

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/346993005>

# Ranching in river Ganga: A protocol of practices for indigenous carps germplasm enhancement and conservation in river

Article in *Journal of the Inland Fisheries Society of India* · June 2020

DOI: 10.47780/jifsi.52.1.2020.106551

CITATION

1

READS

256

8 authors, including:



**Basanta Kumar Das**

Central Institute of Freshwater Aquaculture

901 PUBLICATIONS 10,072 CITATIONS

[SEE PROFILE](#)



**Himanshu Sekhar Swain**

Central Inland Fisheries Research Institute

88 PUBLICATIONS 593 CITATIONS

[SEE PROFILE](#)



**Mitesh H. Ramteke**

Central Inland Fisheries Research Institute

55 PUBLICATIONS 300 CITATIONS

[SEE PROFILE](#)



**D. K. Meena**

142 PUBLICATIONS 1,987 CITATIONS

[SEE PROFILE](#)

## Ranching in river Ganga: A protocol of practices for indigenous carps germplasm enhancement and conservation in river

B. K. Das · H. S. Swain · M. H. Ramteke · D. K. Meena  
A. K. Sahoo · R. K. Manna · V. Thakur · D. N. Jha

Received: 16 December 2019 / Accepted: 17 February 2020

© IFSI, Barrackpore, India, 2020

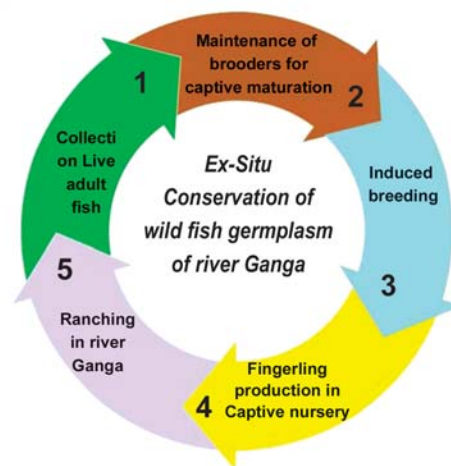
**Abstract** River ranching of fish species is one of the managerial techniques to conserve the native germplasm in the open waters. In the recent years most of the rivers worldwide including the river Ganga have been facing serious pressure including water abstraction, water obstruction, pollution and climate change. In this backdrop, river ranching of the identified indigenous carp species through artificial breeding of native brooders of *Labeo catla* (Catla), *Labeo rohita* (Rohu), *Cirrhinus mrigala* (Mrigal) and *Labeo calbasu* (Calbasu) were carried out in Ganga. The seeds of these species were raised to more than 100mm size before ranching to reduce the chances of natural mortality. More than 30 lakh fingerlings were ranching at different sites of the middle (Pryagraj to Farakka) and lower stretches (Farakka to Howrah) of river Ganga with the objective to enhance the IMC population keeping the native germplasm unpolluted. This study describes a protocol of river ranching of fish seeds through artificial breeding of wild fish stocks, nursery managements and release and may be suitable for other rivers also.

**Key words** River Ganga; Conservation; Ranching; IMC; NMCG

### Introduction

River ecology and fisheries play significant roles in biodiversity, economy and livelihood of riparian

B. K. Das,\* H. S. Swain · M. H. Ramteke · D. K. Meena · A. K. Sahoo · R. K. Manna · V. Thakur · D. N. Jha  
ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata-700120  
email: basantakumard@gmail.com



**Fig.1.** Steps followed for ex-situ conservation of wild fish germplasm

fishermen community. However, in last several decades many of the rivers are highly perturbed due to different anthropocenes such as water abstraction for agricultural, industrial, urban water supply, other uses, water obstruction at dams and barrages, pollution with organic and inorganic pollutants and climate change, etc. (Dastagir, 2015) Reduced flows and habitat modifications have been identified as the major factors responsible for declining indigenous fish stock and biodiversity (Poff *et al.*, 1997). The river Ganga, originating from Gangotri glacier of the Himalayas and draining into the Bay of Bengal with a total length of 2525 km, is the largest river of India and the fifth largest in the world. The river houses a wide spectrum of fish fauna including *Labeo catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Labeo calbasu*, large catfishes, mahseers,

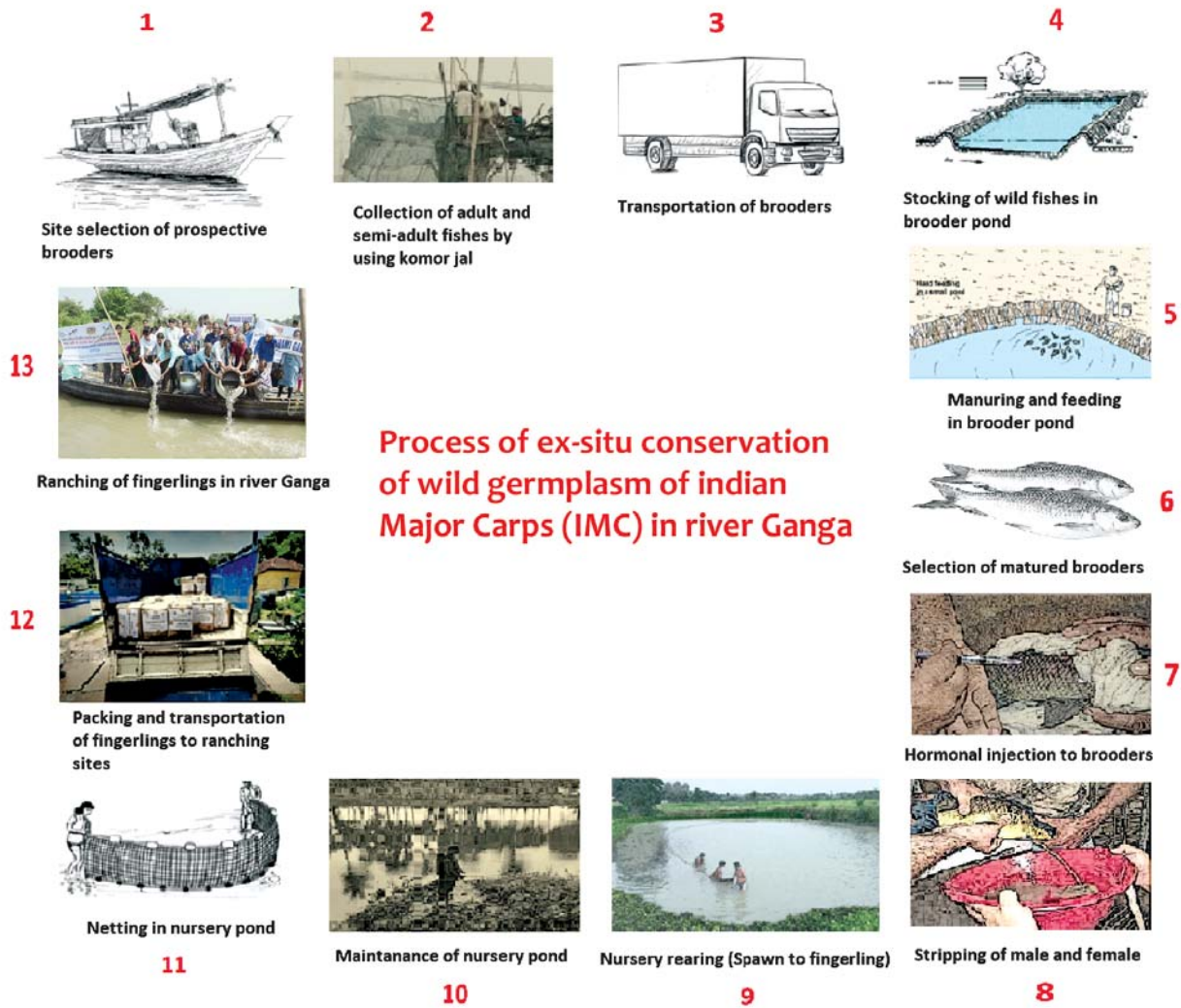


Fig. 2 Processes followed for ex-situ conservation of Indian major carps in river Ganga

hilsa and other miscellaneous fishes, on which millions of people depend for their livelihood (Vass *et al.*, 2010). In the recent past, indigenous fish species composition has declined significantly and species composition has changed more in favour of non major carp and miscellaneous species in the river due to continuous ecological degradation in the entire basin (Vass *et al.*, 2010).

Among several managerial methods to conserve and enhance the native fish or germplasm in the river, *ex situ* conservation is one of most effective. As per Convention

on Biological Diversity (CBD) Article 2, *Ex-situ* conservation is defined as “means the conservation of components of biological diversity outside their natural habitats” (Jena and Gopalakrishnana, 2011). Realizing the importance of the declining indigenous fish species in the river Ganga and the importance of *ex situ* conservation, an effort was made to standardize ranching protol in river keeping the Indian major carps (IMC), viz., *Labeo rohita*, *L. catla*, *Cirrhinus mrigala* and *L. Calbasu* as the targeted species. Although the protocol for the river ranching was established for these selected species considering the locally available

Table 1. Detailed protocol of river ranching

Stage	Protocol	Activity
1	Site selection for brood fish collection	Selection of sites for prospective brooder (brooders, sub adult etc.) depends on observation on fish availability from experimental fishing, catch data and feedback from fishermen.
2	Collection of prospective brood fish	Live and healthy fish to be collected from the river or associated water bodies having active connection with river (open wetlands) to avoid the genetic contamination. Harmless fishing gear such as Surrounding gear ( <i>Komor Jal</i> ) may be employed to catch live fish without imparting harm.
3	Transportation of live fish	Transportation of brood fish from the site of collection to a well maintained brood stock pond is one of the most crucial and challenging aspects. Proper methodology to be followed to transport the adult/sub adult fish in healthy condition maintaining proper stocking density and water quality. Maintain the prospective brood fish in brood stock pond for captive maturation and maintenance of wild germplasms.
4	Brood stock management	Optimum water quality, proper feeding, water exchange and health management of stocked fish are essential in brood stock management. Brooders may be tagged for proper record keeping of individual fish regarding source, collection site, date of collection, sex, length, weight, etc.
5	Selection of mature brooder and breeding	It is suggested to select the matured brooders selected based on secondary sexual characters. Selected brooders may be artificially bred through injection of inducing agent such as carp crude Pituitary Extract (CPE), synthetic hormone, etc. Maintain / follow the entire hatchery procedure as per standard procedure like injection, spawning and hatching, etc. Precaution: If fish are bred in a breeding pool, then single species to be put in a pool for spawning. If using stripping use male and female of same species for stripping.
6	Nursery rearing	Nursery ponds for stocking of spawns must be prepared prior to breeding following standard aquaculture practices like drying of pond, weed clearance, eradication of predatory fish, manuring and insect control, etc. Single species spawn stocking may be preferred. Periodic manuring to be followed to maintain the proper plankton density in the pond. Periodic netting should be carried out and regular health management of the stocked fish should be taken. Once the seed/fingerlings attained >100 mm size they are ready for ranching. Small size fishes are not preferred for ranching because of lower survival and prone to predation in open waters.
7	Transportation of fingerlings to ranching sites	Pre-transportation care (Stop feeding for gut evacuation, prior netting, application of Mahua oil cake, stocking in hapa for 2-3 hours) should be taken. Fingerlings may be transported, to the selected ranching site, preferably in an open tank transportation system (with water exchange, medical grade oxygen supply, oxygen enhancing tablets, application of sedatives) to reduce stress. Extent of care and precautions during transportation depends on the duration and distance of ranching sites.

Table .1 cont....

Stage	Protocol	Activity
8	River ranching	<p>Fishes to be gradually acclimatized to river environment by keeping the fingerlings in a hapa.</p> <p>Ranching should be carried out away from the bank of the river.</p> <p>Mass awareness programme on both banks of the river prior to ranching is required to restrict the fishing activity in that stretch of the river.</p> <p>Participation of local fishers and local officials should be ensured for proper success of the ranching program.</p>

brooders and nursery management practises, the protocol (Table 1 & Fig-1) may also be useful for river ranching of other indigenous fish species in the river Ganga and other inland open water bodies with suitable, need-based modifications.

#### *Methodology for river ranching of fish species*

River ranching programme in Ganga was initiated at different stretches of the river Ganga representing middle stretch from Prayagraj to Farakka and lower stretch from Farakka to Howrah during the period of 2017 to 2020. It included a holistic activities starting with the wild brood stock collection from the river, transportation, acclimatisation under captive condition, feeding, health management, breeding, spawn production, fry and fingerling production, feeding of spawn and fingerlings, size gradation, transportation and ranching into the river system. All these steps are mentioned in Table 1 & Figure 2.

ICAR-CIFRI bred and ranched about 200 lakhs of spawn bred from 350 kg of wild-caught brood fishes. So far, 41 river ranching programmes have been undertaken covering different stretches of river Ganga in Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal under the National Mission for Clean Ganga (NMCG) with encouraging success. It paves a way towards conservation and restoration of IMCs in the river Ganga.

#### **Conclusion**

River ranching of the indigenous fishes is one of the

best methods to propagate and enhance the depleted fish species in its natural habitat. The protocol followed, starting from brood stock selection to ranching, would support different stake holders including state fisheries Departments and various private industries linked to river valley projects to propagate the native germplasm for the depleted fish species enhancement in others rivers of India and in other countries.

#### **Acknowledgements**

The authors acknowledge the funding support by National Mission for Clean Ganga (NMCG) under MoWR&RD, Government of India for carrying out the work. The support provided by the project staffs of NMCG, ICAR-CIFRI are highly acknowledged.

#### **References**

- Dastagir, M. R. 2015. Modeling recent climate change induced extreme events in Bangladesh: A review. *Weather and Climate Extremes*, 7: 49–60.
- Jena, J.K. and A.Gopalakrishnan. 2011. Fish genetic resources of India and their management-role and perspective of NBFGR. In: 9th Indian Fisheries Forum Souvenir (9thIFF), pp. 56-63.
- Poff, N. L., Allan, J. D., Bain, M. B., Karr, J. R., Prestegard, K. I., Richter, B. D., Sparks, R. E., Stromberg, J. C. 1997. The natural flow regime a paradigm for river conservation and restoration. *Bio Science*, 47: 769–784.
- Vass K. K., Mondal S. K., Samanta S., Suresh V. R. and Katiha P. K. 2010. The environment and fishery status of the River Ganges. *Aquatic Ecosystem Health & Management*, 13: 385-394. DOI: 10.1080/14634988.2010.530139.