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Impacts of water hyacinth (*Eichhornia crassipes*) on fish catch in the lower Taylor Creek area of Bayelsa State

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Abstract

The aim of the study was to access the impact of water hyacinth, Eichhornia crassipes on fish catch in the lower Taylor Creek Area of Bayelsa State. The experimental approach involved the division of the creek into two stations; infested and non-infested at the littoral zone. Subsequently, the deployment of six Malian traps with dimensions of 70cm diameter and 80cm height were set in each station for a period of six months using groundnut cake as baits. Furthermore, fish caught were counted and identified into families and species. From results, fish species composition obtained from the stations were a total of 9 families and 15 species. However, it was observed that the water hyacinth infested area had the lowest fish catch while the non infestated area had the highest number of fish catch for both dry and wet season. It is therefore concluded that the invasion of Eichhornia crassipes impacted on fish population and composition.

Keywords: Eichhornia crassipes, fish catch, Taylor Creek, Bayelsa.

Introduction

Eichhornia crassipes (Mart Solms) popularly known as water hyacinth is a free floating aquatic plant which belongs to the family Pontedriaceae and subfamily Lilolinaeceae (Cronk and Fennessy, 2001). This aquatic weed has infested fresh and brackish waters in 20 out of the 36 states and also the federal capital territory of Nigeria (Bolorunduro, 2000). According to Deekae and Onuoha (1987) aquatic weeds are those unwanted and undesirable plants which reproduce and grow in water if left unchecked, thus, choke the water body thereby posing a serious problem to fish culture or production. The Taylor creek is a repository of domestic waste from the indigenes of the communities residing along the banks of the creek, this creek has experienced an explosive growth of Eicchornia crassipes. It has been reported that such alien species as water hyacinth changes or alters the ecosystem functions and as a result constitute a threat to biological diversity of aquatic organisms such as the aquatic plants (flora) and animals (fauna) in such ecosystem and food chains associated with them (Luken and Thieret, 1997). Water Hyacinth prevents light penetration and causes excessive development of algal-bloom which is a nuisance in cultivated fish ponds and small reservoirs. They even cause fish mortality due to oxygen depletion or release of extra-cellular metabolites which are toxic to fish (Pathaik, 1980; Birnin-Yauri et al., 2006; Uka et al., 2006). According to Bolorunduro (2000) there are evidences that dense stands of water hyacinth may bind up nutrient materials throughout the growing season so that they are not available for the production of phytoplankton and those organisms that feeds on phytoplankton. This means that the chances for fish larva survival would be greatly reduced. The objective of this study therefore is to investigate the number of fish species caught in the two different locations or sites, that is, water hyacinth infested site and a site with no water hyacinth infestation so as to proffer the need for some management measures for control of the plant.

Materials and Methods

- **Study Area:** The study was carried out in the lower Taylor Creek which is a tributary of the Nun River in Bayelsa State. The Taylor Creek is located between latitudes 5°01′ N to 5° 02′ N and longitudes 6° 17′ E to 6° 18′E. In this area there are several creeks and flood channels which interconnects the freshwater swamp forests, linking the Nun River and Taylor Creek at different points and form a mass of water body during high flood. The Taylor creek is subjected to mild tidal influences during the dry season. The flow of water is swiftly to one direction during the flood period but gentle in the low water period. At the peak of the dry season, the direction of the flow slightly reversed in the Taylor Creek during the rising tide while at full tide the flow almost stagnates. Some activities such

as oil exploration and exploitation, rural development programmes and dredging activities are going on in the area.

- **Sampling Procedure:** The creek was divided into two sampling areas named Station 1 (ST1) and Station 2 (ST2). ST1 is water hyacinth infested area while ST2 is the area with no water hyacinth for the purpose of this study. Six Malian traps were set in each area for six months between January and June 2013, with dimensions of 70cm diameter, 80cm height. The traps were all baited with groundnut cake. The species of fish caught were identified using identification key provided by Olaosebikan and Raji (1998) and the species were also counted and were recorded in each area for the two seasons.

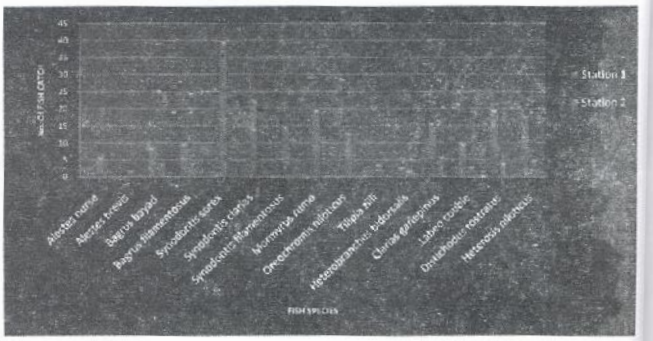

Fig. 1: Number of fish catch against fish species in ST1 and ST2 during the dry season.

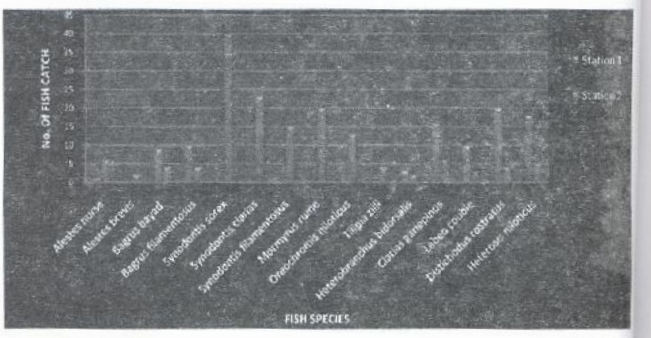

Fig. 2 Number of fish catch against fish species in ST1 and ST2 during the wet season.

Results

The number of fish species caught in both ST1 and ST2 are shown in Fig.1 and 2 respectively. The results revealed that a higher number of fish species were caught in ST2 in both seasons.

Discussion

The results shown in Figure1 and 2 reveals the fish species caught during wet and dry seasons at ST1 and ST2. The statistical analysis revealed significant difference in the catch for both stations. However, ST1 had the lowest catch. This could have resulted from low temperature, low dissolved oxygen and poor light penetration in the water hyacinth infested area (ST1) making only few number of fish species to survive. Uka et al. (2006) affirmed that, water hyacinth decreases dissolved oxygen and also lowered temperature of water bodies, which alters the survival of aquatic organisms living in such aquatic environment (e.g. fish). Birnin-Yauri et al. (2006) also reported low temperature and radiation in water hyacinth / thypa infested areas and stated that only few species of fish can survive in such condition. Mafolabomi et al. (2009) stated that, water quality determines to some extent the success of aquaculture. Furthermore, at station 2 there was no significant difference in fish catch during wet and dry season. Nevertheless, there were changes in the number of fish species caught. Consequently, ST1 revealed significant difference for both dry and wet season. This was as a result of increased number of fish species caught during the wet season. Similarly, this could be attributed to the influx of water into creek accompanied with fish and other factors such as; improved DO, decrease in temperature, low turbidity and the tendency for fish to spawn during raining season.

According to Cook (1965) it was reported that during the wet season more fish migrates to different areas of aquatic environment, which may be due to the seasonal variation in temperature and dissolved oxygen in water bodies during that period. Kwen et al. (2012) also affirmed that temperature directly influences the migration pattern, growth and spawning of fishes in the aquatic environment while Patnaiki (1980) observed that oxygen depletion results to low fish catch or fish mortality or release of extra-cellular metabolites which are toxic to fish. Kwen et al. (2012) also pointed out that fish uses oxygen to oxidize food to produce energy, therefore dissolved oxygen is very vital to aquatic life. On the other hand, high turbidity made it difficult for fish to identify the baits, in the water hyacinth infested area (ST1). According to Harth and Zabbey (2005) it was observed that turbidity is among the other primary factors that determine the quality of a water body, which is also one factor that is very important for the life of aquatic organisms including fish.

Conclusion and Recommendations

This study has demonstrated the impact of *Eichhornia crassipes* on fish population and composition. Therefore, water hyacinth should be controlled and properly managed. Water hyacinth can be controlled mechanically, biologically and chemically. Some advantages of water hyacinth (*Eichhonia crassipes*) are:

a. Serves as food for some animals (e.g. fish etc.)
b. It is purchased as an ornamental in countries like Senegal and the United States.
c. It serves as a source of income because it is offered for sale in the catalogs of many distributors of water garden plants.
d. It serves as sails before the wind because the leaves are 10 to 15cm across, bright green, shiny and are upright.
e. Because of the admiration for the flowers, man has assisted the spread of this plant by cultivating it in pools and gardens.
f. His carelessness towards the cleanliness of his commercial and pleasure craft on land and sea has also contributed to the movement of the plant. For example, Charcoal is made in the bush in Africa; and holes in the sacks used for transport are sometimes plugged with water hyacinth plants that may survive a very long journey.

g. Large plants are used as cushions for sitting and kneeling in native canoes to be thrown away at any place where the plant ceases to be useful.

Some disadvantages of water hyacinth (*Eichhonia crassipes*) are:

a. It hinders transportation in rivers and waterways by blocking them.
b. Fish spawning areas are blocked.
c. Many fishing grounds are being destroyed by darkness and lack of oxygen as the weed cover becomes more dense.
d. Riverine communities are denied their principal source of protein when the growth of the plant becomes denser in water bodies.
e. It increases evapo-transpiration rates in water bodies especially in fish ponds.
f. It clog irrigation pumps and hydro-electric systems if the plant growth is not controlled.
g. Insect vectors of human and animal diseases seek harbour in the mats of water hyacinth, so do dangerous snakes and crocodiles.
h. Fishing camps and marinas are often closed, and are forced into bankruptcy by inaccessibility.
i. The flow in smaller laterals and farm ditches may be stopped.
j. May canal systems will be enlarged in order to compensate for retarded flow.
k. It results to constant accumulation of debris from decaying water hyacinth on the canal bottom.

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