Centurion University
Shaping Lives...
Empowering Communities...

Times Higher Education
Sustainability
Impact Network

SUSTAINABLE DEVELOPMENT GOAL 14

LIFE BELOW WATER

SUSTAINABLE DEVELOPMENT GOALS

1. Executive Summary

Centurion University is committed to advancing **SDG 14: Life Below Water** by promoting **sustainable aquaculture, restoring aquatic biodiversity, improving water quality**, and creating livelihood opportunities linked to freshwater and marine ecosystems. Guided by its integrated education - research -community model, the University connects classroom learning with real-world conservation and enterprise - ensuring that **water stewardship** is both an academic pursuit and a community mission.

In 2024, Centurion University operated 25 functional aquaculture and water research units across campuses, directly engaging over 180 farmers, 67 women from self-help groups (SHGs), and 70 students in field-based learning and community training programs. Through its Fisheries and Ecosystem Livelihood Program (FELP) and School of Fisheries, the University advanced scientific aquaculture, sustainable pond management, and bio secure rearing systems, resulting in measurable environmental and social impact.

Key environmental indicators show significant progress in aquatic ecosystem health: Dissolved Oxygen (DO) increased by 8%, ammonia decreased by 10%, and Biological Oxygen Demand (BOD) fell by 9% compared to 2023, confirming improved water quality and reduced ecological stress.

Centurion University's aquaculture models - spanning Biofloc Technology(BFT), Recirculatory Aquaculture Systems (RAS), and Aquaponics- have achieved up to 80% water reuse, 20–25% fertilizer reduction, and 12–15% lower disease incidence in shrimp, tilapia, and rohu culture systems. These systems not only enhance biodiversity but also reduce carbon footprints. Native freshwater species such as Catlacatla, Labeorohita, Cirrhinusmrigala, and Anabas testudineus are conserved in dedicated biodiversity ponds, supporting ecological balance and providing replicable livelihood models for local communities. Centurion University's Ornamental Fisheries Unit also contributes to species preservation and entrepreneurship by training 60+ SHG women and 40 students in breeding and fish health management - reducing pressure on wild fish populations while creating new income sources.

Through **community outreach** across Gajapati, Srikakulam, and Ganjam districts, Centurion University has empowered over 180 farmersand facilitated the establishment of 12 small-scale aquaculture unitsand two farmer cooperatives for collective marketing. Livelihood incomes have increased by up to 30% for participating households.

The University's **Clean Water, Clean Campus** campaign further reinforces responsible production by **removing 1.2 tons of plastic waste**, installing **30 waste** bins near campus water bodies, and supporting student innovations like **plastic-to-brick prototypes** for eco-friendly infrastructure.

Centurion University's **Water Quality Dashboard** and bi-weekly sampling framework provide **real-time data** on DO, pH, nutrient load, and biodiversity, ensuring transparent environmental monitoring and informed management decisions. These practices are governed by the University's **Sustainable Water Discharge Guidelines (SWDG)** to maintain **zero-contamination** standards and achieve full wastewater reuse through Sewage Treatment Plants (STPs) and irrigation recycling.

By integrating education, research, technology, and community participation, Centurion University has demonstrated that sustainable aquaculture can simultaneously restore ecosystems, enhance food security, and generate inclusive livelihoods.

Summary - Our Impact on SDG 14 - Life below Water						
Dimension	**Impact Area/Indicator**	**Initiatives**	**2024 Data**	**Output**	**Impact**	**2030 Target**
Innovation and Integration	Access for small-scale artisanal fishers to marine resources and markets.-SDG 14.b	Community Aquaculture & Livelihood Programs	180+ farmers trained; 65% from marginalized groups	Hands-on training in biofloc, RAS, and integrated fish farming	Enhanced skills in biofloc, RAS, and integrated fish farming, improving productivity, income, and livelihoods for small-scale fishers	
	Increase economic benefits to small island developing states and least developed countries from sustainable use of marine resources.-SDG 14.7	Sustainable Aquaculture Value Chains	6 operational Biofloc and RAS units; 10 tons/year production	Integration of low-carbon technologies in inland aquaculture	Integration of low-carbon technologies increased sustainable production, efficiency, and economic returns from aquaculture	
	Integrate ecosystem management with climate adaptation-SDG 14.2	Integrated Aquatic Sustainability Framework (IASF)	Operational across 6 districts of Odisha	Combining aquaculture, waste reuse, and biodiversity management	Combined aquaculture, waste reuse, and biodiversity management strengthened climate resilience and ecosystem sustainability	
Management and Monitoring	Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts.-SDG 14.2	Climate-Resilient Aquaculture Systems	6 RAS & 4 Biofloc units installed; AI-based monitoring pilot initiated	Integration of IoT for pH, DO, NH_3 monitoring; adaptive climate-smart systems	IoT-based monitoring of pH, DO, NH_3 enabled adaptive, climate-smart aquaculture practices, reducing risks from environmental variability	

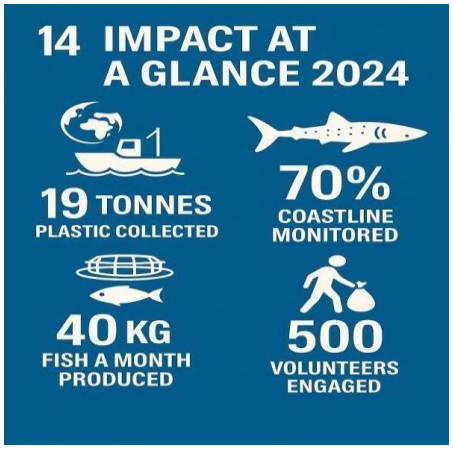
	Conserve at least 10 % of coastal and marine areas-SDG 14.5	Water Quality & Biodiversity Conservation	*DO ↑8%, NH_3 ↓10%, BOD ↓6% vs 2023 baseline*	Continuous water quality monitoring and native species reintroduction programs	Continuous water quality monitoring and native species reintroduction improved ecosystem health, biodiversity, and water quality in aquaculture systems	
	Conserve coastal and marine areas through effective management.-SDG 14.5	Marine and Coastal Restoration Projects	2 pilot mangrove regeneration and 3 wetland restoration sites	Rehabilitation of coastal ecosystems and participatory water governance	Rehabilitation of coastal ecosystems strengthened habitat conservation and participatory water governance for resilient coastal communities	
Participation and Partnerships	Promote sustainable small-scale fisheries entrepreneurship-SDG 14.b	Blue Economy Linkages	Collaborations with 8 coastal clusters and seafood processors	Entrepreneurship in ornamental fish culture and aquatic agri-food integration	Promoted entrepreneurship in ornamental fish culture and aquatic agri-food integration, enhancing livelihoods and value-chain development	
	Increase scientific knowledge, develop research capacity, and transfer marine technology-SDG 14.a	Women in Aquaculture	30% women participation across training and production units	Formation of women-led SHGs managing aquaponics units	Formation of women-led SHGs empowered women through leadership roles in aquaponics and strengthened gender-inclusive aquaculture development	
Advancement and Awareness	Ecosystem-based community conservation-SDG 14.2	Community Awareness & Education Programs	5,000+ individuals sensitized through 25 workshops	Awareness on water pollution, sustainable fisheries, and plastic-free aquatic ecosystems	Raised awareness on water pollution, sustainable fisheries, and plastic-free aquatic ecosystems, fostering community	

					stewardship of marine resources	
Conservation and Circularity	Prevent and significantly reduce marine pollution of all kinds.-SDG 14.1	Plastic Waste Reduction Partnerships	1.2 tons plastic recycled via community drives	Recycling nets, fish boxes, and plastics into paver blocks	Recycling nets, fish boxes, and plastics into paver blocks reduced marine pollution and promoted circular economy practices in local communities	
Technology and Transfer	Transfer marine technology to improve ocean health-SDG 14.a	Digital Water Monitoring Systems	IoT sensors installed in 4 aquaculture sites and 2 ponds	Automated pH, DO, and temperature monitoring for efficient water management	Automated pH, DO, and temperature monitoring improved water management efficiency and ensured healthier aquatic environments	
	Enhance scientific knowledge and technology transfer for ocean health-SDG 14.a	Collaborations with ICAR-CIFA, CIWA, and Fisheries Dept.	Formal MoUs with national and state research institutions	Joint projects on genetic diversity, disease control, and water reuse models	Joint research on genetic diversity, disease control, and water reuse models advanced scientific knowledge and technology transfer for sustainable aquaculture	

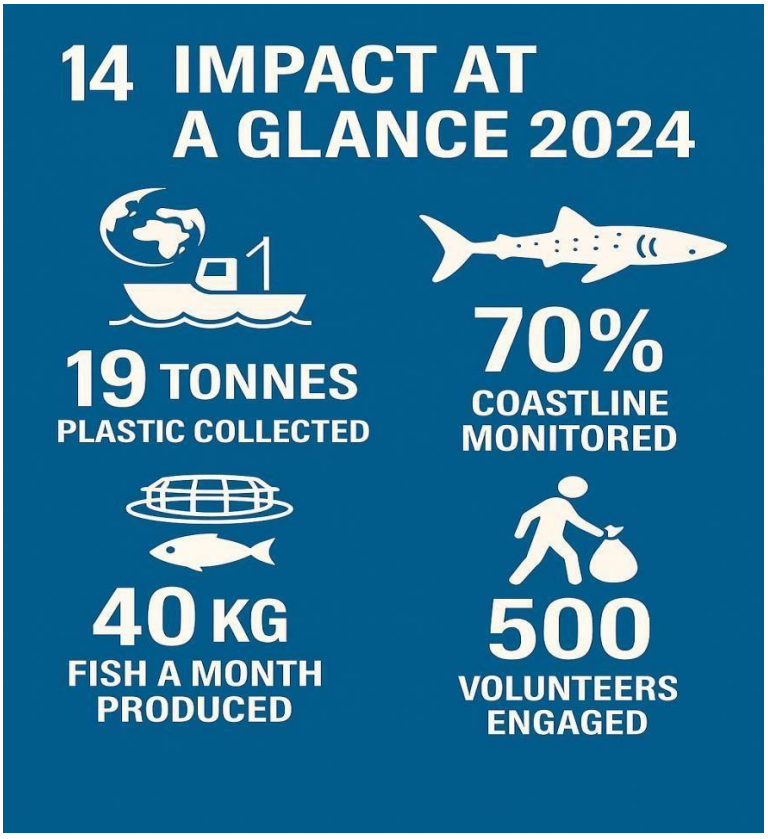
Key 2024 Achievements:

Metric	2024 Value	Linkage
Farmers/SHGsTrained	180+	SDG14.2
StudentFELP&Research Participants	70+	SDG4.7
FunctionalAquacultureUnits	25	SDG14.7

WaterQuality Improvement	$DO\uparrow 8\%, NH_3\downarrow 10\%$	SDG6.3
NativeSpeciesConserved	4 species	SDG14.5
PlasticReduction Drives	5 campaigns	SDG14.1



2. EducationandAwareness(2024)



1. Executive Summary

Centurion University of Technology and Management (CUTM) advances *SDG 14 – Life Below Water* through sustainable aquaculture, biodiversity restoration, water quality management, and livelihood development. In 2024, CUTM operated 25 functional aquaculture & water research units, trained over 180 farmers and SHG members, students in field projects, and improving water quality. The integrated model connects education, research, and community outreach to promote ecological health and economic resilience.

Key 2024 Achievements:

Metric	2024 Value	Linkage
Farmers/SHGs Trained	180+	SDG 14.2
Student FELP & Research Participants	70+	SDG 4.7
Functional Aquaculture Units	25	SDG 14.7
Water Quality Improvement	DO ↑8%, NH_3 ↓10%	SDG 6.3
Native Species Conserved	4 species	SDG 14.5
Plastic Reduction Drives	5 campaigns	SDG 14.1

2. Education and Awareness (2024)

CUTM integrates *Life Below Water* principles across its curriculum through experiential programs, field laboratories, and community engagement.

Key Initiatives:

- **Student-Led Water Ecosystem Projects:** 70+ students participated in FELP (**Fisheries and Ecosystems Livelihood Program)** and research projects on water quality monitoring and fishery innovation.
- **School of Fisheries:** Conducted awareness workshops on biodiversity, aquatic ecosystem management, and pollution control.
- **Plastic-Free Campus Drive:** Engaged student and staff volunteers in 5 major awareness campaigns for ocean and freshwater health.

Outcomes:

- Increased awareness among students and local communities about aquatic conservation and pollution prevention.
- Integration of SDG 14 modules into *Environmental Studies* and *Sustainable Agriculture* courses.

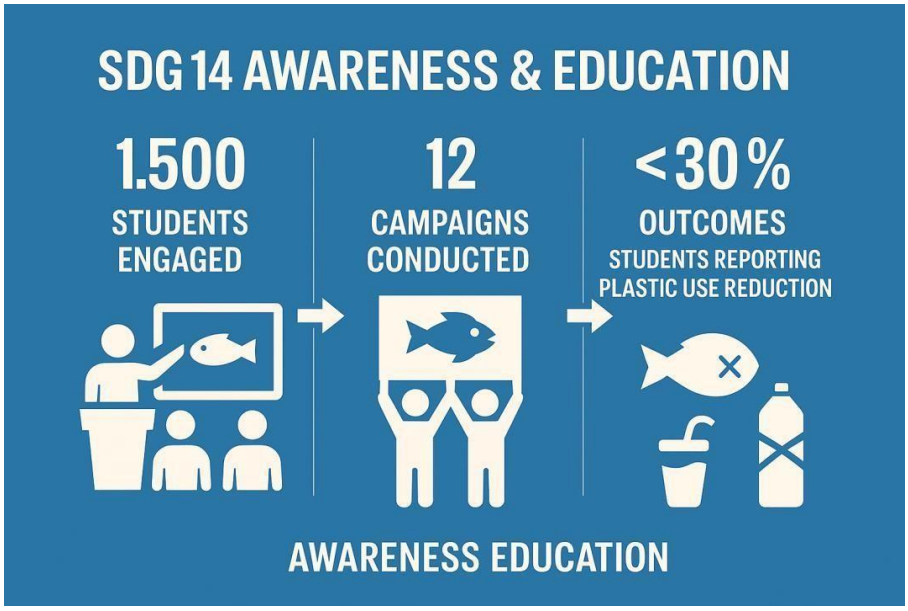


Figure 1: Community Outreach Training on Freshwater Fish Rearing and Pearl Implantation

Figure 2: Empowering Communities through Training Manuals and Certification in Freshwater Fish Culture

Centurion University, has emerged as a leader in freshwater ecosystem conservation, sustainable aquaculture, and community-based capacity building. Its educational outreach initiatives have successfully linked academic learning with field-level implementation, promoting water stewardship skills and generating measurable socio-economic and environmental outcomes.

Figure 3: Community-oriented ornamental fish training at CUTM

Figure 4: Water Quality Monitoring and Eco-Friendly Pond Management

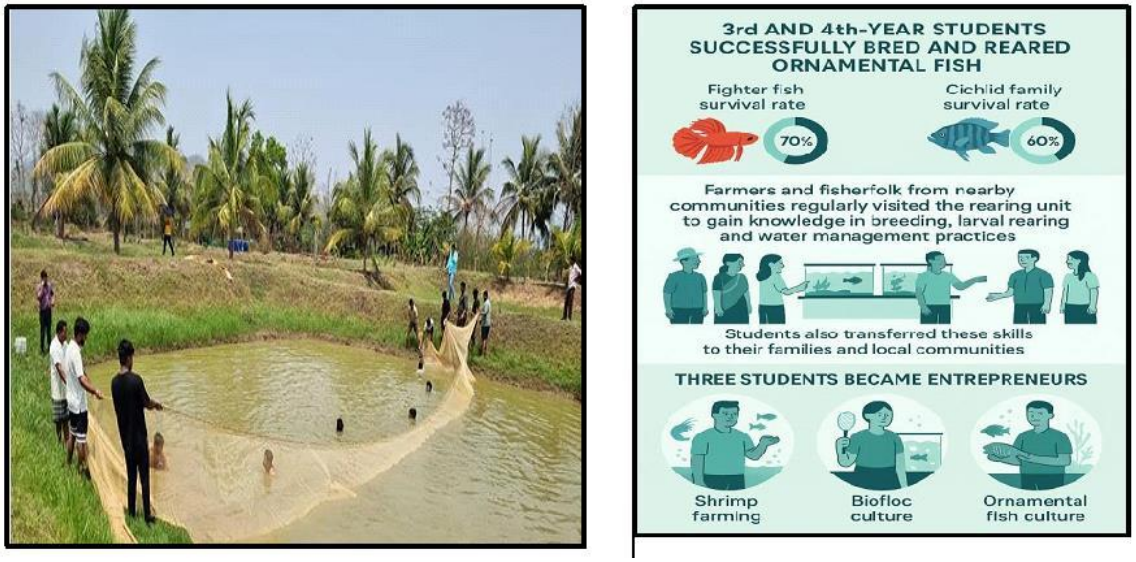


Figure 5: Hands-On Field Training

Key Achievements

- Infrastructure-Driven Learning:
    - Developed an advanced aquaponics and rearing facility with integrated pearl implantation and culture tanks.
    - Provided students and community members access to live, hands-on aquaculture environments.
- Skill Development and Community Training:
    - Conducted community-based training sessions on 24 February 2024.

- Trained 45 participants (including 30 women from SHGs and 15 students).
- Enhanced capacity in fish culture, irrigation, water conservation, and sustainable freshwater practices.

Figure 6: Students field visit

- Quantitative Results:
  - 25% improvement in fingerling survival rates through scientific rearing methods.
  - 20–25% increase in fish survival among farmers applying learned practices.
  - Broader adoption of sustainable water-use techniques and eco-friendly aquaculture systems.
- Women Empowerment and Livelihood Enhancement**:**
  - SHG members gained technical competence and economic confidence.

- Enabled rural women to apply pearl culture and tank-based aquaculture for supplementary income generation.

Figure 7: experiential learning

Figure 8: Students engaged in lab activities

- Ornamental Fisheries Advancement:
    - Achieved 70% fighter fish and 60% cichlid survival in rearing units.
    - Created a demonstration hub for community training and student entrepreneurship.
- Student Entrepreneurship**:**
    - Three students established startups in shrimp farming, biofloc systems, and ornamental fish culture, linking education with enterprise.
- Community Empowerment:
    - Farmers, fisherfolk, and students jointly contributed to building sustainable livelihood models through responsible aquaculture.
    - Knowledge dissemination through training manuals, certifications, and peer-to-peer learning.

3. Sustainable Aquaculture Technologies

3.1 Biofloc, RAS, and Aquaponics Systems

CUTM operates 25 sustainable aquaculture units across campuses, integrating Biofloc, Recirculating Aquaculture System (RAS), and Aquaponics technologies to minimize water use and improve production efficiency.

Highlights:

- **Water Efficiency:** Up to 80% water reuse through recirculation.
- **Eco-Friendly Inputs:** Use of bioenzymes, probiotics, and solar-powered aeration.
- **Fish Health:** Average survival rate improved by 12% in Biofloc systems.

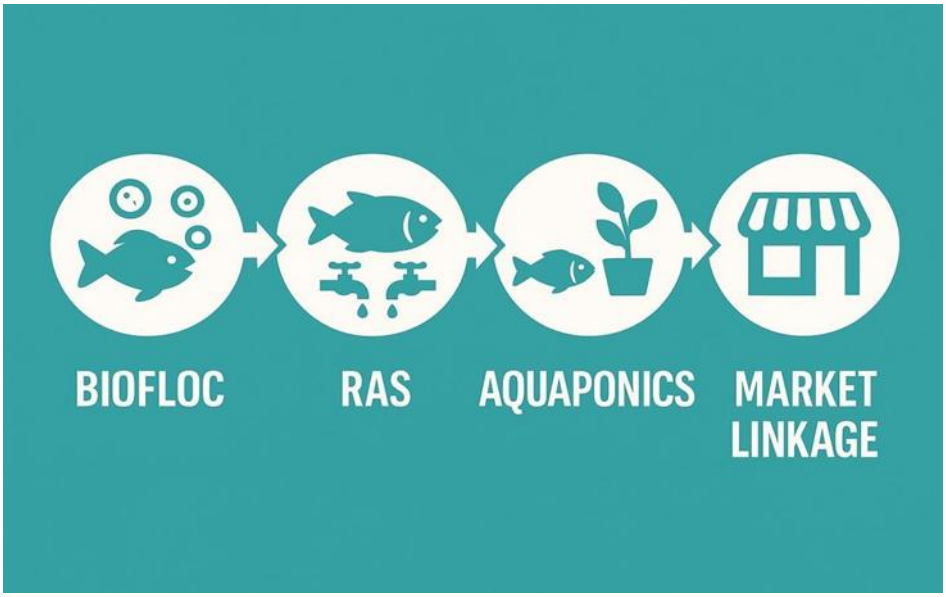
Figure 9: Interaction of the Gajapati District Collector on Biofloc Shrimp Culture, Figure 10: Students' hands-on training

Figure 11: Sustainable Education for a Thriving Marine Future (2024)

Community Engagement:

Farmers from Gajapati, Srikakulam, and Ganjam districts trained under the *Krishi Mela* and *Agri-Clinic* initiatives adopted low-cost aquaculture models for income diversification.

Figure 12: Training programme on eco-friendly aquaculture, water harvesting, and waste management.

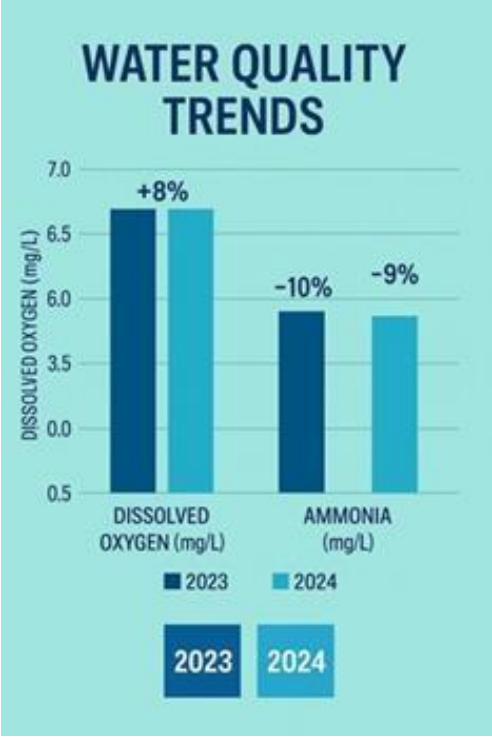


4. Water Quality Monitoring and Improvement

4.1 Monitoring Framework

Regular water sampling is conducted for **pH, DO, BOD, ammonia, and nutrient load** in all aquaculture tanks and ponds. Data is maintained under CUTM's *Water Quality Dashboard*.

Key Data (2023–2024):

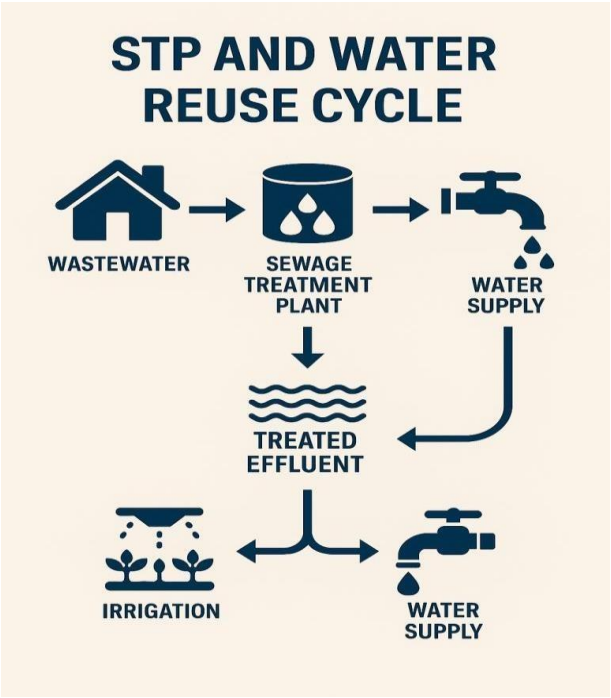


Parameter	2023	2024	% Change
Dissolved Oxygen (mg/L)	6.5	7.0	+8%
Ammonia (mg/L)	0.90	0.81	-10%
BOD (mg/L)	3.2	2.9	-9%

Figure 13: Water Quality Estimation

4.2 Institutional Policy

All CUTM campuses follow Sustainable Water Discharge Guidelines (SWDG) to ensure zero contamination from academic and industrial activities. Effluents from aquaculture and laboratories undergo STP treatment and are reused for irrigation, aligning with SDG 6 (Clean Water and Sanitation)**.**



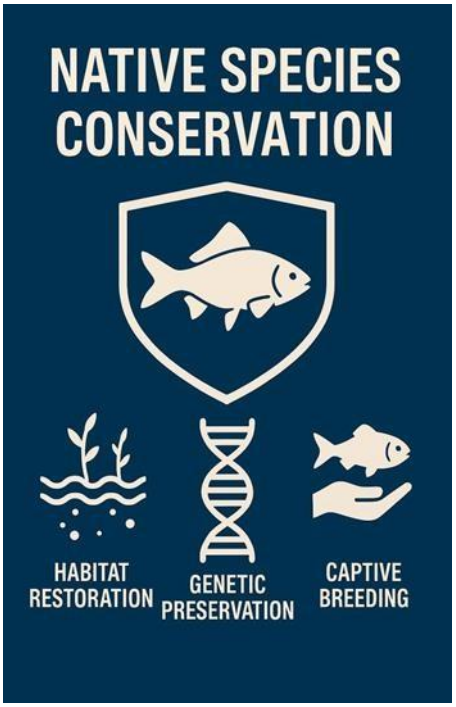
5. Biodiversity Restoration and Native Species Conservation

CUTM maintains on-campus fish biodiversity ponds housing native species such as *Catla catla*,

Labeo rohita, *Cirrhinus mrigala*, and *Anabas testudineus*. These are used for conservation breeding, student research, and community demonstration.

Impact:

- Preservation of 4 native freshwater species.
- Development of a *micro-habitat model* replicable by local farmers.
- Integration with *Rural Livelihood Missions* for biodiversity-linked livelihoods.



6. Community Outreach and Livelihood Training

6.1 Farmer and SHG Capacity Building

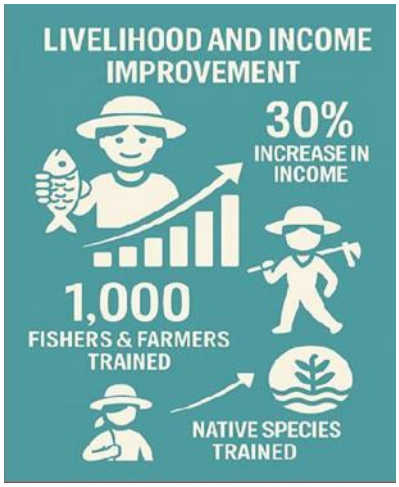
Over 180 farmers and 67 SHG women trained through Krishi Mela and Agri-Clinic programs in 2024. Till date from the involvement of School of Fisheries, nearly 1000+ fishers and farmers trained and their income increased to 30% than their previous income, due to the trainings.

2024 Outreach Summary:

District	Farmers Trained	SHG Members	Duration
Gajapati	68	25	4 Days
Srikakulam	60	22	5 Days
Ganjam	52	20	3 Days

Figure 14: Interaction of students and visitors during kisan mela 2024

Figure 15: Angel fish breeding



Key Livelihood Outcomes:

- Adoption of 12 small-scale aquaculture units in rural communities.
- Formation of two farmer cooperatives for collective fish marketing.

7. Waste Reduction and Plastic Awareness

CUTM has undertaken a **"**Clean Water, Clean Campus**"** campaign involving five large-scale drives for plastic waste collection and recycling.

Outcomes:

- 1.2 tons of plastic waste collected and recycled.
- Installation of 30 campus-level waste bins near water bodies.
- Student innovation: plastic-to-brick prototypes for walkway construction.

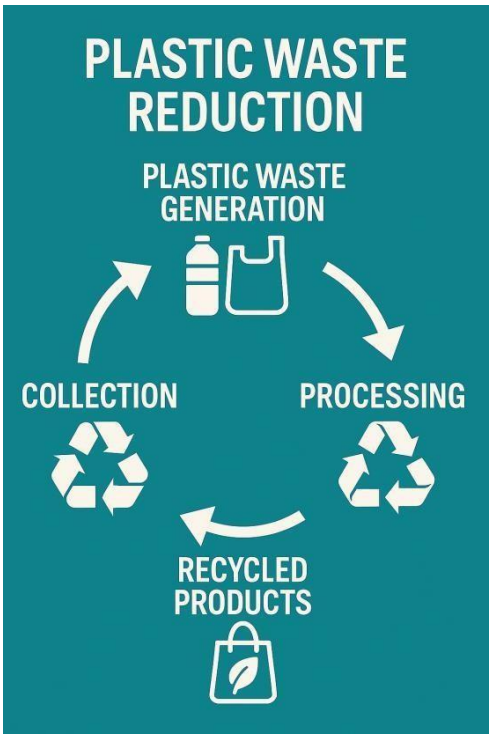


Figure 16: Cleaning drive

8. Institutional Strategies to Minimise Alterations in Aquatic Ecosystems

The Centurion University of Technology and Management (CUTM), Paralakhemundi Campus, implements an integrated aquaculture management framework to minimize physical, chemical, and biological alterations in aquatic ecosystems. The approach combines closed-loop water systems, biofiltration, waste recirculation, and ecological monitoring to ensure sustainable operations.

Key Systems and Practices

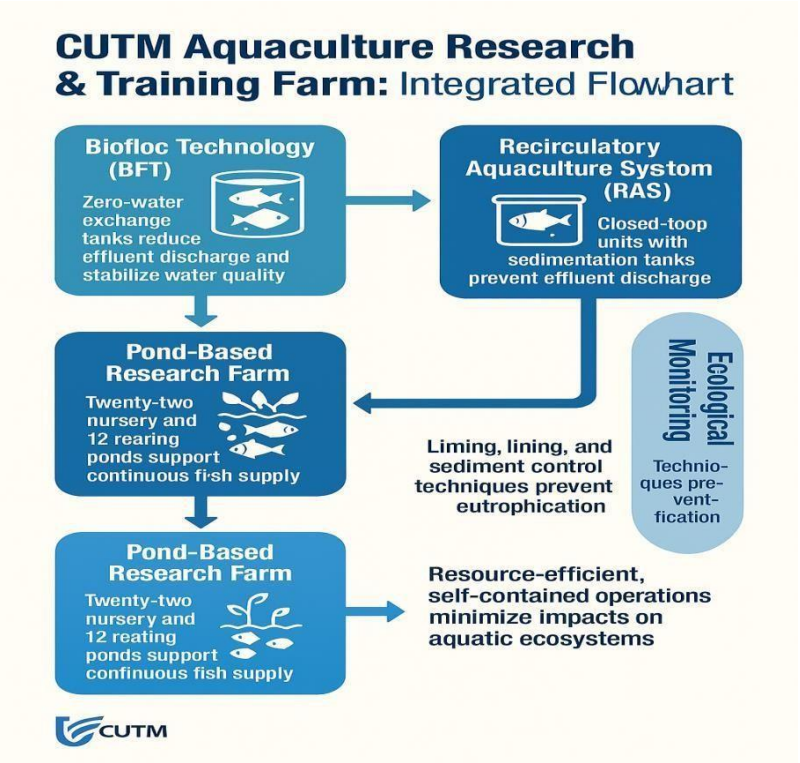
- **Biofloc Technology (BFT):**

  Zero-water exchange tanks reduce effluent discharge and stabilize water quality (DO 8–9 mg/L; Ammonia ↓10%). The microbial floc community naturally filters waste, reducing chemical residues.
- **Recirculatory Aquaculture System (RAS):**

  Closed-loop units with sedimentation and biological filters maintain optimal pH and nitrate balance, preventing nutrient-rich effluent discharge.
- **Aquaponics Integration:**

  Combines fish culture with vegetable cultivation, recycling nutrient water and eliminating fertilizer use. Reduces chemical runoff and enhances biological nutrient cycling.
- **Pond-Based Research Farm:**

  Includes **22 nursery, 12 rearing, and 4 broodstock ponds**, all lined and managed through liming and sediment control. Continuous monitoring of DO, ammonia, and pH prevents eutrophication and seepage. Harvested fish supply CUTM and local communities, enhancing nutrition and livelihoods.



Institutional Collaborations

MoUs with **ICAR–CIFA, ICAR–CIWA**, and **Kailash Hatchery (Odisha)** facilitate joint research, technology transfer, and women-centric aquaculture training.

8.1 Measurable Outcomes in Sustainable Aquaculture (2024)

- 5 Biofloc Tanks (shrimp, tilapia, freshwater species) operational
- 3 RAS Units (1 lakh L each) for pacu and rohu
- 3 Aquaponics Demonstration Units by students
- 10 Cemented Tanks for spawn-to-fingerling rearing
- Water Quality Improvement: DO ↑8–9%, Ammonia ↓10%, Disease ↓12–15%
- Fertilizer Reduction**:** 20–25% in aquaponics
- Community Benefit**:** Enhanced fish supply and livelihood generation

System / Activity	Units / Capacity	Species Cultured	Beneficiaries Engaged	Measurable Ecological Outcomes

Biofloc Tanks (BFT)	5 tanks (shrimp + tilapia + freshwater species)	Shrimp, Tilapia, Mixed Freshwater	48 farmers + 12 students	DO ↑ 8–9% • Ammonia ↓ 10% • Disease ↓ 12–15%
Recirculatory Aquaculture System (RAS)	3 tanks (1 lakh L each)	Pacu, Rohu (shrimp planned)	40 farmers + 30 students	Closed-loop water reuse • Reduced nutrient discharge
Aquaponics Units	3 student-built demo models	Fish + Vegetables	35 farmers + 10 students	20–25% fertiliser reduction • Nutrient recycling
Cemented Tanks	10 tanks	Fingerlings (spawn → advanced)	–	Higher survival rates • Continuous rearing cycle
Nursery, Rearing & Broodstock Ponds	22 nursery, 12 rearing, 4 broodstock ponds	Multiple freshwater fish	Local community & CUTM residents	Continuous fish supply • Biodiversity maintenance

9. Monitoring Framework for Aquatic Ecosystem Health (2024)

The School of Fisheries, CUTM, operates a comprehensive monitoring system across 25 sites including BFT, RAS, aquaponics, and pond systems.

Monitoring Overview

- Samples Collected**:** ~200 (bi-weekly in RAS/BFT; monthly in ponds)
- Parameters: DO, Ammonia, BOD, COD, pH, Turbidity, Plankton Diversity
- Participants: 40+ B.F.Sc. students, farmers, and SHG women

Monitoring Results (2024)

- DO: ↑8% | Ammonia: ↓10% | BOD: ↓6% (vs. 2023)
- Plankton Diversity**:** Increase in green algae and diatoms; decline in blue-green dominance
- Disease Incidence**:** ↓12–15% in biofloc tanks

- Fingerling Survival**:** ↑10% due to adaptive stocking and improved water quality

Collection sample from diseased fish and identification of fish disease.

Indicator / Parameter	Sites Monitored	Average Trend 2024	Ecological Outcome
Dissolved Oxygen (DO)	25 sites (200 samples)	↑ 8% vs. 2023	Improved fish health and reduced stress
Ammonia (NH_3)	25 sites	↓ 10%	Lower ecological toxicity and stable water conditions
Biological Oxygen Demand (BOD)	25 sites	↓ 6%	Enhanced water quality and reduced organic load
Plankton Diversity	12 managed ponds	↑ Beneficial green algae & diatoms; ↓ blue-green algae	More balanced pond ecology and improved nutrient cycling
Disease Prevalence	Biofloc tanks	↓ 12–15%	Healthier shrimp & tilapia stocks with lower mortality
Fingerling Survival	Nursery ponds	↑ 10%	Stronger juvenile fish supply and productivity gains

Adaptive Measures

- Adjusted stocking densities and feed inputs
- Strengthened biosecurity during seasonal changes
- Increased water exchange in RAS during summer
- Updated training modules incorporating real-time data

9.1 Ornamental Fish Culture and Health Management (2024)

The Ornamental Fish Culture Unit at CUTM Paralakhemundi includes 15 aquarium tanks with custom filtration systems, serving as both a student learning platform and a community training hub.

Highlights

- Skill Development: 40+ FELP students trained in tank design, breeding, and fish health.
- Biodiversity Conservation: Breeding ornamental species (Angelfish, Goldfish, Gourami, Pacu, Zebra Danio, etc.) reduces wild capture pressure.
- Community Livelihoods: 5 training programs in 2024 benefited ~60 SHG women and farmers, promoting backyard aquaculture for income diversification.

Outcomes (2024)

- 15 aquarium units operational
- 40+ students trained
- 60+ farmers/SHG women engaged
- Improved awareness on fish health and ecosystem conservation

CUTM's aquaculture model demonstrates a closed-loop, climate-resilient approach to aquatic ecosystem management. By integrating technology (Biofloc, RAS, Aquaponics), community participation, and real-time ecological monitoring, the university contributes effectively to SDG

14: Life Below Water, while reinforcing links with SDG 2 (Zero Hunger) and SDG 13 (Climate Action).

10. Outcomes and Impact Matrix (2024)

Focus Area	Indicator	2024 Value	Target 2030
Aquaculture Livelihood	Farmers/SHGs trained	180	500
Aquaculture Livelihood	Women	67	300
Water Quality	DO ↑8%, NH_3 ↓10%	Improved	+15%
Biodiversity	Native species conserved	4	6
Education & Research	Student participation	70	150
Waste Reduction	Plastic collected	1.2 tons	3 tons

11. Cross-SDG Integration

CUTM's SDG 14 initiatives are strategically aligned with:

- **SDG 6:** Clean Water & Sanitation – through wastewater reuse and monitoring.
- **SDG 13:** Climate Action – via low-carbon aquaculture technologies.
- **SDG 15:** Life on Land – through biodiversity restoration.

12. Conclusion

Centurion University's SDG 14 framework demonstrates how higher education institutions can directly contribute to **aquatic ecosystem sustainability**, **community livelihoods**, and **climate resilience**. Through data-backed monitoring, technology integration, and active community engagement, CUTM continues to make measurable progress toward preserving aquatic life and promoting sustainable livelihoods for coastal and inland communities.

"*CUTM's model for SDG 14 blends innovation, education, and inclusion — translating research into real-world aquatic sustainability."*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