CHAPTER VI
DISCUSSION AND CONCLUSION
Constructing dams and barrages across rivers for the purpose of irrigation has modified several important riverine systems in the country, flood control, navigation, generation of power etc. The river valley projects interfere with the riverine environment, invariably affecting the fishery resources of concerned rivers. The effects of interference may be harmful, beneficial or indifferent, depending on particular station and fish fauna inhabiting the river concerned. Effects of dam and other structures on fish populations can be categorized under 2 headings - structural and ecological.

Dam act as physical barriers to migrations, tending to present access of the fish to their usual breeding grounds. The denial of migration may result in permanent reduction of fish. Stocks ranging from lowering the level of abundance.

The ecological changes brought about by river valley developmental programs adversely affect both the migration and non-migration species of fishes. Inconsequent to dam construction
and reservoir formation, substantial morpho-ecological changes occur in the original river, both above and below the dam site. These include conversion of running water into water body of slow discharge characteristics.

Some species of fish shift to new spawning ground. Intra-specific biological differentiation of fish occurs and eggs laying substrate changes. Other changes occur such as fluctuation in water levels; alternation in the physico-chemical conditions of spawning areas in upper reaches; complete change in turbidity and silting patterns may also affect the fish.

Reduction of water level next to dam result in formation of shallow areas, which obstruct the fish movements.

In case where dams are constructed in estuaries due to reduction in discharge of water there is change in temperature, salinity etc.

The effect of dams on fisheries in general have been studied by Day (1873), Pantule et al., (1966).
Salinity and water temperature were maximum during pre-monsoon season but dissolved oxygen was maximum during monsoon.

Fishes were caught from the near shore waters using drag net with mesh size 0.3 mm. Different species which were caught during the collection period were brought to the laboratory and identified and their length also noted. The distribution and abundance varied depending on the different parameters like salinity, pH and substrata.

The marine living resources particularly prawns, crabs, molluscs and fish use successfully the channels within the mangroves as nursery grounds. It has been observed that the channels of mangrove forests and brackish waters are used by many species of fish for either feeding or reproduction or as nursery grounds or for these multiple uses. The fish species using the above water ways as nursery grounds will spawn in inshore waters and the juveniles are transported to the waterways by means of inshore and tidal currents. These waterways are giving shelter to juvenile fish by possessing extensive prop-root system of *Rhizophora* sps. And save them from predators. The waters bathing
the mangroves and its sediments are very fertile and productive (Krishnamurthy & Sundaraj 1974) The dissolved oxygen, pH and the food weblinks among plankters enable functioning it as a flourishing dynamic ecosystem (Krishnamurthy, Santhanam and Sundararaj 1974, Prince Jeyaseelan and Krishnamurthy 1978).

Among the four study stations Station II is devoid of mangroves as it is the river mouth. The abundance of finfishes drastically varied from Station I- IV because some of Stations consist mangrove patches and some are not. There was also much variation in the various environmental parameters like temperature, Salinity, dissolved oxygen, suspended load and pH, which are essential for the organisms. The variation in environmental parameters either directly or indirectly affects the distribution abundance and growth of various finfishes.

Anthropogenic activities including dam construction, sand mining, mangrove destruction etc happens to be the phenomenal activities that are affecting the Kali riverine system. However, as adequate information of the seed resources are not available from previous works we have to take this work as the baseline data to evaluate any future damage or boost to the species abundance.
Aquaculture has acquired industrial status in view of large-scale involvement of various sectors like preservation, processing and export in addition to hatchery management and farm level activities. The export demands for prawns sidelined fish culture improvements in the brackish water region, though in fresh water aquaculture continued to reign in fish culture practices. But with serious threat to prawn culture owing to disease problems now the attention is diverted towards fish culture. Also, with aquaculture authority of India providing guidelines for aquaculture practices, scientist moot composite culture, crop manipulation, and brackish water fish culture to boost economy.

Though efforts are being made in various parts of the world in hatchery management for some fishes like mullet, sea bass etc. adequate quantity of seeds are not available for aquaculture in Indian region. Therefore, many formers are going back to traditional system of stocking the ponds that were designed for prawn culture. Keeping this in view, it was felt that it is necessary to review the earlier works on Kali River, seed potential (Rammurthy, 1968, Bopaiah and Neelakantann, 1980) as there
has been marked change in the condition of the river in the past 20 years with construction of dams and anthropogenic activities.

Availability of abundant seeds in a particular region indicates the suitability and preference of the water for the fishes. Generally for improved traditional aquaculture it is necessary that the water quality in the river is optimum. With increased anthropogenic activities it is likely that the water quality gets affected. In the present investigation on the hydrological parameters no such marked changes threatening the survival of fishes were visible thus proving that the river basin is adequate for brackish water fish culture on the basic of water quality.

Plankton population and diversity is an indication of productivity of a habitat. Rammurthy (1965), Sudarshan et. al., (1984) provided some information about plankton. However, none of the previous works hinted at the diversity of plankton. Therefore, in the present work an effort was made to collect plankton at different seasons and assess the diversity level.

Though there is adequate information available on the fish resources from different parts of the country David, 1954, Menon,
1955, etc., from the river Kali so far no comprehensive list of available fishes is worked out. Therefore, it was felt necessary to provide information about the available fishes, providing a brief taxonomic key for identification, so that the selection of the species during stocking is made easy. In all 46 fishes were collected and identified thus indicating that the Kali River holds diverse fish fauna. This particular part of the thesis gains significance in that this is the first account detailing the fish diversity particularly after the proposal to study biodiversity of Uttara Kannada is recommended to the Government of India (Biodiversity Action Plan submitted by Dr. Subhas Chandran 2003).

Seed availability, abundance and size range assist in assessing the potential for seed resources, season for collection and the available size of a fish variety for culture. So far no attempt of this kind has been done in Kali estuary. In the present investigation all the available seeds were identified, sorted out on the basic of size range, season wise and presented in the thesis. This tabular representation will help aquaculturists to go for seed collection when seeds of required size range are available. Thus seed collection from natural source to enrich the ponds, and also
to take water from natural source when seeds are available is plenty, this work will provide the required guidelines.

Among the four study stations Station II is devoid of mangroves as it is the river mouth. The abundance of finfishes drastically varied from Station I- IV on the basis of absence or presence of mangroves. There was also much variation in the various environmental parameters like temperature, Salinity, dissolved oxygen, suspended load and pH, which are essential for the organisms. The variation in environmental parameters either directly or indirectly affects the distribution abundance and growth of various finfishes.

There is a debate whether the seeds can be collected from natural stock for stocking the local brackish water ponds, as the fishery of the concerned species is found to be affected by excessive harvest of seeds. However, there is no concrete evidence to what extent the fishery is affected and to what extent natural seed stock can be exploited for the purpose. Leaving aside the management aspects, especially in the absence of hatcheries brackish water aqua farmer have to depend essentially on the potential of natural seeds stock. The argument fits very well into places like Karnataka
State, where there is no hatchery existing at present for any commercially important brackish water finfish species.

Kali estuarine system is one of the largest brackish water system of Uttar Kannada district. A vast area around this ecological system is being used for shellfish culture. The data collected on seed resources will be of some use to develop scientific brackish water fish farming in the area.

Although based upon the information one could suggest that

- Seed bank can be established in the Kali area by collecting the seeds of finfishes.
- Establishing mono or polyculture of finfishes is possible in brackish water area available adjoining Kali estuary
- There is scope to set up hatcheries for commercially important fishes like *Mugil cephalus*, *Sillago sihama* and *Etroplus suratensis*.

Due to time factor, several aspects on the subject could not be covered so as to precisely obtain the information on biology of commercially important finfishes. Intensive investigations are
warranted on the following aspects based upon the preliminary studies conducted presently.

1. More samplings of seeds preferably fortnightly analysis.
2. Among the gears drag net is suitable for collection of seeds.
3. Biology especially reproductive aspects of commercially important estuarine fishes have to be carried out to understand the management aspects of the finfish fishery.