

# Paddy Cum Fish Integrated Farming to Sustainable Aquatic Food Production

## A Climate-smart Approach for Low Lying Areas in Assam, India

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### Paddy-fish integrated farming : A climate smart approach

- Fish and rice is the major crops and staple food of Assam – a North-eastern states of India.
- About 75% of the state population is directly or indirectly dependent on agricultural activities.
- In Assam, paddy-fish integration is mostly practiced in flooded river basins, unmanageable vast waterlogged areas, and perennial waterlogged wet paddy lands.
- Over the years, the practice has evolved with recognition of its multi-ecological benefits.
- Considering recent climate change scenarios in Assam, paddy cum fish farming has emerged as a climate-resilient practice and important adaptation strategy against climate-induced flood.

### Types:

- The paddy-fish integration in Assam can be broadly classified into three categories viz., perennial system, synchronous refuge pond system and enclosure system.
  - 1) In the perennial paddy fish farming system, a single crop of fish is raised along with two crops of paddy, viz., *Ahu* (autumn paddy) and *Sali* (winter paddy) cover nearly both seasons.
  - 2) In a synchronous refuge pond system, the fish crop is raised synchronously with *Sali* paddy during the monsoon period.
  - 3) In the enclosure system, the fish crop is raised with deep water paddy (*Bao*) in deep water areas by enclosing the plot with pegged screens.

### Prevailing Practice:

- Fish enter the paddy fields during monsoon and grow along with paddy.
- Fishing activities start after the recession of water during November-December and the farmers use various fishing gears and indigenous traps either operated in the paddy-free spots of the field or are fixed at appropriate water entry and exit points in the fields.
- These lands often remain dry from December to April. Physically, the aquatic phase starts from May to November and possesses varying water depths depending on land topography, local rainfall patterns, water tables, soil quality etc.
- Indian major carps (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*), exotic carps (*Cyprinus carpio*, *Hypophthalmichthys molitrix*), minor carps (*Labeo bata*, *Labeo gonius*) are common fish species from the system.
- Waterlogged paddy fields were one of the most common fishing grounds for **small indigenous fish species (SIS)** for the rural people of the region during the wet season (June to November). Hence, the paddy fields were the major source of SIS production and were contributing to household nutrition in rural areas.
- Common SIS are *Amblypharyngodon mola*, *Puntius sophore*, *Cirrhinus reba*, *Mystus tengra*, *Trichogaster fasciata*, *Esomus danrica* etc.



Typical view of paddy cum fish farming

### Crop calendar of faddy-fish integrated farming

Months	Paddy farming	Fish farming
January	Seed sowing, nursery bed preparation, and transplanting	Trench/pond preparation, dike repairing
February		
March		Fish seed stocking
April		
May	Harvesting	Grass carp stocking
June		
July		Partial harvesting
August		
September		
October		
November		Complete harvesting
December		

### Intensification of paddy cum fish farming

- In recent years paddy cum fish farming practice has been developed in moderate to high input investment farming practice in the districts like Nalbari, Kamrup, Morigaon, Nagaon, Barpeta, Darrang, Sonitpur etc.
- Low lying area of 0.5 to 2 ha is protected by earthen embankment with a height usually higher than the local seasonal flood level for paddy cum fish farming.
- The paddy cultivation practice in such areas is known as *Borokheti* (paddy varieties Swarna Masori, Lal ganga) supported with motor powered borewell for irrigation.
- The plot preparation for *Boro* paddy is started in the late January by ploughing 3 times and then manuring and transplantation is done after 20-25 days of sowing in late February.
- Paddy cultivation is done in pre-monsoon season (February to May) and subsequently later part fish farming activities is done where entire plot will act as pond for fish culture.
- Cutting the paddy to feed the herbivorous fishes is a common practice, where buying – selling such paddy as grass feed for fishes and domestic animals is emerging business among the locals.
- *Jugli boro* paddy variety is popular among farmers for such buying- selling business.

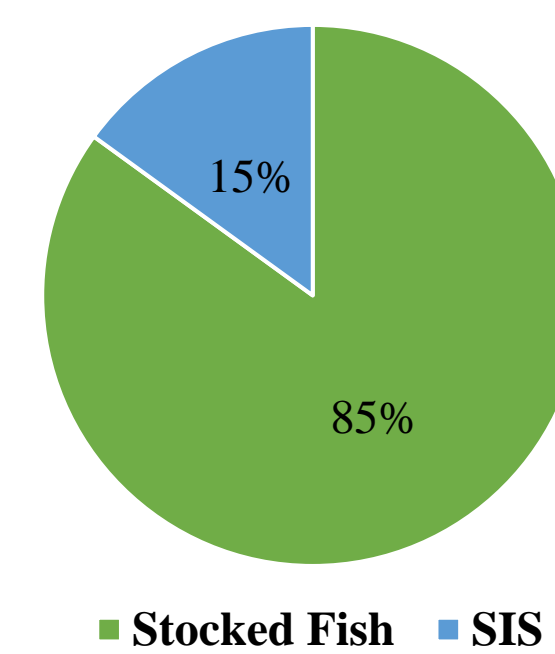


Feed application in paddy fish farming

### Production trend in paddy cum fish farming

- Considering 65% area under paddy cultivation, the average production of paddy was 6500 kg/ha.
- The average fish production was 2500 kg/ha along with 300 kg/ha of production of fishes from other than stocked mostly the small indigenous species (SIS).
- More than 50% of produced paddy is being consumed at home and rest is marketed and kept for next season.
- Swarna masori and Lal ganga were the most used paddy variety.

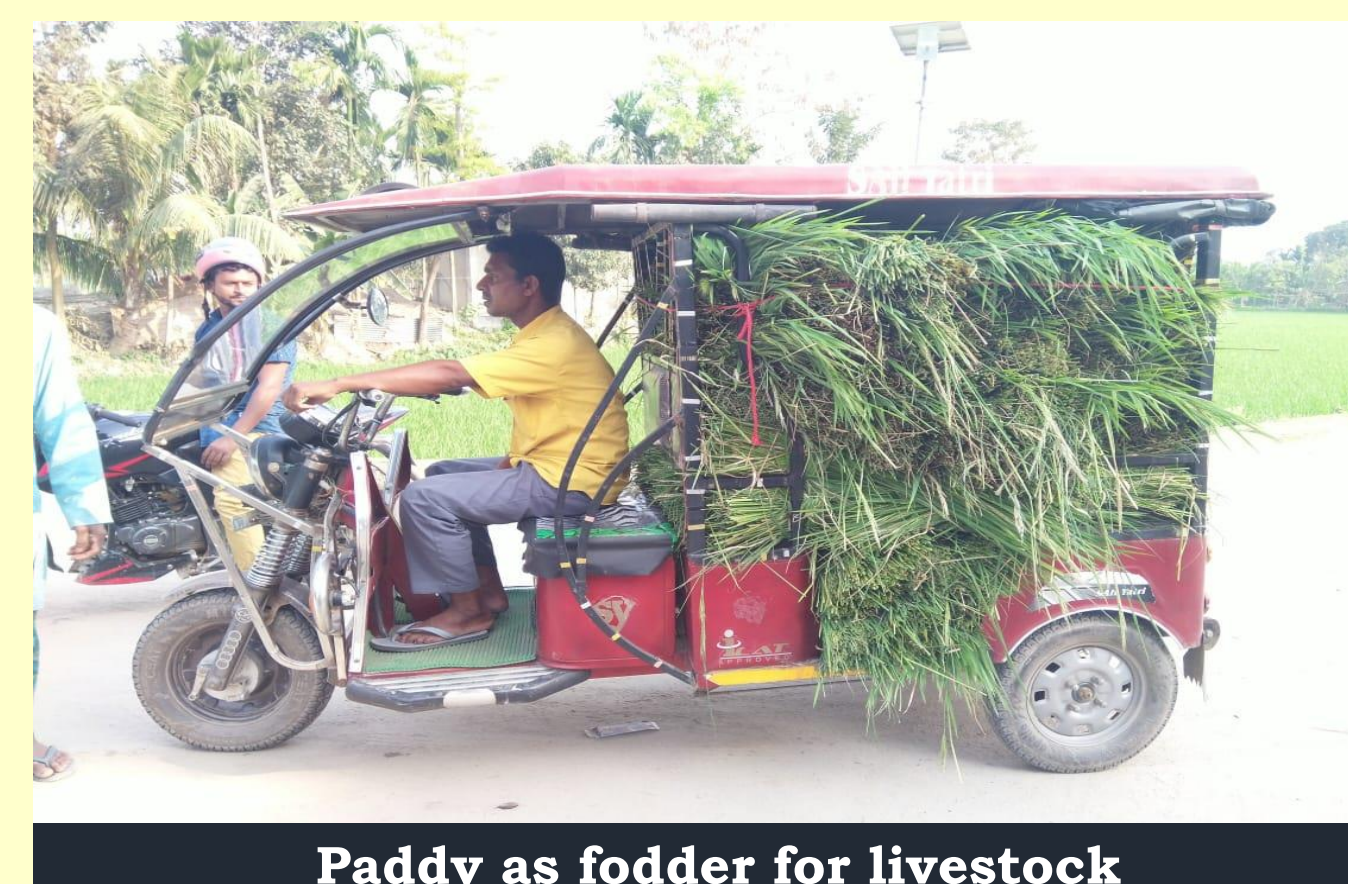
### Contribution of SIS in fish production from paddy fish farming system



Paddy cutting for grass carp



Feeding to grass carp

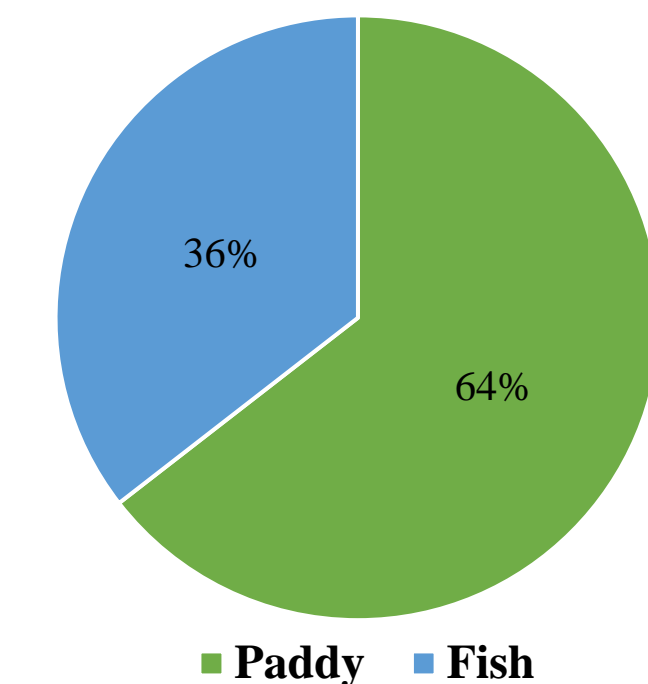


Paddy as fodder for livestock

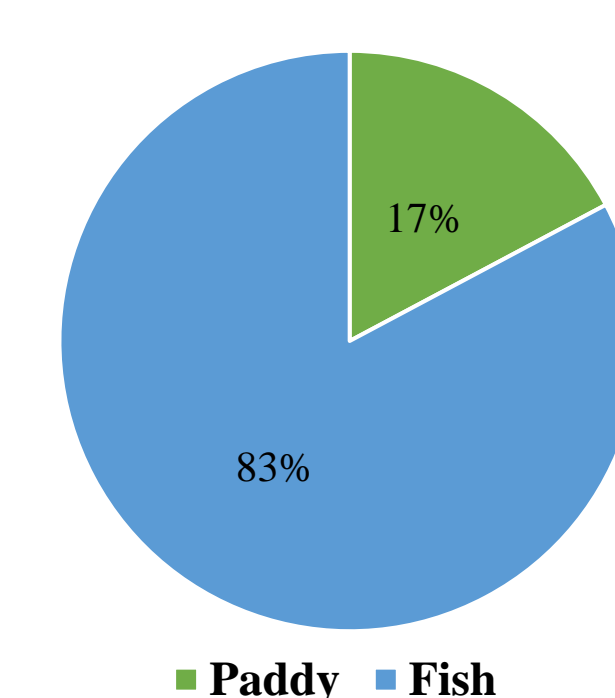
### Grass carp in paddy-fish integrated farming:

- In paddy cum fish integrated farming the herbivorous fish like grass carp is generally avoided as it is believed that the grass carp feed on paddy plant and damage the paddy crop. But some farmers consider grass carp as a beneficial species in paddy-fish integration.
- To facilitate the inclusion of grass carps, immediately after paddy harvest, paddy field is flooded, and advanced grass carp fingerlings of above 100 g size released into the paddy field.
- Fish grow fast by eating the plant residue of the paddy and by occupying larger space. As paddy is harvested while water in the field, only the top portion of the plant is cut and the large portion which remains inside water act as excellent food for the grass carp.
- There are instances where the farmers sacrifice a portion of paddy plants for feeding grass carps as the income from the grass carp outweigh the loss from the paddy. Here, the chopped paddy plant is fed to fish.

### Area occupied under paddy-fish farming



### Contribution to the economic return



SIS are predominant catch

### Conclusion

- Climate change adaptation strategy against flood.
- Production of paddy and fish from same cultivable area at same time.
- Harvesting of one paddy crop prior to seasonal flood.
- Byproducts used for fish and livestock.
- Integrated pest management.
- Low use of pesticide.
- Improved income of the farmers in flood prone low-lying areas.
- Employment generation and nutritional security to rural farmers.

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