

## **Plan to protect local aquatic ecosystems from alteration**

### **Institutional Strategies to Minimise Alterations in Aquatic Ecosystems**

The **Centurion University, Paralakhemundi Campus**, has implemented an **integrated aquaculture management plan** to minimise **physical, chemical, and biological alterations** in surrounding aquatic ecosystems. The strategy combines **closed-loop water systems, biofiltration, and waste recirculation technologies** across its aquaculture units.

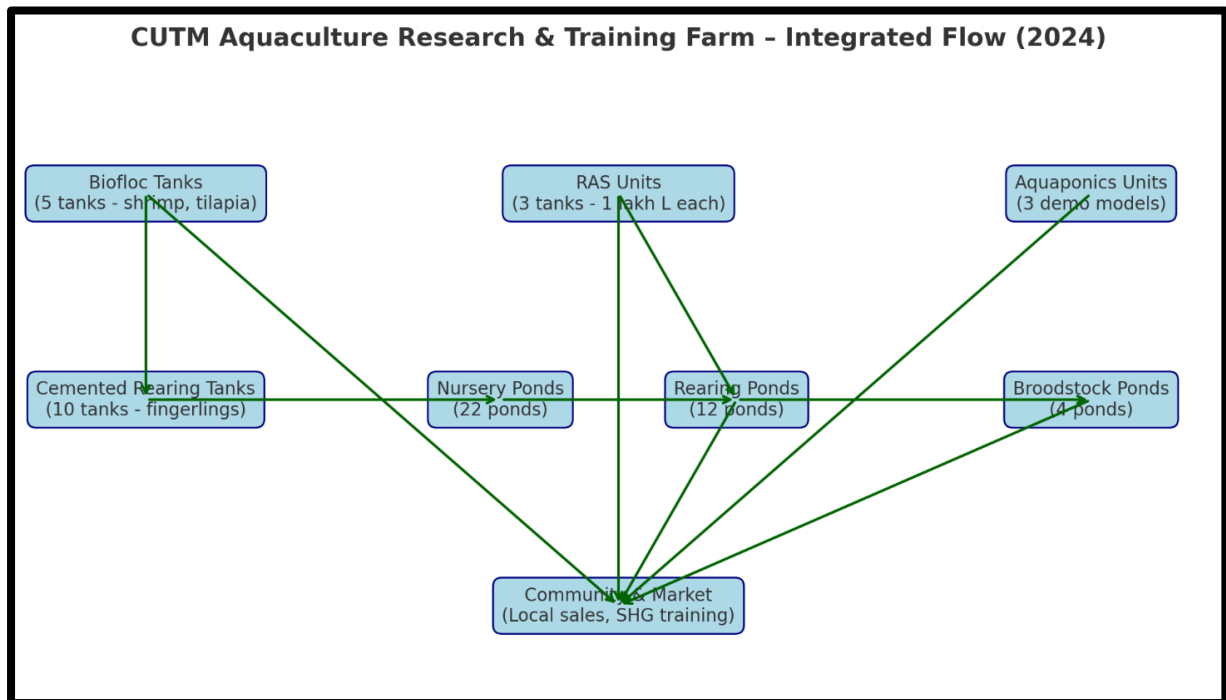
- **Biofloc Systems:** Designed as **zero-water exchange tanks**, these minimise **effluent discharge** and maintain stable **water quality parameters** (DO 8–9 mg/L; ammonia reduced by 10%). The microbial floc community acts as a **natural biofilter**, reducing chemical residues and supporting ecological balance.

**Recirculatory Aquaculture System (RAS):** Operated on a closed-water recirculation model, equipped with sedimentation tanks and biological filters to prevent nutrient-rich effluents from entering natural streams. The system maintains optimal pH and nitrate levels, reducing chemical and organic loading.

**Aquaponics Units:** Integrate fish culture with vegetable production, recycling nutrient water and eliminating fertiliser use. This reduces chemical runoff and supports biological nutrient cycling.

**Pond-Based Research Farm:** Regular water-quality monitoring (DO, ammonia, pH, hardness) and biological control of aquatic weeds prevent eutrophication and habitat alteration. Ponds are lined and maintained through liming and sediment management to prevent seepage or contamination of groundwater.

12 rearing ponds, and 4 broodstock ponds. These ponds are used for culturing a wide range of freshwater fishes, from spawn to advanced fingerlings. Harvested fish are marketed to local communities and Centurion University residents, providing both livelihood and nutritional support. These systems collectively ensure that Centurion University's aquaculture operations are self-contained, resource-efficient, and environmentally sustainable, preventing negative impacts on natural aquatic ecosystems.



**Figure 1: Centurion University Aquaculture research & training farm - Integrated flow (2024)**

### **Institutional Collaborations**

Through MoUs with **ICAR–CIFA, ICAR–CIWA, and Kailash Hatchery (Odisha)**, Centurion University ensures **joint research, technology transfer, hatchery innovations, and women-centric aquaculture training**, enhancing its policy relevance and outreach impact.



**Figure 2: Imparting training in RAS to fish farmers on biosecurity, disease surveillance, and responsible stocking density to reduce ecological imbalances.**

**b) Measurable Outcomes in Aquatic Conservation and Sustainable Aquaculture (5 biofloc tanks operational (shrimp, tilapia, freshwater species)).**

- 3 RAS culture tanks (1 lakh litre each) fully functional (pacu, rohu).
- 3 aquaponics units constructed by students for demos & fairs.
- 10 cemented tanks rearing fish from spawn to advanced fingerlings.
- 22 nursery, 12 rearing, 4 broodstock ponds producing fish for community consumption.
- Water quality improvements: DO ↑8–9%, Ammonia ↓10%, Disease incidence ↓12–15%.
- 20–25% fertilizer reduction in aquaponics.
- Strengthened local food supply & livelihood opportunities through marketable fish harvest.

**Outcome Metrics**

**Table 1: Outcome metrics table**

<b>System / Activity</b>	<b>Units / Capacity</b>	<b>Species Cultured</b>	<b>Beneficiaries Engaged</b>	<b>Measurable Ecological Outcomes</b>
<b>Biofloc Tanks (BFT)</b>	5 tanks (shrimp, tilapia, freshwater)	Shrimp, Tilapia, Mixed Freshwater	48 farmers, 12 students	DO ↑8–9%; Ammonia ↓10%; Disease ↓12–15%
<b>RAS Units</b>	3 tanks (1 lakh L each)	Pacu, Rohu (shrimp planned)	40 farmers, 30 students	Closed-loop water reuse; reduced discharge
<b>Aquaponics Units</b>	3 demo models (student-constructed)	Fish + Vegetables	35 farmers, 10 students	20–25% fertiliser reduction; nutrient recycling
<b>Cemented Tanks</b>	10 tanks	Fingerlings (spawn → advanced)	–	Higher survival rates; rearing continuity
<b>Nursery, Rearing &amp; Broodstock Ponds</b>	22 nursery, 12 rearing, 4 broodstock ponds	Multiple freshwater fish	Local community & Centurion University residents	Continuous fish supply; biodiversity maintenance