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Conservation of Freshwater Fish Biodiversity: A Challenge for Rajasthan

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Abstract
Fish biodiversity is associated with deserts around the globe. Freshwater fishes have suffered from the resultant altered flow regime, together with other threats including habitat degradation and alien species. Impacts reached a critical point during prolonged droughts that lead to broad-scale habitat loss and drying of refuges during, and urgent conservation measures were subsequently instigated for threatened small-bodied fish species. The present paper aims to document the actions undertaken in the desert hatchery of Western Rajasthan by induced breeding exercises on common carp, rohu and mrigal using ovaprim hormone that will help guide and inform management responses for conservation of threatened fishes in modified systems subjected to severe water decline.

Keywords: Fish biodiversity, ovaprim ,hatchery ,conservation and Rajasthan

Introduction

Fishes exhibit enormous diversity in size, shape, biology and in the habitats they occupy. The great majority comprises bony fishes, mainly teleports..It is believed that out of 4000 species of vertebrate recognized world over 22000 are fish species; of which 8411 are fresh water.

Desert fishes are usually hardy fish that persisted through the desertification process. Fish that evolve rapidly radiate into distinct taxa whereas fish that more robustly avail themselves of dispersal opportunities persist with wider distributions. The accelerated and profound alterations of anthropogenic influences on dispersal, and environmental change for desert fishes represent severe threats to their continued survival.

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Freshwater fishes and their habitat routinely suffer because of human use of limited water resources (Ricciardi and Rasmussen 1999; & Bunn and Arthington 2002). Fresh waters in lakes, ponds, rivers, estuaries and wetlands are only 0·3% of available global surface water yet support 47–53% of all fish species. Freshwater fishes are globally valuable yet threatened everywhere through overfishing, pollution, habitat loss, damming, alien invasive species and climate change. Hence, they are in dire need of effective and sustained conservation action, including through zoo and aquarium programmes in the wild and ex situ. It is necessary to assess and mitigate threats to fish survival through research and monitoring. An improved conservation-orientated science of threatened fish species is also needed in terms of taxonomy and biology. The study was undertaken to review and evaluate the efficacy of various conservation actions using induced breeding which will help to plan future undertakings.

Material and Methods

The brood fishes of rohu ,mrigal and common carp were collected from local freshwater sources of Jodhpur and healthy fishes were administered the ovaprim in the breeding circular tank of the hatchery of Jai Narain Vyas University intramuscularly towards the caudal peduncle @0.5 ml /kg of brooder weight. Ovaprim is a ready to use product and the solution is stable at ambient temperature. It contains an analogue of 20 µg of Salmon gonadotropin releasing hormone (sGnRHa) and a dopamine antagonsist, domperidone at 10 mg/ml

Ovaprim has unique advantages over pituitary hormone - ready to use liquid form in 10 ml vial, consistent potency and reliable results, long shelf life, and can be stored at room temperature, formulated to prevent over dosing, male and female can be injected only once simultaneously, reduces handling and post breeding mortality,

repeated spawning possible later in the season and high percentage of eggs, fertilization and hatching Percent fertilization per female was calculated with the following formula :

Total No. of egg counted Fertilization = No. of fertilized eggs × 100 Percentage

Hatchability was determined by direct counting of the number of hatchlings of two days old and estimated as follows

Total No. of fertilized egg Hatchability = No. of hatchlings (two days old) × 100

Results and Discussion

A glance at total water resources available for fisheries in Rajasthan depicts 15838 no. of water bodies covering an area of 4,23,765 hectare excluding rivers and canals (30,000 ha.) and water logged area (80,000 ha.) at Full Tank Level (FTL). (Table 1)

Table 1 :Details of types of water resources, number of water bodies & area

Water Resources of Rajasthan (in Ha)		
Type of Water Resources	**No. of Water bodies**	**Area(FTL in Ha)**
Minor Tanks & Ponds (< 1 ha)	6913	4745
Medium Tanks & Ponds (1.1 0 10 ha)	6207	25516
Large Tanks & Ponds (10.1 - 100 ha)	2047	63,648
Small Reservoirs (101 -1000 ha)	346	82,396
Medium Reservoirs (1001-5000 ha)	35	64,151
Large Reservoirs (>5000 ha)	12	1,83,309
Total Water Resources	15,561	4,23,765
Rivers and Canals	5000 km	30,000
Waterlogged Areas	-	80,000
Salt Affected Areas	-	1,80,000

TABLE 2 : BREEDING OF CARPS USING OVAPRIM DONE IN A HATCHERY OF RAJASTHAN

CARP SPECIES	**INJECTION TIME**	**BREEDING EXCERCISES conducted**	**SPAWNING TIME (HRS)**	**EGGS PRODUCED (LAKHS)**	**FERTILIZATION RATE %**	**HATCHING TIME (HRS)**	**HATCHING %**	**SPAWN PRODUCED (LAKHS)**
Cirrhunus mrigala	**7.30 AM - 11.10 AM**	**05**	**8.15 -12.30**	**1.92 - 3.20**	**70 - 90**	**32-45**	**79-88**	**1.2240-2.4393**
Labeo rohita	**7.15 AM - 3.30 PM**	**05**	**10.10-14.10**	**1.00-2.72**	**50-85**	**30-42**	**80-89**	**0.4895-1.9420**
Cyprinus carpio	**9.00 AM - 4.30 PM**	**11**	**21.35-70**	**1.15-3.45**	**58-94**	**49-87**	**65-90**	**0.7453-2.1783**

The results of the current work in the hormonal stimulation are similar to the effectiveness and usefulness by using Ovaprim (Jamroz *et al*., 2008). The trials on induced breeding of Indian major carps (*Catla catla, Labeo rohita, Cirrhina mrigala*) were carried out by Dhawan and Kaur (2004) during Ludhiana. Only one dose of either ovaprim or ovatide .Ovaprim was tested by Nandeesha *et al.* (1990) for its induced breeding efficacy in three species of Indian major carps, viz. catla (*Catla catla*), rohu (*Labeo rohita)* and mrigal (*Cirrhinus mrigala*). More *et al*. (2010) during 2008- 2009 observed the better spawning response of ovaprim compared with pituitary extract in Indian major carps .

Rath *et al.* (2007) conducted experiments on Indian major carps, viz. *Catla catla, Labeo rohita and Cirrhinus mrigala* were induced bred in eco-carp hatcheries with 3 different GnRH based synthetic inducing agents, viz. ovaprim, ovatide, wova - pituitary extract (CPE).

(Table 2) 21 induced breeding experiments were done using ovaprim on rohu,mrigal and common carp in the hatchery. Of western Rajasthan .A higher rate of fertilization was recorded (50-94%)

and hatching rates (65-90%).The number of spawn produced varied from 0.4895-2.4393.

Conclusion

The 21st century is a time of crisis for freshwater ecosystems and their resources . A multitude of stressors, including urbanization and associated habitat alteration and loss, alien invasive species, overharvest, pollution and climate change, have resulted in freshwater ecosystems and freshwater fish becoming one of the most threatened ecosystems and taxa on Earth . However, the lack of connection between freshwater biodiversity and the general public has resulted in less attention being focused on freshwater-related conservation issues. The threatened fish resources will be conserved by adopting the captive breeding in freshwater fishes of Rajasthan.

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