

Handbook on Fisheries and Aquaculture Technology

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The fishery sector is important from Indian economy view point as it contributes a source of income to a number of fishermen and has huge export potential. The systems and technology used in aquaculture has developed rapidly in the last fifty years. They vary from very simple facilities like family ponds for domestic consumption in tropical countries to high technology systems like intensive closed systems for export production. Much of the technology used in aquaculture is relatively simple, often based on small modifications that improve the growth and survival rates of the target species. Nowadays, the fish and fisheries industry is one of the fastest growing international commodity markets globally. Guaranteeing an adequate supply to this international market requires hundreds of thousands of fishing vessels and fish farms, as well as tens of thousands of fish processing workers, wholesalers and retailers in countries spread all over the world. The fishery sector thus generates employment and income for millions of people and in one of the major fields to venture. A wide range of aspects of fresh water aquaculture such as selection of species of fish and shellfish, construction and preparation of various types of fish ponds, control of aquatic weeds and predators, production of seed fish and their transportation, fish nutrition and fish diseases and their control pertaining to composite fish culture, air breathing fish culture etc. have been dealt with a length for easy adoption.

The major contents of the book are classification of fishes, general characters of fishes, techniques in fish identification, cold water fisheries of India, physical and chemical properties of fishery water, chemical constituents of fish, economic importance of fishes, fish in relation to human health, construction of fish farms, etc.

In this book you can find all the basic information required on the fundamental aspects of the fisheries and aquaculture technology with detailed information of their applications a wide variety of industrial processes etc. The book is very useful for research scholars, technocrats, institutional libraries and entrepreneurs who want to enter into the field of aquaculture technology.

1. Fish, Fisheries and Ichthyology

Fish

Fisheries

History of Ichthyology

2. Classification of Fishes

General Characters of Fishes

Major Groups of Living Fishes

Characterization of Living Fish Groups

Class Agnatha (Lampreys and Hagfishes)

Subclass Cyclostomata

Class Chondrichthyes (Sharks, Rays, Skates, and Chimaeras).

Subclass Elasmobranchii (Sharks, Rays, Skates)

Subclass Holocephali (Chimaeras).

Class Osteichthyes (Bony Fishes)

Subclass Sarcopterygii (Lungfishes and Lobefins)

Subclass Actinopterygii (Higher Bony Fishes)

Major groups of Extinct Fishes

Class Cephalaspides (Osteostraci)

Class Pteraspides (Heterostraci)

Class Palaeospondyli (Cycliaae)

Class Pterichthyes (Antiarchi)

Class Coccostei (Arthrodira)

Class Acanthodii

Teleostei

Division I. TAENIOPEDIA (Ribbon young)

Division II. ARCHAEOPHYLLACES

(Ancient watchmen)

Division III. EUTELEOSTEI (Intensive Teleostei)

3. Fish Identification

Techniques in fish identification

Morphometric characters

Meristic characters

Descriptive characters

Key to the Identification of Fishes

Fisheries of India

5. Cold Water Fisheries of India

Trout

Mirror carp

The Tench (*Tinca tinca*)

Golden carp (*Carassius carassius*)

Mahseer

Barilius

Labeo

Garra

Glyptothorax pectinopterus

Programme of Fisheries

Development of fish in the Hills of

Uttar Pradesh

Composite culture

New Directions

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Crab Fishery

Lobster Fishery

7. Molluscan Fisheries

Shell-fish Fishery

Chank Fisheries

Pearl Fisheries

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Physical and chemical properties

Organisms in fishery water

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Requisites of a paddy field for fish culture

Some of the fishes used in India for fish culture in paddy field's are

10. By-Products of Fishing Industry

Fish Oils

Preparation of body oils of fish

Composition of fish oil

Fish Oil Industry in India

Extraction of liver oil

Liver-oil industry in India

Shark fins

Isinglass (fish-maws)

11. Chemical Constituents of Fish

Flesh of Fishes contains

Mineral constituents

Carbohydrates

Enzymes

Pigments

Vitamins

Phospholipids

12. Economic Importance of Fishes

By-products of fishes

Oils

Fish Protein

Fish-meal

Fish glue

Ising glass

Other uses

Shark fins

Fertilizers

Controllors of diseases

Scavengers

As baits

An object of sports and entertainment

Aquarium

13. Fish in Relation to Human Health

Fish in Relation to Human Health

14. Fish Aquarium

TANK Selection

Selection of Plants

Selection of Fish

Maintenance of Aquarium

15. The Diversity of Fishes

Adaptations in fishes

16. Hill Stream Fishes

Changes in external form and size of fish

Scale covering etc.

Paired fins (skeleton and musculature connected with them)

Caudal fin and its peduncle

Mouth, jaws and barbels

Eyes

Gill opening etc.

Air-Bladder

Skin and other modifications

Examples of Indian hill stream fishes

Cyprinoids

Silurids

17. Plankton and Fish Productivity

Basis of production :

Special adaptations of animals

planktonic life :

The relationship of zooplanktons to the environment:

18. Zooplankton

Protozoa

Porifera

Coelenterata

Ctenophora

Nemertinea

Nematoda

Rotifera

Polyzoa

Chaetognatha

Annelida

Mollusca

Crustacea

Echinodermata

Protochordates

Fishes

Amphibians

Characteristic features of zooplankton as stated before are

Special adaptations of animals to planktonic existence

19. Transportation and Marketing

Transport

Ice and Cold Storage

Marketing

Fishing Crafts and Gears

Fishing Vessels

Sea Crafts

West Coast

East Coast

River Crafts

Rafts and dug-outs

Plank-built boats

Large fishing boats

Fishing Gears (Nets)

Inland Fishing Gear

Gear used in estuaries, lagoons and back waters

Gear used in ponds, jheels, lakes and reservoirs

Gear used in hill streams

Gear used in rivers

20. Processing and Preserving

Cleaning, Boning and Filleting Fish

Cleaning

Boning Round Fish

Skinning and Boning Flat Fish

Preparing Eels

Skinning Dogfish and Tope etc.

Preparing Lobsters and Crabs

Boiling

Extracting the Meat

Shrimps and Prawns

Shelling Shrimps and Prawns

Potted Shrimps

Shrimp Waste

Salting Fish

Roll mops

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Making the Smoke

Equipment

Preparing the Fish

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Smoked Eels

21. Aquaculture - The Concept

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Net Cage Husbandry

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22. Aquaculture - In Practice

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Seaweed

Molluscs

Crustaceans

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Fresh and Brackish Warm Water Fish

The Carp (*Cyprinus carpio*)

Herbivorous Cyprinids

Tilapia spp.

Milk Fish (*Chanos chanos*)

Mullet (*Mugil* spp.)

Catfish

EELS (*Anguilla* spp.)

Other Warm Water Fish

Africa

Heterotis niloticus

Nile Perch (*Lates niloticus*)

Haplochromis spp., *Hemichromis* spp.,

Serranochromis spp.

Labeo spp.

Asia

Ayu (*Plecoglossus altivelis*)

Labyrinth Fish

South America

Pirarucu (*Arapaima gigas*)

Fish in Colder Waters

Trout

Salmon

23. Culturable Fish and Shellfish

Culturable fishes

Indian Major Carps

Exotic (Chinese) Carps

Minor Carps

Catfishes (Order : Siluriformes)

Murrels or Snakeheads

(Order : Channiformes)

Tilapia (Order : Perciformes)

Sport fishes (Cold-water fishes)

Trouts (Order : Salmoniformes)

Salmo trutta fario (Brown trout)

Salmo gairdneri gairdneri (Rainbow trout)

Mahseers (Order : Cypriniformes)

Culturable Shellfish

24. Construction of Fish Farms

Structures of fish ponds

Bunds

Slope

Berm

Construction of pond

Determination of Quantity of Earth for the

Construction of Bund

Bund Formation

Inlet and Outlet

Simple inlet and outlet (monk) made of concrete
and bricks

Types of fish ponds

Nursery Pond

Rearing Pond

Production Pond

Other measures to be considered

during the construction of a fish farm

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Nursery pond

Eradication of Aquatic Weeds and Predators

Liming and Fertilisation

Stocking

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 - Breeding
 - The Biology of Reproduction
 - Breeding Technology
 - Breeding And Multiplication

The Ahrensburg Closed-Cycle System

Construction

Clearing Chamber Volume and Flow Rate

Heating

Materials

Operation

Stock Density

Aeration

Water Pumps

Criteria

Function

Slat Water Modification

Tank 1: *Tilapia aurea* x *Tilapia nilotica*

Tank 2: *Tilapia aurea*

36. Economics of Fish Culture

Production Function

Yield rate and pond area

Input rates

Input-output co-efficients

The interesting input-output co-efficients are :

Input costs

Labour costs

Interest cost

Other costs

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Relative share of cost component in total cost

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Income from Fish Farming

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Yield and input rates

Costs and returns

Farmer's income

Culture Practice

Yield and input rates

Costs and returns

Farmer's income

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Costs and returns

Farmer's income

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Yield and input rates

Costs and returns

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Costs and returns

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Yield and input rates

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Farmer's income

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Rigor Mortis

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Microbial spoilage

Bacterial flora of fish and bacterial spoilage

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Spoilage in marine fish

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Principles of preservation

Methods of preservation

Special problems in fish preservation

Food-poisoning, Intoxications, Allergies etc.
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Simple model of fish liver-oil extractor for use in
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Carragheen Chocolate Blancmange

Carragheen Jelly

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Laverbread

Laver Mutton Sauce

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The individual fecundity is determined

as follows

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About NIIR

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