

Short- and longterm impacts of the Jamuna multipurpose bridge on wildlife, Bangladesh

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ABSTRACT: The Jamuna river, one of the largest in Bangladesh, acts as a natural barrier between the northern and eastern parts of Bangladesh and has impeded development in the northern parts. The under construction Jamuna Multipurpose Bridge is expected to reduce the impediment and hasten the economic and social development of the north zone of Bangladesh. The impact of the construction of Jamuna Multipurpose Bridge on wildlife is expected to last both for a short as well as for a long time depending on the species. These impacts may be positive or negative in nature and their magnitude are expected to be low to moderate. The hydrogeological and ecological changes ensuing from these activities may cause impairment of flora and fauna followed by forced relocation as well as disappearance of some of the species from the impact area. The wildlife in the Dhaleswari basin, except in isolated water logged areas, is adapted to agro-system subjected to intensive human intervention. Wild birds may be attracted to stay longer in the area in view of increased food supply due to changes in cropping pattern following the construction thus reducing flood level and exposing more arable land. This paper is an attempt to identify the short and long-term effects of the Jamuna Multipurpose Bridge and related activities, such as closure of the northern intake of the Dhaleswari river, on the wildlife in that area. Some mitigatory measures have been suggested along with the workplan for implementation of those measures aiming towards reducing the negative impacts and enhancing the positive impacts.

1 INTRODUCTION

The underconstruction Jamuna Multipurpose Bridge, the biggest infrastructural development project in the history of Bangladesh with a total estimated expense of US \$ 900 million, will create an important link between the eastern and western parts of Bangladesh. Apart from a four lane road, the bridge will accommodate a single railway track and will have provision for a high tension electricity line, a gas pipeline, and ducts for telecommunication cables. The major components of the construction of Jamuna Multipurpose Bridge are (a) Construction of the main bridge - a multi-span box-girder structure with spans of around 100 m and a total length of 4.8 km (with provision for an additional 500 m depending on the location of the guide bunds); (b) Construction of the 6.0 km long bridge ends and approach viaducts facilities at the East and West banks of the river; the bridge ends will be reclaimed from the flood plain using dredge spoil; (c) Construction of approach roads (about 29 km long), with embankments, to connect the bridge with the existing road; (d) River training works; (e) Support

services and construction related infrastructure, and (f) Construction of the approach embankments for future railway tracks.

The natural environment of the Jamuna and Dhaleswari flood plains is under stress from human habitation, agriculture, grazing, navigation and many other human activities. Wildlife habitats are very limited to isolated islands and wetlands, where human interference is minimum. The construction of Jamuna multipurpose bridge (Figure 1) will intensify human activities in about 1000 ha of land. Moreover, the construction of Jamuna bridge will cause some hydrological changes in the up and down streams of the bridge site causing some changes in the feeding and breeding grounds of various species of wildlife. The loss of habitat and hydrology and geomorphological changes can cause an ecological impairment concerning wildlife, particularly relocation and even disappearance of some species from the bridge site.

A comprehensive inventory of wildlife found in the impact area of the Jamuna Multipurpose Bridge Project (JMBP) has been prepared under the wildlife study project of the Jamuna Multipurpose Bridge

Authority (JMBA). Total 193 species of wildlife found in the area include 9 species of mammals, 169 species of birds, 9 species of reptiles and 6 species of amphibians. Out of the 169 species of birds, 50 were winter migrants and 119 were resident species. Analysis showed that 100 species were found in villages, about 33 were found both in villages, in and around rivers, and about 36 species were found only in and around the Jamuna and Dhaleswari rivers. Five ducks and seventeen waders recorded in the Jamuna and Dhaleswari river were mainly migratory and only two species from each group were resident and were adapted to the environment.

The species of wildlife in the area enlisted as endangered or threatened in the National Conservation Strategy of Bangladesh (MOEF-IUCN, 1991) have been presented in Table 1. The list includes 1 mammal, 6 aves, 2 reptilia and 1 amphibia of which 3 wildlife species are endangered and 7 are threatened. The frequency and number of these species found in the area vary from low to quite high. These are important wildlife components within the impact area and need special attention.

The wildlife in the impact area is composed of predators, scavengers, pest and commercially important species. The Owls, Jackal, Mongoose, Snake, etc. control the rat population in the impact area. The Crows, Vultures are scavengers in the area. Frogs, Toad, Lizards and large varieties of birds consume agricultural pests and insects. Black mynns

are important insectivorous birds and their biological cycle is related to the life cycle of pests and insects. Some of the wildlife in the area are commercially important for local consumption and export. For consumption, people hunt Ducks, Egrets, Herons, Pigeons, Doves by traps and air rifles. Frogs, Monitor Lizards, Snakes and Turtles are the main export items from the impact area. Since their export from Bangladesh is banned, frogs have not been extracted from the area for the past 2-3 years.

2 POSSIBLE IMPACTS

Construction of the Jamuna Multipurpose Bridge including the closure of the northern intake of the Dhaleswari river (Figure 2) will bring about a major hydrological change in the area seriously affecting the ecological condition. Although subsequent impacts on wildlife are expected to be both positive and negative in nature, their magnitudes are expected to be low to moderate. The wildlife in the Dhaleswari basin, except in few marshlands, is adapted to agro-ecosystem subjected to intensive human intervention. Increase in dry area may provide improved habitat and ease the pressure on the terrestrial wildlife. Wild birds may be attracted to stay longer in the area in view of increased food supply due to changes in cropping pattern and increased terrestrial rest areas.

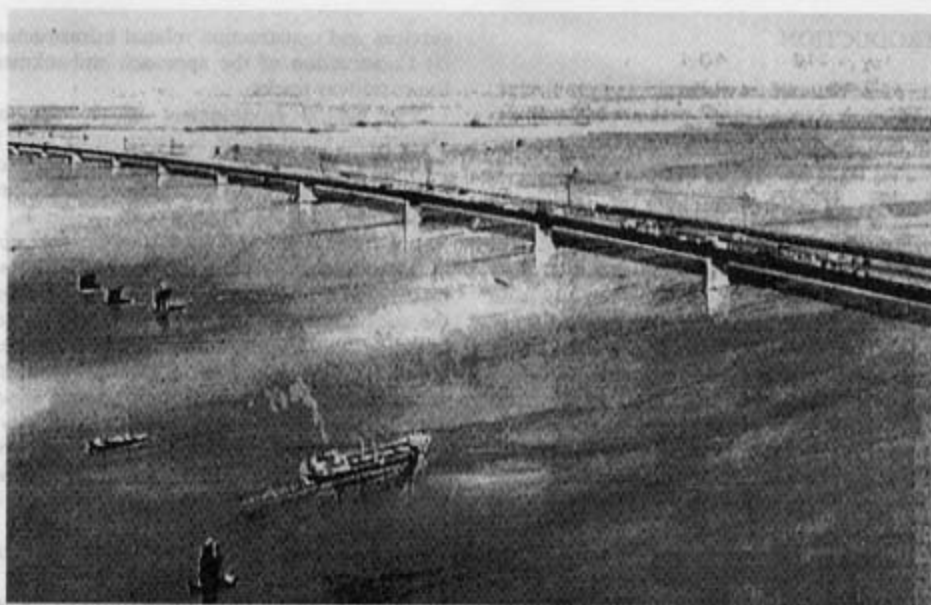


Figure 1 The proposed Jamuna Multipurpose Bridge

Table 1. List of threatened and endangered wildlife species found in the impact area.

Sl. No.	English Name	Scientific Name	Class	Status
1	Jungle Cat	Felis chaus	Mammalia	Threatened
2	Grey Heron	Ardea cinerea	Aves	Threatened
3	Openbill Stork	Anastomus oscitans	Aves	Endangered
4	Black Winged Kite	Elanus caeruleus	Aves	Endangered
5	Whitebacked Vulture	Gyps bengalensis	Aves	Threatened
6	Brown Fish Owl	Bubo zeylonensis	Aves	Endangered
7	Paradise Flycatcher	Terpsiphone paradisi	Aves	Threatened
8	Grey/ Common Monitor Lizard	Varanus bengalensis	Reptilia	Threatened
9	Yellow/ Common Monitor Lizard	V. flavescens	Reptilia	Threatened
10	Bull Frog	R. tigrina	Amphibia	Threatened

The closure of the northern intake of Dhaleswari will reduce the highest flood level and peak discharge of the Dhaleswari which will consequently reduce the fury of bank erosion in the upstream of the bridge. This will not only stabilize the settlement on the bank but also promote the growth of permanent homestead plantations with matured trees. The destruction of such plantations due to

shifting of homestead may be a cause of concern. Stabilization of homestead plantations and bushes along the Dhaleswari during the construction period will provide stable habitat for birds, mammals and reptiles in the area. However, development of erosion channels at the downstream section of the bridge, following the closure, may result in extensive disruption of the natural habitat in those areas.

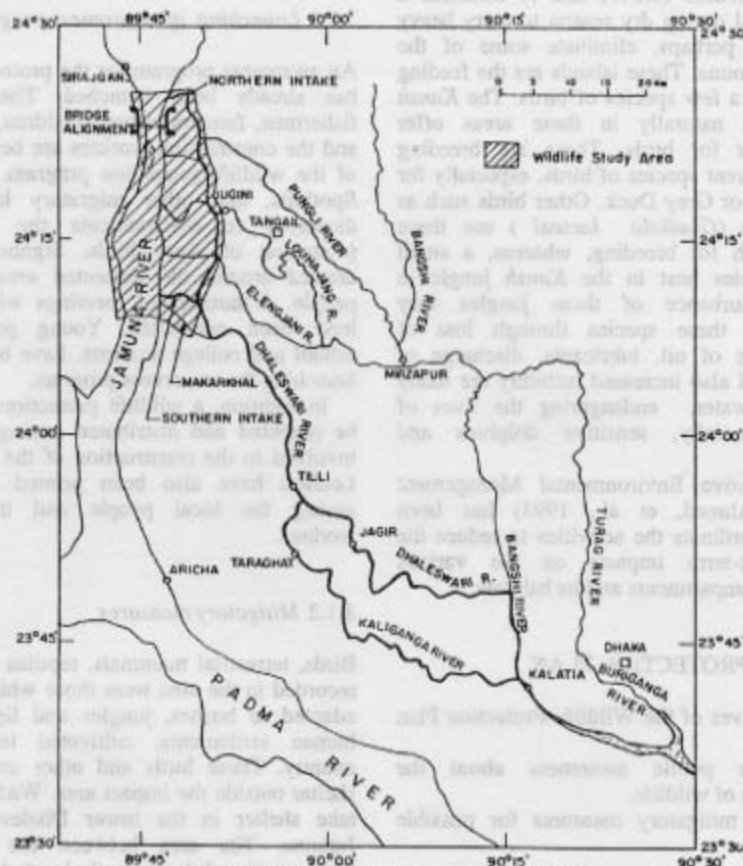


Figure 2 Wildlife study area of the JMBP

It is obvious that the closure of the northern intake of the Dhaleswari will affect the food chain and alter the fauna composition. Reduction of flood in the Dhaleswari basin may affect the aquatic fauna and subsequently the wildlife dependency on aquatic fauna for food, but the overall impact on wildlife is expected to be positive. The wildlife will be benefited in the adopted ecology under low flood condition.

Construction of embankments and approach road would destroy some of the human settlements including the planted trees, bushes and jungles. Furthermore, the birds and other animals living there would lose their shelter and breeding grounds. The construction operations and intensive human activities along the approach road will disturb wildlife habitat upto a certain distance on both sides of the roads under construction. The wildlife species, adapted to this extreme human interference, will only be found in the construction areas. The sensitive species are likely to take refuge in the adjacent areas.

Proposed dredging operation at the bridge site for River Training Works (RTW) and to maintain a navigable channel during dry season to carry heavy machinery will, perhaps, eliminate some of the islands of the Jamuna. These islands are the feeding grounds of quite a few species of birds. The *Kansh* jungles growing naturally in these areas offer important shelter for birds. These are breeding grounds for different species of birds, especially for resident Spotbill or Grey Duck. Other birds such as Small Partincole (*Gladiola lactea*) use these jungles in March for breeding, whereas, a small number of warblers nest in the *Kansh* jungle in November. Disturbance of these jungles may adversely affect these species through loss of habitats. Spillage of oil, lubricants, discharge of other wastes, and also increased turbidity are likely to pollute the water, endangering the lives of biohabitats, especially, sensitive dolphins and tortoises.

A comprehensive Environmental Management Action Plan (Ahmed, et al., 1995) has been developed to coordinate the activities to reduce the long and short-term impacts on the various environmental compartments and its habitats.

3 WILDLIFE PROTECTION PLAN

The main objectives of the Wildlife Protection Plan are:

- (a) to create public awareness about the protection of wildlife,
- (b) to adopt mitigatory measures for possible impacts.

- (c) to establish protected area / sanctuary for the wildlife displaced due to construction activities.
- (d) to study and monitor both the resident and migratory species of wildlife during construction of bridge.
- (e) to study the resettling pattern of dislocated species and residual impact, if any, after the construction of the bridge.

In view of the nature and magnitude of the expected impacts, the wildlife action plan of JMBP will have the following two components in two phases:

- (1) Wildlife Protection & Monitoring (Phase-I)
- (2) Post-construction Evaluation (Phase - II)

3.1 Wildlife protection and monitoring (Phase - I)

The major tasks of the wildlife protection and monitoring are as follows:

3.1.1 Launching of awareness program

An awareness program for the protection of wildlife has already been launched. The local people, fishermen, farmers, school children, animal grazers and the construction workers are being made aware of the wildlife protection program. The picture of Spotbills, and other migratory birds are being displayed to communicate the importance of protection of these birds. Signboards has been erected around the protected areas to warn the people. A number of meetings with local people have been conducted. Young people, specially school and college students, have been involved in launching the awareness program.

In addition, a wildlife protection guidelines will be prepared and distributed among all the people involved in the construction of the Jamuna bridge. Leaflets have also been printed and distributed among the local people and the construction workers.

3.1.2 Mitigatory measures

Birds, terrestrial mammals, reptiles and amphibians recorded in the area were those which are generally adapted to bushes, jungles and light forests near human settlements, cultivated lands and open country. These birds and other animals will find shelter outside the impact area. Waders are likely to take shelter in the lower Dhaleswari or in the Jamuna. The area between the banks of the Dhaleswari and the distantly located villages is open

cultivated land with very few temporary homes with bushes and jungles. These will become permanent under reduced flood condition and provide habitats for wildlife.

The approach roads will be brought under plantation. This will not only replace the homestead trees and bushes lost during the project but will enhance the environmental condition. The planted trees would provide good shelter for migratory birds, and act as breeding location for many resident birds.

3.1.3 Establishment of protected area and sanctuary

The Spotbill is no doubt a courageous bird. The constant presence of men and cattle along with the busy traffic in the river did not seem to deter it from using the islands as breeding grounds. In order to protect the Spotbills the *Kansh* jungles should be kept undisturbed until the breeding season is over. A team will be required to conduct scientific studies and also to prevent the local people from cutting the *Kansh* from some islands during April- September every year. People are likely to cooperate as they will be able to cut the *Kansh* grass after September. Such an operation will help in increasing the population of the Spotbills.

A wildlife sanctuary has been proposed in one of the stabilized islands of the river Jamuna for resident as well as migratory birds of the disturbed area. An island with thick *Kansh* near the west bank of the Jamuna about 1 km downstream of the bridge site has been tentatively selected for the proposed sanctuary. It can be an ideal breeding ground for the Spotbills and will be maintained throughout the construction period.

3.1.4 Monitoring program

A wildlife monitoring program is needed to be established with the following objectives :

- To observe the frequency, abundance, distribution and dislocation of wildlife in the impact area of the project.
- To observe the adherence of the mitigatory measures and identify the activities in the protected area extremely deterrent to wildlife and to recommend remedial measures where necessary for the protection of wildlife as per Bangladesh Wildlife Preservations Act of 1974.
- To study the ecology and breeding nature of the Spotbill duck.
- To maintain the protected area and the sanctuary established for wildlife protection.

The change in the wildlife population in the impact area will be observed with respect to the pre-

project situation presented in the Environmental Management Action Plan (Ahmed, et al. (1995), Husain (1990))

The area between the upper Dhaleswari and the Jamuna extended downstream upto the southern intake of the Dhaleswari, including 2 kilometers east of upper Dhaleswari and 2 kilometers west of the Jamuna shown in Fig. 2 is the main wildlife study area. In addition, the wildlife around the East and West approach roads will also be monitored.

To the observation of all wildlife present in the area, intensive study will also be conducted on four selected species. These indicator wildlife species are as follows :

- The Ganges Dolphin
- The Ruddy Shelduck (Brahminy Duck)
- The Spotbill/Gray Duck
- The White breasted Kingfisher

The indicators representing different class are important wildlife species susceptible to water regime, availability of food, and increased human intervention in the impact area. Distribution of the indicator species in the impact area are presented in Figure 3.

Of the three migratory ducks, the Tufted Duck was found only in June. They might have been vagrant or in transit. The Gargany was recorded in October, November and December only. It was found in small numbers. It may or may not be a regular visitor to the area.

The Ruddy Shelduck (Brahminy Duck) was found regularly in November to March. One flock was seen even in June. It appeared that the same group of this migratory duck was found every month of the study period. The Brahminy Ducks found in the Jamuna indicated that they, or at least some of them, stay in Bangladesh throughout the winter. However, since this species occurs in good numbers elsewhere in Bangladesh, no special mitigatory measure will be needed for them, though the feeding ground in the impacted area will be lost to them during the construction period.

Of the two resident ducks, the Lesser Whistling Teal is the most common resident duck in Bangladesh and is usually found in hundreds. However, in the impact area it was found on four occasions and one to four at a time.

The resident Spotbill or Grey Duck need special attention. It was recorded regularly in the impact area throughout the study period, varying in number from 12 to 75. It occurs widely throughout South Asia, but not in abundance (Ali & Ripley, 1987). Although it is supposed to occur widely in this country, there is no record of sighting the Spotbills in flocks. Although, the local people around the Jamuna know about these birds, they could not provide any definite information on the breeding grounds. These species were found, in June,

breeding in the *Kansh* covered islands in and around the impact area of the Jamuna.

The breeding season of the Spotbill Duck is not definitely known (Ali & Ripley, 1987). Local people claimed to have collected eggs in May as well. The *Kansh* covered islands of the Jamuna is a very important breeding ground for this species. However, as soon as the water starts receding following flood, the *Kansh* grass are cut by the local people for feeding cattle, building houses or for other household uses. During these activities the eggs are destroyed or consumed by the local people driving the Spotbill Duck to seek other breeding areas.

Dolphins were recorded in October, November and June. It appeared that as the water receded from the impact area, the dolphins moved further down to the lower Dhaleswari and Jamuna, and returned with the rise of the water level.

3.2 Post-construction evaluation (Phase - II)

The post-construction evaluation will be needed to observe whether the dislocated / displaced species have settled after the construction is over and to work out future action, if required.

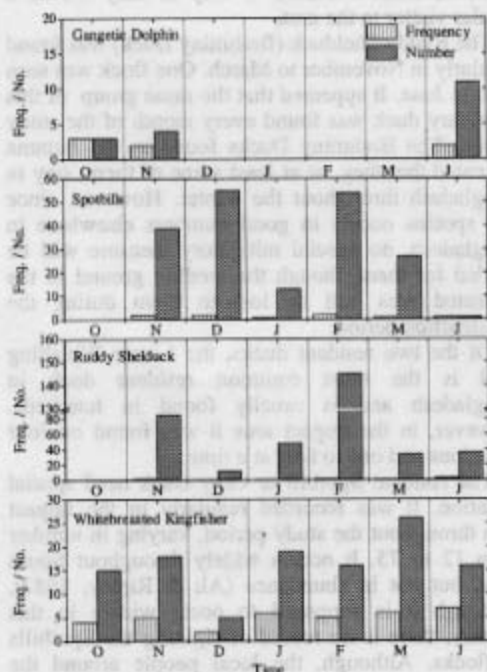


Figure 3 Frequency/number of indicator species in the impact area.

The project areas are expected to attain a steady state condition after the construction of the bridge. Many of the wildlife species are likely to be adapted to the changed environment. Some of the species dislocated during the construction period are expected to come back during the operation period of the bridge. In this study, the pre-project conditions and the situation during the construction period will be reviewed and post-project conditions will be assessed to work out the future actions required. The lessons learned from this project will be recorded and used to plan similar projects in future.

4 CONCLUSIONS

The Jamuna Multipurpose Bridge is so far the largest civil engineering structure in Bangladesh. Construction activities involved in development work have already affected the natural habitat in that region. Attempt has been made to identify the impacts of the project on the wildlife. Possible mitigatory measures have also been suggested along with establishment of a protected area to provide sanctuary to migratory birds and other endangered species.

Monitoring of the indicator species reveals that the migratory birds usually flock in the impact area from November to March. However, migratory pattern of these birds could not be ascertained as bird ringing is not practiced in Bangladesh due to financial constraint. As a result, it is difficult to identify which species stay here throughout the winter and which species use Bangladesh as a transit route for their south-west and north-east movements. Thus, long-term monitoring as well as bird ringing is essential to assess the effect of Jamuna Multipurpose Bridge on the wildlife satisfactorily.

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