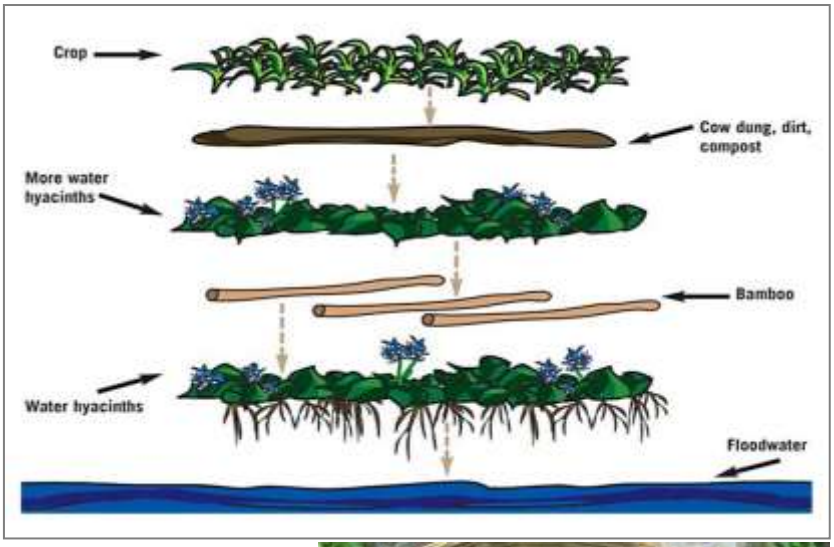
FLOATING GARDENS AS CLIMATE RESILIENT SOLUTION T0 CULTIVATE IN COASTAL AREAS IN BANGLADESH

The floating gardens in Bangladesh, a traditional form of agriculture that dates back at least 400 years, are being recognized as a climate-resilient, nature-based solution that can keep the country's increasingly resistant to withstand climate threats. Low-lying Bangladesh is among the nations most vulnerable to impacts of climate change. Much of its land is flooded after severe monsoons, and by 2050 rising sea levels and coastal erosion could displace 20 million people, the World Bank has estimated, while submerging a substantial amount of land and wiping out a large share of food production.



In the wetlands of southern Bangladesh, most affected by floods, farmers do not have enough cropping space in terms of access to land, so people have learnt to make the most of flood water. In this context, already in ancient times they had developed an agricultural practice to rear plants and crops in floating bed, made of water hyacinth, algae or other plant residues.

The floating gardens adopt scientific methods similar to hydroponic agriculture practice, based on a traditionally rooted know-how in the use of local resources. With the free, locally abundant materials, as water hyacinth (*Eichhornia crassipes)* and other aquatic weeds, local communities construct reasonably-sized floating platforms or rafts covered with soil and cow dung on which vegetables and other crops can be cultivated. A new raft needs to be built every year, but the old one can be used as fertiliser during the dry season. Vegetables, spices, and flowers are grown sustainably over the years on floating substrata.

Taking into account the great benefits provided by this cultivation technique, floating gardens in costal districts in Banglasesh (Barisal, Goplaganj and Pirojpur) have been recognized as Globally Important Agricultural Heritage Systems by the GIAHS Initiative promoted and managed by FAO.

In recent years impacts of climate change with adverse effects in Bangladesh of sea level rise, water logging, poor drainage, siltation, and seawater intrusion, disrupted the normal farming system particularly during the monsoon season. People has suffered from repeated flooding as lands are submerged making floating agriculture the only alternative method of cultivation. With

the heritage valorisation of floating gardens, numerous social, economic, agricultural, and ecological benefits are provided to local population.

Floating platforms come in handy for growing vegetables during the rainy seasons; during winter instead, farmers carry the floating bed on higher grounds, they break it and mix it as hummus for the soil of the winter cultivations. The rafts can be moved from place to place so are also suitable for families that have temporarily or permanently lost their homes and land. During the monsoon, farmers use small boats to manage the floating agricultural land.

Because crops could absorb prime nutrients such as nitrogen, potassium and phosphorus from the floating beds and below water, there is almost no need for fertilizer input as this practice cuts pollution from chemical fertilizers, and the vegetables grow comparatively faster on floating beds than normally grown on soil. Additionally, because the water prevents vermination, almost no pesticides are applied being an eco-friendly system to the environment.

Ecologically, floating gardens not only causes no damage to the water ecosystem, but using controlled water hyacinth, that normally congests the water canals, it also restores healthy environment to the water bodies. Although the process does require huge amount of physical work and dedication of time devoted to cultivation, platforms are made free of cost from locally abundant materials. The floating platforms are usually narrow because it is easier to operate from the boats. To minimize threats of storms in the coastal areas of the country, beds are fixed with bamboo poles.

The recognition of the floating gardens as a world agricultural heritage has gone hand in hand with an effort made by all the actors involved, with the support of FAO, to improve current practices and adapt them to the realities of other Districts of Bangladesh, as well affected by the consequences of climate change. In particular, the Bangladesh Agricultural Research Institute BARI, carried out different research on floating agricultural production systems, to make them more effective by adopting the identified innovations. The Department of Agricultural Extension (DAE) also carried out training projects for farmers to transfer this production technology to other similar ecosystems in the country. DAE also began implementing Extension of Floating Vegetable and Spices Cultivation Technologies as a Climate Change Adaptation Technology for Flood and Water-logged areas of Bangladesh, the first-ever government project dedicated to floating gardening and the Bangladesh Climate Change Trust Fund (BCCTF) funded a project to work with 12,000 farmers in 40 sub-districts of eight districts. The DAE is currently implementing a much larger follow-up project (2017−2022) in 46 sub-districts of 24 districts.

Through research and projects, the ancient knowledge of floating gardening is being encouraged to develop the technique as a new sustainable farming option. Farmers are advised on how to make floating beds and trained on proper cultivation procedures, to smartly use methods and techniques which differ from region to region. Growers require skill and knowledge to protect against plant disease and insect attack using organic control method. In this way labour and seed mainly form the production cost and women engagement ensures sustainability of the system.

Many International Organizations and NGOs in Bangladesh and in other countries of the region are sustaining the construction and functioning of floating gardens. The humanitarian agency Care Internationaland IUCN and IUCN for example introduced floating gardening as a pilot project, in the north-eastern wetlands of Bangladesh. The organization *Shidhulai Swanivar Sangstha* has been working since 2002 to improve the quality of life of communities in northern Bangladesh by providing boat services and agricultural support including beds made of water hyacinth for growing vegetables.

The Practical Action international organization also has supported for years the implementation of floating gardening both in Bangladesh and in other countries because it largely contributes to local livelihood security under severe environment. The technical and financial support of Practical Action is internationally recognized.

The WIPO Organization in its catalogue of green technologies also mentions the floating gardens as examples of innovations because "adapting to water movement, they are of particular interest for flood-prone areas with fluctuating river levels. Despite volatilities in yield due to climate impacts, floating gardens provide stability in terms of food production and income, sometimes earning families several times more than traditional rice cultivation. The FAO has declared them a globally important agricultural heritage system. Indigenous floating gardens are undergoing a revival as an effective climate adaptation technology. The Government of Bangladesh allocated USD 1.6 million to promote floating farms for climate change adaptation in nearly 50 locations across the country (2021).

The use of the system is spreading over a wide area in Bangladesh and in many other countries. The method also dates from pre-Hispanic times in Mexico, when the Aztecs constructed floating gardens (*chinampas)* in the canals of *Lago Texcoco.* It is an eco-friendly agriculture system enhancing the environmental value of wetlands, so rich in biodiversity. The diversified floating gardens also has a unique aesthetic view creating remarkable waterscapes and beautiful sceneries of flower's colors and green leaves.

To know more

Floating Garden Agricultural Practices, Bangladesh – GIAHS Initiative

Bangladesh Agricultural Research Institute (BARI)

Bangladesh Agricultural Research Institute BARI

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Article in greenpagebd.net

Article in gulfood.com

Article in humanitarian.org

Article in japantimes.co.ip

Article in una.city.nbs

Document in iucn.com

Article in thehindu.com

FAO.org/giahs

Article in bbc.com/future

Article in thedailystar.net

Document in fao.org

Article in crisisresponse.com

Practical Action Document in FAO Climate Change

Artícle in news.trust.org

Article in iied.org website

Chinampas in mexicolore.co.uk website