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TO STUDY THE CONSTRUCTION AND MAINTENANCE OF FISH FARM AND FISH DISEASES

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ABSTRACT :
As the global population is projected to reach 8.2 billion by 2025, the fast-growing aquaculture sector is playing a part in addressing food security and economic development. Incorporating aquaculture into food systems has several benefits, including easing pressure on wild fish populations and boosting economies, especially in rural regions. India is the world's second-largest fish farming nation, behind only China, thanks to its thriving fishing sector. This study examines the building and maintenance practices used in three different fish farms in the Indian state of Telangana: Bibinagar, Cheeryala, and Jadcharla. Channa striata, Labeo rohita, and Catla catla are the main fish species cultivated in these farms because of their abundance and adaptability to different soil types. The similarities and differences, as well as the variances in the execution of maintenance activities, are shown by comparing the building techniques and maintenance procedures of various fish farms. Also included are fish illnesses including red spot, dropsy, fin rot, and head rot, as well as possible causes like poor water quality, improper maintenance, and the lack of isolation ponds. This study sheds light on farmers' attempts to manage and minimise these health concerns, and it emphasises the importance that building and maintenance methods have in avoiding illnesses among aquatic lifeforms. Based on the findings, it is critical to strengthen maintenance procedures and building standards to boost fish health and guarantee the sustainability of aquaculture operations in the long run.

INTRODUCTION :

AQUACULTURE:

Aquaculture is the practice of raising aquatic creatures in controlled environments for the purpose of food production for both humans and other animals. When it came to international trade, aquaculture was once a game-changer. A number of national socio-economic development goals may be attained by the rapidly expanding aquaculture industry. People looked to it as a way to make money and find jobs, rather of relying only on agriculture. The agricultural and fisheries sectors have been hit hard by the predicted global population boom of 8.2 billion people by 2025 (A.D.) (Vibhavari and D'Souza 1998). The source is Devi (2000). Marine aquaculture refers to the practice of growing plants and aquatic creatures in saltwater environments including seas, bays, and estuaries. Prolonging production, reducing fishing pressure on wild species, and generating economic opportunities for coastal communities are all dependent on it. On the other hand, freshwater aquaculture is all about growing fish, crustaceans, and aquatic plants in environments that are specifically designed for them. Both methods are well-liked because to their adaptability, ease of maintenance, and low initial investment requirements. There are ongoing attempts to improve farming methods, maximise resource utilisation, and limit ecological effects in order to keep aquacultures viable in the long run, despite challenges with disease management and sustainability.

FISH FARMING:

In India, fishing is a booming industry that makes use of a wide variety of resources. In terms of total fish output, India is second only to China, and it is also the world's second-greatest fish farming country. For the vast majority of people, particularly in rural areas, fishing and fish farming provide the most basic needs for sustenance, employment, and economic growth. At the most basic level, the fishing sector employs 250 million people, and that number doubles as one moves up the value

 ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

chain. The potential of inland fisheries and aquaculture has not been realised, despite the fact that they have increased in absolute terms. Increased output, improved livelihoods, and economic success are all within reach thanks to the vast inland aquatic resources. [D. UTTÉJ, year 2023] The inland fisheries of Telangana have traditionally relied on leases and licenses to access lakes and tanks for fishing. There is a fresh push to increase the water storage capacity of bodies of water and expand the water spread area (7.76 lakh hectares) via irrigation projects in the Krishna and Godavari river systems as well as Mission Kakatiya. In 2018–19, fish production surged to 294 thousand metric tonnes, up from an expected 133 thousand metric tonnes in 2016–17. Putting the Indian state of Telangana among the top five best central fish farms in the country. [D. UTTÉJ, year 2023]. Fish may soon replace chicken and cattle as the primary source of protein in the food chain. The primary rationale for this is that fish is a cheaper source of higher-quality protein. The year 2017 was mentioned by Gopalakrishnan A.

CONSTRUCTION OF A FISH FARM:

In addition to planning the layout and expansion of his farm, a fish farmer requires certain kinds of ponds for the various phases of fish development. The architecture of the fish farm, including the quantity and size of ponds, is determined by the kind of fish to be cultivated. Soil type, terrain, water availability, and drainage are the four most critical factors to think about when selecting a location for a fish farm. Shahna (1986) According to Parihari (1994),Establishing a fish farm requires careful consideration of location. Picking the right location is crucial to the fish farming industry's performance and the project's financial feasibility. Some important things to think about include, as stated by Khanna (1986) and Parihari (1994): When planning and running a fish farm, topography is an important factor to consider. An ideal location would include a sloping surface, a bowl or valley form, hills all around, and a way out. In addition to having high-quality soil, there should be an abundance of water and plans for water flow and drainage. Type of soil: To avoid seepage, it is essential to utilise impermeable soil while building fish ponds. Soil that is too permeable is not ideal for stocking ponds; heavy clay and silty clay are better choices. Applying a layer of clay or soil sealant to soil-based ponds used for raising plants might be advantageous. If you need assistance deciding which soil type is best for building a pond, a soil analyst is a good resource. The availability of clean water is one of the most important considerations when choosing a location for a fish farm. Many natural features, such as lakes, springs, rivers, streams, canals, wells, and surface runoff, may be used as water sources.Reservoirs, lakes, tanks, and, as a backup, springs, are all good places to get water. Several different Other potential water sources include minor rivers and canals, provided their water levels remain consistent and there is little silt in them. Stay away from streams that might flood after heavy rains since they could lower the productivity of fish ponds.

Layout of the Fish Farm: Layout plans for location design and pond types are crucial before construction. The farm size depends on the purpose, with subsistence fishing requiring a small 0.04 ha farm. Commercial and experimental farms require larger areas for nursery, rearing, stocking, and breeding ponds. Fish farms typically have 4 or 5 types of ponds for specific purposes:

i. **Hatching pits**: Small hatching tanks, typically 8x4x2, near riverine collection grounds, use continuous, slow-flowing water for aeration and a cloth tank called hapa.
ii. **Nursery ponds:** 50x50'x4' seasonal ponds help eradicate fish enemies and increase productivity by drying up during summer.
iii. **Rearing ponds: Ponds** for rearing advanced fry 2-3 months, seasonal or perennial, are long, narrow, gently sloping, 4' deep, and suitable for netting**.**
iv. **Stocking ponds:** Large perennial tanks with depths over 6 feet, 300 feet or more, designed for netting and long construction. . [Khanna,1986] [Parihari,1994]

MAINTENANCE OF FISH FARM:

There are ways to make a pond more productive. The first step in pond management is to remove any unwanted plants or weeds. To keep production high and muck buildup to a minimum, it is

 ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

recommended to empty, dry, and clean the pond on a regular basis. In order to keep the pond's pH stable, prevent the growth of parasites, and get rid of bacteria and fish parasites, lime is an essential component. The use of fertiliser helps increase yields because it supplies plants with essential elements like vitamins and minerals. You may use organic choices like guano, liquid manure, and agricultural manure sewage sludge, or inorganic ones like ultra nitrogenous fertilisers. You can get more fish out of less expensive ingredients like grain, flour, rice bran, and food scraps by adopting artificial feeding techniques. You may use either netting or draining to get the fish out of the pond, but draining is the most complete way. Findings, in terms of water loss, although alternating drainage between consecutive ponds may aid in preventing excessive water loss.

FARMED FISH DISEASES:

Environmental stress, poor water quality, insufficient nutrition, parasites, fungus, and bacteria are some of the causes of fish farm illnesses. Infectious diseases are more likely to spread when fish are housed in close quarters. The immune system of fish is compromised by stressful environments, overpopulation, uncleanliness, and ineffective farm management. Financial losses, lower production, decreased growth rates, and death rates are all possible outcomes of disease outbreaks in the fish farming industry. Managing and preventing these illnesses requires prompt diagnosis, effective methods for disease prevention, biosecurity measures, frequent health monitoring, and the right use of drugs and vaccines.

ROOT TURN OR FIN TURN:

Young fish often have bacterial rot of the fins and tail. Hygiene standards at hatcheries, whether they are too clean or too unclean, are associated with fin and tail rot. Tail and fin rot is most often caused by bacteria, however it may also be caused by pathogenic protozoans and fungi. It is possible for the infection to progress to the skin's surface. Hydrophilic Aeromonas: It is a facultative anaerobic bacterium that is Gram-negative and found in a wide variety of marine environments, including freshwater, brackish water, and marine ecosystems. The rod-shaped, motile Aeromonas hydrophila has metabolic and biochemical characteristics. It uses glucose, lactose, sucrose, and mannitol as feedstock and has a fermentative metabolism; it is also catalase and oxidase positive. In addition, it may break down red blood cells (haemolysins) by its haemolytic action. Many antibiotics, such as ampicillin, cephalosporins, tetracyclines, and fluoroquinolones, have been ineffective against Acinetobacter hydrophila. Parasitis, wound infections, septicaemia, and systemic infections are just a few of the many illnesses that Acinetobacter hydrophila may cause in both humans and animals. One parasite illness that may infect both marine and freshwater fish is white spot disease, which is also called ichthyophthiriasis. Ichthyophthirius multifiliis is a ciliated protozoan that causes ich in freshwater environments, while Cryptocaryon irritating, a two-stage protozoan, causes ich in marine environments. The illness symptoms are caused by the trophont stage, which is characterised by a horseshoe-shaped nucleus, cilia covering it, and a round or oval form. The binary fission-based reproduction process allows Ichthyophthirius multifiliis to swiftly grow on the skin or gills of afflicted fish. When trophonts have grown and fed on their host's fluids, they shed their shells and encyst in the environment, changing into tomonts. A large number of infectious theronts may be produced by these tomonts via asexual reproduction. The protoplasmic feet of trothrits allow them to cling to fish hosts, where they irritate and destroy tissues. The trophont, tomont, and theronts are the three main phases of the life cycle of Ichthyophthirius multifiliis. After developing and falling off the host, the trophonts metamorphose into tomonts, which encyst and reproduce asexually, producing a plethora of infectious subsequent generations. After hatching, the theronts are free to swim around in the water and infect any victims they come across. Shahna (1986) According to Parihari (1994), In 2011, Colorni published a study. In 2006, Dickerson Infectious dropsy is caused by the bacterium Pseudomonas punctata. Discharge of a yellowish fluid from the body cavity, projecting scales, and exophthalmic symptoms are the hallmarks of this condition (intestinal dropsy). Ulcerative dropsy

ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

causes the fish's backbone to distort and its fins to lengthen, and it also causes the fish to jump more often when skin sores develop. Infectious dropsy is one of the worst illnesses that may happen to carp farmers. Most people think that bacteria are present when viruses first infect a host. The rod-shaped, motile, and pigment-producing Pseudomonas punctata is a Gram-negative bacteria. It helps build antibiotic resistance by forming biofilms that shield it from environmental stressors. To fuel its metabolism, Pseudomonas punctata may take carbon from a wide variety of organic molecules and nitrogen from either nitrate or nitrite. It may be distinguished from other species of Pseudomonas by its unique yellow tint. According to Parihari (1994),Spinal abnormalities are prevalent in farmed fish and are caused by a lack of proper nutrition. Abnormal lateral curves developing in their spinal columns impact their swimming abilities, which is exacerbated by a lack of essential vitamins (C, D, E), phosphorus, and amino acids (particularly tryptophan). Just as in people, the root cause of scoliosis in fish is often a mystery. It may be present at birth or developed later in life as a result of things like a family history of the condition, a lack of proper nutrition, water contamination, an injury, or a developmental defect. [Akiyama 1984] Gill rot is a fungal illness caused by Phycomycetes that quickly kills carp and other freshwater fish. The hyphae of these fungi branch out and enter the gill veins, where they cut off the host's supply of nutrients. The decay of the gills causes the fish to suffocate and die. The fish's survival from this disease is difficult to prevent. Shahna (1986)

BACTERIA:

Pseudomonads, Aeromonas, Micrococcus, Bacillus, Vibrio, and Moraxella are some of the bacteria that have been linked to outbreaks of epidemic urea syndrome (EUS). The gram-negative bacteria known as pseudomonads cause tissue injury in fish by the secretion of poisons and enzymes. Enzymes, poisons, and virulence factors are produced by Aeromonas species such as Aeromonas hydrophila and veronii, which contribute to EUS. Although micrococcus bacteria are present in certain environments, they are not responsible for endocarditis. It is yet unclear how Bacillus bacteria in soil and water contribute to the development of EUS. Water is a haven for some Vibrio species, such as Vibrio harveyi and Vibrio alginolyticus. Utilise virulence factors to inflict tissue damage and death in fish. Additional study is needed to have a better understanding of the role of Moraxella bacteria in the pathogenesis of EUS. In 2006, Subhas Chandra Routh wrote: VIRUS: In the context of viruses While viruses may amplify the symptoms of EUS, the fungus Aphanomyces invadans is the actual culprit. In rare cases, viruses such as rhabdoviruses or birnaviruses may compromise fish immune systems, leaving them more susceptible to infections and perhaps causing severe illness. While most retroviruses affect primarily birds and mammals, EUS has been shown to have an effect on fish populations. Contrary to popular belief, retroviruses are not associated with instances of EUS (Subhas Chandra Routh, 2006).

STUDY OF OBJECTIVES:

1. To study the comparative construction of fish farms.
2. To study the comparative maintenance of fish farms.
3. Diseases caused due to poor maintenance of fish farms.

RESEARCH DESIGN :

The purpose of this research is to examine fish infections in Hyderabad, Telangana, as well as the building and management of fish farms. We will only choose fish farms that nurture the Channa striata, Labeo rohita, and Catla catla species. Site visits, evaluations of infrastructure, interviews with farmers, and records of upkeep will all be part of the research. The table compares and contrasts various building styles and evaluates the potential influence of maintenance procedures on fish health results.

RESEARCH AND METHODOLOGY:
Exploration of three fish farms in Hyderabad, India: Bibinagar, Cheeryala, and Jadcherla. Construction, maintenance methods, and fish diseases are all noted and recorded throughout the trips.

COMPARATIVE STUDY OF CONSTRUCTION OF FISH FARMS :

CHARACTERISTICS	BIBINAGAR	CHEERYALA	JADCHERLA
SOIL TYPE			
LANDSCAPE			
TOTAL AREA OF FARM			
WATER SUPPLY			
TOTAL NUMBER OF PONDS			
FINGERLING POND NUMBER AND SIZE			
FINGERLING POPULATION			
ADULT POND NUMBER AND SIZE			
ADULT POPULATION			
ISOLATION POND			
TYPE OF FISH CULTIVATED			

COMPARATIVE STUDY OF MAINTENANCE OF FISH FARMS :

CHARACTERS	BIBINAGAR	CHEERYALA	JADCHARLA
TIMES OF CLEANING THE POND			
DRAIN			
LIMING			
pH OF WATTER			
TEMPERATURE OF WATER			
FERTILIZERS			
NATURAL FEED			
ARTIFICIAL FEED			
AERATION SYSTEM			
VACCINATION			

COMPARATIVE STUDY OF DISEASE IN FISH FARMS :

CAUSATIVE PATHOGEN	BIBINAGAR	CHEERYALA	JADCHARLA
BACTERIA			

ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

FUNGI			
PARASITIC			
VIRUS			

NUTRITIVE DEFICIENCY	BIBINAGAR	CHEERYALA	JADCHARLA
VITAMIN D			
VITAMIN C			
TRYPTOPHAN			
VITAMIN A			
VITAMIN B			
VITAMIN E			

RESULTS AND DISCUSSION

COMPARATIVE STUDY OF CONSTRUCTION OF FISH FARMS:

CHARACTERISTICS	BIBINAGAR	CHEERYALA	JADCHERLA
SOIL TYPE	Red soil	Red soil	Black soil
LANDSCAPE	Negative slope	Negative slope	Negative slope
TOTAL AREA OF FARM	1 hectare	1 hectare	1 hectare
WATER SUPPLY	Bore water	Bore water+25kgsalt	Pond water
TOTAL NUMBER OF POND	3	2	3
FINGERLING POND NUMBER AND SIZE	1 pond of 0.5sqm	1 pond of 0.5 sqm	1 pond of 0.5 sqm
FINGERLING POPULATION	5000	1000	1000
ADULT POND NUMBER AND SIZE	2 pond of 0.5 sqm	1 pond of 0.5 sqm	2 pond of 0.5 sqm
ADULT POPULATION	3000	9000	6000
ISOLATION POND	absent	absent	absent
TYPE OF FISH CULTIVATED	Channa striata	Labeo rohita channa striata	Labeo rohita Catla catla Channa striata

COMPARATIVE STUDY OF MAINTENANCE OF FISH FARMS :

CHARACTERS	BIBINAGAR	CHEERYALA	JADCHARLA
TIMES OF CLEANING THE POND	2 times a day	0 Once in 15 days	0 0 Once in 15 days
DRAIN	RAS TYPE	BIOFLOC	ABSENT
LIMING	done	done	Done
pH OF WATER	7	7.2	7
TEMPERATURE OF WATER	27 Celsius	27 Celsius	27 Celsius
FERTILIZERS	Organic and	organic	Organic and

ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

	inorganic		inorganic
NATURAL FEED	Kitchen waste	Kitchen waste	Kitchen waste
ARTIFICIAL FEED	Commercial feed	Commercial feed	Commercial feed
AERATION SYSTEM	present	present	Absent
VACCINATION	absent	absent	absent

COMPARATIVE STUDY OF DISEASE IN FISH FARMS :

CAUSATIVE PATHOGEN	**BIBINAGAR**	**CHEERYALA**	**JADCHARLA**
BACTERIA	0	3	5
FUNGI	0	4	2
PARASITIC	0	0	0
VIRUS	0	0	8
NUTRITIVE DEFICIENCY	**BIBINAGAR**	**CHEERYALA**	**JADCHARLA**
VITAMIN D	1	0	0
VITAMIN C	0	0	0
TRYPTOPHAN	1	0	0
VITAMIN A	0	0	0
VITAMIN B	0	0	0
VITAMIN E	0	0	0

The importance of well-built and regularly maintained fish farms in avoiding fish infections was highlighted during site visits to farms that raise Channa striata, Labeo rohita, and Catla catla. Importantly, the Bibinagar fish farm has a substantially lower incidence of disease outbreaks. By routinely checking the water and feed quality as well as the number of fish in the tank, the farmer at the Bibinagar farm shows his dedication to environmental health. Furthermore, precautions like water filtration and enough aeration are taken very seriously. These methods help keep fish populations healthy and lessen the likelihood of disease outbreaks. The water treatment systems used for fish farming included Biofloc and RAS type. The farms in Cheeryala and Jadcharla, however, have fish illnesses due to a lack of proper upkeep. Red spot disease, dropsy, and tail or fin rot were among the ailments that were noticed.

CHEERYALA FISH FARM :

Red Spot Disease or EUS in Channa striata

ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

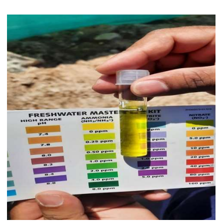
Red Spot Disease or EUS in Labeo rohita

JADCHERLA FISH FARM:

Tail Rot in Fingerling of Channa striataFin Rot in Adult Channa striata

Dropsy in Fingerling of Channa striata Head Rot in Fingerling of Channa striata

BIBINAGAR FISH FARM



API freshwater kit to measure pH, ammonia, and nitrate levels.

 ISSN: 2278-4632
Vol-14, Issue-10, No.02, October: 2024

Spinal deformity fish from Bibinagar farm

CONCLUSION :

Optimal development and health of fish populations were ensured during the visit to three fish farms by observing infrastructure and different maintenance procedures on a comparative basis. A variety of fish, including the water-dependent Channa striata, the filter-dependent Labeo rohita, and the non-filter-dependent Catla catla, were reared. Regular cleaning and maintenance of tanks or ponds, monitoring and maintaining water quality, and undertaking biosecurity measures to avoid disease introduction were all part of the maintenance routines. Water temperature, water quality, and food preferences varied greatly across fish species. Natural feed, which may include food scraps, varies in composition based on the fish species and its growth stage. Pelletised and extruded commercial feeds were widely utilised since they were designed to meet the specific nutritional requirements of fish. The use of recirculating aquaculture systems (RAS) and Biofloc were among the many fish farming techniques highlighted. Although each approach had its benefits and drawbacks, RAS provided more control over water quality but required more technology and infrastructural investments. While at Bibinagar, we tried to spot nutritionally insufficient fish with spinal abnormalities and common fish infections in the Cheeryala and Jadcharla farms. The presence of bacterial, viral, or fungal illnesses in farmed fish, such as tail and fin rot, EUS, and Dropsy, highlights the need for efficient preventative measures in such farms. In conclusion, learning about the many fish farming techniques, feed kinds, varieties of fish grown, and maintenance measures during the farm visits was a very educational experience. In addition, the infections that were detected during this visit highlighted the need for proper implementation of preventative measures and biosecurity regulations. A more thorough comprehension of farm fish health management might be achieved by more study and cooperation with aquatic vets. This would be useful for spotting and dealing with any health problems.

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