FISHERIES SCIENCE II

RIVERINE FISHERIES

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MAJOR RIVER SYSTEMS AND FISHERIES

* **RIVERINE FISHERIES**
* India is blessed with a vast inland water resources in the form of rivers, estuaries, natural and man made lakes.
* The Inland water bodies have been divided into five riverine systems and their tributaries extending to a length of about 29,000 km in the country – **Indus, Ganges, Bramhaputra, East flowing riverine system and West riverine system.**
* All these rivers, their tributaries, canals and irrigation channels have and area of roughly 13000km.
* These water bodies harbor the original germplasm of one of the richest and diversified fish fauna of the world comprising 930 fish species belonging to 326 genera.
* The major river systems of India on the basis of drainage can be divided broadly into two major rivers systems. They are (i) **Himalayan rivers system** (Ganga, Indus and Bramhaputra) and (ii**) Peninsular river system** (East cost and West coast river system).



**Ganges River System:**

* It is the largest river systems of the world, having a combined length (including tributaries) of 12,500 km. It originates from Gangotri in the Himalayas at a height of about 3129 km above the sea level.
* After origin it drains the southern slopes of the central Himalayas.
* Ganga passes through UP, Bihar, some parts of

Rajasthan, M.P. and west Bengal and finally joins to the Bay of Bengal.

* It has a large number of tributaries and ‘Yamuna’ river is one of the major tributaries of this system, which is about 1000 km long.
* It has numerous lakes, ponds .
* It has a total catchment area of 9.71 lakh sq. km and receives an annual rainfall of 25-77 inches.

# • Common Phytoplanktons:

* Phytoplanktons are generally poor during the monsoon and autmn months.
* Common phytoplanktons found in Ganga river system are – (i) Members of Bacillariophyceae like Amphora, Asterionella, Cymbella, Navicula and

Synedra etc. (ii) members of Chlorophycace like,

Chlorella, Closterium, Denticula, Pandorina and Spirogyra etc.(ii) members of Myxophyceae like Anabaena, Nostoc, Oscillatoria etc.

# • Common zooplanktons:

• Rattulas, Rotaria, Keratella, Filuia, Notops, Monostyla etc.

# • Fisheries of Ganga river systems:

* The Ganga river system supports a large number of commercially

important fish species including major carps , *minor carps ( Labeo fimbriatus), catfishes,* murrels (*Channa species), feather backs, mullets (Mugil corsula), fresh water eel (Anguilla) and* prawns.

*Apart from* these fishes, the others like *Pangasius; silonia silondia; Gudusia chapra;Bagasius. bagasius;*

*Eutropichthys. vacha are also found in the river* system.

* The commercial fisheries in this zone are non-existing due to spares population, inaccessible terrain and poor communication between fishing grounds and landing centers.
* The fish yield has been declined over the years due to

1) sandification of the river bed (upto Patna) which reduced the rivers productivity due to blanket effect,

1. Marked reduction in the water volume on account of increase sedimentation,
2. increased water abstraction and (4) irrational fishing.

• In spite of this, the Ganga river system is contributing nearly about 89.5% of the total fish seed correlation of India.

# • Godavari River System:

* It originates in Doolai hills near Nasik in North Western Ghats.
* This river system is a part of East coast of pennensular river system, with a length of 1465 km covering the states like Maharastra, Andhrapradesh and Madhyapradesh.
* It has the primary tributaries like manjira, Wainganga; Subtributaries like paingunga and wardha and minor tributaries like maner and sabari. It drains into Bay of Bengal.
* It has a total catchments area of over 315,980 sqkm.

# • Fisheries of Godavari River System:

* The head waters harbour a variety of game fishes but don’t support the commercial fisheries.
* The commercial fisheries consist of carps (major caps, Labeo fimbriatus), large cat fish (Mystus spp.,
* Wallago attu; Bagarius bagarius) and fresh water prawn (Macrobrachium rosenbergii).
* Hilsa formed lucrative –fisheries and the Indian major carps planted in the river in the beginning in 19th century are thriving well and contributing to the commercial fisheries.
* **Krishna river system:**
* The originates in Western Ghats region, south of Poona and finally drains into East coast, with an a length of 1401km covering the state like Maharastra, Karnataka and Andhrapradesh.
* It has the main tributaries like Bhima (Annual) and Tungabhadra (Perennial).
* This river system has an total catchments area of 2,33,229 sq km.
* The head waters support rich fishery when
* compared to mid-stretch, which is rocky and inaccessible.
* No information is available on its present fishery and catch statistics.
* **Cauveri river System:**
* This river system originates from Brahmagiri hills on western ghat, with an elevation of 1340 m extending to a length of 800 km.
* this river system covering the states the Karnataka and Tamil Nadu finally drains into Bay of Bengal in Thanjavur district of Tamil Nadu.
* It has the tributaries like Bhavani, Noyil and Amaravathi.
* This river system has an total catchment area of 4,70000 sq km.
* The water resources of the river are extensively exploited as numerous reservoirs, anicuts and barrages have been built on the river.
* **Fisheries of Cauveri river system:**
* The Cauveri river system exhibits substantial variations in its fauna - nearly 80 species of fish belong to 23 families have been reportedfrom this river system.
* Its fish fauna differs significantly from Godavari and Krishna river system.
* The fishes like *Labeo kontius; L. ariza;* carps such as *Catla catla; Labeo rohita; Cirrhinus mrigala and the exotic species Cyprinus carpio have been*
* transplanted in Cauveri river system. The game fish *Tor khudri and T mussullah are found all along the river length except the deltaic stretch.*

# • West coast river system:

* The west coast system comprises the river Narmada and Tapti, both of which flow in western direction of the country and drain the

narrow belt of peninsular India, west of the western ghats further in the north the system forms basins of Narmada and Tapti and the drainage of Gujarat.

* **Narmada river system :**
* This river system originates in Amarkantak hills of Madhya Pradesh, at an elevation of 1,057 m above the sea level.
* The length of the river is 1280 km, covering Madhyapradesh and Gujarat states and finally drains into gulf of Cambay in Gujarat.
* The effective catchments area of this river system is 94235 sq. km and 6330 sq. km of its all

tributaries.

* This river system comprises of total 18 tributaries, of which 16 in Madhya Pradesh and 2 in Gujarat.
* This river system receives and annual rain fall of 12” – 115”.
* **Fishery of Narmada river system:**
* Narmada river harbors 84 fish species belonging to 23 genera.
* The contribution of carps in commercial fishery is of the order of 60.4%, followed by catfishes of 34.1 % and miscellaneous fishes of 5.5%.
* **Tapti River System:**
* This river system originates in Mount Vindhya of Satpura range

at an elevation of 670 –100m above the sea level, with a total length of 720 km.

* This river system covers the states like Maharastra, Madhya

Pradesh and Gujarat and finally drains into Arabian Sea at Dumas near Surat in Gujarat.

* The total catchments area of this river is 48,000 sq.km and annual rainfall is more or less similar to the Narmada riversystem.
* Not much information of fish stock composition and fish yield is available.

# • Factors influencing fish yield from rivers:

* The intensity of fishing, nature of exploitation and species orientation are the characteristics of the artisan riverine fisheries and are governed by
* i) Seasonality of riverine fishing activity
* ii) Unstable catch composition
* iii) Conflicting multiple use of river water
* iv) Cultural stresses leading to nutrient loading and pollution.
* v) Lack of understanding of the fluvial system and infirm data base.

# • RESERVOIR FISHERIES

* India has a large spread of fresh water resources in the form of rivers, reservoirs, lakes, ponds. Indian reservoirs, being in the tropics, have high primary productivity and have the capacity to produce more fish than their present low Indian average of 29.7 kg/ha/yr in reservoirs.
* Reservoir fisheries are essentially a stocking cum capture system. There are 975 reservoirs in the country with a total area of more than 3.15 million hectares.
* River water is usually running or flowing water. Construction of dam results in the creation of a reservoir or dam- lake, in which the lotic water of the upper reaches becomes lentic as water approaches the dam.
* Rise in reservoir depends upon river flow and rain water.

Reservoir ecology is changed from the reverine ecology because, in reservoirs, the lotic water of the upper reaches becomes lentic as water approaches the dam. This facilitates entirely different types of fishery called reservoir fishery, to suit the ecology of the reservoir.

A reservoir has its own peculiarities in which it differs from natural lakes.

* The dam in some way interferes with the ecology of the upper reaches of the river. Migratory fishes are completely wiped out from the upper reaches.
* This often leads to disturbances in the ecosystem
* especially with advantage to the prey.
* The reservoir it self may affect the ecology of the lower reaches of the river.
* Periodical discharge of sediments from the reservoirs may cause mud and silting in the lower reaches with serious consequences on the fauna.
* Reservoir acts as fertility traps, reducing the amount of dissolved plant nutrients which would other wise be freely arriving at the lower reaches.
* **Classification of reservoirs:**
* The reservoirs are classified by many authors in different ways mainly based on the area of reservoirs.
* Mohanty (1984) reported three types of reservoirs.
* Minor reservoirs – with water spread area up to 40 ha.
* Medium reservoirs – With water spread area upto 400 ha.
* Major reservoirs – with the water spread area above 400 ha.
* Pathak (1990) classified the reservoirs into three categories.
* Large reservoirs – covering an area of 5000 and more hectares.
* Medium reservoirs – having impounded water spread area of 1000 –5000 hectares.
* Small reservoirs – having water spread area less than 1000 hectares.

# • Management of Reservoir fisheries:

* The fish production from the reservoirs is low, emphasizing the need for attention to shape and develop the reservoir fisheries from the survey and planning stage to achieve high rate of production and better returns for the fishermen, who represent the weaker section of the society.
* Majority of these water bodies are not scientifically managed.
* Only a handful has so far been harnessed on scientific lines, while the others are either half-heartedly managed or even not managed at all.
* There are marked variations in the fishery management practices which are followed in various reservoirs within the country.
* Even though the reservoirs are owned by the Government or Corporate agencies in most of the states, their fishing rights and exploitation systems vary considerably.
* The fishing systems can be divided into the following broad categories: a). privately owned and managed reservoirs, b). Public water bodies, c). Community water bodies and d). Water bodies managed by the Government.

After a scrutiny of the various management practices followed in the country, it is difficult to miss a common underlying spirit of the common property norm.

Majority of Indian reservoirs are public properties where a fixed number of licensed fishermen make their living.

The exceptions are the small reservoirs in some states like

* Karnataka and Uttar Pradesh, which are auctioned to private individuals on annual basis.
* The following steps are to be taken for the development of reservoir fisheries.
* Some of them are 1. Pre- impoundment survey of the reservoir
* 2. Removal of obstacles like tree stumps.
* 3. Fish farm construction at the dam site for stocking of fish seed adequately.
* 4. Organization of fishermen co-operative society for harvesting the fish in the reservoir and to take up fish marketing.
* 5. Implementation of conservation methods to prevent over exploitation and to prevent catching of small fish.
* Stocking of the fish seed in reservoirs: An adequate sized fish seed should be stocked in the reservoirs.
* The tender stages of fish seedlike fry (22-25 mm), fingerlings (40-50 mm) are susceptible and are to
* be eaten by the carnivorous fishes.
* Hence the reservoirs to be stocked with an advanced fingerlings (100-120 mm).
* Stocking of reservoirs with fingerlings of economically important fast growing species to colonies all the diverse niches of the biotype is one of the necessary prerequisites in reservoir fishery management.
* This has proved to be a useful tool for developing fisheries potential of such small aquatic systems.
* LAKE FISHERIES:
* The fishery of the lakes is termed as lakesterine fisheries.
* Lake fisheries are of much importance in our country.
* According to Vemberg (1970) Lake is an inland depression on the surface of earth ranging from a few meters to about 150 meters in depth and containing standing water.
* Important natural freshwater lakes in India.
* Naini lakes of Nanital
* Bakhira lake (U.P)
* Great mansarover lake
* FRESHWATER LAKES OF INDIA:
* Freshwater lakes are situated in hilly areas or planes.
* YERCAUD LAKES:
* It is horse shoe shaped with an area of more than 8 hectares and has an average depth 2.0 metres maximum being 5.5 m.
* It is situated at an altitude of 1,340 m.
* The annual fish production of this lake has been estimated to exceed 31.6 kg/hectare.

KODAIKANAL LAKE:

* It is located on the Palani hills at an altitude of 2,285 m.
* It covers an area of more than 26 hectares and has an average depth of 2m the maximum being 10 m.
* Fish production of this lake is over 53 kg/hetare/year.

OOTY LAKE:

* This lake is polluted and located in Nilgris at an altitude of 2,500 m.

It has an area of 34 hectare and average depth of 3.0m maximum being 10 m

* The fish production has been recorded to be 75 kg/ hectare /year.

LOGTAK LAKE:

* Located in Manipur.
* Maximum depth of 4.5m.
* The total production is about 262 tonnes/ year.
* It is a weed choked lake.

BAKHIRA LAKE:

* Located in Basti district of U.P.
* Wide varities of freshwater fish speccies are found in this lake.
* Still it is pollution free lake.

RAMGARH LAKE:

* Located in Gorakhpur district of U.P.
* Depth upto 2 m
* Catfishes,perches and eels are dominant in this lake.
* The principle freshwater fisheries of plane lakes are the following:
* Catfishes,murrels,mullets, major carps, eels, minor carps, perches and feather backs.
* Fisheries of freshwater hilly lakes include trouts, mahaseers and snow trout.
* FACTORS REGULATING FISHERIES OF LAKES:
* The productivity of lake is chiefly regulated by the following factors:
* Natural produtivity of lake water
* Availability of natural food to fishes.
* Availability of stocking material.
* Capacity to catch on commercial basis.

THANK YOU..