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Underground tube mangrove ecofarming system

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Following 7 years of field trials conducted in the mangrove areas of Guangxi Province, China, between 2007 and 2012, a mariculture system has been developed that greatly enhances natural productivity. This system is based on the installation of underground tubes, and has resulted in annual mean production values of between 35,283, and 44,097 USD (1USD=6.5 China Yuan) per hectare per annum without requiring cutting or conversion of mangrove vegetation. Based on the peer trials, an improved system is being established in 2015. This article provides details of the system, its construction, operation, economics and production. Consisting of a network of underground tubes, erect pipes and management chambers, this system is based on enhancing the spatial heterogeneity of the benthic environment by burying plastic pipes in the mangrove soils thus providing refuges for economically important fishes with minimal disturbance to the mangrove root system. Landward shrimp ponds can be used as reservoirs to oxygenate the water in the system during low tide. Molluscs are raised on mudflat surfaces within the habitat. The ecofarming site is accessed by boardwalks that also facilitate ecotourism and public education. This ecofarming system is environmentally friendly because no enclosures are constructed and there is no industrial feed input. Since the bulk of the system is buried within the mangrove soils, it is resistant to storm and tidal surges, is easy to control and has low management cost, whilst the products are of high quality and have high recapture rates. To date, ten indigenous species have been trialled and five of them have been successfully raised and harvested. The underground tube ecofarming system is unique and original and not derived from any similar system currently in operation elsewhere in mangrove ecosystems. In 2015, the underground ecofarming system was improved by fish living box to minimize eruption probability of fish natural enemy, the leech *Aestabdella* sp, and round chamber replaced the prior rectangle chamber to increase drainage efficiency of sediment that usually causes lack of dissolved oxygen. In order to mitigate high water temperature during low tide period in summer, one meter depth ditches were dug on the bottom of shrimp pond, and plant drafts, *Sesuvium portulacastrum*, were put on water surface. In addition, mangrove and saltmarsh plants are cultivated along the pond edge as a shelter for fish. These measures facilitate shrimp pond not only being a reservoir but also a perfect habitat for multi-species aquaculture. Regarding the shrimp pond and underground tube as a whole system, more products and higher benefits are anticipated.

Biography

Fan Hangqing has completed his PhD in 1991 from Xiamen University of China. He is the Director of Guangxi Mangrove Research Center. He has published more than 100 papers and 10 monographs in mangrove and seagrass. He is the Chairman of Academic Association for China Mangrove Ecology.

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