

# Modern day's Aquaculture

Sayli Mandar Bhosale

Dept. of I.T., Sonopant Dandekar College, Palghar-401404, India; e-mail: saylipatil1991@gmail.com

## ABSTRACT

Agriculture has been backbone of India. This paper focus on promising solutions of precision aquaculture which have been proven to work in many countries by using artificial intelligence in aeration, feeding and water and pond management. Series efforts have been done to develop and improve the production of fish by rearing high value fish in tanks or ponds. As we know India is developing country and aquaculture farmers are still using traditional techniques, hence there is low production and financial losses are high. So by using advance techniques of artificial intelligence farmers can overcome the production and risk of financial losses.

**Key Words:** promising solutions, artificial intelligence, aquaculture.

*SAMRIDDHI : A Journal of Physical Sciences, Engineering and Technology, (2021); DOI : 10.18090/samriddhi.v13iS1.17*

## INTRODUCTION

**A**quaculture means breeding and harvesting of aquatic species.

It is an important business sector in India which employs more than five million people and also provides low cost protein food to the consumers. Fish industry contributes nearly 200 trillion rupees to the national economy which forms 1.4% of GDP (Gross Domestic Product) and 5.4% of agricultural GDP and it's a major foreign export sector.

The present paper provides an overall aspect of the countries inland aquaculture production practices, trends and future perspective using artificial intelligence. It includes both fresh and brackish water based on research and recommendations made about how to develop inland aquaculture in India using modern techniques.

There are two types of Aquaculture – Marine and Freshwater

### Marine

Marine culture is an aquaculture which works by the use of sea water. It is carried on banks of creeks by creating earthen ponds. The species which are bred in marine cultures are prawn, crabs even seaweed.

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**Corresponding Author :** Sayli Mandar Bhosale, Dept. of I.T., Sonopant Dandekar College, Palghar-401404, India; e-mail: saylipatil1991@gmail.com

**How to cite this article :** Bhosale, S.M. (2021). Modern day's Aquaculture.

*SAMRIDDHI : A Journal of Physical Sciences, Engineering and Technology, Volume 13, Special Issue (1), 76-80.*

**Source of support :** Nil

**Conflict of interest :** None

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### Freshwater

It works by the use of fresh water which we get from rivers, natural lake and rain water. It can be created by making earthen ponds in our farms. The species which are bred in fresh water are rohu, catla, tilapia, catfish etc.

### TRADITIONAL TECHNIQUES IN AQUACULTURE

In Traditional aquaculture practices farmer use paddy lands for fish or shrimp culture in which bunds height is low, due to which during high tide creek water floods into the pond and wash away the fishes from the pond into creek.

Lack of water management such as pH, Salinity count is not conducted. Hence, there are mortality

of product, feeding practice are down rated hence the growth of fish is less and time consuming. Farmers do not add supplementary food products to the diet of fish. Therefore the profit is low, traditional practices have low productivity but the culture cost is very low.

In old techniques we can take single crop a year, as there is low pond management practice.

### MODERN TECHNIQUES IN AQUACULTURE

Modern farmer selects his land for aquaculture according to lands quality, minerals and its capacity of cultivation. For this, soil test is conducted by taking a small amount of soil and sent to the lab to check its quality. Same goes with water availability and quality of water which is also tested in lab to check its PH, Salinity and other minerals. After land and water test is being done and if results are good the farmer measures the land accordingly to the required size for creation of pond. Modern machineries are used like JCB and tracker for digging the land.



Figure 1: Determination of pH

### AERATION SYSTEM

As we know all living creatures need oxygen for living. The same goes with aquaculture the fish also needs dissolved oxygen, as it gets from natural environment such as river, sea and ocean.

As a culture has stagnant water we have to artificially generate oxygen by using water soluble oxygen powder or aeration system for proper growth of fish. Artificial intelligence is used in modern time's aeration system in which the

intelligent technology control of the aquaculture aerator based on deep learning. The model is used to accurately predict the concentration of dissolved oxygen in aquaculture industry, and the predicted data can be used to intelligently control the work time of the aerator, to ensure that the energy consumption of the aerator is at the lowest level when the concentration of dissolved oxygen is suitable.

There are many types of aeration system.

#### 1. Pump – sprayer aerator:

These aerators have pumps that discharge water at high velocity through pipes or manifolds.



Figure 2: Pump-sprayer aerator

#### 2. Vertical pump aerators:

It consists of a submersible motor which sprays water to the output shaft like fountain.

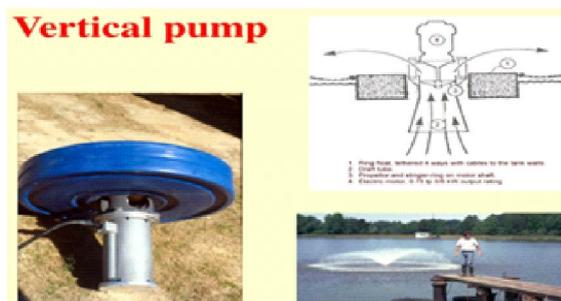


Figure 3: Vertical Pump

#### 3. Diffusers or bubblers:-

These systems use blowers or compressors to supply air to diffusers. The diffusers have many small holes that release bubbles in the pond bottom. It transfers oxygen as bubble rise through the water column.



Figure 4: Diffuser

#### 4. Paddle wheel aerator:-

It is a form of water wheel or impeller in which a number of paddles are set around the periphery of the wheel. It has several uses, some of which are low head hydro power (as a water wheel) Flow sensors aerators.



Figure 5: Paddle wheel aerator

There is also advance technique for water management and to increase dissolved oxygen level in water known as IPA (Intensive Pond Aquaculture).

By using one of the above aeration systems we can artificially create oxygen in pond water, like natural environment. Therefore, there will be less mortality and water management will be properly managed.

### FEED

As feed in aquaculture is the highest cost input in production by using automatic feeder system it can prove to be an important approach for lowering production cost and improving fish growth and reduce labor requirement.

As we have seen in traditional technique that farmer by himself or by labor feed the fish manually

by getting into the pond by boat or by working alongside bunds of the pond. By which the feed is not properly circulated and much of the feed spills around the bunds. So it cost waste of feed and money.

By using artificial intelligence, an improved feeding strategy can be developed in accordance with fish behavior. Such a system can terminate the feeding process at more appropriate times, thereby reducing unnecessary labor and improving fish welfare. The feeding intensity of fish can also be roughly graded and used to guide feeding. This method can be used to detect and evaluate fish appetite to guide production practices. In the future, additional data, such as environmental measurements and fish physiological data will need to be incorporated to achieve more reasonable feeding decisions.

Below some new techniques which can be used for feeding purpose.

#### Robotic feeder

This feeder can be used for feeding by just adding quantity, time and area of feeding. By using this we can directly get reed of human dependability and can get accurate feed distribution and zero wastage of feed. The feeding mechanism is easily and widely adjustable. Among other, the height of the feeder is adjustable to accommodate different heights of tanks used in the industry.



Figure 6: Robotic feeder

### POND MANAGEMENT

This is very important aspect in any aquaculture. Technique of management involve

- Continues check of pond ecology to ensure optimum production of natural fish food while maintaining the water quality parameters within limits of stocked fish species.
- Monitoring of fish growth through stock check, supplementary feeding and health care.

Below are the stages that involve pond management:-

### Pre-Stocking Management

It means proper preparation of ponds to reduce the cost of unfit growth, poor survival and also to ensure ready availability of natural food in sufficient quantity for the spawn/ fry/ fingerlings to be stocked.

### Stocking

Complete detoxification of the pesticide applied earlier should be ensured before stocking the nursery, rearing and stocking ponds.

### Post-Stocking

In this process we should over-look pond and fish productivity in the form of natural fish food. There should be proper feed management and chart should be maintained for same.

We need to calculate biomass on regular basis to check the growth of the fish for these process farmers can use "biomass daily" a product that helps them to check their fish biomass and health. This product is totally artificial intelligence based. It gives overview of all ponds live data and it can be accessible online. In this we don't have to remove fish from the pond to check its weight as this frame is been placed inside every pond. On daily basis information is generated on average weight of fish, size distribution. Due to this there is no stress to

the fish and zero disturbances to the feeding operation.

### BIOFLOC FISH FARMING

Biofloc is also known as RAS (Re-circulating Aquaculture Systems).

Biofloc is a technology which defines the use of aggregates of bacteria, algae or protozoa held together in a matrix along with particular organic matter for the purpose of improving water quality, waste treatment and disease prevention in intensive aquaculture systems.

To improve environmental control over production Biofloc systems are developed. For places where water is less and land is expensive, more intensive forms of aquaculture are recommended for cost-effective production. There are good economic incentives for an aquaculture business to be more efficient with production inputs, especially the most costly (feed) and most limiting (water and land). Waste treatment plant is needed for High-density rearing of fish. Biofloc is also known as waste treatment system.

Biofloc is basically a bunch of micro-organisms. It works as on water treatment bacteria by eating or cleaning feed waste, fish waste etc. and keeping the water clean for fish survival.

In biofloc aeration systems are important aspect as we treat water and reuse the same. By using this ammonia (waste) management will be simplified.

In biofloc we can easily install automated robotic feeder as the production area requirement is limited here and makes harvesting simple. As the

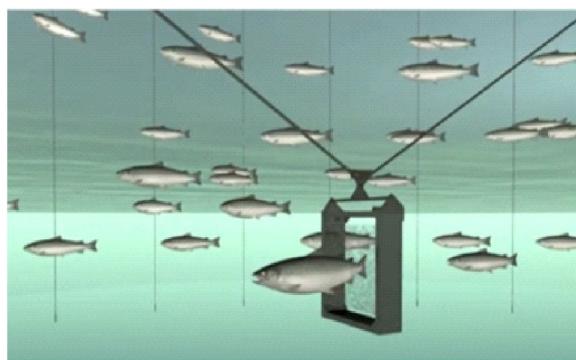


Figure 7: Pond management - stocking



Figure 8: Biofloc fish farming

water is treated on regular basis there are less chances of disease and fish health is good.

## CONCLUSION

This paper conducted a deep and comprehensive investigation of the current applications of Artificial Intelligence for smart fish farming. In aquaculture industry, the rational use of aerator can effectively prevent the deterioration of dissolved oxygen, increase the utilization rate of resources and reduce energy consumption. In robotic fish feeder, it is controlled by a digital timer which allows the owner to adjust the cycle time and dispensing time as and when required. More importantly, the timing can be programmed to ensure that the feeding schedule is consistent. Using Biomass frame growth can be analysis without disturbing fish in pond. By adapting Biofloc technology farmers can produce same amount production as of earthen ponds in less area and less water.

## REFERENCES

- [1] Victor Mokaya(2019). Future of precision agriculture in India using Machine Learning and Artificial Intelligence. *Journal of Environment, Science and Technology*, volume 5 issue 2, 2019.
- [2] Pradeep K. Katih, J. K. Jena, N. G. K. Pillai, Chinmoy Chakraborty, M. M. Dey (2005). Inland aquaculture in India: Past trend, present status and future prospects. *Aquaculture Economics & Management*
- [3] J. BOSTOCK (2011). The application of science and technology development in shaping current and future aquaculture production systems. *The Journal of Agricultural Science*
- [4] Rohana P. Subasinghe, David Curry, Sharon E. McGladdery and Devin Bartley (2005). *Recent Technological Innovations in Aquaculture*.
- [5] T.K. Ghoshal, Debasis De, G. Biswas, Prem Kumar, and K.K. Vijayan (2017). *Brackishwater Aquaculture: Opportunities and Challenges for Meeting Livelihood Demand in Indian Sundarbans*
- [6] S. J. Yeoh, F. S. Taip\*, J. Endan, R.A. Talib and M.K. Siti Mazlina(2010). Development of Automatic Feeding Machine for Aquaculture Industry. *Pertanika Journal of Science and Technology*
- [7] John A. Hargreaves (2013). *Biofloc Production Systems for Aquaculture*. SRAC Publication No.4503