with Niger Republic should also be immediately set in place.

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