Fish Migration

- Many types of fish migrate on a regular basis, on time scales ranging from daily to annual, and over distances ranging from a few meters to thousands of kilometres.
- Fish usually migrate **because of diet or reproductive needs, although in some cases the reason for migration remains unknown.**

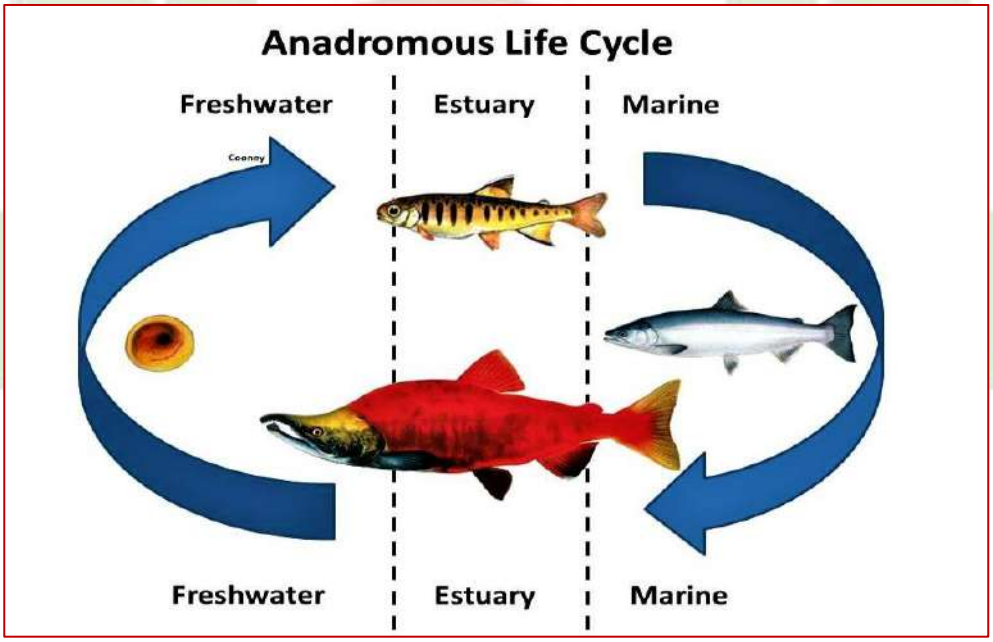
Classification

Anadromous Migration

✓ Here fish are **born in freshwater, then migrate to the ocean as juveniles** where they grow into adults before migrating back into freshwater to spawn.

✓ **Anadromous Fish** live in the ocean mostly, and breed in fresh water (*Greek: 'Ana' is up; The noun is "anadromy"*)

✓ Examples: **salmon, smelt, American shad, hickory shad, striped bass, lamprey, gulf sturgeon**

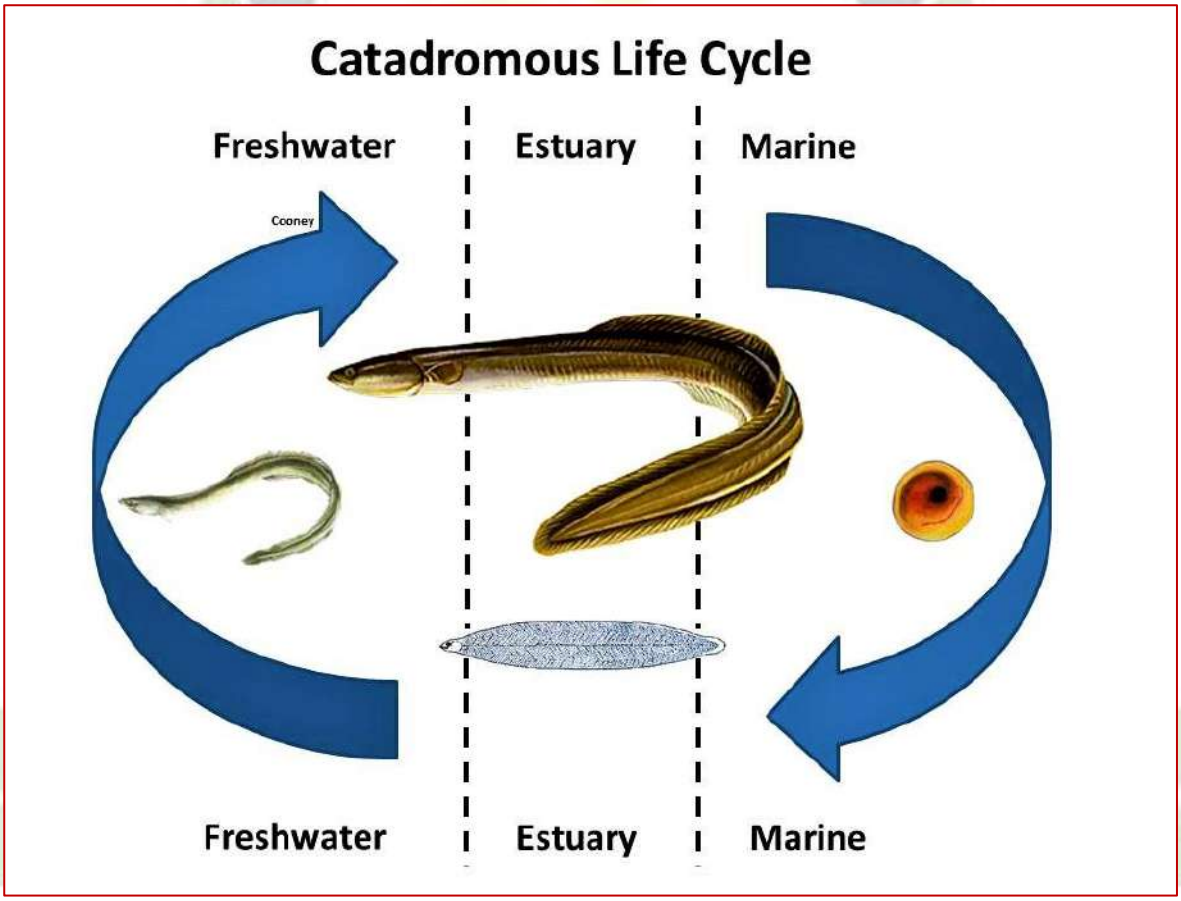


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Fish Migration

Catadromous Migration

- ✓ Fish are **born in saltwater, then migrate into freshwater as juveniles** where they grow into adults before migrating back into the ocean to spawn.
- ✓ **Catadromous Fish live in fresh water, and breed in the ocean** *(Greek: 'Cata' is down)*
- ✓ Examples: **American eel, European eel, inanga, shortfin eel, longfin eel**

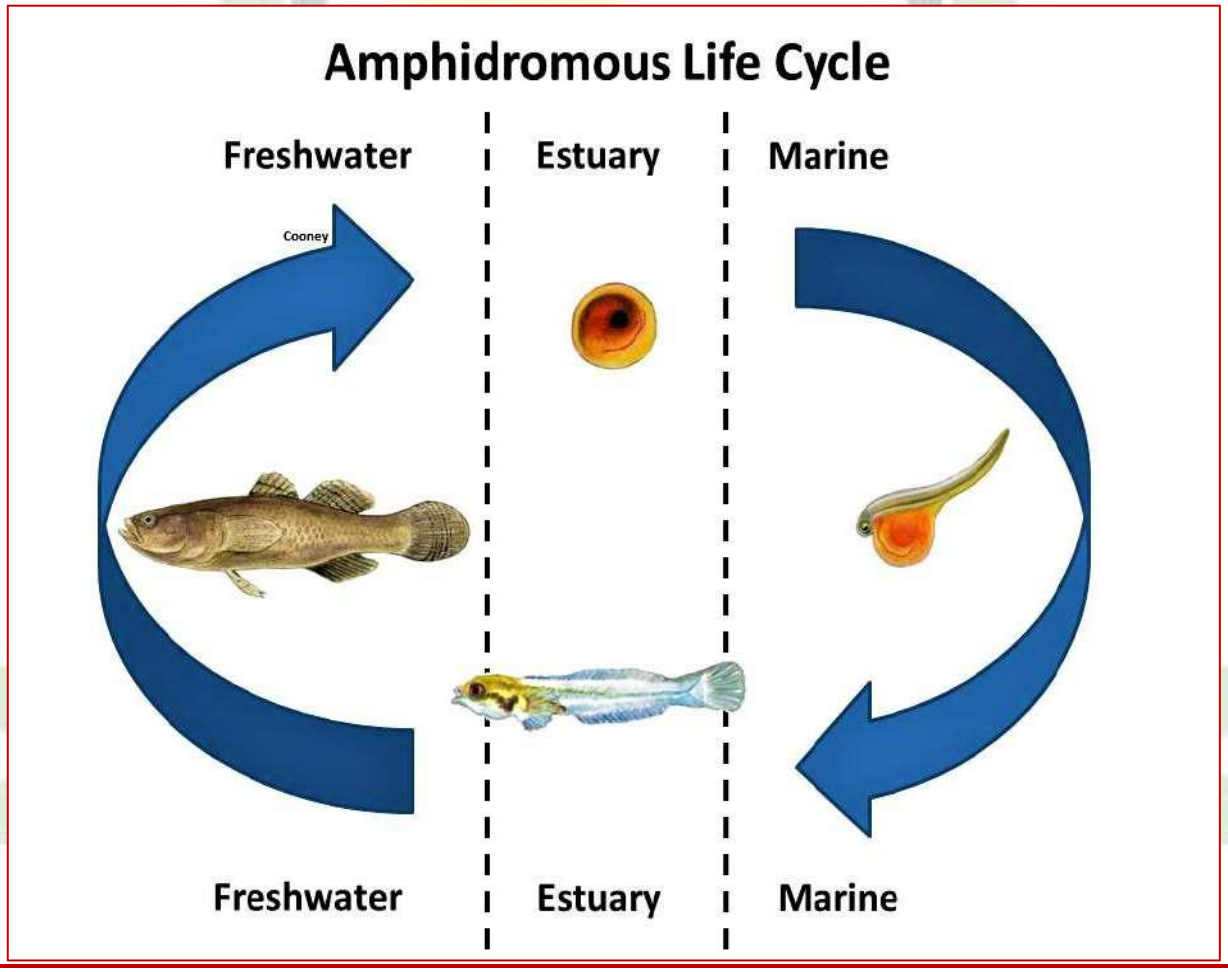


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Fish Migration

Amphidromous Migration

- ✓ Fish **are born in freshwater/estuaries, then drift into the ocean as larvae before migrating back into freshwater** to grow into adults and spawn.
- ✓ **Amphidromous Fish** move **between fresh and salt water during their life cycle**, but not to breed *(Greek: 'Amphi' is both)*
- ✓ *Examples:* ***bigmouth sleeper, mountain mullet, sirajo goby, river goby, torrent fish, Dolly Varden***

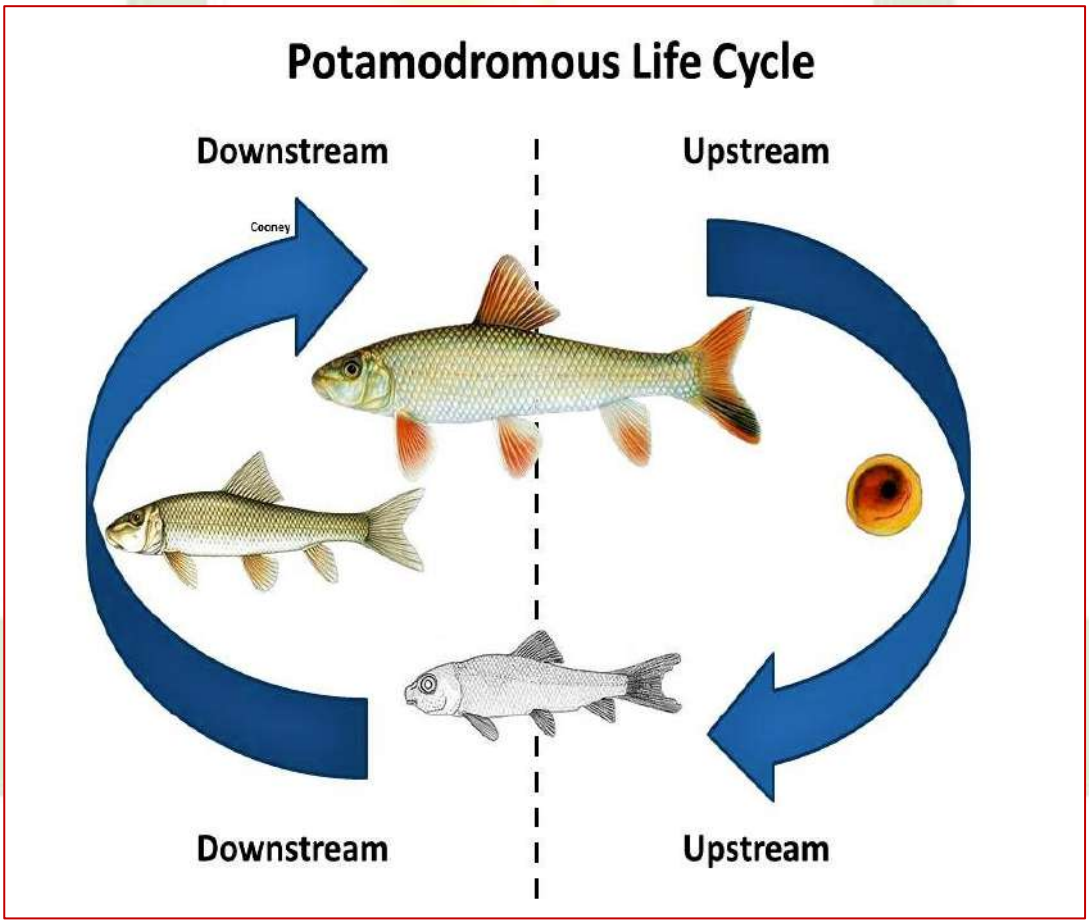


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Fish Migration

Potamodromous Migration

- ✓ Fish are born in **upstream freshwater habitats, then migrate downstream (still in freshwater) as juveniles to grow into adults** before migrating back upstream to spawn.
- ✓ **Potamodromous fish** migrate within fresh water only *(Greek: Potamos is river and dromos is 'a running')*
- ✓ *Examples**: sicklefin redhorse, lake sturgeon, robust redhorse, flathead catfish***

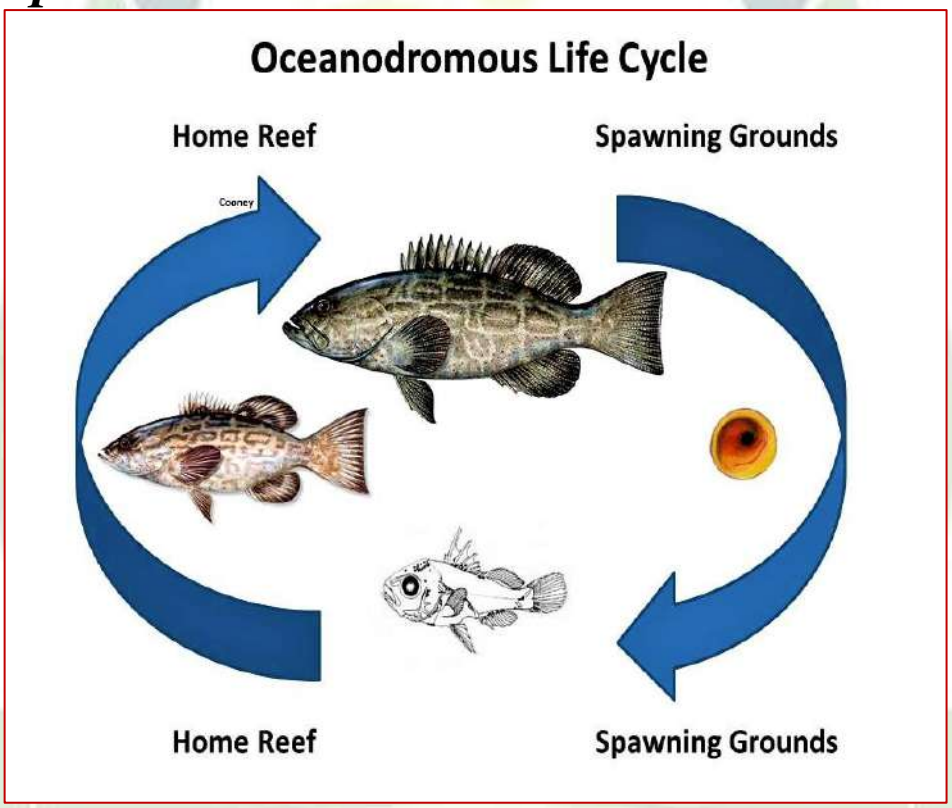


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Fish Migration

Oceanodromous Migration

- ✓ Fish are born near spawning grounds, then drift on ocean currents as larvae before settling as juveniles to grow into adults before migrating back to spawning grounds.
- ✓ **Oceanodromous fish** migrate within salt water only *(Greek: 'Oceanos' is ocean)*
- ✓ *Examples:* ***black grouper, mutton snapper, goliath grouper.***



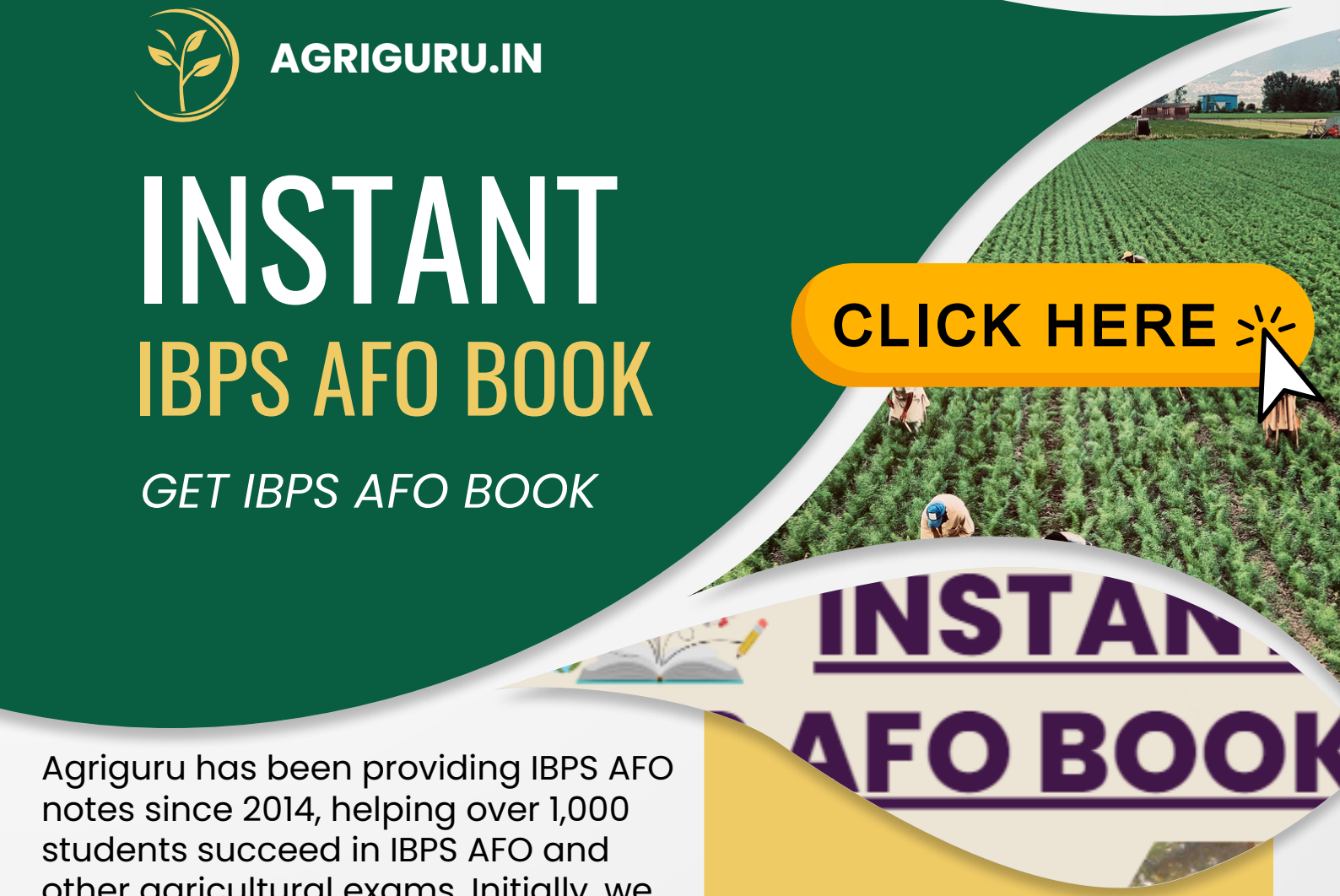
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BRACKISH WATER FISHERY MILKFISH BY AGRIGURU

Milkfish (Chanos chanos)



The milkfish (***Chanos chanos***) is one of the **most ideal finfishes for farming in coastal areas**.

They are **fast growing, tolerates a wide range of temperature, oxygen, and salinity.**

They feed mostly on **filamentous algae** from the bottom of the pond and are free from major diseases and parasites.

Milkfish are cultured in large scales in countries like **Indonesia, Philippines and Taiwan in ponds called "Tambak"**.

In **India to** the popularity of its farming is growing especially in **Tamil Nadu and Kerala**.

The milkfish has a moderately compressed, **spindle-shaped, elongated body covered with small scales and without scutes along the belly.**

In its early stages of life history, in natural environment, the fish **enters estuaries, backwaters, lagoons and rivers**, which

serve as nursery grounds and spend early part of its life there for about a year or more.



Seed Collection

Since milkfish does not mature and breed in confined waters and culture ponds, development of a hatchery technology has been difficult.

However, **induced breeding** has been successfully carried out in this species, but the **final survival rate has been less, and hatchery operations hence are not economical.**

In this respect the most suitable method is collection of seeds from **natural sources**.

In India, the seeds of milkfish measuring **2-7 cm** in length occur along the coast of **Orissa, Andhra Pradesh, Tamil Nadu, Kerala, and Karnataka.**

The **main fry season extends from March to June**.

Milkfish seeds prefer clear calm inshore waters of gently sloping beaches including tidal creeks, estuaries, brackish water bodies and mud flat areas where the **temperature is about 23-25 oC and salinity varies between 10 and 32 ppt.**

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The seeds are collected from **low-lying areas using scoop nets, dip nets and hand nets.**

In estuaries and lagoons, drag nets or seine nets may be used, while in mud flat areas, a scare line made of coir rope of about 3-3.5 m length with palmyrah leaves attached is dragged below the water surface and seeds collected in fine meshed cloth.

Soon after collected the seeds are conditioned by keeping in a limited volume of clear water for a definite period without food.

Seeds are transported in containers with diluted seawater of 10-15 ppt salinity and at a rate of about 100 fry/L.

Nursery Rearing

- Nurseries are ponds for rearing the fry until they **attain 5-7 cm in length.**
- The area of nursery ponds **ranges from 500 to 5,000 m2.**
- At the nursery site the fry is acclimatized to the salinity of the pond water.
- Preparation of pond for stocking with fry has to be started about **one or two months in advance**.
- The ponds are drained and dried for about **10 to 15 days and later tilled and raked.**

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- Lime is added **@ 1000 kg/ha and fresh water is let in**.
- Pond water is fertilized with **organic and inorganic fertilizers.**
- Once the algal bloom develops more saline water is added to a **height of 10 cm**.
- Within **3-7 days**, a complex of blue green algae, diatom, bacteria, nematode worms develop at the bottom of the pond called **"Lab-Lab".**
- This algal consortium is most vital for developing **frys of milkfish.**
- Stocking to the nursery pond is usually done only after **"Lab-Lab" has developed in the pond**.
- The fry is stocked at densities of **20-50/ m2.**
- The threat of **predatory fishes, crabs and snakes can be screened from entering the pond using nets**.
- Erecting poles along the **embankments and crisscrossing with strings can discourage predatory birds**.
- One serious cause of mortality of seeds in fry ponds is the **sudden reduction of temperature and salinity due to heavy rains.**

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- Filling the ponds with **brackish water before rains may prevent such an eventuality.**

Eradication of predators and pests

- Certain predatory **fishes, crabs, water snakes are the common threat to milkfish culture ponds and pen structures.**
- These can be prevented from entering the farming area through use of fine meshed screens.
- Apart from these **larvae of certain insects also pose threat to fingerlings of milkfish.**
- Application of **0.5 ppm Baluscide, lime, urea etc.**
- in the initial preparation of the **ponds helps to reduce their growth.**

Harvesting

- Milkfish has a higher growth rate in its first year in brackish water, during when it grows to a **marketable size of 30-45 cm long and 300-800 gm in weight.**
- The periodicity of harvesting depends upon the number of batches stocked.
- During harvesting the pond is drained using pumps, while in the case of pens, the **lowest tidal period is the best time for harvest.**

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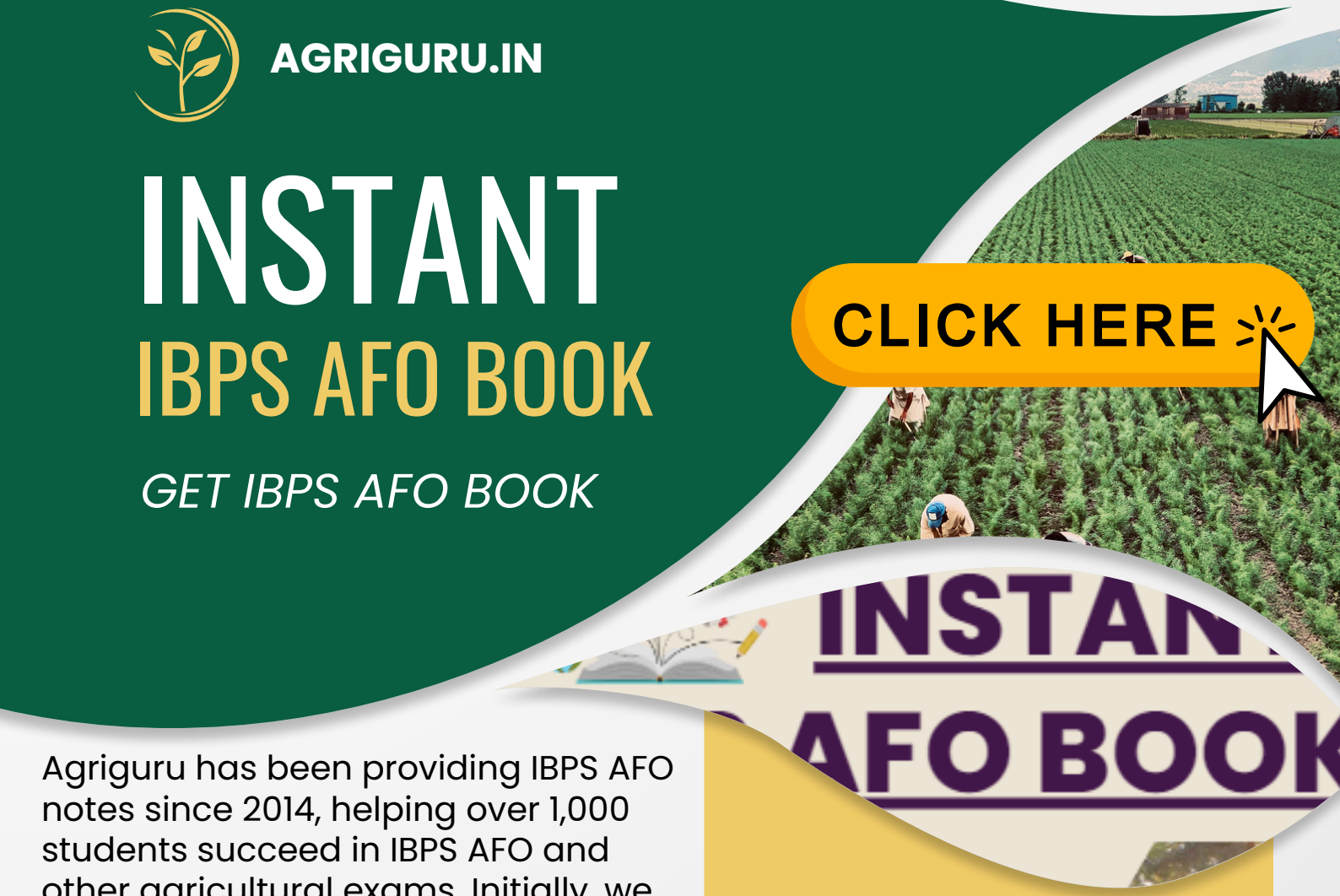
- If trenches were **provided in culture ponds, it would be easier to gather all the fish inside the trenches by draining the water and then capturing them**.
- Usually, **seine nets are operated for capturing farmed fish**.
- The survival rates range from **80 to 95% amounting to a production ranging from 500 to 1000 kg/ha in ponds and 250 to 500 kg/ha in pens.**

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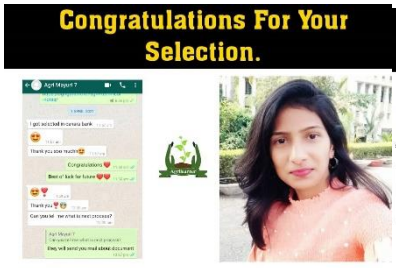
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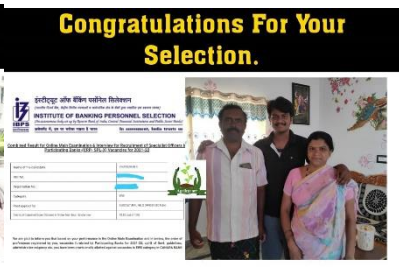
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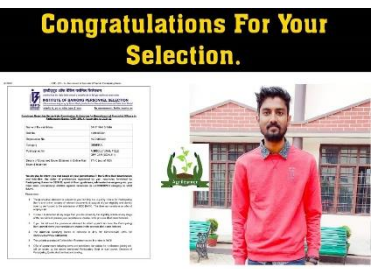
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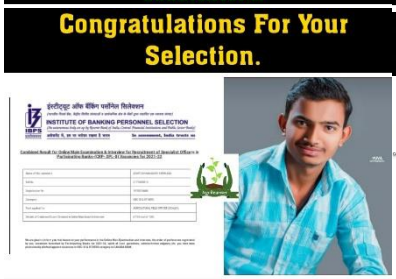
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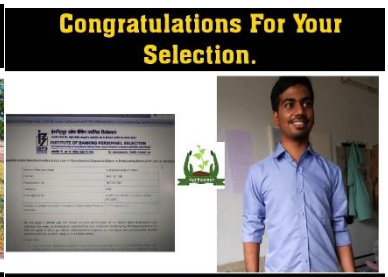






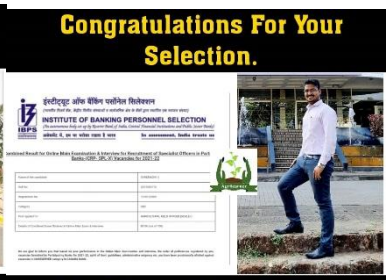


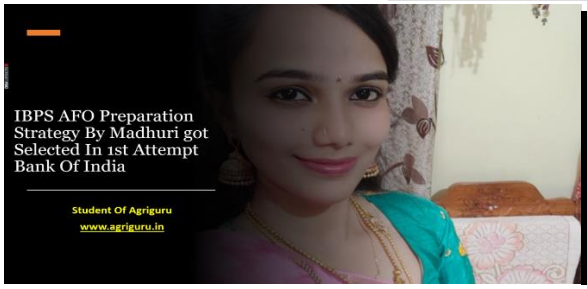


















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