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Floating Farms-Review

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Abstract

Floating farms are another alternative for small space agriculture. Integrated technologies like fertigation, herbigation are used. Flaoting farms are rich in mineral and nutrition, they have copious amount of organic matter. This paper deals with the idea to create awareness about floating farms and ways to construct floating farms.

Keywords- *Floating, Farms, Ferigation, Integrated, Herbiagation*

INTRODUCTION

Floating Farms

(Chinampas) supported the Mesoamerican food security. They were probably the most intensive and the productive agricultural system in pre-Hispanic times and were part of a larger and the integrated agricultural system that supplied food for local population. The origin of this kind of agriculture is precisely identified in the preclassic period hypotetically around 1450 BC. In the sole Chalco zone in the year 1518, the 10,000 hectares under cultivation were said to supply food for 180,000 people with a carrying capacity of about 10-18 people per ha. Gardens were mainly created by means of stakes or cane frames on which soil was piled up to mainly build small dikes and surrounded by willows to prevent erosion. The plots were filled with different layers of organic matter, the water weeds and soil and were self irrigating. In general the plots were 2 to 4 m wide and 20 to 40 m long and were approx 30 cm to 35 cm above water surface. Floating agriculture was also developed in other Asian countries such as in Kashmir (rádh) , on the Pulawat atoll in Micronesia (Maa) , Inle Lake in Burma, Cambodia and countries like Bangladesh too(Karim,2011).

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This growing system is seen today as a strategy to mainly diversify production in common property of wet lands and to cope with climate change effects wherever flooding make land unavailable for agriculture for many decades. In Asia such systems are mainly made with water weeds piled together to add much buoyancy and left decaying for few weeks to make them a fertile support for plants .The Rafts were loaded with compost or manure as top layer, which was an ideal substrate for seedlings, escalated raft nutrient pools and reduced evaporation . The nutrient constituents of some of these floating beds showed ammonia levels between 60 to 280 ppm against a reference value of 150 ppm of nitrogen for the good quality vegetable productions. Potassium was in much excess or at optimal levels while phosphorus, manganese and the iron concentrations were low. Organic matter levels were quite high with values ranging from 20.7% to 42.9% and pH from 6.9 to 7.4(Sutton et al., 2004).

Floating agriculture in integrated with the agriculture aquaculture systems (IAAS) can support the nutrient balance of the pond water, where chemical or natural fertilization occurs to improve the primary production. Leaching of nutrients from organic matter or manure is in fact a cost-free practice among poor smallholders to aggrandize plankton blooming for feeding planktivorous fish and escalate pond yields. Furthermore plants production in aquaculture water can be availed as a bioremediation tool to reduce high nitrogen levels in more intensive aquaculture operations, as in the case of hydroponics or aquaponics (soilless plant production on aquaculture water)(Mahmud et al.,2017). Floating agriculture is a way of generating food in areas that are waterlogged for long periods of time. It is mainly aimed at adapting to aggrandized or prolonged flooding.

The system employs beds of rotting vegetation that act as compost for the crop growth. The beds are able to float on the surface of the water, thus creating areas that agricultural land in a waterlogged area. Scientifically, the floating agriculture can be referred to ashydroponics.

Floating agriculture is reasonably widespread in Bangladesh, where the agricultural land is inundated for extended periods during the monsoon seasons.

Implementation

A typical application of floating agriculture in Bangladesh involves a floating layer of water hyacinth, straw or rice stubble, to which is added upper layers of small and quick-rotting

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water worts, which make for good manure (APEIS & RIPSO 2004). The floating raft structure is strengthened with bamboo, and bamboo poles are used to fix it in position to avoid damage caused by wave action or drifting (Sirr, 1849). The floating raft can then be transferred to any submerged location for agricultural purposes (APEIS & RIPSO2004).

Environmental Benefits - Uses water hyacinth, a highly invasive weed with the prolific growth rates, in a much highly beneficial way. By harvesting water hyacinth, areas covered by it are cleared, with the beneficial side-effect of reducing the breeding grounds for mosquitoes and also improving conditions for open-water fishing.

Garners a source of organic fertiliser when crops are harvested and the floating rafts are no longer required. The fertiliser can be maneuvered in fields or used in the following year's floating beds.

Socioeconomic Benefits - Serves as an alternative growing area to the land lost through flooding. - Is highly productive – up to 10 times much more productive than traditionally farmed land, and requires no additional chemical fertilisers or any manure.

Opportunities and BarriersOpportunities:

When cultivating crops in water it is also possible to simultaneously harvest the fish populations that reside in the beds - It aids, supplement the income of local communities and contributes to poverty alleviation and improving the food security - Because the system is fairly labour intensive, it can provide employment opportunities within communities worsen the poverty situation. Scarcity of the food and water are the common during that time period. People go without any income and the overall situation becomes quiet stagnant. Under such a background, the floating cultivation could solve this twin problem of food scarcity and unemployment. This observations tries to explore the role of the floating cultivation, an indigenous practice, and how it can be a means of prolifically improving rural livelihood of coastal area where people are suffered from the catastrophic condition (Simoons,1990).

Although this practice has been manoeuvred for centuries in some countries, it has become allied with new technologies giving it the potential for widespread growth. Floating

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agriculture can be extremely effective, especially in mainly minimizing crop damage from flooding.

Farmers can use raft garden beds to cultivate a vast range of vegetables for food and income during times when the other activities are impossible due to inundation. This low- technology production system has the biopotential to improve productivity per unit of land with little or no chemical fertilization. In some cases, it mainly shortens the production cycle of crops, which can now be mainly harvested more frequently.

Floating agriculture is best suited for areas where a plentiful supply of water is mainly available, especially in coastal areas, and in freshwater lakes. It is a particular adaptive technology for the areas thatexperiences heavy monsoon or is prone to mainly flooding.

Year-round availability of stagnant water and enough material to build the rafts are the basic prerequisites for sustaining floating agriculture in an area . The prevailing literature also focused on different agricultural practices as alternative adaptive techniques, but does not evaluate and assess the role of floating cultivation in creating livelihood for coastal people in the post-disaster period. This research tried to evaluate the practice manoeuvring the sustainability indicators proposed by certain researchers Sustainable Livelihood Framework.

Such an effort may contribute to the existing literature and thus may aid the policy makers in the concerned field to design the adaptive techniques considering the socio-economic differentials of the terrain (Prein,2002).

RETHINK HYDROPONICS

Plants expend a great deal of energy growing the root systems to search soil for the water and nutrients they need to survive (Prein et al., 2000).

The students therefore wanted to avail hydroponics to maximise crop growth and quality on the floating platform. Rather than relying on the soil, plants would be grown in a waterbased, the nutrient rich solution, with root systems supported by an inert medium like the rockwool or peat moss(Fig:1).

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Fig: 1

HYDROGRAPHICAL CONSIDERATIONS IN COUNTRIES LIKESINGAPORE

Knowledge of the environmental aspects is crucial for the design and operation of any location- specifically floating structures. Fortunately, the naturally protected (Malaysia in North and Indonesia with many small islands in the South) vast coastline mainly the major regions of Singapore provides a safe harbor environment suitable for safe operations of MFFs, compared to many other places around the world(Popper,2000).

Wave - Due to its sheltered geography, the significant wave heights around Singapore are typically lower than 1 m. An estimated 10 Yr. return period of significant wave height is approx. 1 meter and for 100 Yr. Return period, it is around 1.3 meters. Besides, on a seasonal basis, a maximum significant wave height of approx. 0.3 m and of 0.34 m is observed during the southwest and the northeast monsoon season, respectively. The heights commonly decrease to approx. 0.1 m during the inter monsoon periods. Such small wave heights are not expected to contribute to structural. However, it may still affect the logistic operations throughout the year and also for upcoming years too (Parvej, 2007). Fertigation is one method implemented in farming. Herbigation is another integrated method (S. Sreeremya, 2017). Floating farms always allies with wetland conservation (S. Sreeremya, 2016). Floating farms are possibility of tourist attraction like forest walking (Dr.S. Sreeremya, 2020). Many biomass can be produced by floating farms like azolla, sphagnum (S. Sreeremya, 2018)

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Wind- The prevailing winds are mainly northerly to North-easterly and South to South-easterly for Northeast and Southwest monsoon, respectively. Specifically, the winds in Singapore are light, with the mean surface wind speed usually less than 2.6 m/s. However, during the Northeast Monsoon, a wind speed of 18- 20 m/s or more may be observed. The 1-hour average, 10 Year Return Period winds speed can go up to 11.6 m/sec. For this project, the MFF will have a large windage area; therefore, the wind load will largely impact total mooring loads (Netting, 1993).

Current- Due to the several islands and shipping routes, the directionality and magnitude of current around Singapore water differ significantly. In the open waters of the Singapore Straits, the tidal speed can differ from 0.5-1 m/sec and may increase to 1.5-2.0 m/sec in constricted channels between the islands. The wind-generated the non-tidal current can attain a maximum speed of 0.5 m/s during the North-East monsoon. Although the overall range is relatively low, the current speed of 2 m/sec may play a key part in the MFF's mooring loads (Mizrahi et al., 1985).

Water depths and the Tides-The water depth of the Singapore Strait ranges between 20m and 120m. The blue and the green zones (20-40 m) represent interest areas suitable for MFF (subject to approval) (Manner.1994).

Tidal variation in the Singapore Strait is generally generated by tidal waves from the South China Sea and the Indian Ocean, and it mainly ranges from 2.5-3.0 m during spring to 0.7-1.2 m during neap. However, as the demonstrated later, the nature of the proposed MFF design makes it indifferent to the tidal variations (Noble,2006).

CONCLUSION

Multiple variants of crops can be grown in floating farms. Many countries like Singapore, Malaysia are extensively working on extending various aspects of floating farms. This paper revies about various abiotic factors and other criterias to understand regarding floating farm technique.

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