

## Factor Affecting the Survival of Populations of the Smooth Freshwater Stingray *Dasyatis garouaensis* (Stauch and Blanc, 1962) of the Lokoja Section of the River Niger.

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### Abstract

A study of factor which may affect the populations of the smooth freshwater stingray, *D. garouaensis* was carried out. Populations of the species inhabit the Lokoja section of the River Niger. Habitat modification through river dredging and watershed disruption, urban expansion and development, road construction, pollution, culture and tradition are some of the observed factors which could be affecting the survival of *D. garouaensis* populations in the Lokoja section of the River Niger.

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**Keywords:** Smooth freshwater Stingray; River Niger; habitat modification, ecosystem.

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### INTRODUCTION

The natural habitat of stingrays extends the entire globe (Gonella and Axelrod, 2003). Concerns over the status and conservation of elasmobranch populations around the world are being raised at an international level (Martin 2005). Two freshwater stingrays have been reported in Nigerian inland waters, *Dasyatis Ukpam* and *Dasyatis garouaensis*. The Niger stingray or smooth freshwater stingray *D. garouaensis*, is a fresh water Elasmobranch of the family *Dasyatidae* native to rivers in Nigeria and Cameroon. The family *Dasyatidae* includes a number of true freshwater species and numerous species that visit brackish water (Ross and Schafer, 2000). Populations of the smooth freshwater stingray *D. garouaensis* inhabit the Lokoja section of the River Niger (Reed et al. 1967, Alum-Udensi and Nlewadim, 2016). They are found both in the deep and shallow sections of the river.

A declining population of this species has been reported by various authors (Reed et al, 1967; Stauch and Blanc, 1962; Alum-Udensi and Nlewadim, 2016) and they have been classed as vulnerable by the IUCN red list of threatened species. Lack of data on the biology of *D. garouaensis*, is hindering proper assessment of its status. Many elasmobranch species, in particular, are vulnerable to population decline when exposed to anthropogenic pressures, owing to intrinsic characteristics such as large size, late ages of maturity and low reproductive outputs (Dulvy and Reynolds 2002; Garcí'a *et al.* 2008). Much is still unknown about the species and knowledge of their biology, distribution, ecology, and status of the smooth freshwater stingrays and factors affecting their populations has become important.

### MATERIALS AND METHODS

A study of factor which may affect the populations of the smooth freshwater, *D. garouaensis* of the Lokoja section of the River Niger was carried out between April 2013 and March 2016. Regular visits to this section of the river was made during the period of study. During the field visits, observations were made of prevailing environmental characteristics and cultural practices that relate to the fish species in the area. Residents of the river side communities w regularly The study covers the length of the River Niger between Lokoja and Itobe. Lokoja sits west of the Confluence of River Niger and River Benue and is between longitude 7<sup>o</sup> 48'O North and latitude 6<sup>o</sup> 44'O East. Existing literature, personal communications and reliable internet publications were used when no peer-reviewed publications were found.

## RESULTS AND DISCUSSIONS

Some of the observed factors which could be affecting the survival of *D. garouaensis* in the Lokoja section of the River Niger include the following:

### Over fishing

The demand for fish for human consumption has led to increased pressure on populations of stingrays. This increasing fish demand, driven by human population growth expanding settlement in the area, has further put pressure on fish stock. The population of Lokoja town has doubled within two decades. This trend is similar with other peri-urban centres in Kogi State, Nigeria. This development is said to be caused by massive southwards relocation of businesses and families to Lokoja and further south following disturbances and unrests in North Eastern Nigeria and other parts of Northern Nigeria by Boko Haram. Elasmobranchs in general, including freshwaters stingrays, have low growth and fecundity, are long-lived, and mature late in life when compared with most bony fish (Camhi *et al.*, 1998, Musick & Bonfil 2004). Sharks and rays appear to be particularly vulnerable to over-exploitation due to their life-history strategy, characterized by slow growth, late attainment of sexual maturity, long life spans, low fecundity and natural mortality (Camhi *et al.*, 2008; Izzo and Rodda, 2012). Fishing practices in many cases have caused the size and presumably age structure of many populations to be fished down (Mason 1998; Pauly *et al.* 2002; Pauly *et al.* 2003; Worm *et al.* 2005), and this may have seriously impacted long-lived fishes like Chondrichthyan.

### Dredging

The Lower Niger has been dredged severally. First in 1958, also in 1978 from Baro through Lokoja to Onitsha, Onya to Warri/Port Harcourt (Salu, 2000) and lately in 2012. Lack of maintenance and regular flooding experienced by this section of the river resulted in the entire dredged channel silting up. Dredging disrupts river benthic ecology with negative effects on fish food organisms and the food chain (Alum-Udensi *et al.*, 2016). This will affect benthic fish species such as *Cynoglossus senegalensis* (sole), and *D. garouaensis* which are found in the area.

### Urban development, Agriculture and road construction

Disrupted watersheds could make streams and rivers warmer as water running off artificial surfaces, such as streets, parking lots, and roofs, is warmer than water running off vegetated land and, thus, contributes to thermal pollution of water bodies (Alum-Udensi, 2016). Alum-Udensi *et al.*, (2016) observed massive earth works and wrong dumping of soil into the River Niger during the construction of the Abuja Lokoja highway, at that time, the river was undergoing dredging. This will expose river to increased and accelerated sedimentation which will affect benthic communities.

Also agrochemicals such as fertilizers, herbicides, pesticides and other nutrients used in agriculture on farms and in gardens adjoining water bodies may be carried may find their way to streams and other water bodies (USEPA, 1986; Agbon *et al.* 2014).

Runoff from residential and industrial areas washed into rivers carry pollutants which are harmful to fish. Road runoff is a major source of nickel, copper, zinc, cadmium, lead and Polycyclic Aromatic Hydrocarbons (PAHs), which are created as combustion byproducts of gasoline and other fossil fuels (Burton and Pitt, 2001). The Lokoja section of the river Niger has high human population density and plays host to Ajaokuta steel complex. Waste water if improperly discharged into the river Niger may disrupt aquatic ecosystem.

### Culture and Tradition

The smooth freshwater stingray has whip-like tail with single or double barbed, usually venomous spines. Wherever they occur, freshwater and euryhaline elasmobranchs have long been regarded as highly dangerous and thus much feared (McCormick *et al.*, 1963, Budker, 1971). Stingrays are not aggressive by nature, they only react when people step on them or handle them improperly (Vida *et al.*, 2013). Although envenomation by stingrays are not quite common in the Lokoja section of the River Niger, probably due to rareness of the fish in the area, the fear of the spine well known. Fishermen cut off the spines in fear, when the fish is entangled in their nets. The spines are sold to use in preparation of local arrow heads because of the poisoned barbs. Local young persons also collect the spine for use in fights. The spines are

collectable among local youths. In one evening, we collected about ten stingray spines, within one hour, from youths in Itohe area. The demand for stingray spines has in its own way placed some pressure on the fish as fishermen now hunt them to meet this demand.

### Medicine

Fishing communities along the River Niger such as Itohe , Geregu and shintaku use stingrays in preparation of medicine. In these communities and among migratory fishing communities, it is believed that preparations made from baby stingray helps reduce labour pains in women if taken before going into labour. These believe has resulted in the demand for baby stingray to be high. Stingray pups which would have been released back into the waters when pregnant fish is caught are kept for use in preparation of prized traditional medicine.

**Table 1: Some factors affecting populations of the smooth freshwater stingray *D. garouaensis***

Factors affecting <i>D. garouaensis</i>	Possible Effects
Habitat alteration	Dredging could directly kill fish by sucking them up. Disturbance of benthic ecosystem leading to loss of species habitat. Disturbance/destruction of fish food communities including prey. May disrupt fish mating/reproduction circle.
i. Dredging	
ii. Watershed disruption	Exposes soils to erosion depositing silts into rivers. Exposure of watersheds through deforestation or urbanization may lead to rise in water temperature.
Fishing	Target and by catch by fishermen for food and other uses depletes stocks
Cultural and traditional practice	Target collection for preparation of traditional medicine and other uses such as preparation of hunting arrow heads devastate populations.
Pollution	Contaminant from disused automobile oils and washed into the river may poison fish. Runoff water from residential areas may carry toxic substances which could cause fish kill. Effluents from industrial operations introduce chemicals or hot water which may be damaging to fish health. Accidental oil spills from transport/fishing boats may be damaging to fish health.

### CONCLUSIONS

There is need to adopt effective *in situ* and *ex situ* conservation of the smooth freshwater stingray *D. garouaensis*. An elaborate plan incorporating habitat protection, management for sustainable use, funded scientific research, species monitoring, public awareness and possibly legislation should be considered for the smooth freshwater stingray. Being a small sized species, research into its captive breeding should be encouraged. This will help generate fish for population for restocking programmes and possible use in

aquariums. Public Aquariums should be encouraged to play a role in conservation of vulnerable species with or without commercial value, such as elasmobranchs.

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