

DEVELOPMENT AND UTILIZATION OF THE INLAND FISHERY
RESOURCES OF PAKISTAN

by

M. R. Qureshi

*Ex-Director, Marine Fisheries Department
Karachi, Pakistan*

Abstract

Pakistan has only modest inland fishery resources. Production for these can be improved by proper management of both river and lake fisheries. Many water-logged brackish and saline areas are also ripe for development. Any increases in production will have to be matched by a corresponding improvement in the marketing network and in the preservation of the fish.

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1. NATIONAL PERSPECTIVE OF INLAND FISHERIES

The fishery resources of Pakistan are modest because the water area is not very large compared to other countries of the region. The average rainfall in the north is between 750 mm and 1 000 mm but decreases to barely 170 mm in the extreme south. The main artery is the River Indus which crosses the country from north to south. It receives many tributaries in the north, among which the Kabul, Khelum, Chanab, Ravi and Sutlaj are the most important. After 29°N practically no perennial rivers join the Indus. The area between 29°N to 33°N contains a network of canals and many ponds and small lakes which cover an area of about 30 000 km².

Construction of dams, barrages and weirs has formed many reservoirs, some of which are deep and difficult to fish. These are constructed on the Indus and its tributaries and include the Mangla and Tarbela Dams and the Chasma, Sukkur, Guddu and Kotri barrages. Their construction has totally changed the regime because water supply downstream is curtailed and less water is available in the region south of 29°N. Big and medium size lakes have been formed by raising bunds, Manchar, Kalri, Haleji, Hadero and some smaller ones near Sujawal. For about six months water collects between the river and protective bunds near Jacobabad, Kashmore and Kandhkot where fish are available for a short time during the winter. Some lakes in the hilly area can be made productive if stocked with suitable fish.

Owing to waterlogging, vast areas have been covered by saline waters unsuitable for carps and other fishes. Efforts have been made to introduce species such as *Tilapia* to see if they could adapt to such conditions. The attempts were successful although it has not been proved conclusively that this fish can breed in saline water. No work has yet been done on the fish present in the estuarine area. This is not extensive but if judiciously managed, could yield a quantity of fish and shrimps.

Marshes and shallow water areas below lakes and canals have been neglected so far and can be made productive if properly managed. Fish are not popular in Pakistan; nevertheless the total production is estimated at 22 000 metric tons.

Bhatti, who was for many years warden of fisheries, Punjab, contributed many papers on fisheries between 1924 and 1952. Since then there are contributions from Husain and Ahmad which are indicated in the general bibliography. From Sind very few papers have been published. Mention, however, may be made of Qureshi (1950, 1953, 1954), Qureshi and Jaleel (1950), Sufi (1956, 1958, 1962, 1963), Zahid Husain (1961, 1973), Baqai *et al* (1970, 1972, 1974) and Ahmad (1949, 1952). This paper includes a selected bibliography of work on inland fisheries in Pakistan.

2. DEVELOPMENT AND MANAGEMENT OF :

2.1 Riverine and Estuarine Fisheries

Riverine fisheries are not systematically exploited. In the upper reaches castnets, gillnets and beach seines are used in comparatively shallow waters. Traps are not used in the rivers but sometimes weirs are employed in canals for catching fish which swim against the current especially during the breeding season.

The main fishery of the River Indus is that of hilsa *Hilsa ilisba* (Ham) which is locally known as "Palla". It used to ascend the river to spawn in the middle of June but its ascent is now delayed by at least one month owing to late freshets. The fish used to travel as far as Multan but owing to the construction of Sukkur Barrage its ascent has been curtailed. Fortunately the available distance of 220 miles from the sea was enough to allow breeding. This distance has now been reduced by a further 100 miles with the construction of Kotri Barrage near Hyderabad. Here the fish ladders are ineffective through faulty design. *Hilsa* is unable to ascend them and consequently is prevented from going up to the upper reaches of the river. As a result the *Hilsa* fishery is being depleted and immediate action is imperative to increase its production by providing hatcheries down the river. Failing this, the fish will eventually disappear from the river.

Fishing in the estuarine area is not developed. No special gear is used but during the ascent of *Hilsa*, long gillnets are spread across the river blocking its ascent. No brackish water fish culture has been practised but may be tried using the methods that are successful on the west coast of India and Indonesia.

2.2 Development and management of the fisheries of natural lakes and man-made reservoirs

Natural lakes occur in small numbers in the hilly tract, e.g. Saiful-Mulook near Kaghan. Man-made lakes are abundant and Manchar lake, situated in the Dadu district, is fed by an inundation canal and has an outlet which discharges overflow water into the River Indus. It has very beautiful surroundings and yields a good quantity of fish. It is, however, gradually silting up and is full of vegetation which hampers fishing and accelerates silting. Kalri lake is situated 75 miles north of Karachi and is formed by the combination of Sonahri and Kalri lakes. Here also vegetation is profuse and this should be controlled in the initial stages to avoid a repetition of the problems now faced by Manchar lake. Maleji lake is about 55 miles north of Karachi and is fed by a canal from Kalri lake. At one time very productive, this productivity has diminished through overgrowth of vegetation and overfishing. Other smaller lakes exist in the Tatta district and, if properly managed, can be good sources of fish supply.

The Mangla and Tarbela reservoirs each cover approximately 2 500 hm² with maximum depths of 350 ft and 450 ft respectively. The construction of these dams has submerged the breeding grounds of the Mahseer (*Tor putitora*) and it is necessary to provide substitute breeding grounds for this famous sport fish. Besides the mahseer, carps, catfishes and other food fishes are found in these reservoirs. Moreover, three varieties of common carp, *Cyprinus carpio* are also present. Other dams have been constructed across the River Indus and some of its tributaries. These include the Chashma, Sukkur, Guddu, and Kotri barrages which have formed deep reservoirs where fishing cannot be done by traditional methods. Improved types of fishing gear should be introduced, together with powered fishing boats and the construction of jetties for mooring and landing of fish. An FAO project is currently working on these problems.

2.3 Development and management of the culture fisheries of freshwater ponds and tanks and those of swamps and marshes

Vast, saline waterlogged areas await utilization. Experiments were carried out to assess the suitability of carps and other fishes for stocking these areas. However, the species tried remained stunted in growth and did not breed. Introduction of exotic fishes which breed in brackish water was then attempted and *Tilapia* was obtained from Singapore by the Punjab Fisheries Department in December 1950 (Ahmad, 1952; Ahmad, 1956) but all died due to cold. Husain (1964) states that the fish was also introduced in 1951 from Penang, but these too ultimately died. A consignment of 100 tilapia was transported from Central Fisheries Department, Karachi, and then from Lahore where the fish was distributed to different freshwater areas (Naik, 1974). Later, work on this fish was extended to saline waters (1952, 1962) (Husain, 1959; Naik, 1964, 1969, 1970, 1971). It was established that tilapia is a suitable fish for waterlogged, saline waters but it has not yet been shown whether the fish breeds as prolifically in saline water as it does in fresh water. The recommendations put forward by Naik (1973) are that *Tilapia*:

- (i) should be cultured with care in selected water areas in brackish and saline water. They may be utilized in paddy-cum-fish culture;
- (ii) monosex culture be tried for increasing fish size;
- (iii) they should not be introduced in open waters and canals.

In Madras, mullets were introduced into brackish and fresh water after gradual acclimatisation. *Etroplus suratensis* is a good cichlid fish for saline water and has been successfully cultured in many parts of Madras and Bombay. It can be obtained from India and Sri Lanka.

Inland fisheries has been a neglected subject in Pakistan. Most of the work has been done in the province of the Punjab but there too the Department of Fisheries remained under the Directorate of Agriculture, only to be made an independent unit 12 years ago. In comparison with the Agriculture, Animal Husbandry and other departments, Fisheries received meagre grants for its development and the results achieved are individual efforts of the officers concerned.

Popular fish culture does not exist in Pakistan. There are no farms where fish may be bred and from where fingerlings may be supplied to culturists. It is essential that at least a dozen fish farms be established at suitable places in the country. These should consist of hatcheries and nurseries for culture and fingerling stocking as well as experimental and market ponds.

There are about 25 000 ponds and many waterways and abandoned canals which could be managed for a great increase in fish production.

Seepage waters below bunds can be utilized for the polyculture of *Ophicephalus* species with *Tilapia* as a forage fish. Varieties of *Cyprinus carpio*, suitable for the hilly region, should be introduced to stock low temperature lakes.

The main carps in Pakistan are *Labeo rohita*, *Catla catla* and *Cirrhina mrigala* which are used in fish culture. The common carp, *Cyprinus carpio*, is also present in the Mangla reservoir. Three varieties are found, suitable for stocking in cold water as well as lakes and ponds in the plains. Pakistani carps do not breed in impounded waters but *Cyprinus carpio* breeds in confined waters and may be widely propagated. The technique of induced breeding should be perfected for the local carps in order to increase their availability.

Other useful exotic fishes may be introduced from countries which have similar climates and ecological conditions.

Location of spawning grounds and transport of fingerlings should be given priority, although at present very little such work is being done in Pakistan.

Trout culture has been practised for a long time. A hatchery existed in the Kaghan Valley and additional ones near Madyan and Chitral were later established. Very little work has been done on trout although Bhatti (1938, 1939) has worked on food and diseases and Qureshi (1951) has given an account of the early introduction and propagation of trout in Pakistan.

3. MARKETING AND UTILIZATION OF INLAND FISH CATCHES

Fish marketing is not organized in Pakistan. For wholesale auctions fish are generally thrown on the floor except in Karachi where platforms are provided. Retail markets are similarly unhygienic. The Directorate of Fisheries in Punjab have their own sales depots in Lahore and Rawalpindi, but these too are not of a high standard. Qureshi and Jaleel (1955) describe how fish is handled and marketed in Pakistan. Fish are carried in open lorries; packed in ice in gunny bags. There is also no provision for refrigerated rail transport. Except one cold store at the Karachi fish harbour, there are no special cold stores for fish anywhere in the country. In order to minimize spoilage and to keep fish fresh, the whole process of catching, landing, transport and marketing must be streamlined. The paper by Qureshi and Jaleel (1951) may serve as a basis for the re-organization of the system.

4. CONCLUSIONS AND RECOMMENDATIONS

The obvious conclusion is that inland fisheries in Pakistan are not developed, badly managed and not patronized by the Government agencies. Whatever progress has been made is due to the efforts of individual departments under adverse circumstances.

To compensate for this, immediate action is necessary in several sectors :

- (a) A central agency, financed and managed by the Federal Government, should be formed to make a thorough survey of perennial and seasonal ponds and tanks and to collect statistics from other stations.
- (b) It is essential to establish fish farms consisting of hatcheries, nurseries, rearing, market, research and experimental ponds. A suitable research station should be established before the possibility of introducing exotic fish is investigated.
- (c) Training should be organized both inside and outside the country. Suitable locations for the training of departmental personnel are China, Thailand, Malaysia and Indonesia.
- (d) Attention should also be given to stocking and fishing reservoirs and dams. New gear should be introduced for the exploitation of deep waters and powered fishing boats are also recommended.

- (e) Encouragement should be given to private fish culturists by promoting short, practical training courses in fish culture. Other facilities, such as engineering services should also be made available to them.
- (f) Specialized transport is needed both for safe and quick movement of fingerlings and for carrying fish from the landings to the markets. Marketing must be organized. Cold storages and ice plants are necessary in the cities because fish is a very perishable commodity. Existing refrigerated railway vans should be utilized by providing special containers so that the same vans may be used for fish and other perishables.

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