

## Research and innovation to prevent marine ecosystem damage

### A. University Engagement in Eco-Friendly Aquaculture Technologies (2024)

Centurion University, Odisha, actively promotes research and engagement with industry and communities to minimise environmental impacts of aquaculture and ensure sustainable use of aquatic resources. The university has established Biofloc, Recirculatory Aquaculture System (RAS), and Aquaponics demonstration units at its Paralakhemundi campus, serving as research hubs, training centres, and industry–community collaboration platforms.

- **Biofloc Technology (BFT)**

The Biofloc unit demonstrates waste recycling into protein-rich feed for shrimp and fish culture, thereby minimising nutrient discharge into natural water bodies. It is regularly used for 3rd and 4th-year student internships, applied research projects. This helps in getting job opportunities in different industries.



**Figure 1: Interaction of District Collector, Gajapati, with Students and Farmers on Shrimp Culture in Biofloc Technology (BFT) System**

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- **Recirculatory Aquaculture System (RAS)**

The RAS facility enables intensive aquaculture with closed-loop water recycling, ensuring near-zero discharge into the environment. Students gain hands-on training in water treatment and fish health management, while around 30-35 farmers and industry partners are exposed to advanced, eco-friendly aquaculture practices. The unit demonstrates Centurion University's capacity to integrate research with industry-oriented solutions.



**Figure 2: International Delegates Visiting Sustainable Aquaculture Units at Centurion University Paralakhemundi Campus (2024)**

- **Aquaponics for Integrated Resource Recycling:**

Centurion University operates a large-scale aquaponics system that links fish culture with vegetable farming, ensuring nutrient recycling and water-use efficiency. This unit serves as a practical laboratory for student research and as a community training centre, where SHG women, farmers, and visiting delegates from abroad learn about integrated farming practices with plants, crops, and fish.

- Regular Engagement & Outreach

On a regular basis, 3rd- and 4th-year B.F.Sc. students conduct their internships and field projects within the Biofloc, RAS, Aquaponics, and Pond Culture units of the university, engaging directly with sustainable aquaculture technologies. These systems serve as live training and demonstration models for eco-friendly fish farming, waste recycling, and water-quality management.

- Throughout 2024, the School of Fisheries, Centurion University, organised 7 structured training and exposure programmes, benefiting 135 external stakeholders, including farmers, SHG members, and visitors from national and international institutions. These sessions focused on biofloc operation, RAS management, integrated farming, and aquaponics, ensuring continuous community learning and technology adoption.



**Figure 3: Students interacting with Farmers**

### **Outcomes (2024)**

- Reduced reliance on unsustainable aquaculture methods through demonstration of eco-friendly technologies.
- 65 students and external stakeholders, including farmers, SHG and visitors members trained in water-efficient and pollution-mitigating systems.
- Strengthened university–industry–community partnerships for scaling sustainable aquaculture. Centurion University has collaborated with regional aquaculture

industries, government institutions, and community organisations to strengthen its sustainable aquaculture initiatives. Partnerships with the Department of Fisheries (Odisha), private hatcheries such as Kailash Hatchery, and research bodies like ICAR–Central institute of freshwater aquaculture and ICAR-Central Institute for Women in Agriculture (ICAR-CIWA) have enabled knowledge sharing and technology transfer. These collaborations benefitted more than 180 farmers and SHG members through training and demonstration programmes on Biofloc, RAS, and integrated aquaculture systems. The partnerships have also provided internship and employment pathways for students, reinforcing university–industry–community linkages in sustainable aquaculture

## **B. Community-focused aquaculture development**

Centurion University-Paralakhemundi- Odisha fisheries strengthened its ecosystem engagement by signing MoUs with ICAR–Central Institute of Freshwater Aquaculture (CIFA), ICAR–Central Institute for Women in Agriculture (CIWA), and Kailash Hatchery (Odisha). These collaborations focus on joint research, technology transfer, women-centric aquaculture practices, sustainable hatchery development, and farmer capacity building, positioning Centurion University as a regional hub for aquaculture innovation and the blue economy.



**Figure 4: Interaction of students and visitors during kisan mela 2024**

## **C. University Engagement in Eco-friendly Aquaculture Technologies (NFDB-Funded Trainings – 2024)**

The School of Fisheries at Centurion University Paralakhemundi-Odisha, India, organised two National fisheries development board sponsored three-day training programmes in 2024 to enhance the capacity of 30 students and 35 farmers in eco-friendly aquaculture technologies.

1. **Reservoir Fisheries Management** – focused on ranching, responsible gear use, cage and pen culture, and reservoir conservation for productivity enhancement.
2. **Grow-out Culture of Indian Major Carps (IMC)** – covered feed, water quality, pen vs cage systems, and sustainable grow-out practices.

These trainings improved participants’ understanding of ecosystem-based management, resource conservation, and livelihood diversification.

### Key Outcomes (2024)

PARAMETER	ACHIEVEMENT
Training Programmes Conducted	2 (Reservoir Fisheries & Grow-out Culture of IMC)
Funding Agency	National Fisheries Development Board (NFDB)
Duration / Interaction with Farmers	3 days each
Participants	~ 65 students & aquaculture trainees
Learning Outcomes	Knowledge on reservoir ranching, gear selection, cage & pen culture, water quality management, and conservation practices

**Table 1: Reservoir fisheries training programme Summary**





**Figure 5: Interaction with farmers on the Reservoir fisheries training programme**



**Figure 6: Interaction with SHG women**

<p>1. Name:</p> <p>2. Age :</p> <p>3. Gender:</p> <p>4. Marital status: Married[ ] Unmarried[ ]</p> <p>5. Family: Joint Family [ ] Nuclear Family[ ]</p> <p>6. Occupation:</p> <p>7. Location:</p> <p>8. Contact number:</p>	<p>8. Contact number:</p> <p>9. Are you a member of an SHG: (If yes) Name of the SHG:</p> <p>10. Duration of membership:</p> <p>11. How many members are there in the SHG:</p> <p>12. Monthly income: Has your income increased since joining the SHG: How much (%) increased:</p> <p>13. Have you accessed loans or credit from the SHG: For what Purpose:</p> <p>14. Do you attend SHG meetings regularly:</p> <p>15. What are the benefits of self-help-groups:</p> <p>16. Is it necessary to be educated and highly qualified to be a member of SHG:</p> <p>17. Activities of self-help group:</p>
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**Figure 7: Interview Schedule prepared for SHG Members**