CHAPTER

Fish Culture 24

Demand of fish as a valuable source of animal proteins, fats and minerals is increasing day by day. In recent years efforts have been made to increase not only the area under the fish pond but also to improve pisciculture technologies, in order to increase the productivity of the pond. India has vast and varied inland fisheries resources. Rivers, streams lakes, reservoirs, tanks, ponds, irrigation canals, multipurpose dams, and paddy fields provides an immense scope, perhaps richest in the world, for the propagation and production of fishes. From these large number of resources, fishes can be obtained. It has been estimated that only 600,000 out of 1600,000 hectares of water area is used at present. Harnessing all cultivable pieces of water under scientific methods of fish culture, thus offers an immense scope for the development of fisheries.

Qualities of culturable fishes

For profitable fish culture it is necessary to select such species of fish which can utilise the natural and artificial food to the maximum extent, and grow rapidly to a large size. Species that fulfil the following conditions can be considered suitable for culture.

1. It should have a fast growth rate.
2. It should be able to use the natural food of the pond efficiently, and artificial food to maximum advantage.
3. It should be hardy and resistant to disease.
4. It should be able to survive under temporary bad water conditions and hardships of transport.
5. It must be a prolific breeder and easy to breed in ponds.

6. It should not be predaceous, and preferably herbivorous in habit.
7. The flesh should be tasteful and with high nutritive value.
8. Species that can be cultured together without competing with each other, are preferably for maximum utilisation of water.

TYPES OF FISH FARMING

Various techniques of fish farming have been successfully developed in the country. Cultivation, however is restricted to only a selected varieties of fish species and depending upon the various aspects, may be classified into the following types.

1. **Complete Fish Farming :** The complete fish farming begins with the production of eggs and culminates in the formation of full size fishes, which may be utilized as food, for marketing or as breeding stocks.
2. **Restricted Fish Farming :** This type of fish culture is restricted to one or more stages of fish growth. Fish seeds, fry or fingerlings, for example, may be produced and allowed to grow in the ponds of the farm. Hatcheries may also be established, where, after induced spawning the collected fries may be sold to fisherman for restocking their ponds.
3. **Extensive Fish Farming :** In extensive farming, the fishes are cultivated on the natural food available in the pond, and their productivity corresponds to natural productivity.
4. **Intensive Farming :** The cultivation in intensive farming is based on artificial feeding, so that the produce is a maximum quantity of fish in minimum quantity of water.
5. **Farming Types Based On Natural Habitat of Fish :** Fish farming may be done in cold water, warm water, fresh water or brackish water depending upon the habitat of the fish selected for cultivation.
6. **Monoculture :** Monoculture is the cultivation of only a single type of fish species in a pond. It may be tilapia of one species, common carp or any other species.
7. **Polyculture :** In polyculture two or more species of fishes are cultivated together in a pond. Fingerlings of fast growing stages of compatible species, with different feeding habits are selected and stocked together.

8. **Mono sex Culture :** Monosex culture is the culture of only one sex of a species of fish in a pond. When only the male or female individuals are stocked together, all the energy of fish goes into growth and not in reproduction. *Tilapias* are often used for mono sex culture.

9. **Sewage Fed Fish culture :** Oxidised sewage water from the sewage oxidation ponds is rich in both the organic and inorganic contents. It is added in desired quantities to the fish pond to increase their productivity.

10. **Culture of Air Breathing Fishes :** Air breathing fishes can be easily cultured in oxygen depleted water, so that unused water may be brought under cultivation. The common species suitable for such type of culture include *Clarias batrachus, Heteropneustes fossilis* and *Channa* spp.

11. **Integrated Fish Farming :** In this type of fish farming, the culture of fish is done along with the agricultural crops, such as in paddy and banana fields.

Types of Cultivable Fishes

The cultivable fishes are 3 types :

(1) Indigenous or native fresh water fishes *viz.,* major carps.

(2) Salt water fishes acclimatized for fresh water *viz.,* Chanos, Mullets.

(3) Exotic fishes, imported from other countries *viz.,* Mirror carp, Chinese carp, Crucian carp and Common carps.

The principal fresh water species generally used in Eastern and Northern India are as follows :

Carps

(*i*) *Catla catla* (*ii*) *Labeo rohita*

(*iii*) *Labeo bata* (*iv*) *Labeo fimbriatus*

(*v*) *Labeo calbasu* (*vi*) *Cirrhina mrigala*

(*vii*) *Cirrhina reba* (*viii*) *Cirrhina cirrhosa*

(*ix*) *Tor tor* (*x*) *Puntius* or *barbus spp.*

(*xi*) *Bagarius bagarius* (*xii*) *Pangasius pangasius*

(*xiii*) *Silonia silongia*

Cat–Fish

(*i*) *Mystus seenghala* (*ii*) *Mystus oar*
(*iii*) *Rita rita* (*iv*) *Eutropichtys vacha*
(*v*) *Callichrous bimaculatus* (*vi*) *Wallago attu*

Sheat–Fish

(*i*) *Ompok bimaculatus* (*ii*) *Notopterus chitala*

Feather backs

(*i*) *Notopterus notopterus* (*ii*) *Clarias batrachus*
(*iii*) *Heteropneustes fossilis*

Live–Fish

(*i*) *Anabas testudineus* (*ii*) *Channa striatus*
(*iii*) *Channa gachua* (*iv*) *Channa punctatus*
(*v*) *Liza corsula*

Mullet (*i*) *Liza carcasia*

Herring

(*i*) *Hilsa ilisha*

Anchovies

(*i*) *Setipinna phasa* (*ii*) *Anguilla bengalensis*

Eel (*i*) *Mastocembalus armatus*

None of the above mentioned species can be called an ideal one for culutre, as it may not possess all the desirable quantities. Carps are economically the most important fishes for culture as :

1. They feed on zoo– and phytoplankton, decaying weeds and debris, and other aquatic plants which are available in plenty in the ponds.
2. They are resistant to relatively high temperature and turbid water.
3. They can tolerate low oxygen content.
4. They have a fast rate of growth and attain a reasonably large size in a short time.
5. They breed profusely.

Management of Fish Culture Programme

Fish culture is a complicated process, so for an ideal fish culutre one should have an idea about the different stages of fish culutre *i.e.*, topographic situation, quality of water, source of water,

and other physical, chemical and biological factors. Fish culture is usually practised in ponds. These are small shallow bodies of water in natural conditions and completely drainable when constructed artificially. The natural ponds differ from the lakes in having a relatively large littoral zone and a small profundal zone. Their source of water supply may also vary, depending upon which they may be classified into the following types.

1. **Spring Water Ponds:** These ponds are supplied by ground water, either through natural springs at their bottom or through others lying adjacent to them. The spring water is regarded good for fish farming, because it is clean and has no unwanted fish or fish eggs in it.
2. **Rain Water Ponds:** These ponds, also called sky ponds are filled with rain water and the extent of their filling depends upon the amount of the rainfall.
3. **Flood Plain Ox-bow Ponds:** The ox-bow ponds are water bodies left, after the stream supplying it has changed its course. Because of accumulation of organic materials and periodic flooding these ponds are regarded as highly productive.
4. **Well Water Ponds:** These ponds are filled with well-water and considered best for fish culture. They may be adequately supplied with water which has no contaminants.
5. **Water Course Ponds:** These ponds are placed on the course of flowing water and divided further into two. Keeping in view the various stages of fishes, the following different types of ponds have been recommended to manage them.

BREEDING PONDS

First step in the fish culture is the breeding of fishes, therefore, for proper breeding special types of ponds are prepared called as breeding ponds. These ponds are prepared near the rivers or other natural water resources.

There are two types of breeding:

1. Bundh Breeding or Natural Breeding.
2. Induced Breeding.

I. BUNDH BREEDING

The natural bundhs are special types of ponds where natural riverine conditions or any natural water resource conditions are

managed for the breeding of culturable fishes. These specially designed bundhs are constructed in large low-lying area having facility to accommodate large quantities of rain water. These bundhs are having an outlet for the exit of excess rain water. The shallow area of such bundhs is always used as spawning ground. These bundhs are of three types:

(i) **Wet bundh:** The ponds specially constructed for fish breeding having water throughout the year are known as wet bundhs or perennial bundhs.

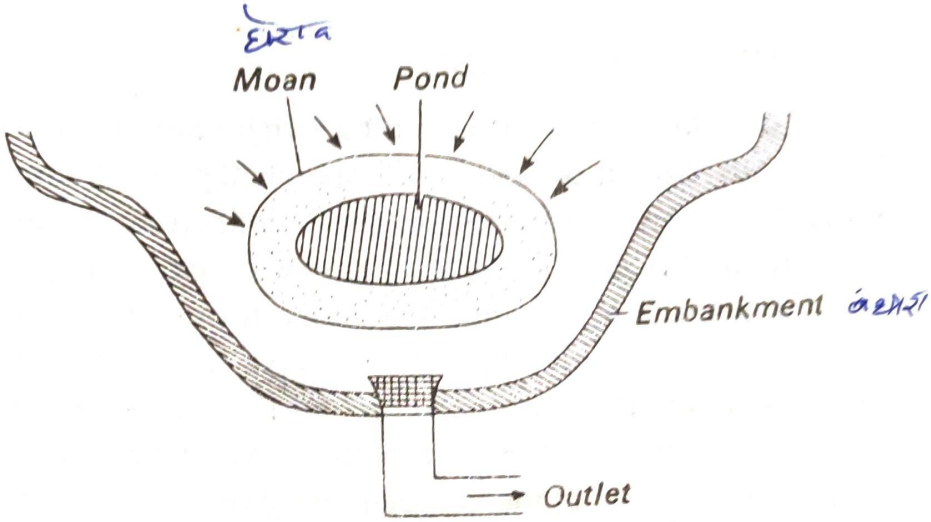

Fig. 24.1. Wet bundh.

An inlet is formed at the higher level of bundh for the entrance of the water while an outlet is prepared in low lying area for the exit of the water from the bundh. The flow of water from outlet is controlled with the help of bamboo fencing.

(ii) **Dry bundh:** This type of pond is purely seasonal with shallow water areas. This is constructed by keeping soil walls from

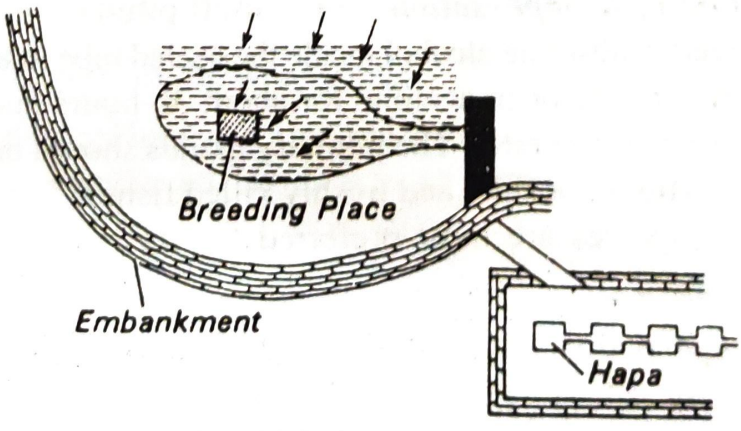

Fig. 24.2. Dry bundh.

three sides and open area from one side. In monsoon period rain water flows towards this bundh and fills the pond. But after monsoon water this bundh dries up after a month or two.

(iii) **Modern bundh:** This is known as 'Pucca bundh'. It is a masony construction and a sluice gate at the lower-most level of the bundh is the characteristic feature. The total exit of water from the bundh is possible by this gate so that after each spawning, bundh is cleared of water.

According to the breeding nature of different fishes, suitable bundhs are used for spawning.

II. INDUCED BREEDING

The main source of the India's fish seed supply comes from the riverine collection and certain percentage of it comes from the bundh type breeding places. In these collections it becomes quite difficult to sort out the fries of major carps, as large number of uneconomical fish fries and predatory forms also accompany the collection. Besides this the farmers have to wait for the arrival of monsoon and the time of breeding of different species of fishes also varies. To overcome these problems several persons successfully tried the process of induced breeding by injecting pituitary extracts and different hormones. Indian cat-fishes like *Heteropneustes fossilis and Clarias batrachus* and carps like *Labeo rohita*, *Labeo bata, Cirrhina mrigala* and *Cirrhina reba* responded well to this method of breeding.

The gonadotropin hormone (F.S.H. and L.H.) secreted by pituitary gland influences the maturation of gonads and spawning in the fishes. In India, Khan (1938) successfully induced *Cirrhinus mrigala* to spawn by injecting mammalian pituitary hormone.

Method of hypophysation: First of all pituitary is taken out, then preserved in absolute alcohol inside the sealed tube in a dessicator at room temperature or in acetone for about 36 hours and stored in sealed phails in refrigerator. The pituitary glands should be taken out from fully matured, healthy and freshly killed fishes. The donor fish of the same species are most preferred for this purpose.

For the preparation of extract, the weighed glands are homogenised in distilled water or 0.3% saline or glycerine and centifuged for 15 minutes at 20,000 rpm. The supernatant thus

obtained is injected intramuscularly on the back or on the base of the caudal fin. In some cases intraperitoneal injection is also recommended at the base of the pectoral fin.

Usually the males and females used for this type of breeding are taken in proportion of 2 : 1. Female gets two injections at a lapse of six hours, the first dose being 2–3 mg./kg body weight and second being 5–8 mg/kg. body weight. The male gets only one injection of 2–3 mg./kg. body weight along with the second injection of female. The injected fishes are kept in breeding hapas, made up of fine meshed mosquito net cloth and fixed in water by the help of bamboo poles. The fertilised eggs are collected and transferred to the hatching hapas as described above. It has been noticed that well fed and healthy fishes respond more quickly and successfully than ill fed and unhealthy fishes. It is advisable to feed the fishes chosen for this purpose with oil cake and rice bran for 2–3 months prior to the treatment and this will give a better result.

Collection Eggs or Fish seeds: During monsoon months (June to August) when the rivers are over flooded, the fish migrate to adjoining shallow water lands. These submerged shallow areas act as breeding ground for the carps. The eggs are collected 12–14 hours after fertilisation and made to hatch under protected conditions. For collection of eggs at the collection spot, two long bamboo poles are fixed near the bank of the river. A piece of round meshed mosquito net about 15' × 6' in dimension is fixed from these bamboo poles. At every 10–15 minutes this net is lifted up and the eggs so collected are removed to "hundi". The eggs are then, transferred hatching pits.

Hatching Pits: They are a series of pits located very close to the breeding ground. These pits are specially made in order to make the eggs hatch.

Hatching pits are of two types:

1. **Hatcharies:** These are small sized ponds in which fertilized eggs are transferred. After 2 to 15 hours the fertilized eggs

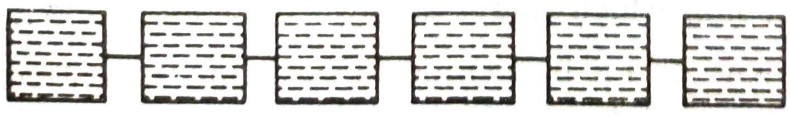

Fig. 24.3. Hatching hapa.

are hatched Some draw backs make the hatcharies unfit for advanced fish culture programme.

2. **Hatching hapas:** Hapas are rectangular trough shaped tanks made up of cloth supported by bamboo poles fixed in the river. In these hapas fish eggs are aerated by continuous flow of current. The size of hapa is about 3' × 1.5' × 1' and is made up of mosquito net cloth which is fixed into outer larger hapa made up of coarse cloth. Two types of hapas are designed; *fixed type* and *floating type.*

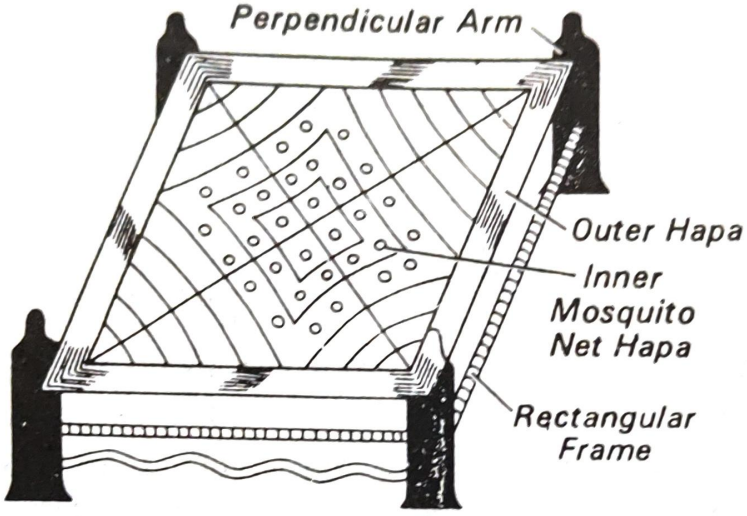

Fig. 24.4. Hatching hapa.

Transportation of fries to nursery ponds. For local transportation large earthenwares hundies are used. Each hundi contains 50,000 to 70,000 fries of 4–5 mm. Water is constantly being aerated by agitation and for long distance it should be changed frequently. To keep the water inside the hundies clear and also to carry down the dead larvae 75–100 grams of fine clay is added to each hundi.

For transportation of seedlings to far away distances earthenware hundies are not used because they are liable to break during loading and unloading in carriers. In such cases metal containers are used. They are round vessels about 53 cms. in diameter and 38 cms. high.

To maintain the normal oxygen content of water inside container different devices are in practice. One of which is a small semi-rotatory pump which sprays air over the entire surface of water.

Another fact to be considered during transportation is to keep the temperature below 20°C. A rise in temperature will increase the

bacterial population which in turn will decrease the oxygen content. The carbon dioxide which comes out during respiration generally accumulates in the container resulting in the fall of pH. It has been found that the addition of 10% suspension of ant-hil earth keeps the pH constant.

NURSERY PONDS

These ponds also called the transplantation ponds are the seasonal ponds. They are constructed near the spawning and the rearing ponds, and cover about 15m in area and 1.2m in depth. Young fry about, 3 to 5 days old are transferred from spawning ponds to nurseries, where they remain for about 15–20 days. The main objective is to create suitable conditions of food availability and growth of fry, because at this stage they are very susceptible to hazards like the wave of action and predation. Undisturbed early development with suitable conditions of food and enemy-less environment ensures a future productivity of the farm.

The heavy mortality fish fries has been recorded in nursery ponds. The following factors are responsible for such mortality:

1. Sudden change in the quality of water from hatching hapa to nursery ponds.
2. Lack of suitable food in pond.
3. Presence of predatory fishes and predatory aquatic insects in the pond.
4. Overgrowth of plankton.
5. Decreased oxygen concentration in water.
6. Cannibalism.

Precautions for nursery ponds

1. In the nursery ponds water should be under good control and circulating.
2. Pond should be nearer to the hatching ponds.
3. Ponds should be predator free.
4. To avoid th overcrowding, fries should be kept in limited number.
5. Supply of food material should be proper.

Rearing Ponds

In these ponds the advanced fry are raised for about 2 to 3 months. The ponds are deeper than the former types (generally 1.2 to 1.5 m) and have narrower sides to facilitate netting. Such ponds are located near the spawning and nursery ponds and their number may vary depending upon one, two or three year rotation of carp culture. The seedlings during fifteen days in nursery pond, with the add of artificial food attains a length of about 20–25 mm. After this period they are transferred to the rearing pond which is pre-prepared. The transference is done by netting the fries from nursery pond and transporting them into metal containers. The preparation of rearing pond is done in the same manner to that of nursery *i.e.* removal of weeds, elimination of predators, manuring the pond *etc.* In rearing pond the fish reaches from fry to fingerling stage in about 2–3 months. By this time they attain a length of 75–125 mm. and are ready to be transferred to the stocking pond.

Stocking Ponds

Stocking ponds are large perennial ponds covering an area varying from 2–20 ha and average depth of about six feet. Before releasing the fingerlings, the stocking pond is prepared to stock them. The process of preparing the pond is the same as that of nursery and rearing ponds. As for the proper organic manuring cow dung is the best and should be used at the rate of 20,000 to 25,000 kg./hectare/year. The inorganic chemical fertilizers are also used *viz.*, super-phosphate, ammonium nitrate and ammonium sulphate at the rate of 1,000 to 1,500 kg/hectare/year.

The powdered rice, paddy, oil cakes, coconut, mustard, groundnut, *etc.* are commonly used as artificial food for the fishes. The artificial food used for the fishes should be easily digestible in natural form and economically suitable. The best time for feeding the fishes is in the morning hours. The quality of food should not be changed suddenly. The amount of fertilizers used is totally dependent on the fertility of the soil, number of fishes and types of fishes being kept in the stocking ponds. When fishes attain maximum length and weight they should be harvested.

Harvesting

Harvesting is done to capture the fishes from the water. The well grown fishes are taken out for marketing and smaller ones are

again released into stocking ponds for their growth. In highly organised and well planned fish farming the fishes below a particular size are not generally captured.

Fishing Methods

A variety of methods are used to capture and thus to exploit the vast resources of food fishes of the country. The methods differ in fresh and marine water to a considerable extent and are adopted to suit the condition of water, fishing grounds and the fish type to be captured. In our country, though a large number of fishing methods are in use but all are not of common use throughout the country. Some common methods of fishing are described here:

1. Stranding : It is widely used in shallow water resources in which some of the shallow area of the pond is separated from the main body by throwing up a low earthen bundh. When almost all the water is thrown out from this area, fishes are gathered and caught out. This method is economical but can only be used in shallow swamps and burrow pits.

2. Angling : This is also very common in practice for fishing of large and predatory fishes. Along the banks of rivers or ponds fishing rods are left dug into the soil and the owner of rod visits to unhook the occassional catch or renew the bait consisting of earthworms. Sometimes very long lines containing 100 to 250 hooks attached to it, are also used for fishing. This method can be used both in shallow and deep waters.

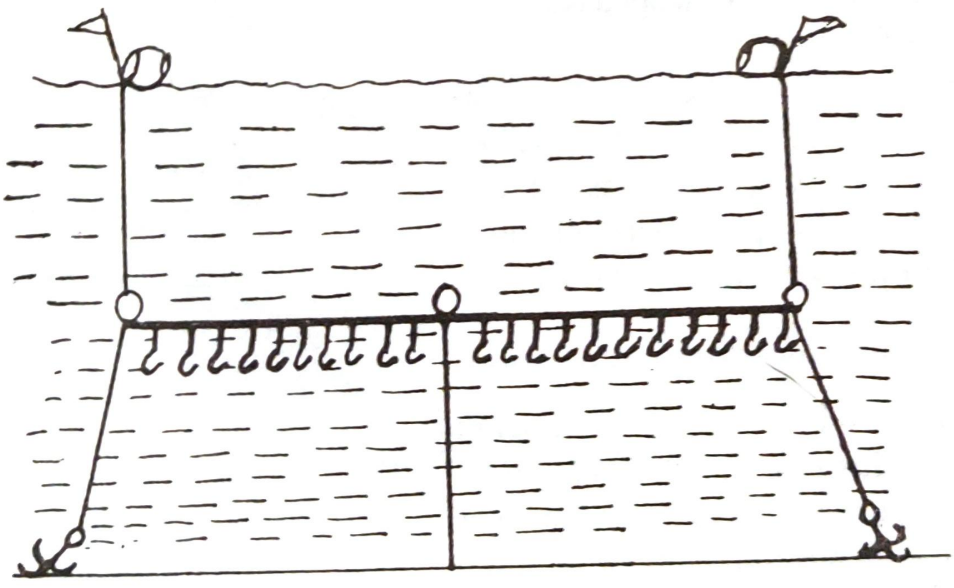

Fig. 24.5. Angling.

3. Traps : This stationary type of net is passively operated to trap fishes which move into it through the gaurded entrance. Fyke net is the modified form, (Fig. 5) constructed to form a long cylindrical bag, with one end (mouth) widely opened and the other end blind. It is provided with rigid, circular frameworks called the hoops (about 13 to 18 per bag) of decreasing diameter, which are arranged at regular intervals from the open to the close end of the net. A pair of rectangular wings are arranged, one on each side of the mouth. They extend out forming an inclined angle to direct the fishes towards the mouth of the trap. The net is operated in shallow waters and used to capture the flounders.

4. DIP Nets (Scoop net) : Such nets are operated in shallow waters to capture schooling mackerals. It consists of two stacks attached to each other at an angle at one end while the other end remaining separate. Fitted on this frame is the finely webbed net. During operation, which is usually done from a boat, the net is lowered down in water to trap the schooling fishes.

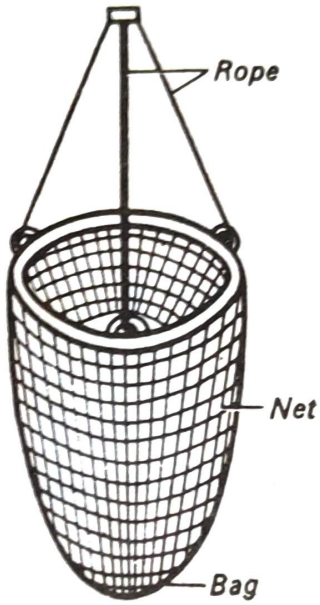

Fig. 24.6. Dip net.

5. Cast net. This is a circular umbrella-shaped net made up of cotton twine. The number of meshes on the mouth is 50 and at the periphery around 1,000. The size of the mesh is 2.5 cm. and at the periphery circular pockets are formed by folding the net inwards to about $6\frac{1}{2}$ meshes in depth. Each pocket contains two iron sinkers. On its apex a thin rope of 3 mm diameter is woven through 50 meshes and it is tightened to close the mouth. At the time of fishing the net is

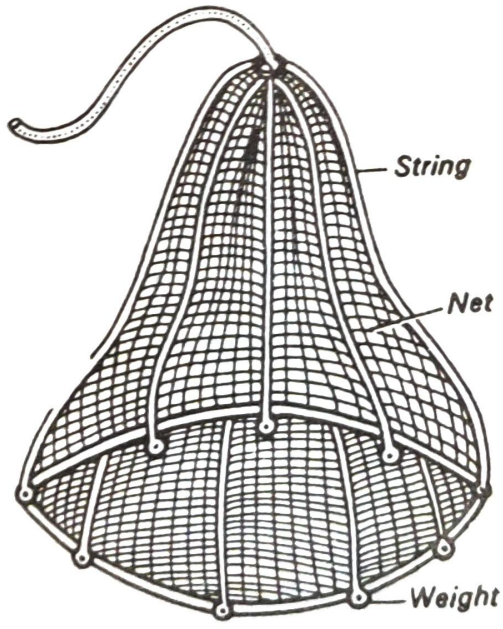

Fig. 24.7. Cast net.

swung over head and dropped to the distance reachable by attached rope. Cast net is operated from the boat. After sometime it is slowly dragged in water with the rope. The fishes enter in the net pockets and thus are caught and collected.

6. **Bagnets.** In Andhra Pradesh, Madras and Kerala coast specially made bagnets are used. Thurivalai which is very common in Andhra Pradesh and Madras have a wide platform like mouth with a long tapering flanks and is dragged by the help of two boats. Bagnets are used mostly in the areas where the current is strong, so that the net remains expanded.

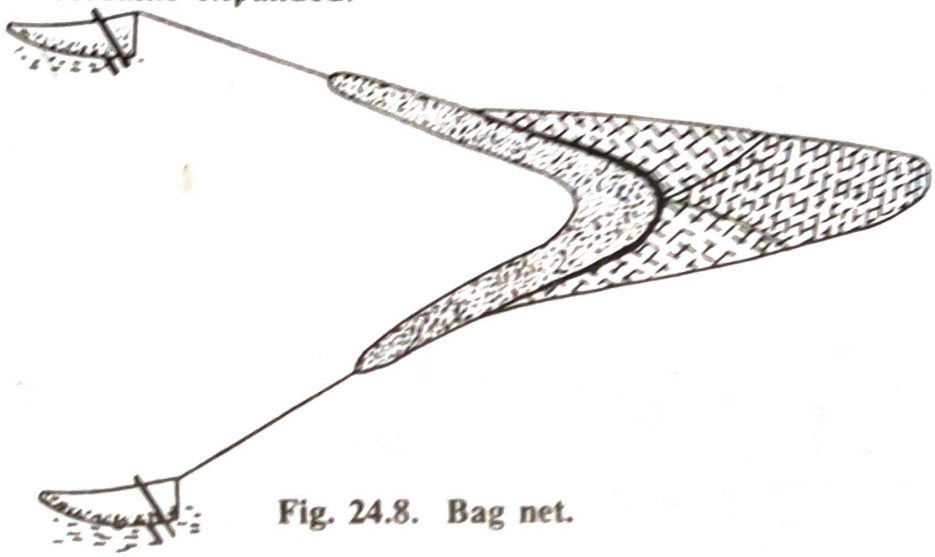

Fig. 24.8. Bag net.

7. **Gill and Drift Nets.** These passively operated nets of fixed type are made of cotton or nylon threads, woven

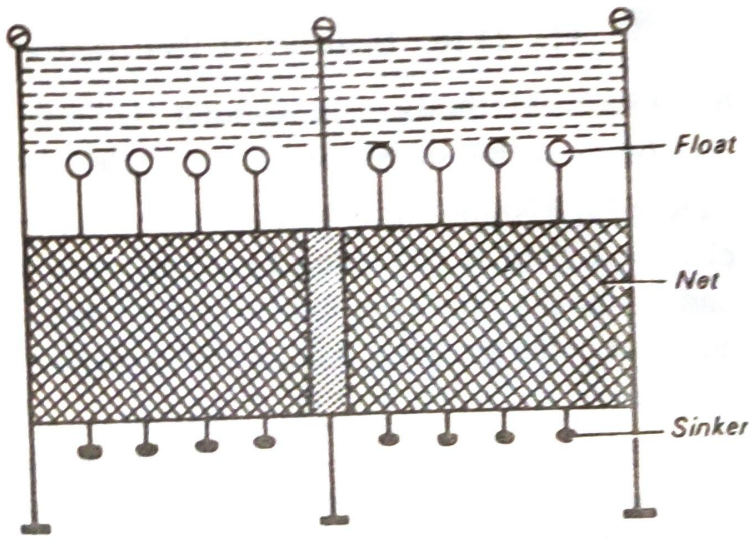

Fig. 24.9. Gill net.

into small meshes. The nets (Fig. 9) are suspended vertically in water in a wall shaped manner, so that the advancing fishes enter the mesh and upon withdrawal get entangled by the gills. The colour of such nets should be such, that it cannot be detected easily by the fish. Nylon threads are advantageous, because these can be twined easily and interlaced into fine meshes. The net may be dyed into the colours of suitable choice. Normally light coloured nets for turbid water and dark coloured for dark waters are selected. Capture is however, most successful in the night due to invisibility of the nets.

The mesh size of gill net is kept in accordance to the type of fish sought. The drift nets are the floating types of gill nets. Because they are meant for large varieties of fishes, they are made of stronger material. They are attached with wooden floats on the upper side (float line) and with sinkers on the foot rope (lead line). Such nets are commonly operated along the west coast, particularly in Tamil Nadu.

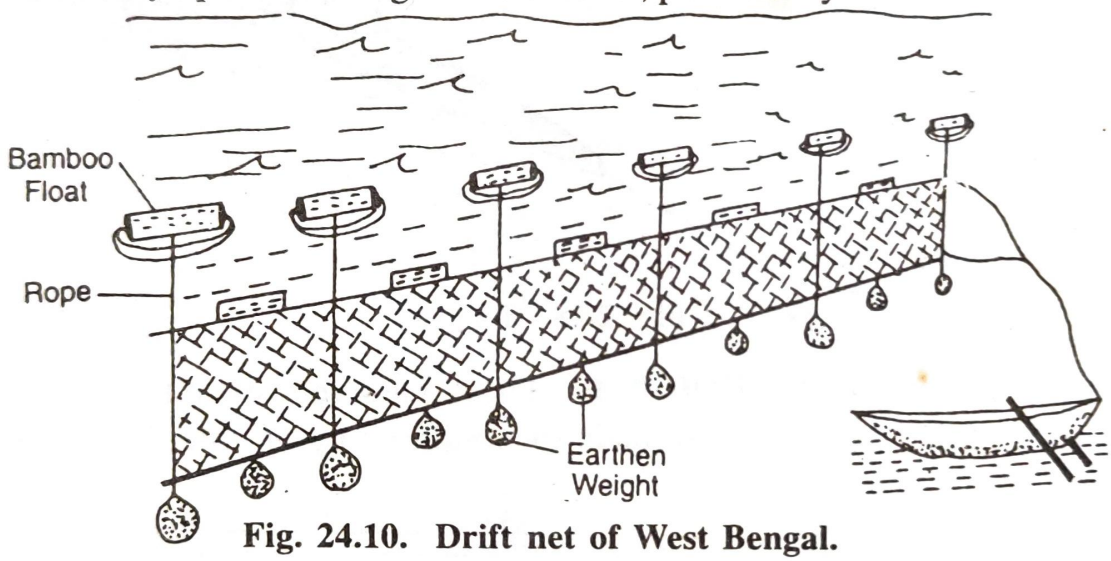

Fig. 24.10. Drift net of West Bengal.

8. Other Methods. These other methods are of various types, a few of which are mentioned below :

(*i*) **Electrical Fishing :** It is based on the principle, that when an electrical field is generated by inserting electrodes; (Anode and Cathode) in water, fishes tend to concentrate near the anode or in the electrical field, from where they can be collected by netting or by the suction pumps.

(*ii*) **Light Fishing :** It is the fishing done, after the fishes (particularly pelagic) are attached by artificial light. A net or pump may be used to collect the attracted fishes.

(*iii*) **Echo Sounder :** This technique is based on the artificial creation of sound waves under water and later their reception by the instruments. Those deflected on their way by water objects such as fishes etc. can be retraced by an automatic recorder and captured. The system is useful in locating deep sea fishes and those moving far off from the instrument.

PRESERVATION OF FISH

Flesh of fish has high energy value but is an extremely perishable product which starts undergoing change soon after the death of the fish and if not protected immediately may decay within few hours after death and becomes unfit for human consumption. In early days of civilization, when techniques were not much evolved, fishes were cured in other ways but now-a-days they are stored, placed and transported in deep freezed conditions. There are certain other probable ways of fish preservation besides deep freezing. The following methods of preservation of fishes are generally practised in India and abroad.

1. **Refrigeration :** The basic idea behind refrigeration is to preserve the fish at 0°C which prevents the spoilage for short period. For this purpose alternate layers of fish and ice are kept in closed vessels to maintain the temperature at 0°C. In case of large fishes ice pieces are kept in abdominal cavity of gutted fishes.

2. **Deep–freezing :** Before this, freezing, fishes are washed properly and kept at a temperature of –18° C for longer period. Only the fresh fish in good condition are deep–frozen. Before keeping the fish in this process the heads of large fishes are removed. They are also gutted and washed. By this method fishes can be kept for longer period without spoilage.

3. **Freeze drying :** This is long process and expensive so only good quality of fishes are put to this type of preservation. The first step is the freezing of the fish, which is then allowed to dry by sublimation. In this process ice is changed into water vapour without melting. The colour and nutritive substances are completely preserved by this technique. Further, the fish is frozen to –20° C by keeping them in freezing chamber. After freezing, fishes kept in trays are sent to the cabin containing

horizontal heating plates for drying in vacuum. Now fishes are well dried due to plates and packed in air-conditioned chamber.

4. **Drying :** Drying is done by the fishermen in most of the tropical countries where sun rays are strong enough to make the fish dry. It can be seen in Kerala, Karnataka and other parts of India whereas is a common practice in Philippines, China, Japan and most of the African countries. The drying of the fish can be done after salting also. Such a fish can be used in curry or by other means. It is a common food in Bengal, Bangladesh and Burma.

5. **Sun Curing and Mona curing :** An advanced method called sun curing over simple sun drying is developed in which body of the fish is opened from the ventral side and the viscera and the gills are removed. Then the fish is washed and salted in ratio of 1 : 3 to 1 : 8 (salt : fish) which is related with the size of fish.

   Mona curing is basically similar to sun curing with the difference that no incision is made in the body of the fish to remove the intestine and the gills. In this method the intestine and the gills are removed directly form the mouth. Further, eviscerated fishes are cleaned, salted and dried as earlier.

6. **Salting and Pickling :** The fish in brine or salt water is most widely distributed and accepted formula. This is such a process which is done ashore and just after catching the fish, they are decapitated cut open to clean the viscera. The cavity is washed by salt water and then they are kept layer after layer alternating with heavy deposition of salt. Then they are dried in the machine and packed in barrels. These fishes are grouped in two sub-heads–one the Klip–Cod which are decapitated, cut open and spreaded on rocks for drying whereas *Stock Fishes* are not decapitated and are kept intact. They are hung for drying in open sun. These are packed and sold in the market.

7. **Smoking :** This is an accepted principle for some of the fishes like, Herrings, Whiting, Cod, Ling, Saithe, Cat fish and Mackerel. In early days the fishes were smoked over camp fire and stored for few days only. But now-a-days more evolved

techniques have developed and they are smoked in large number. This is done by some special type of woods particularly Mahogani, Oak and other hard wood which are low in oil contents and resins. Saw dust is also used for producing smoke but it is always kept in mind that taste and flavour is not damaged. The fishes are cut open and cleaned then burried in salt for 3–5 days depending upon quality of fish and then smoked for 7–10 days. Such a fish can be stored for long period.

8. **Canning :** The canning of fish is a long, complicated and advanced process. It is done in more scientific way. The fish is cleaned, washed, decapitated and cut open to remove the viscera. Small chips or pieces are cut, salted and washed in brine. They are kept in brine for some time then washed properly. After drying and cleaning again they are fried in oliv oil for 2–3 minutes and then packed in oliv oil filled container. Sealed tins keep the fish fresh for a longer period. Canning is done in various ways in different parts of the world. In some countries they are packed in olive oil but in other countries in vinegar or other medium. The fish flesh is used in making sausage, rissotes, anchovy paste and cakes of fishes.