Sub-project 3

National Network of Germplasm Centres for Conservation Aquaculture

Lead Centre: NBFGR, Lucknow
Collaborating centres: 4 centres

1. Background and Rationale

The challenges and importance associated with natural genetic resources, including those from aquatic ecosystems, is undergoing paradigm shift. This shift stems from the basic fact that growing population of the world need to be not only fed but should be nutritionally secure. In this context, agrodiversity or bioresources for food and agriculture take the center stage. The genetic resources are basic ingredient for enhancing food production. Therefore, from fisheries perspective the conservation of an economically important species in the wild is as important as enhancing production of its conspecifics through domestication and aquaculture. The agrodiversity in aquatic systems also faces threats with wide ranging causes including overexploitation, habitat alterations and constrictions, reduced environmental flow of water in rivers and introduction of non-native species, and is leading to more species becoming threatened. Such species could be restricted in sanctuaries and protected areas or in the wild with fragmented low population sizes. Many of the threatened species may even become extinct unless species-specific recovery programmes are initiated. Therefore, incorporating strategies for enhancement and utilization with conservation efforts will be fruitful in harnessing potential of genetic resources to ensure sustained livelihood of masses. In such perspective, aquaculture development itself can be critically useful for conservation, as the availability of diversified species will satisfy consumer demand and reduce pressure on natural resources of such species.

It is worthwhile to mention that second highest cultured global fish producer status for India is primarily due to three species of Indian major carps, *viz.,* catla *(Catla catla),* rohu (*Labeo rohita)* and mrigal (*Cirrhinus mrigala),* supplemented by three exotic species viz., silver carp (*Hypophthalmichthys molitrix),* grass carp (*Ctenopharyngodon idella)* and common carp (*Cyprinus carpio),* exotic Pangas catfish, *Pangasianodon hypophthalmus(Pangasius sutchi),* and freshwater prawn *(Macrobrachium rosenbergii)* from freshwater aquaculture and shrimps from coastal farming. Though, India has rich and diverse aquatic genetic resources, nevertheless, it is also fact that domestication level of fishery resources, that can provide sustainable utilization, is not commensurate with the level of biodiversity and agro-climatic environment possessed. In other words, diversification of aquaculture to enhance domesticated species is need of the hour. In recent years, however, efforts have also been made or are being made for development of technologies pertaining to mass-scale seed production of several potential medium carps viz., *Labeo calbasu, L.fimbriatus, L. gonius, L. bata, Cirrhinus cirrhosa, C. reba, Puntius sarana* and *P. jerdoni* and protocols for their farming. Although during the recent past there have been significant efforts for farming of catfishes, with special focus on air-breathing catfishes viz., *Clarias batrachus* (magur) and *Heteropneustes fossilis* (singhi), non-availability of seed in adequate quantity has been the major issue. Further, considering high consumer preference of catfishes in different parts of the country, the mass-scale breeding and management protocol for grow-out farming of several other non-air breathing catfishes *viz.,*

Pangasius pangasius, Ompok pabda, O. bimaculatus, Horabagrus brachysoma etc. have been developed/fine-tuned for their commercial faming. With the availability of the technology of mass-scale seed production of murrels (*Channa striatus* and C. *marulius).*

Conservation of natural resources inhabiting aquatic ecosystems is important from the fact that majority of the genetic resources for food still come from the wild due to low domestication level in fisheries sector. This is in contrast to the animal farming and agriculture where domestic varieties only contribute to food security. Conservation research and strategies need focused efforts directed towards both species and its ecosystem for its sustenance in the native range. However, in view of the vast and diverse aquatic germplasm resources, prioritization of species that need directed conservation efforts is necessary. Conceptually, 'Live Gene Banks' or 'Germplasm Resource Centers' (as they may be called) are a means of on-farm conservation that can provide resources for rehabilitation of species, provided these are built upon the deep scientific background. As such the scientific inputs being prerequisite and large operational expenses involved, such **Germplasm Resource Centers** can fulfill envisaged conservation objectives, if these are established for prioritized fish species. Therefore, if a scenario is perceived, where species which are important for conservation value as well as aquaculture potential are prioritized, the efforts can be strengthened to harvest the dual benefits. Even prospects of development of region-specific aquaculture and conservation practices could yield multiple benefits for aquaculture diversification and livelihood security, besides conserving genetic resources. Approach for establishments of **Germplasm Resource Centers** could be modulated to reap such benefits. With regards to diversification of aquaculture, it is necessary that regionally-important species having high consumer preference and good market are identified. Concerted efforts further would be necessary for development of technology of breeding, mass-scale seed production and grow-out farming under mono and polyculture systems.

The proposed plan envisages developing stock specific broodstock of identified fish species in different regions as germplasm resource centers. The research can be carried to implement technological interventions for artificial propagation of species. The developed broodstock at such germplasm resource centres will conserve the native species on farm, can produce native seed (of similar genetic makeup) for stock enhancement in wild and also technology for regional level diversified aquaculture for livelihood enhancement.