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Book Review

Construction and Pond Preparation in Aquaculture

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ABSTRACT

The construction of freshwater ponds first parity is needed to be a suitable site and include the suitable villager locality, water sources, a good quality soil for fish farming, and proper management for outlet and inlets, road facilities for ingredients and fishes exporting, and after that construction of ponds and proper castrated pond dike height, depth, and sloping and fencing management. And the ponds are after construction preparation of ponds includes the liming, after liming process 15 days fill the water. After that fertilization process starts with organic and inorganic methods for growing fish food include planktons, algae, microorganisms, etc. after those proper checking water qualities parameters like pH, ammonia, temperature, alkalinity, nitrate, nitrite, etc. after stocking fishes.

Keywords: Construction of ponds; Freshwater; Aquaculture; Ponds fertilization; Pond preparation

INTRODUCTION

The role of nature unique point not only human consideration. Understanding such aquatic life requires sound knowledge not just for organisms themselves but also of those of external influence of the medium that affects them [1].

The chemical parameter variation in ponds affected in the water quality is below the standard values has potential effects on fish health and production values. Fish production depends on physical, chemical, and biological water qualities. The fish culture in the growth of fish is most important in good growth in includes the factors temperature, pH, dissolved oxygen, hardness, ammonia, turbidity, alkalinity, and nutrients, etc [2].

Start a new freshwater ponds construction by following these steps first you select a good site and locality and check the soils and free seepage after construction start for ponds. New ponds constructed about ponds depth and sloping etc. After construction of all ponds sanitize them in lime and other sanitizing chemicals etc. Check the water quality and then add fish seed in ponds [3-7].

CONSTRUCTION OF FISH PONDS

Steps in ponds construction

Prepare the site by removing unwanted things such as the trees, bushes, and rock and a road, construction of seepage-free and secure dike by using the clay core, digging the ponds and construction of dike over the clay core, a good source of inlet and outlet construction, ponds dike covered with soil and plant grass species (avoid long-rooted plants such as Rhodes grass and star grass), ponds should be fenced to avoid theft and entry of predatory animals and coming any unvented fish [2].

Site selection

The site selection is one of the most important factors that determine the success of the fish farm. Before the construction of the pond, the water retention capacity of the soil and the soil fertility has to be taken care of because these factors influence the response to the organic and inorganic fertilization in the farm ponds. The selected site should have adequate water supply round the year for pond filling and good road facilities for other uses. The pond construction has to be based on the topographic area. In swampy and marshy areas, bunds should have a greater accumulation of soil to build the ponds of a preferable size. The site should be easily accessible by road or any form of transport to reach the market for easy fish disposal. In addition to this, the accessibility of inputs such as feed, seed, fertilizer, and construction material should also be available nearby the site. The site should be free from pollution, industrial waste, domestic waste, and any other harmful activities. For, site selection the

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following ecological, biological and social factors need to be considered [3-7].

Ecological factor

The ecological factor includes the water, soil, topography, and climate [3-7].

Water: Water is required to build the fish farm because water depth needs to be adjusted at regular intervals. Natural water bodies such as reservoirs, rivers, canals, and lakes have stable water quality parameters (temperature, dissolved oxygen, pH, alkalinity, and water hardness, etc.) when compared to bore well and well water and the site should be away from the flood area. Water should not be acidic or alkaline and if found to be so, suitable correction is to be done by applying lime or organic manure respectively. The ideal water temperature is commonly in carp's culture 26°C–35°C for a fish farm [3-7].

Soil: Loamy, clay loamy and silt clay soil types are most suitable for ponds construction. Good quality gravel should not exceed 10%. Thus the rocky, sandy, gravel and limestone soil types are to be avoided [3-7].

Topography: Good sources of water inlets and outlets in ponds water. Normally flood-prone areas and poor rainfall areas need to be avoided. Areas such as industrial zones, fields with underground oil pipelines, irregular land areas, fields with high electricity poles and radio masts, and highly rooted vegetation areas are also not recommended for pond construction [3-7].

Biological factors

Biological factors include the species to be cultured, seed source, feed sources, fertilizer, and culture type and they need to be considered before site selection of farm [3-7].

Social and economic factors: The ecological and biological factors are a prerequisite for good practices in fish culture site selection and site management. It is also important to get to know the social and economic background of the area and understand the culture and traditions, particularly ideas and beliefs locally associated with fish culture practices. The social fabric, market, and its structure, services directly or indirectly linked with the fish farming sector such as transportation, storage, wholesale market aspects, etc. are to be considered. The lands identified for farms should be without legal issues and fish farming should be accepted by the local people. Other important factors needed for fish farming include the availability of labour, electricity, medical facilities, and transportation

Site preparation: The place is cleared of ropes, cables, and other items and the removal of big trees-manually/animal power/ using machinery. All vegetation including wood is to be cleared in the area (inclusive of 2 to 3 m between the dikes for the workspace). Trees within 10 meters surrounding, tree stumps, large stones, are also to be removed. The surface soil which has the highest concentration of roots and organic material is not suitable for pond construction. Hence, about 30 cm of surface soil has to be removed [3-7].

Soil: The soil quality influences the pond's productivity and water quality and determines the dike construction. The properties of soil structure and soil permeability are determined to decide the suitability of a site. Ponds bottom should have the ability to hold the water. The soil qualities include the Loamy, clay loamy, and silt clay soil types that are most suitable for pond construction. Good quality gravel should not exceed 10%. Thus the rocky, sandy, gravel and limestone soil types are to be avoided [3-7].

Dike: The dikes should be compact, solid, and leak (seepage) free. A desirable dike is constructed using 15% -30 % of silt, 45% -55% of sand, and 30% -35 % of clay.

Prepare good dikes which are less than 1meter wide and 1meter height. In horizontal embankment slope to vertical should be 3:1 in good quality loamy silt and 2:1 for clay soil or sandy soils uses of the dike preparation. To raise the dikes, keep the clay buddle (1:2 sand and clay) is deposited as a 10-15 cm thick layer and it can be formed at the centre or inside the waterside of the pond. The crest of the dike should be sufficient to help allied farm activities and the top of the embankment should be above 1-1.5 m. An extra outlet is essential on the embankment as a safety measure to avoid damage due to excess raise in the water level [3-7].

CONSTRUCTION OF PONDS AND DESIGNS

Types of ponds

Ponds are required for specific life stage development of fishes as likes nursery, rearing, stocking, and brood-stock fish ponds. The rectangular ponds are preferred than rounds shaped corners as it prevents the fish escape during harvest. An ideal length and breadth ratio of the ponds is 3:1 is ideal, with breadth, not more than 30-50 m. The total farm area can be divided as -nursery-5% of total farm area, rearing pond-20%, stocking pond-70%, and bio pond-5% of the total farm area [3-7].

Nursery ponds: Nursery ponds small ponds constructed for seed rearing in nursery ponds. The size of nursery ponds is about 0.01-0.05 hectares with a depth of 1 to 1.5 meters, and the spawn is stocked in nursery ponds and reared a maximum of 30 days [3-7].

Rearing ponds: The rearing ponds for fry and fingerling seed rearing, rearing ponds of size varies 0.05 to 0.1 hectare with a water depth of 1.5 to 2meters. The rearing culture duration is 2-3 months. And proper management carefully like water quality parameters for fishes [3-7].

Stocking ponds: In the stocking ponds, the fingerlings fishes (length 10-15 cm) are rearing ponds into marketable size. The culture duration varies from 8-12 months. The stocking density varies according to the target fish production. The stocking pond is used as a brood-stock pond and breeding pond as per the requirement. However, the pond area ranges from 1-2

hectares and above but is suitable for fish farming in 1 hectare is better with a greater water depth of 2.5-3.0 meters [3-7].

Bio (Treatment) ponds: The bio ponds are compulsory for any medicinal trial, fish quarantine, and any other factor checking for fish's related treatments. And the water for purified biologically methods and used the stocking ponds an even flat bottom is recommended for easy netting operation [3-7].

Types of ponds construction

The ponds are constructed by digging the soil and are most suitable to constructed ponds in plain areas. It is to be scientifically constructed maintained shape, size, depth, and other factors. An embankment pond is more appropriate for the hilly areas. Dikes may be erected on 1 or 2 sides based on need. This pond is economically viable but not ideal for fish culture because the size, shape, and depth of ponds cannot be fixed as per scientific fish culture specifications [3-7].

Inlet and outlet construction of ponds water: Inlet systems in the canals are constructed to provide a sufficient amount of water quality to the ponds except in ponds that are filled by rainwater. Inlets are provided at top of the ponds, screens are used to filter the pumped water to avoid the entry of unwanted particles into the culture system. The inlet pipe size has to be designed in such a way that it should not take more than 1 or 2 days to fill the ponds.

The outlet pipe is set up at bottom of the centre ponds. It is used to dewater the pond during harvest and partial draining for ponds water exchange to maintain the water quality of the ponds during the culture periods. The outlet is constructed before ponds dike construction [3-7].

Ponds fencing: The Protection of ponds is fenced to protect live fences also serve as windbreaks, provide privacy to farms, increase farm diversity, and develop the appearance of the fish farms. These include a live fence, piled fence, woven fence, post and rail fence, wire fence, wire netting fence, net fenced and stone wall. Each type of fence has its advantages and disadvantages. The wired net fence is primarily used in fish farms to stop intruders and protect the fish stock [3-7].

Pond preparation

Preparation of ponds before stocking fish: After the construction of fish, ponds sanitize and prepare for before stocking fish including composed, fertilizing, etc. put the lime for unwanted bacteria killed, and use of fertilizer and composted soil fertility after some days stocking fish [3-7].

Liming: Lime (calcium hydroxide) is spread over the bottom, for two weeks. The lime has been the use of new Ponds construction in the 20-30 kg/Acres before stocking waters for dying unwanted bacteria. The use of liming before stocking water in ponds 200-300 kg/h. It removes the acidity of the soil, facilitates desirable geochemical cycles, and kills unwanted soil organisms and after two weeks stocking water and check all parameters after stocking fish [3-7].

Role of lime in ponds:

- Liming neutralizes soil acidity (soils of the State are mostly moderately acidic).
- Liming is done to increase the PH value of soil towards Alkaline.
- It changes the soil structure.
- It promotes the bacterial breakdown of organic matter.
- It supplies calcium needed for plant growth and bone formation of fish.
- It serves as a fertilizer.

Manuring (Composed): After 15 days of liming, the fertilization is to be done to develop the fish food organisms (phytoplankton and the zooplankton, macro and micro). Manure may be of organic or chemical nature. Organic manure may be urine or sewage rich in nitrogenous matter, cow dung, pig dung, poultry manure, and plant manure such as green manure, compost, oil cake, etc. If the organic carbon is less, cow dung for the stocking pond is applied at the rate of 2-3 tonnes/ha.

Poultry manure at the rate of 5000 kg/ha is known to enhance zooplankton induction. The use of chemical fertilizers should vary according to the concentration of phosphorus and nitrogen in the soil. The standard combination of N:P:K as 18:10:4 is generally recommended for freshwater ponds. For a production pond of medium fertile soil, urea at the rate of 200 kg/ha/yr. or ammonium sulphate at the rate of 450 kg/ha/yr. may be applied in split-up dozes, alternating with organic manure [2].

Fertilizing: Pond fertilization is important to increase primary productivity in extensive culture ponds. Fertilizers also are used in semi-intensive aquaculture to supplement feed until feed inputs reach 20 to 30 kg/h/days and nutrients from metabolic wastes are sufficient to maintain plankton blooms. Intensive ponds often are fertilized before stocking to develop plankton blooms, because recently stocked fingerling or post-larvae benefit from natural food organisms. Organic fertilizers have been used widely to promote fish production in ponds. However, there also has been much use of urea, Triple Superphosphate (TSP), and other commercial chemical fertilizers in the use of ponds. Anyone or combination of at least 14 mineral nutrients that could be in short supply in ponds relative to phytoplankton requirements. Fortunately, only two mineral nutrients (nitrogen and phosphorus) consistently limit phytoplankton productivity in fish ponds. Although primary productivity in ponds with low-alkalinity waters can be limited by a shortage of carbon dioxide, this problem is solved by liming rather than fertilization [3-7].

CONCLUSION

The fish farming before proper management and construction methods should be most important as like locality, soil, locality environments, water sources, inlets and outlets, and road facilities its basic facilities is most important. Scientific methods in ponds construction, includes pond dike, depth, suitable leng-, -th sloping, etc. after that ponds should be sanitied with lime.

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REFERENCES

1. Rana N, Seema J. Assessment of physico - Chemical parameters of freshwater ponds of district Bijnor (U. P), India. J Entomol Zool Stud. 2017;5(4):524-528.
2. Jhingran VG, Sehgal KL. Coldwater fisheries of India. 1978.
3. Food and Agricultural Organization. Fish pond construction of management book. 2005.
4. Ch B, Singh RK, Sureshchandra N, Soranganba N, Sobita N, Singh TB, et al. Fish farm design and pond construction for small scale fish farming in Manipur. ICAR Research Complex for NEH Region. 2019.
5. Carballo E, Eer AV, Chie TV, Hilbrands A. Small-scale freshwater fish farming. Agromisa/CTA. 2008.
6. Lalremsanga HT. Types of fish farming. 2021.
7. Chakroff M. Freshwater fish pond culture and management. 1976.
8. Shah I, Aklakur M, Prabhakar P, Kumar N, Kumari S. Construction and pond preparation in aquaculture. Fish Aqua J. 13: 286.