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Some aspects of environmental degradation due to the construction of Kampe (Omi) Dam in Kogi State, Nigeria

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ABSTRACT: Plant distribution along Kampe (Omi) Dam and Irrigation Project (KODIP) were compared in both the riverine and lacustrine environment of the project. Sixteen aquatic plant species belonging to six families were recorded. *Cyperus iria, Pycreus lanceolatus* and *Elytrochorus spicatus* rarely exist at the lacustrine environment of the project due to the impoundment. Similarly 25 species of terrestrial plants were also submerged apart from other vegetation destroyed during the construction works and land clearing for irrigation activities. Some of the dry dead woods were being used as sources of fire wood for domestic activities in most of the communities. This is cost ineffective, but there is need for government to extend development to these communities. Also, some decaying dead woods along the pelagic zone of the lake were growing mushrooms which became another source of nutritious diets for the communities. Mitigating measures in order to replenish the lost vegetation and to sustain the remaining ones were suggested for the Basin Authorities.

Key Words: Irrigation Project; Environmental Impact Assessment; Kampe Dam.

Introduction

The Kampe (Omi) dam and irrigation project (KODIP) of the Lower Niger River Basin and Rural Development Authority is located in Yagba West Local Government Area of Kogi State, about 146 km from Ilorin on Ilorin-Kabba road. It lies between longitude 6^o 37’ and 6^o 42’ E of Greenwich and latitude 8^o 38’ N of the equator (Fig. 1).

Nigeria’s Environmental Impact Assessment (EIA) Decree No. 86 of 1992 stipulates that any construction of dams and man-made lakes and natural embankments of lakes with surface areas of 300 hectares or more, and irrigation schemes covering an area of 5000 hectares or more must have an EIA carried out. Even though the construction of KODIP started long before the official promulgation of EIA decree, the project falls within this category (KODIP EIA, 2000). The creation of a lake system through dam construction would disrupt the equilibrium state of the ecosystem by interfering with the quality and quantity of the available food items, living space, inter- and intra-specific competition and the limnological conditions (Araoye and Jeje, 1999). There is, therefore, the tendency for some changes in the flora and fauna composition of the affected areas. Some species may be eliminated, or faced with the problem of adaptation, some new species may also emerge.

This paper reports on some of the vegetation affected due to the creation of the dam. It also suggests some mitigating measures to redeem the situation.

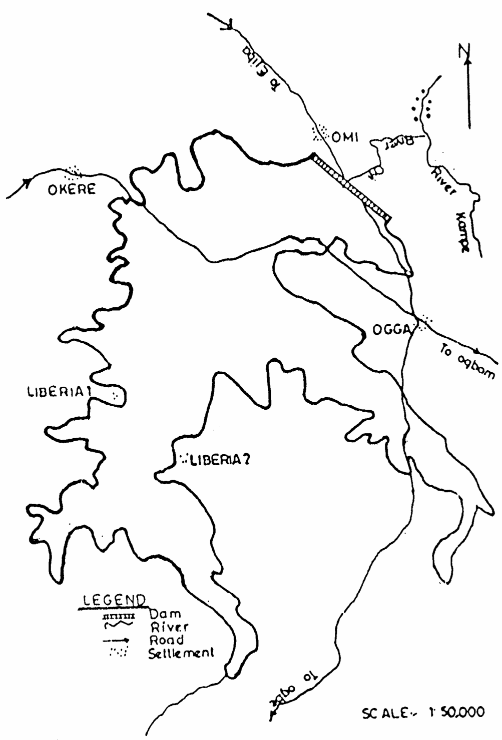

Fig. 1. Location of the dam, sampling sites and settlements

River Basins all over the world have nourished human society for thousands of years, yet the demand for food is on the increase because the human population explosion that has led to an increasing shortage of natural resources and ecosystem services of the globe has not ceased. It has been estimated, for example, that humans would need two additional earths for every human to have similar standard of living as that of most European countries (Rees and Wackernagel, 1994).

As the gains from successful River Basin Development Projects can be enormous, so are the risks. Such schemes as that of KODIP profoundly affects water flow, vegetation, drainage pattern and general ecology of the area. Some of the benefits include storing of water, which could otherwise flow wastefully into the ocean to be used for proper generation or irrigation. It is estimated that power from large dam accounts for about a quarter of the world's total supply of electricity (Robert, 1998).

Dam construction can also prevent flood in river basins and can improve fisheries and navigation of rivers. However, they can also cause major financial and environmental problems. Some developing countries invested heavily on large dam projects and discovered that these investments did not yield the desired returns. Debts were incurred and the expected economic benefits were not achieved. People were displaced, arable lands destroyed by floods resulting from the impoundment of the dam, and both forest and wildlife resources were devastated. The spread of water-borne diseases and the collapse of coastal fisheries are also harmful consequences of such big projects. Some of these problems, though foreseen, were not considered as crucial until when the harm had been done and could no longer be ignored.

The construction of KODIP started long before the official promulgation of the Environmental Impact Assessment (EIA) Decree No. 86 of 1992. Hence, there were no EIA studies before the creation of the

dam. Nevertheless, this study has compared the vegetation around the river section of the project with the existing ones around the lake area to determine which of the vegetation is submerged and eliminated due to the creation of the dam and its impoundment.

Materials and Methods

Field trips were made to KODIP from Ilorin. Trips were also made along the lake using a crestliner aluminium boat with 25 H.P. Yamaha outboard engine attached, belonging to the Lower Niger Basin and Rural Development Authority. The settlements along the lake reached include Omi, Oga, Liberia 1 and 2, Oke-Ere and Ogbe (Fig. 1). Apart from Liberia 1 and 2 which are new settlements for the fishermen, all other settlements were indigenous and existed before the creation of the dam.

Plant samples, both terrestrial and aquatic, were observed and brought to the Botanical laboratory for identification using their taxonomic features. The plants were classified into families and species. Specimens of aquatic weeds were collected from the littoral zone of the lake, canal slopes and the river banks for identification. Samples of terrestrial weeds and plants were also collected around the command area of the project. Photographs of submerged vegetation along the lake were also taken.

Results

The distribution of aquatic plants is shown in Table 1. Sixteen plant species belonging to six families were recorded in both river and lake sections. All, except *Cyperus iria* (Cyperaceae), *Pycreus lanceolatus* and *Elytrochorus spicatus* (poaceae) were found around the lake. Six species were found around the main canal, the feeder canal and the pools within the command area (Table 1). Aquatic weeds found around the pools but absent around the main canal include *Kyllinga squamulata* (Cyperaceae) while aquatic weed found around the canal but absent in the pools include *Leptochloa cearulescens* (Poaceae) and *Nymphae maculata* (Nymphaceae).

The distribution of terrestrial plants is also shown in Table 2. Twenty five plant species recorded along the river section were ebing submerged along the lake due to impoundment along the dam. Some economic trees, e.g. *Daniella olivera* (Plate 1) were dead, while many others, including *Borassus aethiopum* (Plate 2) and *Ceiba penthandra* (Plate 3) were shedding leaves and falling. This has not included several other vegetation cleared during the construction works of the dam and land preparation for irrigation activities. Some of the dead trees and shrubs were sometimes being removed by fishermen and others for fire wood and building of sheds (Plate 4). Also, the dead decaying wood scattered along the lake were sometimes seen growing mushrooms (*Pleurotus tuber-regium*) which fishermen and other members of the community removed for domestic use and consumption.

Discussion

The disappearance of *Cyperus iria, Pycreus lanceolatus* and *Elytrochorus spicatus* around the lake littoral zone might be due to ecological shift of the water body from the *lotic* to the *lentic* state. Dam construction across seasonal or perennial river can disrupt the balance of a population within a complex community as the aquatic environment (Araoye and Jeje, 1999). Hence, it may probably take sometime for stability of the new environment to be accomplished due to loss of vegetation and the need for some time to complete the process of succession.

Aquatic weeds found around the canals and the pools must have been newly developed due to the construction works for irrigation around the command area because those areas were initially dry lands. However, the processes of land scraping and excavation in order to pave way for the canals during the construction works must have also destroyed some terrestrial vegetation. Twenty five species of terrestrial plants submerged due to the dam impoundment is enormous. The development of dam for hydro-

Table 1. Distribution of aquatic plants

Aquatic Plants	Omi	Ogga	Oke-Ere	Liberia I	Liberia II	Ogbe	Main Canal	Feeder canal	Pool	River
Ceratophylum Sp.	+	+	+	+	+	+	-	-	-	+
Cyperus difformis (Cyperaceae)	+	+	+	+	+	+	+	-	+	+
Cyperus Iria (Cyperaceae)	-	-	-	-	-	-	-	-	-	+
Fimbristylis ferruginea (")	-	-	-	+	+	+	-	-	-	+
Fimbristylis littotalis (")	+	+	+	+	-	-	+	-	+	+
Kyllinga squamu lata (Cyperaceae)	+	+	+	+	+	+	-	-	+	+
Pycreus lanceolatus (")	-	-	-	-	-	-	-	-	-	+
Scleria Verrucosa (")	+	+	-	+	+	+	-	-	+	+
Nymphae maculata (Nymphaeceae)	+	+	+	+	+	+	+	+	-	+
N. lotus (watelily)	+	+	+	+	+	+	+	+	+	+
Ludwigia abyssinica (Onagraceae) water primrose	+	+	+	-	+	+	-	-	-	+
Perrtodom pentandrus (Rubiaceae)	-	-	-	-	+	+	-	-	-	+
Salvinia nymphellula (Salviniaceae)	+	+	+	+	+	-	-	-	-	+
Elytrohorus Spicatus (Poaceae)	-	-	-	-	-	-	-	-	-	+
Leersia hexandra (poaceae)	+	-	+	-	-	+	+	+	+	+
Leptochloa caerulescens (poaceeae)	+	+	+	+	-	+	+	-	-	+
**Cynodon dactylon (poaceae)*	-	-	-	-	-	+	-	-	-	-
**Arachis hypogea*	-	-	-	-	-	+	-	-	-	-

* = non-aquatic + = Present - = Absent

Table 2. Distribution of terrestrial plants

SPECIES	Locations										
	Omi	Ogga	Oke-Ere	Liberia I	Liberia II	Ogbe	Main canal	Feeder canal	Pool	River	Cd
Borassus aethiopum (Movaceae)	s	s	s	s	s	s	-	-	-	+	-
Elias guinensis (Palmae)	s	s	s	s	s	s	-	-	-		-
Raphia hooker (Palmae)	s	s	s	s	s	s	-	-	-	+	-
Ceiba penthandra	s	s	s	s	s	s	-	-	-	+	-
Doniellia oliveri (Caesalpiniaceae)	s	s	s	s	s	s	-	-	-	+	-
Viterllaria paradooxa (Sapotaceae)	s	s	s	s	s	s	-	-	-	+	-
Antiaris africana	s	s	s	s	s	s	-	-	-	+	-
Parkia biglobosa (Mimosaceae)	s	s	s	s	s	s	-	-	-	+	-
Chromolaena odoratatum (Asteraceae)	s	s	s	s	s	s	+	+	-	+	+
Ageratum comyzoides (Asteraceae) goat weed.	s	s	s	s	s	s	+	+	+	+	+
Aspilia africana (")	s	s	s	s	s	s	+	+	+	+	+
Spilanthes filicaulis (")	s	s	s	s	s	s	+	+	+	+	-
Synedrella nodiflora (")	s	s	s	s	s	s	+	+	+	+	+
Tridax procumbens (") nodeweed	s	s	s	s	s	s	+	+	+	+	+
Newbouldin laevis (Bignoniaceae)	s	s	s	s	s	s	+	+	+	+	+
Cassia occidentalis (Cesapiniaceae)	s	s	s	s	s	s	-	+	-	+	+
Piliostigma thonningii (")	s	s	s	s	s	s	-	+	-		+
Combretum zenkeeri (Combretaceae)	s	s	s	s	s	s	-	+	-	+	+
C. hispidum (")	s	s	s	s	s	s	-	+	-	+	-
Platostoma africana (Lamiaceae)	s	s	s	s	s	s		+	-	+	-
Anacardium occidentale (Cashew)	s	s	s	s	s	s	-	+	-	+	+
Sida acuta (Malvaceae-Bromweed)	s	s	s	s	s	s	-	+	-	+	+
S. corymbosa (Malvaceae)	s	s	s	s	s	s	-	+	-	+	+
Mimosa pudica (Mimosaceae)	s	s	s	s	s	s	-	+	-	+	+
Andropogon tectorum (Praceae)	s	s	s	s	s	s	-	+	-	+	+

Cd = command area; s = Submerged; + = Present; - = Absent electricity and irrigation activities is usually accomplished with environmental degradation. It has been reported that drainage and channelization may cause substantial environmental degradation in an irrigation project (Kornilov and Timoshikina, 1975; Duval et al., 1976).

In the Lower Anambra Irrigation Project of Nigeria, for example, 3,850 hectares of land cleared for irrigation project has led to the losses of rare flora and fauna (Water and Dam Services, 1994). Similarly, the negative impact of Bakolori and Challawa/Tiga dams on the environment was discussed with emphasis on the downstream agricultural and fisheries activities (Adam, 1995; Thomas, 1996).

The use of dead wood by the community as fuel energy may not be cost effective since there could be cheaper means of source of energy, e.g. electricity and the use of kerosene for domestic cooking if the government can extend development to these areas. The felling of trees and submerged vegetation form a substantial loss in terms of forest and potential wildlife habitats. the development of mushrooms on some of the dead decaying wood was another source of cheap protein to fishermen and the communities apart from the fisheries resources. the growth of mushrooms was encouraged by the increased dead decaying trees that were felled or submerged as a result of the damning. Generally, mushrooms have been reported to be highly nutritious and of importance in human diets (Oso, 1981). *P. tuber-regium* was also reported to be of great medicinal value among the Yoruba native doctors in Nigeria because they have been used in curing ailments such as headaches, stomach pain, fever and cold (Oso, 1977).

It is important for the Basin Authority in charge of this project to design mitigating measures to replenish the lost vegetation particularly the terrestrial forms, and to sustain the remaining ones. Hence, there is need for strict control of tree cutting, land clearing and grazing by livestock within the water shed. Also, the Basin Authority should set up appropriate aforestation schemes to prevent soil erosion and enhance the richness of wildlife. Such schemes should take care of bush clearing practice and fire tracing. Hence, it may be suggested that a minimum of 5 trees per hectare should be spared during bush clearing and land preparation for irrigation activities. Finally, a forest reserve scheme may be embarked upon around the area for recreational and wildlife preservation.

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