Rice-fish Farming System

What is the issue?

- Sustainable intensification of agricultural production systems is crucial to address the ever-increasing pressure on food and the environment.
- In this context, rice-fish farming constitutes a unique agro-landscape, and here is an overview on that.

What are the concerns with rice farming?

- Rice, an important food grain, roughly feeds 50% of the world population.
- But, it has been identified as a major crop consuming vast chunks of available water resources.
- Also, paddy fields emit large amount of the greenhouse gases, the two major GHGs being methane (CH_4) and nitrous oxide.
- Methane emission depends on anaerobic degradation of organic complexes under submerged conditions where there is a lack of oxygen.
- [These include plant residues, organic matter and organic fertilisers.]
- A total of 10-20% of methane in the atmosphere comes from paddy fields.
- This is significant as the Global Warming Potential (GWP) of methane is 25 times more than that of carbon dioxide.
- The impact of rice cultivation on the environment due to this is a matter of big concern.
- Global climate change is thus being closely linked to agricultural production.
- Thus, solutions need to be sought to improve the management of rice production systems.

What is rice-fish farming?

- It is the co-culture of rice and aquatic creatures with animal production (e.g. fish, shellfish, crab, shrimp and ducks) in paddy rice systems.
- This has been proposed as a technique to maximise the use of land and water resources to provide both grain and animal protein.
- It is no longer an agro-production practice but an agro-culture pattern.
- Rice-fish farming constitutes a unique agro-landscape across the world, especially in tropical and sub-subtropical Asia.
- The method probably began with the beginning of rice cultivation itself in the North-East India.

- This is because the waterlogged rice fields create a natural habitat for fish.



What advantages does it offer?

- **Environment** - Rice-fish cultivation system is capable of lowering the emission of methane and other GHGs.
- Aquatic creatures especially bottom feeders (crabs and carps) disturb the soil layers by their movement or sometimes searching for food.
- Thus, they influence the CH4 production processes.
- Potentially, aquatic creatures increase diluted oxygen in field water and in soil.
- Eventually, this shifts anaerobic digestion to aerobic digestion and helps to reduce CH4 emissions.
- Methane emission from rice-fish cultivation system is 34.6% less than that from a monoculture rice cultivation system.
- Rice-fish farming is also beneficial to restore soil fertility and avoid soil degradation, which is a major global environmental issue.
- Its multi-ecological functions thus cover biodiversity, food security, soil enrichment and emissions reduction.
- **Economy** - The rice-fish system requires only a small amount of pesticide and fertiliser as it is a low input system.
- The adoption of this system has led to an increase in economic efficiency of farmers.
- In Bangladesh, the net income return from rice-fish culture was over 50% greater than that from rice monoculture.
- Rice yields from the rice-fish system were 10-26% higher, labour input 19-22% lower and material inputs were 7% lower.
- Additionally, fish production increased net income.
- Indonesian figures show that the rice-fish system yielded a 27% higher net return with fish, as compared to a single crop of rice.
- The method ties the aquaculture industry to the agricultural industry in a social way, which is not possible in the case of monoculture.
- It thus increases contacts among various stakeholders that provide or share useful skills and technical knowledge.

How feasible is this in India?

- The total area of land available for rice cultivation in India is 43.5 million hectares (ha).
- Out of this, an estimated 20 million ha is suitable for adoption of the rice-fish system mainly in rain-fed medium lands, waterlogged lands etc.

- However, only 0.23 million ha is currently under rice-fish culture.
- [This low degree of adoption, exploitation and yield is primarily due to the introduction of high yielding rice varieties (HYV).
- The associated use of pesticides has really impeded the culture of rice-fish farming.]
- In India, rice-fish farming has especially a huge scope in the North-Eastern region.

What is to be done?

- India’s rich traditional primitive farming is as old as this dual-farming culture, and fish and rice both are the staple food of India.
- Achieving higher productivity from this underutilised high potential area is an immediate need.
- Basic research on the rice-fish ecosystem should be emphasised.
- This includes research on basic techniques of rice-fish farming and technology required for engineering intervention.
- Support for initial investment should be taken up with farmer-friendly policies, easy loan schemes etc.

Source: DownToEarth

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