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STRC NEWSLETTER

Science & Technology Resource Centre
Gondwana University, Gadchiroli

A centre of excellence for sustainable value creation, conceived and funded by Rajiv Gandhi Science and Technology Commission (RGSTC), Mumbai, Govt. of Maharashtra.

TECHNOLOGY | ENTERPRISE | DEVELOPMENT

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From Streams to Livelihoods

Aquaculture Opportunities in Gadchiroli's Water-Rich Landscapes

Shri Swapnil Girade
Chief Program Officer and
Head (In-Charge), STRC

Gadchiroli district, spread over 14,412 square kilometres, is richly endowed with natural water resources, offering significant untapped potential for aquaculture-based livelihoods. While over 86% of the district is covered under forest, the region is interspersed with perennial rivers such as the Wainganga, Pranhita, Indravati, and Godavari. Gadchiroli's waterscape spans about 322.6 km², forming a viable base for aquaculture and related water-based interventions (NWIA Maharashtra Atlas) along with numerous seasonal streams, ponds, reservoirs, and irrigation structures. The district receives an average annual rainfall of 1,300–1,350 mm, making it one of the better-hydrated regions of central India. The strategic use of this hydrological wealth can support the development of a vibrant and sustainable aquaculture sector—especially when guided by applied science and technology.

One of the key water infrastructure assets in the district is the Chichdoh Barrage. It plays an important role in irrigation and downstream water regulation. Periodic gate releases shape the ecological conditions that directly influence the viability and planning of fish culture cycles in adjacent zones. Surface water quality assessments conducted in the region have shown pH values between 5.2 and 7.8, with dissolved oxygen ranging from 5 to 9 mg/L—favourable ranges for aquaculture. Moreover, studies from the Wainganga River basin report over 20 species of indigenous fish, indicating a healthy and biodiverse aquatic ecosystem.

At the national level, India ranks second in global aquaculture production, yet a large share of its inland water resources remains underutilized. Maharashtra itself has over 1.77 lakh hectares of saline and inland water bodies with immense aquaculture potential. Gadchiroli contributes modestly to this figure, but research from pilot interventions points to a bright future. Seasonal pond-based aquaculture, even on a small scale, has shown high profitability. For example, seed-rearing in farm ponds of 2,000 to 4,000 square meters has yielded net returns of

₹72,750 with a benefit-cost ratio of 1.51. Larger grow-out ponds have reported net incomes of ₹189,750 per hectare, with a return on investment of 1.18. These results highlight aquaculture's potential not only as a supplementary livelihood but also as a core rural enterprise.

Applied science and precision technologies are proving essential in driving aquaculture outcomes. IoT-based water quality monitoring systems—tracking parameters like pH, turbidity, temperature, and dissolved oxygen—are emerging as transformative tools for timely and adaptive pond management. Innovations such as Recirculatory Aquaculture System (RAS), solar-powered aeration, and integrated fish-livestock systems are also gaining relevance in tribal regions with fragmented landholdings.

Recent state-level initiatives, including Maharashtra's large investment in irrigation and river-linking projects across Vidarbha and Marathwada, signal a growing emphasis on water-based livelihoods. While Gadchiroli is not yet central to this conversation, the expansion of such infrastructure provides a strategic window to establish canal-fed or reservoir-linked aquaculture projects in the district.

At the grassroots level, the Science and Technology Resource Centre (STRC), Gondwana University, has been implementing targeted initiatives to demonstrate aquaculture viability in tribal communities. STRC has introduced portable carp hatcheries in select locations, helping farmers produce and access quality seed locally. The centre has also deployed fish vending units (FVUs), which extend the shelf life of fish by 4–5 days—improving market reach and reducing post-harvest losses. Pilot efforts in integrated fish-poultry systems have allowed farmers to diversify income while maximizing land use. In parallel, STRC is working to establish fish farmers' interest groups (FIGs) and eventually form a Centralize Fish Hatchery and Aquaculture Lab in Gadchiroli as one-point resource for fish-farmers and entrepreneurs of the region. Such efforts create not only livelihoods but also a sense of local leadership and technical confidence key to sustaining aquaculture ventures.

Looking ahead, Gadchiroli is uniquely positioned to become a model district for community-driven aquaculture. Scaling up hatcheries in all blocks, expanding real-time water quality monitoring, promoting integrated farming systems, and building a robust aquaculture value chain through FPOs can transform the local economy. With proper alignment of state infrastructure initiatives, financial support mechanisms, and technological guidance, “Blue Gadchiroli” can emerge as a flagship case of livelihood transformation through aquaculture. With its abundance of water, traditional ecological knowledge, and a growing base of scientific interventions, the district holds all the ingredients for success. STRC remains committed to this vision, and through collaborative efforts with farmers, institutions, and government bodies, we can ensure that aquaculture becomes a sustainable and inclusive engine for rural development.

Wetland Map Gadchiroli

source - NWIA- Maharashtra Atlas

Article

Recirculating Aquaculture System (RAS)

A Step toward Water-Smart Fish Farming

Water scarcity, land constraints, and environmental challenges are pushing modern aquaculture towards innovation. The Recirculating Aquaculture System (RAS) presents a sustainable and efficient solution for fish farming, particularly relevant for regions with limited water availability. For tribal and rural communities, RAS offers a scalable, eco-friendly alternative to traditional pond-based aquaculture—aligning with STRC's mission of promoting technology-driven livelihoods.

Shri Suraj Gongale
Jr. Scientific Officer,
Aquaculture & Livelihood, STRC

What is RAS?

RAS is a closed-loop fish farming system where water is continuously filtered and reused, reducing the need for large volumes of freshwater. The system typically includes:

- Fish tanks
- Mechanical and biological filtration units
- Oxygenation systems
- UV or ozone disinfection (optional)

This allows farmers to raise fish in controlled indoor or semi-indoor environments, independent of natural water bodies.

Why RAS for Tribal & Rural Communities?

1. Water Efficiency

RAS uses up to 90-95% less water compared to traditional pond systems. This is critical in water-scarce or drought-prone tribal regions.

2. Year-Round Production

Unlike seasonal pond culture, RAS enables continuous fish production throughout the year, improving income flow.

3. Space Optimization

RAS can be set up in small areas, including backyard farms, cowsheds, or terraces—ideal for land-constrained families.

4. Disease Control

With controlled environments, fish are less exposed to external pathogens, reducing the use of antibiotics and improving fish health.

Types of Fish Suitable for RAS


Tilapia


Catfish


Carps


Murrel


Ornamental fish
(for niche markets)

Challenges and Considerations

- Initial investment is relatively high.
- Requires technical training in water quality management and filtration.
- Electricity-dependent, though can be supported with solar systems.

STRC Interventions in RAS

- Offering capacity-building programs on RAS operations.
- Providing startup kits for local entrepreneurs.
- Establishing demonstration units at cluster level as models of good practice.

Potential Impact By integrating RAS into rural livelihoods

- Promoting water-smart aquaculture
- Creating employment for youth and women
- Improving nutritional access through protein-rich fish
- Reducing dependency on seasonal agriculture

STRC facilitated pilot projects, like Aquaculture set-up in Chamorshi, already demonstrate that RAS units in farm, cowsheds or in backyards can revolutionize the way fish farming supports income, nutrition, and economical sustainability for local people.

Source: https://www.intechopen.com/chapters/78285

Conclusion

Recirculating Aquaculture Systems represent the future of climate-resilient aquaculture. For STRC, championing RAS is not just about technology adoption—it's about building sustainable livelihoods, ensuring food security, and promoting resource-smart development in India's rural heartlands.

Cover Story

STRC Honoured with the 'वसंतराव नाईक सामाईक पुरस्कार २०२५'

Mumbai | July 1st, 2025

Science and Technology Resource Centre (STRC) has proven itself as a model for the state of Maharashtra due to its concerted efforts to improve the lives of rural youth and to assist tribal dominated areas of Vidarbha. In recognition of this, the prestigious 'वसंतराव नाईक सामाईक पुरस्कार २०२५', awarded by the Vasantrao Naik Agricultural Research and Rural Development Foundation, Bombay has been conferred upon Science and Technology Resource Centre, Gondwana University, Gadchiroli at the event.

Gadchiroli district, known for its tribal population and remote geography, has limited access to education—especially in the fields of science and technology. To bridge this gap, the Rajiv Gandhi Science and Technology Commission, Mumbai, Government of Maharashtra, established STRC in 2014 in collaboration with Gondwana University, Gadchiroli, with the vision of 'STRC to because centre of excellence for sustainable value creation, STRC is leveraging local resources, relevant knowledge and appropriate technologies for human capacity development'.

Today, the Centre plays a vital role in the educational and social development of the region through applied science & technology. With a focus on enhancing skill development, promoting employment, facilitating social transformation, and addressing local issues through S&T baased approach, STRC has emerged as a key platform for shaping a brighter future for Gadchiroli.

Acknowledging the Centre's impactful work in driving sustainable change through effective application of science and technology in rural development, the award was presented with a memento and a cash prize of ₹1,00,000. The award ceremony took place on Tuesday, 1st July 2025, at 5:00 PM at Yashwantrao Chavan Centre, Mumbai, on the occasion of 112th birth anniversary of the late Shri Vasantrao Naik, former Chief Minister of Maharashtra. The award was presented by Hon. Shri Manikrao Kokate, Agriculture Minister of Maharashtra.

What's Making News

Strengthening Fish Farmers by Providing Essential Equipment for Sustainable Aquaculture

Gadchiroli | 23 June 2025

As part of its ongoing commitment to promoting sustainable aquaculture practices, the Science and Technology Resource Centre (STRC), Gondwana University, Gadchiroli, under the jointly implemented project with the College of Fishery Science, MAFSU, Nagpur titled 'Development of Organized Fish Seed Production, Culture, and Marketing to Ensure Sustainable Livelihood Opportunity in Aquaculture in Gadchiroli District', has extended equipment and training support to local fish farmers.

Through this initiative, STRC has facilitated the distribution of Fish Vending Units, Live Fish Tanks, and Portable Carp Hatcheries—to strengthen quality fish seed production at source, ensure hygienic storage of grow-out fishes, and improve market accessibility.

Beneficiaries under this support initiative include

Gautam Gajen Das, from Shrinivaspur (Chamorshi) received a Fish Vending Unit and Live Fish Tank

Vaibhav Vishvanath Somankar from Chamorshi received Fish Vending Unit and Live Fish Tank

Vishal Vishvanath Somankar, from Chamorshi was provided with a Portable Carp Hatchery

By enabling better access to modern equipment, STRC is empowering small-scale fish farmers to improve productivity, reduce post-harvest losses, and adopt scientific and sustainable aquaculture methods.

STRC Steps Forward to Start Smart Agricultural Initiative for Sustainable Livelihoods in Gadchiroli

Chamorshi | June 2025

The Agricultural Initiative for Sustainable Livelihoods, under the Climate Smart and Regenerative Agriculture Project led by the Science and Technology Resource Centre (STRC) is driving a

transformative shift in cotton and pigeon pea cultivation in Chamorshi block, Gadchiroli. Launched during this Kharif season under Phase I, the initiative aims to enhance productivity and sustainability in the region. The initiative involves 50 farmers, promoting climate-resilient and regenerative practices.

It introduces High-Density Planting Systems (HDPS) (90 cm x 15 cm) and intercropping cotton with pigeon pea, enhancing yields, improving soil health, and increasing climate resilience. Use of compost, biofertilizers, and nitrogen-fixing pigeon pea reduces chemical inputs and supports soil fertility. Following the completion of soil testing and the distribution of climate-resilient seeds, sowing activities are now underway. This sustainable approach promotes income diversification, water conservation, and biodiversity enhancement.

To support implementation, students from Kewalramji Harde College of Agriculture, Chamorshi, have joined under a 4-month RAWE program, linking academics with field practice.

STRC Participated in Diagnostic Study Report Validation Meet under Micro & Small Enterprises Cluster Development Programme, District Industries Centre

Gadchiroli | 13th June 2025

Science and Technology Resource Centre participated in the Diagnostic Study Report (DSR) Validation Meeting held at the District Industries Centre (DIC), Gadchiroli. The meeting was organized under the Micro & Small Enterprises – Cluster Development Programme (MSI-CDP) to review and validate the DSR prepared for the proposed industrial cluster in the district.

The session brought together officials from the DIC, technical consultants, industry stakeholders, and representatives from cluster units. STRC was specially invited as a Research and Development organization to offer technical insights and strategic support for shaping the proposed cluster's development plan.

STRC Organizes Interaction on Internship Opportunities with National Innovation Foundation, India

Gadchiroli | 13th June 2025

Science and Technology Resource Centre (STRC), Gondwana University, in collaboration with the National Innovation Foundation – India (NIF), organized an interaction session with Dr. Rahul Prakash, Research Associate, NIF to explore internship opportunities for students at Gondwana University.

As an autonomous institute under the Department of Science & Technology, Ministry of Science & Technology Government of India, NIF offers unique exposure to grassroots innovations, traditional knowledge systems, rural development, and field-based learning. The session highlighted various ways students can contribute to and learn from real-world challenges in rural innovation landscapes.

The event aimed to connect young minds with meaningful experiential learning opportunities, encouraging them to engage with community-based innovations and sustainable development practices.

STRC Participates in World Environment Day Celebration

Gadchiroli | 5th June 2025

Science and Technology Resource Centre (STRC) actively participated in the World Environment Day celebration organized by Lloyds Metals and Energy Ltd. and hosted by Gondwana University. Marking the occasion with a commitment to environmental sustainability, a plantation drive was conducted by Lloyds Metals and Energy on the university campus.

Visit by Eminent Personalities

Gadchiroli | 4th June 2025

Delegation from the **Regional Ayurveda Research Institute**, Nagpur, is one of the peripheral institutes of the **Central Council for Research in Ayurvedic Sciences (CCRAS)**, an autonomous body under the Ministry of AYUSH, Govt. of India visited Science and Technology Resource Centre. The visit focused on exploring collaborative opportunities in the domain of Indigenous Medicinal Knowledge and they expressed their interest in collaboration regarding scientific validation of folk claims. STRC team presented a brief overview of its ongoing work & community based documentation efforts.

Gadchiroli | 23rd June 2025

Shri Abhay Kulkarni, Vice President of MITCON Consultancy and Engineering Services Ltd., visited the Science and Technology Resource Centre (STRC). The visit aimed to explore potential areas of collaboration in the fields of technology transfer, entrepreneurship development, and capacity building. During the interaction, team STRC brief their ongoing initiatives and community-driven programs to promote sustainable development in tribal regions.

Gadchiroli | 26th June 2025

Dr. Abhay Deshmukh and Dr. Kavita Deshmukh from Rashtrasant Tukadoji Maharaj Nagpur University visited STRC to explore the Centre's innovative initiatives and ongoing developmental projects.

During their visit, the esteemed guests appreciated STRC's community-centric approach and its impactful work in science and technology for sustainable development, they also added industrial inputs for the further development of Gondwana Craft.

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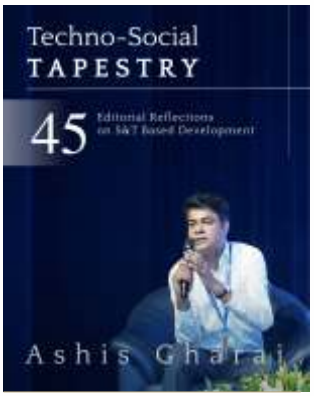

Techno-Social Tapestry
45 - Editorial Reflections on S&T Based Development

Threads of Change: Our 2024 Story
A Pictorial Representation

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Science & Technology Resource Centre Gondwana University, Gadchiroli

Conceived and funded by Rajiv Gandhi Science and Technology Commission (RGSTC), Mumbai, Government of Maharashtra, Science & Technology Resource Centre (STRC) is an autonomous institute established in concurrence with Gondwana University, Gadchiroli in 2014. As a centre of excellence for sustainable value creation, STRC is leveraging local resources, relevant knowledge and appropriate technologies for human capacity development. STRC acts as a catalyst to science and technology based development of the under-served tribal communities of the Gadchiroli region and as a bridge between knowledge activities of the University and enhanced livelihoods in the neighborhood.

'Science & Technology Resource Centre Foundation Gadchiroli', registered under the Societies Registration Act, 1860 (XXI of 1860).

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