Techno-Social TAPESTRY

40 Editorial Reflections on S&T Based Development

Ashis Ghatrai

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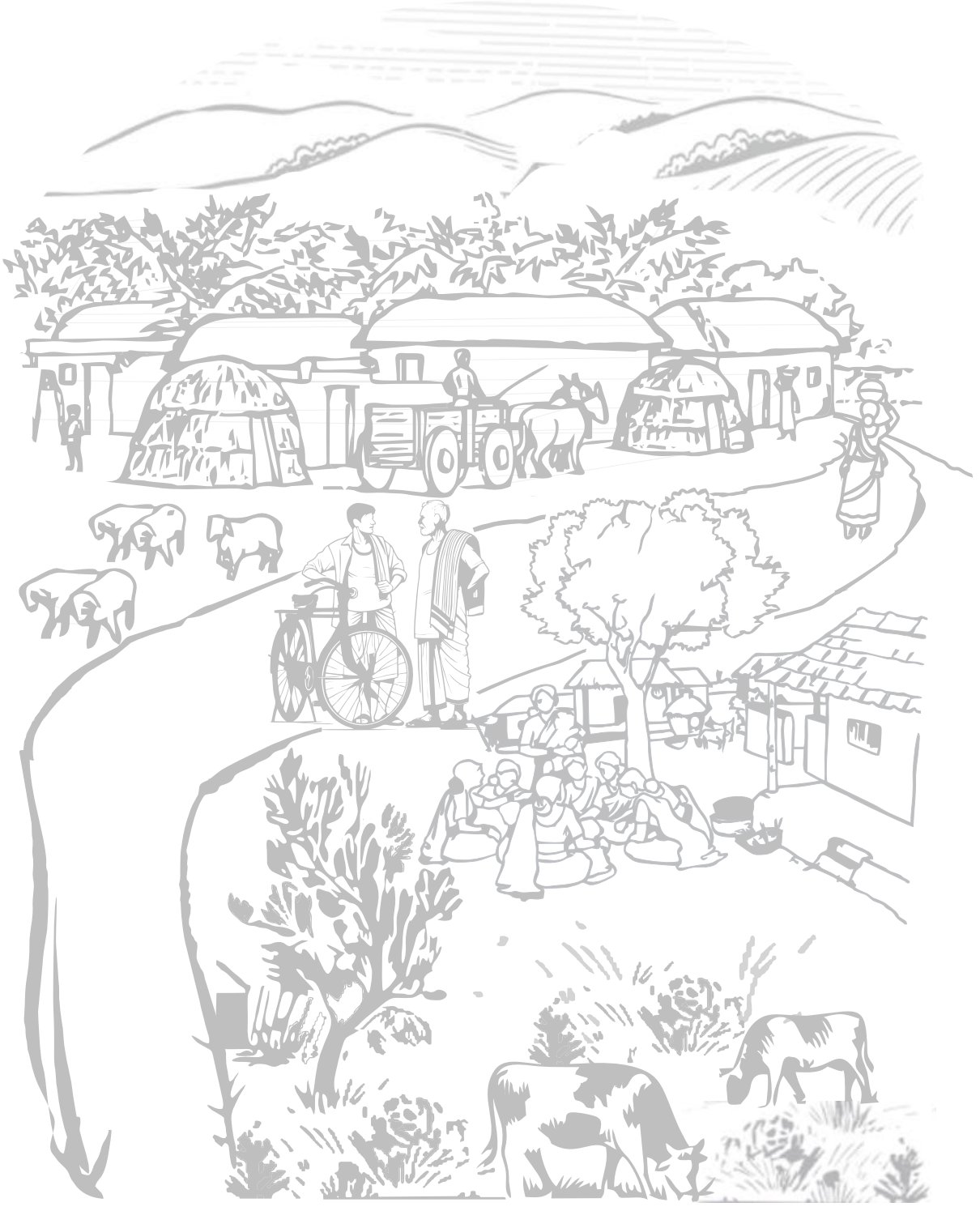

About The Author

Ashis Gharai

An alumnus of the Forest Research Institute (FRI), Dehradun, Wildlife Institute of India (WII), Dehradun, and Indian Institute of Technology (IIT), Kharagpur, he brings over two decades of experience in wildlife conservation and techno-social development sector. His professional journey spans the development of science and technology based livelihood solutions for forest dependent communities across India, conservation of large mammals (with WII and National Tiger Conservation Authority), management of community conserved areas (with UNDP India), and facilitation of community-led forest and biodiversity conservation initiatives (with the Centre for People's Forestry), among other notable contributions. He played a pivotal role in shaping and advancing the growth story of STRC over the last decade. A passionate traveller and avid watch collector, he has explored the diverse landscapes of India, effortlessly blending research, leisure, and culinary advantures.

About The Book

‘Techno-Social Tapestry’ refers to the interwoven and complex relationship between technology and society. It highlights how technology shapes social structures, behaviors, and cultural norms, while simultaneously being influenced by social forces and human actions. This interplay is often seen as a dynamic, interconnected web, where technology and society co-evolve and mutually reinforce each other.

This compilation features a curated selection of editorials authored by the writer, originally published between January 2019 and March 2025 under the ‘From the CPO’s Desk’ section of the Science and Technology Resource Centre (STRC) Newsletter. These 40 reflections offer insightful commentary on the role of science and technology (S & T) in shaping inclusive and sustainable development.

Drawing from real world experiences, this compilation explores themes such as rural innovation, community led development, traditional knowledge, eco-system conservation, and technology enabled governance based initiatives executed under STRC. Each editorial captures the evolving intersections of scientific thought, social change, and ground level practice, providing valuable perspectives for practitioners, policymakers, researchers, and students alike.

Both reflective and forward-looking, Techno-Social Tapestry highlights how science and technology, when rooted in human-centered values, can become powerful tools for societal transformation.

Chairman's Foreword

Dr. C. D. MAYEE
Ph.D (IARI) New Delhi, D.Sc.
AvH Fellow (Germany), NAAS Fellow,
Chairman: Agriculture Finance Corporation (Mumbai)
Agrovision Advisory Committee (Nagpur)
President: ISCI (Mumbai), SABC (New Delhi)
Board Member: African Biosafety Network (Uganda)
Dr. PDKV Akola, ISAAA (USA), SKAUST, Srinagar, (J & K)

Former :
Chairman, ASRB (ICAR), New Delhi
Agri Commissioner, GOI, New Delhi
Director, CICR, Nagpur
Vice Chancellor, MAU Parbhani

Foreword

I am pleased to introduce *Techno-Social TAPESTRY: 40 Editorial Reflections on S&T Based Development*, a succinct yet impactful chronicle of STRC's work at the confluence of science, technology, and grassroots action.

This compilation captures the evolution of STRC's field-based initiatives and thought leadership from 2019 to 2025, reflecting how localized, knowledge-driven approaches can address complex developmental challenges. The themes—ranging from rural innovation to ecological stewardship—offer compelling insights for policymakers, researchers, and development practitioners alike.

I commend Shri Ashis Gharai, Chief Programme Officer and Head of STRC, for his visionary role in articulating these reflections and for steering STRC as a model for science-led community development.

This volume stands as a valuable contribution to the discourse on inclusive and sustainable transformation, particularly in underserved regions like Gadchiroli.

Dr. C.D. Mayee

Date: 08.05.2025

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Vice Chancellor's Foreword

Dr. Prashant S. Bokare
Vice-Chancellor

Gondwana University
Gadchiroli
Maharashtra, India

(Established by Government of Maharashtra Notification No.MISC-2007/(322/07) UNI-4 Dated 27th Sept. 2011 &
Presently a State University governed by Maharashtra Public Universities Act, 2016 (Maharashtra Act. No. VI of 2017)

No. GUG/VCO/1531/2025 Date:- 08/5/2025

Foreword

It is with great pride that I present Techno-Social TAPESTRY: 40 Editorial Reflections on S&T Based Development, a compelling collection of insights drawn from the Science and Technology Resource Centre (STRC), Gadchiroli. These editorials, penned over six years, reflect the Centre's deep engagement with grassroots communities, highlighting how science and technology can drive inclusive and sustainable development.

STRC's work, anchored in the ethos of Gondwana University, bridges traditional knowledge with modern innovation. This compilation showcases themes like rural innovation, ecosystem conservation, and community-led governance each demonstrating how context-sensitive applications of S&T can bring real change.

I commend Shri Ashis Gharai, Chief Programme Officer and Head of STRC, for his visionary leadership and unwavering commitment in shaping this body of work. More than reflections, these writings offer a roadmap for practitioners, scholars, and policymakers seeking to align scientific progress with societal well-being. I trust this compilation will inspire thoughtful action toward a more equitable future.

Prof. Dr. Prashant Bokare
Vice Chancellor
Gondwana University, Gadchiroli

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Former Vice Chancellor's Foreword

गोंडवाना विद्यापीठ, गडचिरोली
Gondwana University, Gadchiroli

Dr. N. V. Kalyankar
M.Sc., D.H.E., Ph.D
Vice-Chancellor

डॉ. एन. व्ही. कल्याणकर
एम. एससी., डी.एच.ई., पीएच.डी.
कुलगुरु

क्रमांक/गो.वि./229/2019

दिनांक : 22.01.2019

Introductory foreword

I am delighted to foreword the first edition of Science and Technology Research Center's (STRC) newsletter, the gateway to all the latest information on its foray into bringing in applicable science and technology that works as an aid to the traditional technologies. STRC poise to scale new heights and achieve meaningful targets to work for the betterment of tribal communities of Gadchiroli, a densely forested and amongst the aspiring districts of Maharashtra.

I am happy to note that with passage of time, STRC is now slowly and steadily emerging as a centre of excellence in its true letter and spirit. It's a matter of great pleasure that the newsletter would voice what you need to know about, be it an important socio-development issue, individual or story that is making news that seek your attention.

I am sure, readers, teachers, academicians, opinion makers and parents can use them to find their way to interesting information.

I congratulate STRC for its commitment and service and wish the best in all their future endeavours.

(Dr N.V. Kalyankar)
Vice-Chancellor

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Chapter 1

Science, Technology, and Innovation for Rural Development

Driving Societal Transformation through Science and Technology The Pioneering Role of RGSTC Govt of Maharashtra

Padma Vibhushan
Dr. Anil Kakodkar

Chairman, Rajiv Gandhi Science and Technology Commission (RGSTC), Mumbai, Govt. of Maharashtra

Nothing ever built arose to touch the skies
Unless some man dreamed that it should
Some man believed that it could
And some man willed that it must.

In an era defined by rapid scientific advancement and technological evolution, the Government of Maharashtra has demons-trated remarkable foresight through the establishment of the Rajiv Gandhi Science and Technology Commission (RGSTC), headquartered in Mumbai. Conceived as a visionary initiative for socio-economic development, RGSTC was instituted in April 2005, following cabinet approval in December 2004. The Commission stands as a hallmark of the state's enduring commitment to harnessing science and technology for the collective welfare of society.

What sets Maharashtra apart is its pioneering approach being one of the few states in India to create a statutory commission solely dedicated to leveraging science and technology for societal transformation. RGSTC's core mandate is to act as a catalyst, enabler, and facilitator of innovation, bringing scientific research and technology closer to the people it is intended to benefit.

Under the visionary leadership of Padma Vibhushan Dr. Anil Kakodkar, Chairman, RGSTC, along with an experienced team of advisors and a passionate cadre of young scientists, the Commission has introduced numerous programs aimed at bridging the gap between research and real-world applications. These initiatives focus on enhancing community well being, improving livelihoods, and driving sustainable development across Maharashtra.

RGSTC Plays a Pivotal Role In:

- Identifying and promoting technological innovations, particularly in key sectors such as biotechnology, biomedical engineering, agriculture, forest resources, rural economies, artisan and cottage industries, agro-based enterprises, building materials, and marine products.
- Supporting value-added solutions and replicable non-conventional energy technologies.
- Establishing Centres of Excellence to promote employment and technological research in emerging domains.
- Funding, monitoring, and implementing projects in collaboration with academic institutions, research bodies, and grassroots organizations.

Among RGSTC's flagship programs is the **Assistance for Science & Technology Applications Scheme**, which invites proposals for innovative S&T based solutions tailored to specific regions or sectors. This scheme empowers institutions and innovators to implement locally relevant projects with tangible socio-economic benefits.

In a unique approach to fostering innovation at the grassroots level, RGSTC also administers the

Science & Technology Application through University System Scheme, which supports small and medium-scale science and engineering institutions across Maharashtra. These projects are designed to address local development challenges by utilizing available resources and skills, thus democratizing access to research opportunities.

Recognizing the importance of cultivating scientific thinking from an early age, RGSTC has launched **Science and Innovation Activity Centres for school students**. These centers provide experiential learning environments that nurture creativity, inquiry, and a scientific mindset among young learners.

Another notable initiative is the **Assistance to Collaborative Projects between Institutions and Industries for Technology Development / Adoption (CPIITA)**. This scheme strengthens partnerships between academia and industry, promoting need-based research and facilitating the translation of scientific discoveries into viable, scalable technologies. From pilot demonstrations to real world deployment, these collaborations ensure that research outcomes are effectively adapted to address pressing challenges on the ground.

An exemplary manifestation of RGSTC's vision is **Science & Technology Resource Centre (STRC) at Gondwana University, Gadchiroli**. Conceptualized and funded by RGSTC, STRC represents a model for leveraging science and technology in tribal and rural areas to foster knowledge based development and empower underserved communities of the Gadchiroli region.

Through such progressive initiatives, RGSTC continues to strengthen Maharashtra's innovation ecosystem, positioning the state as a national leader in S & T led growth. As the challenges of the future become increasingly complex, the role of institutions like RGSTC becomes ever more critical in ensuring that every innovation is a step forward in the service of humanity.

Maharashtra's journey in scientific progress is not merely about invention-it is about vision, belief, and the collective will to make technology work for the betterment of all. Through the unwavering efforts of RGSTC, this vision is being transformed into a tangible reality where S&T are not confined to laboratories but are actively shaping lives, communities, and the very fabric of society.

Creating Impact through Promotion of Low-cost Technologies and Conservation of Indigenous Medicinal Knowledge

> *Gadchiroli, a district nestled in the forests of eastern Maharashtra, is characterized by its rich natural resources, indigenous cultural heritage, and predominantly rural population. However, the region faces challenges such as limited industrial development, economic disparity, and dependency on traditional, low-yield livelihoods. Science & Technology Resource Centre (STRC) has emerged as a vital institution to address these challenges by promoting low-cost, contextually relevant technologies that enhance rural livelihoods while fostering sustainable development.*

With a mission to bridge science and rural needs, STRC serves as a hub for innovation, knowledge dissemination, and community engagement in Gadchiroli. Its primary objective is to bridge the gap between advanced scientific research and the practical needs of rural communities. By leveraging modern science and technology, STRC facilitates the creation of sustainable, low-cost solutions tailored to local conditions, ensuring technologies are accessible, affordable, and user-friendly for the local communities.

Key Areas of STRC's Impact

- **Agri-allied Innovations**

Agri-allied activities remain the backbone of Gadchiroli's economy. STRC introduced low-cost technologies such as; soil testing kits for optimizing fertilizer use. Bamboo made Seed Spacer for line-transplantation to help reduce drudgery and seed requirement through a pilot project on Saguna Rice Technique (SRT) for paddy and vegetable cultivation. STRC also envisaged to introduce modern technologies like IoT in vegetable cultivation and climate smart agriculture project in the pipeline. These interventions have enhanced crop yields, reduced input costs, and made farming more resilient to climatic variability.

- **Forest-Based Livelihoods**

With over 75% of the geography under rich forest cover, major chunk of Gadchiroli's tribal communities, living in and around forests, depend heavily on minor forest produce for their livelihoods. STRC has been putting a lot of emphasis to streamline the collection, processing, and marketing of Non-Timber Forest Produce (NTFP) like tamarind, mahua, honey and bamboo under the its NTFP Collectivization project. STRC has introduced low-cost tools such as; mahua flower harvester, collection net, hand-held blowers, and also has plans to have basic infrastructure for low-cost processing such as solar dryer for better quality and higher value-added products. STRC also provides training on sustainable harvesting practices, ensuring resource conservation.

- **Skill Development and Entrepreneurship**

STRC has implemented decentralized training cum production facilities for bamboo craft and NTFPs through CFCs to promote self-reliance and entrepreneurship. STRC will soon venture in to low-cost construction techniques using local materials like mud and bamboo and setting up micro-enterprises in NTFPs, agro-processing and handicrafts. Gondwana Craft, an artisan centric umbrella brand created to preserve and

promote traditional art-forms and boost artisan economy in the region.

► Promoting Community Engagement

One of STRC's most significant contributions is its participatory approach for technology need assessment. The center involves local communities at every stage of technology development and deployment, ensuring their needs and traditional knowledge are respected. This engagement fosters a sense of ownership, ensuring the long-term sustainability of these initiatives.

Conservation of Indigenous Medicinal Knowledge and Traditional Healers and their Healing Practices

STRC initiated the Van-aushadhi Abhiyan in 2017 to identify and recognize local Traditional Healers. A series of Vaidu Sammelans were organized in 2019 to address over 300 traditional healers, leading to the development of the Vaidu Directory, a handbook of local traditional healers and their healing practices in 2021. Subsequently, scientific documentation of important medicinal plant to establish the indigenous medicinal knowledge and ethno-medico-botanical context of the region was carried out, culminating in the establishment of the Vaidya Chikitsalay, a traditional healers' OPD in 2022. The OPD has now catered to over 2500 patients. This initiative aims to promote traditional healers and their healing practices, and provide them due social recognition. Furthermore, this unique initiative opens the door for intensive research leading to the marriage of traditional healing practices with modern healthcare system, ensuring holistic well-being for all, going forward.

► Challenges and Way Forward

While the STRC project, through its multiple initiatives over the years, has gradually progressed and managed to create tangible impact, the issue of sustainability and scalability for greater impact remains the major challenge going forward! Based on the preliminary impact created till date, a subject focussed log-term sustainability plan is being developed. The current thematic verticals are being institutionalized and developed as independent divisions, to operate in a larger scale with a multi-stakeholder approach, forging greater collaboration.

STRC in Gadchiroli is poised to become an example of how science and technology can be harnessed to uplift rural communities. By integrating low-cost, innovative solutions with traditional knowledge systems, STRC has paved the way for sustainable livelihood enhancement, empowering the people of Gadchiroli to thrive in harmony with their natural environment. As this model continues to evolve, it holds immense potential to be replicated in other regions facing similar challenges.

STRC's Quest to Create a Vibrant Research and Innovation Ecosystem: Current Trends & Way Forward

> *Buoyed by a vibrant start-up ecosystem and research collaborations between the industry and academia, India's research and innovation landscape is thriving and how. Further, with the recent impetus for research and development, the start-up ecosystem is rapidly gaining traction, innovation and entrepreneurship are advancing across diverse sectors.*

Over the years, India has made significant advancements in various domains of science, be it in pharma, space exploration, healthcare, technology, and more. In the current research landscape, both government and private academic research institutions play an indispensable role in human resource development, knowledge creation and global technological advancements. Despite these notable achievements, challenges persist. Although India ranks third worldwide in the number of scientific publications and PhD students, 9th in the number of citations and 6th in patent filings, we stand at a relatively low 40th for innovation, which is a cause for concern.

A focused multi-faceted approach in funding, infrastructure, policies and collaboration is vital to improve the research and innovation ecosystem. However, when it comes to allocating funds, India's expenditure on research and development (GERD as a percentage of its GDP) stands way lower compared to many developed countries like China and USA, who spend as much as 8 times and 40 times more, respectively.

Synergy in Our Approach

At STRC, we are dedicated to fostering the kinds of innovation and research in science and technology which directly benefit local communities. The Assistance for Science & Technology Application Scheme is a great way to support researchers and faculties in developing applicable solutions that can improve livelihoods. Although, we trust the fact that these research outcomes are meant to benefit the under-served local communities, encouraging the filing of patents also ensures that the outcomes of this research are protected and can potentially lead to further advancements. Outcome of our recently awarded research grants under the scheme, have been rather interesting. While the mobility aid made out of bamboo composite could greatly benefit individuals with physical disabilities, providing them with a more affordable and sustainable solution, the uniquely designed Mohua Seed Harvester could have a positive impact on tribal communities by helping them collect fresh mohua flowers more efficiently and increase their trade value.

In recent times, STRC has taken up minor research and innovation projects in pilot mode, such as; Solar Hydro Distillation Unit and Pyramid Solar Dryer which have direct relevance with STRC’s mandate to promote applicatory research for livelihood enhancement. Additionally, our Model Production Unit (MPU), which thrives on creating innovative products in bamboo, especially in the category of souvenirs, lifestyle products and its structural application, multiple preliminary research have been carried out to create innovative tools out of bamboo such as; Bamboo Craft Toolkits for local artisans, and Bamboo Poly-house as nutri-gardens, Bamboo Seed Spacers and Bamboo Composite Poultry Sheds to support local farmers. Through our Environment Education

Program for Tribal Schools, we are trying to promote a sense of curiosity and cultivate an inquisitive thought process among young children to pursue research and innovation.

Ideas for the Future

STRC believes, by promoting and supporting R&D in low-cost tools and technologies, we can drive innovation and make these advancements more accessible to a wider audience, hence, a NTFP and Medicinal Plant Resource Centre (MPRC) for extensive research in sustainable harvesting, storage, primary processing and indigenous medicinal knowledge, a Design and Innovation Centre for Bamboo and other Materials (DIC) for higher order R&D in bamboo, a Aqua Technology Facilitation Centre (AFC) for advance scientific fishery and would drive the ideas in future.

It's important for these innovations to be adopted on a larger scale and commercialized to maximize their impact. It is of paramount importance that we have a clearly defined road-map and a strategic approach that ensures sustained flow of funds for R&D, supported with required infrastructure and state policies encouraging new collaborations for ground-breaking research.

Grateful to Cactus Communications and Shri Abhishek Goel, Co-Founder & CEO, for the wonderful gesture to allow me to use excerpts from his authored article 'Nurturing India's research ecosystem: A roadmap for growth and innovation' (Source: www.thehindubusinessline.com, March 2024)

An Idea to Establish a STRC Medicinal Plant Resource Centre in Gadchiroli

> *Medicinal Plant Resource Centre (MPRC) at STRC will serve as a strategic initiative to harness the potential of medicinal and aromatic plants for conservation, action research, scientific documentation on indigenous medicinal knowledge and academic advancement fostering improved market access and empowering livelihoods.*

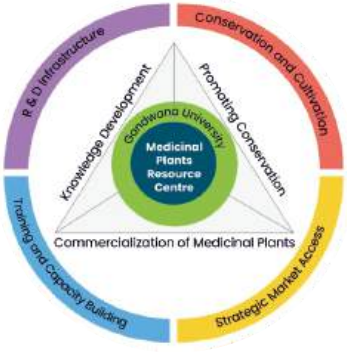
The eastern vidarbha region of Maharashtra has a rich diversity of medicinal and aromatic plant resource and a history of traditional medicinal knowledge which has remained relatively under-explored. Commercially and medicinally important plant resource along with traditional medicinal knowledge holds the potential to positively influence the economy at multiple levels and also help develop a knowledge repository, something in the mode of a Traditional Knowledge Digital Library (TKDL), New Delhi.

Referring to the Foundation of Revitalization of Local Health Traditions (FRLHT), Bengaluru database, out of the 178 highly traded medicinal plant species in Maharashtra, 48 species are found in the Gadchiroli region.

Gradually threatening conservation concerns of important medicinal plants must be dealt with raising medicinal plant in nurseries, through in-situ / ex-situ conservation and plantation along with scientific documentation of traditional medicinal knowledge.

Our past experience with the Department of Science & Technology (DST) and National Academy of Sciences India (NASI) supported Indigenous Medicinal Knowledge (IMK) and plant propagation projects have led us to explore and scientifically document over 300 important medicinal plants and consolidate traditional healing practices of over 150 Traditional Healers along with developing a checklist of important Medicinal Plants and a Traditional Healers' Directory. Both are being developed further with more scientific rigour.

To strengthen and institutionalize these efforts, STRC is weighing on an idea to establish a Medicinal Plant Resource Centre (MPRC) in Gadchiroli. Designed to harness the area's rich bio-diversity, MPRC, will act as a strategic initiative to scientifically document traditional medicinal knowledge while integrating modern scientific methods along with an overarching mandate of applicable R&D, digital documentation of traditional knowledge including conservation, preservation and scientific evidence-based validation. Additionally, MPRC will establish a structured framework for cultivating, processing and marketing of medicinal plant as raw material for industries. The centre will also serve as a platform for academic research and would act as a propeller to such efforts in collaboration with state and national level agencies positioning STRC as a nodal centre for medicinal plant research in the region.



Low-Cost Bamboo Polyhouse: A boon for Marginal Farmers for Crop Security and Land Use Optimization

> *Bamboo poly houses are an affordable and sustainable solution for small farmers to practice protected cultivation. Made using locally available bamboo and covered with transparent polyethylene sheets, these structures help shield crops from harsh weather, pests, and diseases. They create a controlled environment, enabling year-round production of high-value vegetables, flowers, and seedlings.*

India has varied agro-climatic conditions across the country and crop production in general is influenced by external factors. To negate most of the external factors and to take up crops in a controlled micro climatic condition, polyhouse-based crop production is considered more effective and beneficial. One can grow crops in polyhouse that are otherwise impossible to grow under natural climatic conditions of that area, like growing strawberries in the plains of India. Major benefits of having crops in a polyhouse are; controlled environment, non-dependency on season, no bearing on external climatic condition, protection from disease and pests, better quality of produce, efficient land utilization, higher yield, growth uniformity, shorter crop-cycle, better drainage, and aeriation system etc. All these factors lead to higher income for farmers.

Generally, two major kinds of polyhouses are commonly used, namely; Open Ventilated Polyhouse System (OVPS) and Environmentally Controlled Polyhouse System (ECPS). Furthermore, the Environmentally Controlled Polyhouse System has three sub-categories such as; Low-tech, Medium-tech and High-tech.

Low-tech ECPS build using low-cost material such as wood or bamboo with UV film as cladding is believed to have the potential to be more popular and widely accepted as it is low-cost and easy to maintain. Hence, Bamboo Polyhouse has immense scope as a replicable model. There have been a lot of research done and few pilot initiatives carried out to develop a standard operating procedure for Bamboo Polyhouse, especially through a collaborative pilot by CTARA-IIT Bombay and BAIF in Palghar district of Maharashtra.

Taking this initiative forward, STRC has decided to incorporate the Bamboo Polyhouse initiative into its framework. A cadre of artisan will be trained on the SOP (developed by CTARA, IIT Bombay) to construct Bamboo Polyhouse and two such pilots have been planned in Gadchiroli. STRC sees a lot of scope in using Bamboo Polyhouse concept for Aromatic Plant Gardens (experimental plots), Nurseries and Nutrigarden (vegetable growers) across Gadchiroli.

STRC Bamboo Polyhouse

Facilitated by IIT-B, SASMIRA and RGSTC Mumbai

ICT for Enhancing Human Capacity through Development Communication

> *The rapid development of technologies immensely helped by the internet has irrevocably changed the information landscape. Community based information platforms have evolved accordingly in response to both technological change and the increased sophistication of information matrix.*

Access to development information is important as it acts as the driving force for knowledge enabled development. Rural communities in far-flung areas need access to right information, knowledge and required skills to optimize their potential through education and training, to succeed in business, to enrich their cultural experience, and so on. While information is a key contributor to the development of individuals and communities, access to information is not uniform across geographies; people belonging to far-flung communities are frequently deprived of access to information and benefits they need to improve their lives.

Gadchiroli District includes far-flung communities that are predominantly tribal, dependent on NTFP in general with scattered traditional knowledge of herbal medicines, rudimentary skills, age-old agricultural practices etc. Our experience suggests that there is very low awareness on specific initiatives by the administration, and exploitation in myriad ways. Setting up multiple web based interaction platform in remote pockets within the district can be an important mover for community development.

Enabling rural communities across the nation through human capacity development initiatives to enhance their knowledge, skill-set and by providing low-cost technology support would help in addressing the livelihood concerns. This concept advocates adoption of eco-friendly technologies and enterprise development based on available natural resources, can be used as a tool in addressing the issues of sustainable livelihood and food security. It provides the poor access to multiple sources of livelihood through skill up-gradation and technological empowerment. A 'self sufficient' community in line with the 'CILLAGE' concept is what developing nations must aim for and Information, Communication and Technology (ICT) can play a vital role in this endeavour.

Technologies can enhance rural productivity by enabling solution sharing between the local people and communities. ICTs can help provide access to practical information on small business, commodity value chains, book-keeping, weather forecast, and best practices in Agri / Allied sector. New technologies with a range of applications are being developed that include energy (for lighting, cooking, transportation, and agriculture), water (for domestic consumption and cultivation), agriculture (better seeds, practices, and equipment), manufacturing (small scale, agro-based, etc.), can contribute to improve the quality and reduce the costs of delivering services to rural communities. ICT based solutions allow rural communities to access high quality services by overcoming physical distances and road or rail infrastructure challenges.

At Science & Technology Resource Centre (STRC), we believe, ICT centric initiatives provide ample opportunities in creating Community

Interaction Platforms which plays a vital role in creating awareness, facilitating knowledge, skill-sets and technologies and to have one-on-one dialogue to understand intricacies of the challenges they face.

This is what we call Communication for Development (C4D)!

STRC

Community

Role of Science and Technology in Human Capacity Development

> *Developing countries face numerous challenges in the process of building their scientific and technological human capacity; particularly in relation to the training and accumulation of human resources or specialized human capital in science, technology and innovation.*

The lack of organized and sustainable higher education options (masters and doctoral programs), non existent or low-quality academic programs, lack of research oriented study options, and other factors are strong contributors to the emigration of talent from underdeveloped rural pockets to urban spheres.

The essence of how science and technology contribute to society is the creation of new knowledge, and its utilization to boost the prosperity of human lives, and as solutions to everyday challenges.

Investment in Science, Technology and Innovation (STI) is essential for economic development and social progress. Research and development (R & D) can foster sustainable development by building greener, more inclusive societies. To be effective, however, infrastructure development, technology transfer and both public and private level R & D need to be nurtured and regulated via effective policies.

S&T Sutra:

- The formulation and implementation of adequate science, technology and innovation policies is critical to tackling contemporary challenges.
- Strengthen institutional capacity for research and improve science education in particular at secondary and tertiary levels.
- Identify strategic areas for enhancing national and regional research capacity, infrastructure for engineering and innovation, and designing new institutional strategies at national and regional levels.
- Enhance university-industry collaborations, technology transfer and entrepreneurship.

STRC, a centre for excellence in sustainable value creation is entrusted with leveraging available natural resources, traditional knowledge and low-cost rural technologies for capacity development of the tribal communities of Gadchiroli.

The primary focus areas are:

- Applied knowledge enabled human capacity development
- Skill based human capacity development
- Appropriate technology enabled human capacity development

STRC believes in maximizing peoples' potential to enable individuals / focused groups to optimize their traditional practices through enhancement of capacities and adopting to appropriate S&T and knowledge enabled development.

Revitalizing Rural Economies in the Post-Pandemic Era: STRC's Role in Enabling Livelihood Opportunities through Science and Technology

> *The economic disruption caused by the COVID-19 pandemic has been far-reaching, with its most visible impacts concentrated in urban centers. However, the silent yet significant distress faced by rural India - home to a majority of the country's population and a substantial contributor to national consumption - remains under reported.*

"STRC envisions a self-reliant rural economy driven by empowered youth and resource based micro-enterprises" - Ashis Gharai

One of the most critical consequences of the pandemic was the large-scale reverse migration that added immense pressure to already strained rural economies. The sudden loss of income opportunities, coupled with a reverse influx of workers into rural regions, triggered an unprecedented economic strain. Estimating the financial impact on these communities remains a challenge.

With the emergence of 'new normal' and lingering uncertainties, it is increasingly evident that many who returned to their native villages may not re-migrate to urban areas. This shift presents both a challenge and an opportunity to reimagine and rebuild rural livelihoods in a sustainable and locally grounded manner.

Science and Technology Resource Centre (STRC), Gondwana University, Gadchiroli, has been entrusted with the critical mandate of applying science and technology for rural livelihood development. STRC's approach emphasizes the use of low-cost, user-friendly technologies tailored to rural contexts - ranging from advanced agronomic practices and innovative tools for farm and non-farm activities, to small-scale processing equipment for non-timber forest products (NTFPs). These interventions hold the potential to catalyze rural enterprise and income generation, particularly when aligned with locally available resources and traditional knowledge systems.

In its ongoing efforts, STRC continues to promote natural resource-based micro-enterprises by skilling and capacitating rural youth, with a particular focus on empowering women. Over the past year, STRC has supported the development of several grassroots enterprises including the Bamboo Gotul (Common Facility Centre), an Ornamental Fish Rearing Unit (OFRU), and pilot initiatives such as Integrated Fish Farming (IFF), High-Value Vegetable Cultivation, and Scientific Poultry Rearing across various talukas in Gadchiroli district.

These initiatives are currently being nurtured with the aim of evolving into replicable models or best practices that can be scaled across similar geographies. In the long term, STRC envisions the establishment of individual and group-based small-scale entrepreneurship models, while continuing to serve as a technical and business development facilitator for rural communities.

As India continues its path to economic recovery, the rural sector cannot be left behind. Strengthening rural enterprises through targeted, science-based interventions is not only essential for inclusive growth but also key to building resilient and self-reliant communities.

Data is Everything: Embracing 'Data Intensive Micro-Planning'

> *In the age of information, the adage 'Data is the new oil' has never rung truer. For development planning - particularly in remote, underserved, and diverse regions - data isn't just valuable; it's transformative. Enter the concept of Data Intensive Micro-Planning (DIMP), a strategy rapidly gaining ground in evidence-based development frameworks.*

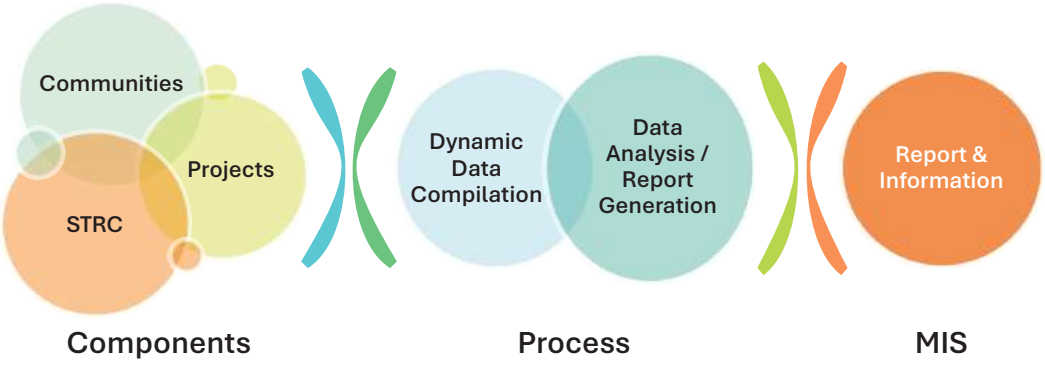
Being guided by information sourced from qualitatively and quantitatively measurable dataset is a good way to make decisions on intervention planning. For STRC, managerial action is about making continuous informed choices and decisions whether to include a new requisite at any time of the day or to adopt a new planning approach, whether to tweak strategies or to collaborate with external actors rather than trying to do everything with our own and so on.

There are some pertinent questions that arise, such as, if the pre and post activities in the field do not generate data, how can one plan interventions logically? And even if data is collected in whatever form, if they are not interpreted, analysed and assessed to produce useful information for decision making, how can one justify that activities are specific to the geography, to the community or the prevailing socio- economic and demographic conditions? And more importantly, how can one justify that, a positive impact at family level is the outcome of a certain intervention? How would one know what kind of S & T interventions the projects need and kinds of technology adoption is required and whether the communities or beneficiaries are geared up to adopt those technologies that are offered to them? Mapping the aspiration of the communities is also part of resource mapping exercise.

However, the primary focus should be on how to collect and collate useful data. Therefore, from planning to estimates and to progress control, how does one favour a truly data-driven Project Management Approach into the organization's DNA, is what we should focus on.

Ultimate goal is to close knowledge gaps by using quality real-time data to support logical decision making processes and improve avenues for communities.

Yes, data is everything!



Measuring Impact of Interventions: Adoption of Technology, a Village Ranking Approach!

> *Measuring the impact of rural technology interventions requires a systematic evaluation of changes in socio-economic outcomes, productivity, and quality of life. Key metrics include adoption levels, cost-benefit analysis, user feedback, and potential for scalability. A combination of baseline-endline studies and participatory evaluation methods ensures robust insights into both measurable outcomes and transformative community-level shifts.*

Measure of success of any S & T centric intervention is based on the adaptability to technologies that boost production performance and convenience of use for the communities. Community is truly transformed or bundle of interventions successful is when inputs broadly match outputs.

STRC recognizes the fact that to assess technology adoption, it needs systematic tracking and more effective and adequately resourced monitoring practices. To achieve these ends, STRC proposes a new framework based on 'adoption of technology and corresponding rise in socio-economic status of the community'. The proposed framework is meant to function as 'evaluation tool'.

The framework is titled 'S&T Based Block Transformation Initiative'.

The framework may have following key objectives:

- To carry out post-implementation assessment and quantify it into a ranking format
- To understand the rate of 'technology adaptors' and see whether that has pave the way to higher disposable income (for community)
- To finetune the existing system in such a way that it is able to deliver outputs and results consistently, efficiently, and effectively
- To collect feedback on low cost technologies offered for adoption, bring in necessary improvements to ensure more adoption

The framework envisions a ranking of villages based on adoption of technologies. The prime idea behind this arrangement is to systematically and methodically rank villages at the end of the project cycle and see objectively whether the community has been able to enhance its status and is moving up to break out of poverty. Villages adopting more and more technologies would rank higher in the list, however, sustainablility of adoption post project cycle will be more crucial.

Chapter 2

Sustainable Livelihoods, Natural Resource Management, and Rural Economy

Emerging Trends in Marketing of Non-Timber Forest Produce: Central Indian Context

> *Non-Timber Forest Produce (NTFP) plays a vital role in sustaining the livelihoods of over 275 million people in India, contributing an estimated annual market value of INR 30,000 Crore. Central India, comprising states like Maharashtra, Madhya Pradesh, Chattisgarh, Jharkhand and Odisha contributes over 40% of the country's NTFP supply.*

A significant shift is evident in the market, transitioning from the trade of raw materials such as *tendu* leaves, *mahua* flowers, *chironji*, and various seeds to value-added products like herbal medicines, essential oils, and natural cosmetics *(Sources: Ministry of Tribal Affairs, TRIFED Reports, and Independent Market Analysis)*.

This transformation has been catalyzed by branding initiatives emphasizing the cultural and ecological significance of NTFPs. Tribal-focused brands like Tribes India and state-supported ventures like, TRIFED-Odisha, Chattisgarh Herbals are successfully positioning products such as mahua, chironji, and tamarind in premium markets. These strategies are creating opportunities for national and international outreach, ensuring better returns for tribal producers.

In discussion with Shri Harsh Chaturvedi, Head, PMU, IIM Raipur, Chattisgarh Herbals

Emerging Trends in NTFP Marketing

The marketing of NTFPs has undergone significant changes, driven by advancements in technology, policy support, and evolving consumer preferences. There is a growing emphasis on value addition at the source to enhance profitability. Products like herbal teas, honey, essential oils, and cosmetics are being processed locally, which not only improves shelf life but also helps fetch higher prices. Branding has further elevated the market appeal of these products, with initiatives like Tribes India and Chattisgarh Herbals setting benchmarks for promoting regional and tribal identity.

The rise of digital platforms has also played a pivotal role in expanding the reach of NTFPs. Online marketplaces such as Amazon, Flipkart, and niche platforms dedicated to organic and sustainable products have made these goods more accessible. Social media is increasingly used to highlight the cultural narratives behind these products, allowing tribal communities to connect with niche markets.

Government Policies and Institutional Support

Government policies and institutional support have further bolstered this sector. The Forest Rights Act (2006) has empowered communities to directly market their produce, while the Minimum Support Price (MSP) scheme introduced by TRIFED ensures fair pricing for

selected NTFPs. Van Dhan Vikas Kendras (VDVKs), established to promote the collection, value addition, and marketing of NTFPs, are helping bridge the gap between producers and markets.

Certification and eco-labeling are emerging as critical drivers for market growth. Organic and fair-trade certifications are particularly popular in urban and international markets, while Geographical Indications (GIs) are being sought for unique products such as Bastar's tamarind and Gondia's lac, further enhancing their market value.

Challenges in the NTFP Sector

Despite the promising trends, the sector faces challenges that hinder its full potential. Tribal communities often struggle with inadequate infrastructure and limited access to markets. The presence of middlemen continues to reduce the profitability for primary producers, while maintaining consistent quality and meeting export standards remains a persistent issue.

STRC's on-going Efforts and the Way Forward

At STRC, we are addressing these challenges through a combination of targeted interventions and innovative strategies. Our cluster-based approach emphasizes sustainable harvesting and storage practices, with one cluster already operational and plans to expand to two or three more. Women beneficiaries will be trained to produce value-added products, which would not only increase their income but also empower them within their communities.

Strengthening cooperatives and producer groups is another key focus area, ensuring better engagement with markets. To address digital gaps, we are working on improving e-commerce literacy and connectivity among tribal communities. At the same time, we are fostering innovation by promoting sustainable practices and developing new products to cater to emerging market demands.

The marketing of NTFPs present immense opportunities to support tribal livelihoods, enhance rural economy, and promote biodiversity conservation. By addressing existing challenges and leveraging current trends, the sector can pave the way for a sustainable and prosperous future.

(With inputs from Shri Gandharv Pilare, Scientific Officer, NTFP/ Med. Plants and Other Livelihoods, STRC)

Ashis Gharai

Community Engagement

Through Eco-Tourism Initiatives in Gadchiroli Region

"Leave only footprints, take only memories" captures the essence of eco-tourism. This approach to responsible tourism emphasizes harmonizing with nature, deriving joy from its tranquillity and beauty, without disrupting the environment or seeking unnecessary luxuries. Eco-tourism goes beyond mere recreation; it focuses on educating visitors about the natural and cultural environment, serving as a tool for conservation, and offering sustainable economic benefits to local communities. By fostering an appreciation for the natural world, eco-tourism encourages responsible tourists to preserve the sanctity of their surroundings. At the same time, it aims to create sustainable income opportunities for forest-dependent communities, ensuring that tourism contributes to the well-being of both nature and the people who live closest to it. This balance of enjoyment and conservation makes eco-tourism a powerful instrument for protecting the environment while supporting local livelihoods.

Having said that, there exists a very thin line between mass / commercial tourism and eco-tourism; if eco-tourism projects are not planned and managed properly, it can inflict damage to natural environment and to the communities living in close proximity . Though India is not entirely new to the concept of eco-tourism, it's not too old either. It has been observed that despite having serious potential and political will to develop the idea of eco-tourism in a natural resource and bio-diversity rich country as India, it was not until late 90s and early in to the new millennium that the concept got momentum. States like Kerala, Sikkim, Madhya Pradesh and parts of West Bengal can be termed as pioneers of the concept of eco-tourism in India. Lately, Odisha, Uttarakhand and Maharashtra (especially the western region) and few others have taken up significant steps in this direction.

Talking about Maharashtra, like the western part, the eastern Vidarbha region, with its vast stretches of forests having rich floral and faunal diversity, forest dependent primitive tribal groups, natural water bodies, tribal culture and art forms and places of religious importance presents tremendous potential for eco-tourism development. The nodal body for eco-tourism development in the state, Maharashtra Eco-Tourism Development Board (MEDB) was established in 2015, with a mandate to boost eco-tourism in the state and create employment opportunities for local youths, has been recently reconstituted. With a clear mandate in mind, concerned stakeholders such as department of Forest, Tourism, Tribal Development and District Administration may come forward, drawing reference from successful ET Models from across the country to formulate unique Eco-tourism Development Framework for Gadchiroli region.

Some of the factors, comprehensive and well-aligned with sustainable development principles, must be considered while we foster Eco-Tourism in Gadchiroli.

Here's a closer look at each initiative with additional insights:

a. Local Participation and Ownership

Forming Eco-Tourism Committees within the community to involve members in decision-making. Conducting regular meetings to gather feedback and adjust plans as needed.

b. Offering Well Packaged Eco-Tours

Gadchiroli has immense potential when it comes to designing well packaged eco-tours such as temple tourism, river tourism, jungle stays and artisan villages etc.

c. Capacity Building and Skill Development

Gondwana University's Model Degree College has a uniquely designed course curriculum being offered in-form of certificate, diploma, research-based degree courses which has the potential to develop a cadre of skilled youth in eco-tourism sector. There can be multiple certificate courses that can be introduced in hospitality management and nature education. Partnering with NGOs or government programs can help to provide training in eco-tourism related ancillary skills along with workshops on sustainable practices, customer service, and safety protocols.

d. Promotion of Indigenous Culture and Crafts

Gadchiroli's remote charm, rich cultural tapestry and unique art-forms invite travellers to discover its serene landscapes and ancient traditions. Gadchiroli is known for its unique art-forms such as bamboo craft, dokra craft, earthen pottery and gond paintings etc. Science and Technology Resource Centre (STRC), Gondwana University through its Bamboo Craft and Gondwana Craft initiatives is mandated to focus on artisan centric skill development, revive dying art-forms and in creating a viable social-entrepreneurship platform for local artists and craftsmen to showcase their work to tourists.

e. Conservation Awareness Programs

Developing educational materials and activities for tourists to learn about local ecosystems. Encouraging schools and community centres to participate in conservation efforts and awareness campaigns. Educate tourists about the region's biodiversity, wildlife, and environmental conservation. Community-led awareness campaigns can promote responsible tourism practices. Develop guided nature trails, birdwatching spots, and interpretation centers. Locals can lead these tours, sharing their knowledge about flora, fauna, and ecosystems.

f. Sustainable Livelihoods

Eco-tourism can create livelihood opportunities beyond agriculture. Community members can engage in handicraft production, organic farming, or culinary experiences.

Successful eco-tourism initiatives prioritize community well-being, environmental conservation, and cultural preservation.

g. Home-stays and Community-Based Lodges

Encourage community members to offer home-stays or manage small lodges. This not only generates income but also allows visitors to immerse themselves in local life. Construction of bamboo cottages can also be a source of engagement for local artisans

Bamboo for a Green Economy

“You (farmers) grow bamboo, I will give you the market” urges Shri Nitin ji Gadkari, Union Minister for Road Transport and Highways, Govt. of India, an enthusiast and flag-bearer of innovative use of Bamboo, himself. Considering the multifarious use of bamboo, including as a structural material, promoting cultivation of and entrepreneurial activities around raw bamboo has incredible potential, and hence, makes it a viable and sustainable resource to boost rural economy.

The area under bamboo cultivation in India is estimated to be more than 13.96 million hectares with more than 136 distinct species, according to National Bamboo Mission (NBM). Cultivation of Bamboo will certainly ensure a return of over INR 40,000/- per acre / year, which is thrice as lucrative compared to many other agriculture crops being cultivated. In fact, the average return per acre in farming is less than INR 10,000/- per season with many problems and uncertainly in the realizable income.

Ensuring Bamboo is grown in large scale, we also need to understand that, science behind the cultivation of bamboo is equally, if not more, important than the art and craft of it, post-harvest. Bamboo can be grown in a wide variety of soil and climatic conditions and Bamboo flourishes in valleys, on the lower slopes of hills, and in the vicinity of streams, rivers, ponds, and other water bodies. Generally, rainfall promotes the growth of bamboo however, a combined effect of high temperature and rainfall promotes the growth. And multiple climatic zones in our country is conducive to the growth of bamboo. Except rocky soil, Bamboo shoots can be planted and grown in a range of soil types, including degraded soil.

Bamboo is typically propagated through culms, cuttings, or rhizomes. Bamboo seedlings are raised on nursery beds and then allowed to grow in poly pots for up to a year. Some of these methods ensure a good survival percentage. Establishing a bamboo nursery in a suitable place close to the plantation area is good for starting large-scale bamboo plantation. However, nurseries can be established at different scales of production and activity, and also depending on its objectives. Bamboo nursery sites should be well-drained along with

facilities for irrigation, composting, potting shed, seed germination beds, and rhizome propagating area. Scientific harvesting of bamboo is another important aspect to ensure better income and sustainability.

The recent thrust in the large-scale cultivation of bamboo is now evident and has been in the forefront. The restructured National Bamboo Mission (2018) envisages to promote holistic growth of bamboo sector by adopting area-based, regionally differentiated strategy and to increase the area under bamboo cultivation and marketing. NBM has also identified industrially important species such as; *Bambusa tulda , B. bambos , B. balcooa, B. nutans, Dendrocalamus hamiltonii*, etc. for extensive plantation on non-forest land. Similarly, Maharashtra Bamboo Development Board (MBDB), established in 2016 (having its headquarters at Nagpur), with a mandate to oversee the plantation of bamboo in the state, with larger emphasis on plantation on farm lands and supplement farm income. MBDB launched the *Atal Bamboo Samridhi Yojna* in 2019 to boost the economic security to farmers through end to end support in bamboo cultivation in the state. The Maharashtra state government has also promoted bamboo cultivation under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA) and appealed farmers to come forward for bamboo cultivation.

STRC is mandated to promote extensive bamboo plantation in the region as a sustainable resource development approach. STRC is engaged in creating a decentralized entrepreneurial eco-system with an artisan / farmer centric approach to boost the local economy and envisages to curate specialized skill development program in craft and structural application of bamboo.

As an experiment in 2019, STRC initiated bamboo plantation on a barren piece of CFR land and managed to successfully sustain a healthy plantation through a public private partnership model in Gadchiroli and believes that such models can be replicated across the district. This year, STRC is introducing a specialized skill course i.e.; Bamboo Grower, under the Maharashtra State Skill Development Society (MSSDS), skill development scheme to create a cadre of trained human resource to be engaged in nursery development and extensive bamboo plantation activities.

Responsible Tourism: Potential Game Changer in Boosting Rural Economy of Gadchiroli

Gadchiroli region with its vast stretches of forests, rich bio-diversity, natural landscapes, water-bodies, temples and tribal culture, has the potential to boost its rural economy significantly by creating opportunities in responsible tourism. When implemented effectively, responsible tourism can positively trigger local economy as it thrusts on sustainability, conservation, and community involvement.

Influx of tourists, from this region or across the country brings in a lot of revenue from travel, accommodation, local food and crafts, rich cultural experience and a host of other hospitality avenues which directly contributes to income of the local communities.

Growing scope of tourism will enhance demand for local guides, travel agencies, traditional artisans, accommodation facilities in natural settings and hospitality staffs leading to creation of employment opportunities for the local workforce, reducing unemployment rates and boosting local economy. Responsible tourism often emphasizes the preservation of local culture, indigenous knowledge and traditions. This can lead to an increased interest in traditional arts, crafts, and customs, providing artisans, traditional healers and cultural practitioners with a market for their products and services.

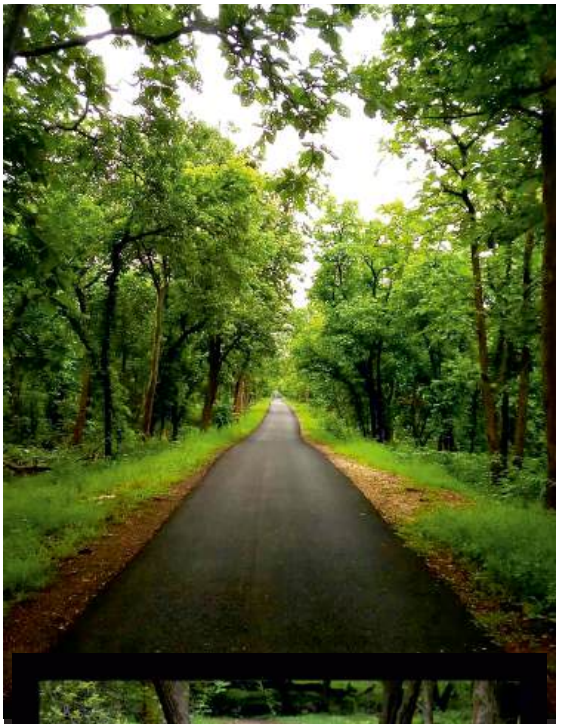
Responsible tourism encourages conservation of natural resources and biodiversity. Preserving the unique flora and fauna of Gadchiroli can attract eco-tourists who are willing to pay a premium for sustainable and environmentally-friendly experiences. Higher footfalls of tourists can lead to investments in local infrastructure such as roads, transportation, and sanitation facilities. Improved infrastructure benefits both tourists and local residents, enhancing the overall quality of life.

Responsible tourism encourages active participation and empowerment of local communities in decision-making processes. This helps ensure that tourism benefits are distributed equitably and that local residents have a say in shaping tourism development. Relying solely on traditional economic activities like agriculture and forestry can lead to vulnerability. Eco- Tourism offers an opportunity for economic diversification for the local communities, reducing their dependency on a single industry, enhancing economic resilience and minimizing migration.

Assessing the potential Gadchiroli has with regard to the vast scope in responsible tourism, tourism related human resource and infrastructure development and hospitality services; it's essential that Govt, local communities, private sector and NGOs must align their priorities in developing exclusive packaged tourism corridors around nature and forests, rivers and reservoirs, temples and tribal culture i.e. Vainganga basin and Somnur Sangan, Chaprala and Alapalli Forests etc. through careful planning and management. Bringing right expertise on board would help create a cadre of skilled human resources in

hospitality, guiding, and other tourism-related services contributing to human capital development.

Maharashtra Tourism Development Corporation (MTDC) should play a key role in promoting responsible tourism by acting as a catalyst for sustainable and inclusive tourism development. It should facilitate eco-friendly infrastructure, support community-led initiatives, and ensure that tourism benefits reach local populations. By promoting lesser-known destinations, building local capacities, and encouraging cultural and environmental sensitivity, MTDC can help create a tourism model that balances economic growth with conservation and community well-being. Collaborative efforts with civil society, private stakeholders, and academic institutions will further strengthen this vision.



Opportunities of Using Locally Available Bamboo as a Structural Material

> *STRC with technology facilitation and knowledge support from institutions such as IIT Bombay, Maharashtra Bamboo Promotion Foundation (MBPF), Bamboo Research and Training Centre (BRTC) and other stakeholders in the sector is now shaping to venture in to bamboo as a structural / construction material.*

Contribution of Bamboo in the socio-economic, cultural and ecological development of certain geographies is significant. Bamboo, contributes to subsistence needs of about 2.5 billion people around the world, a majority of whom are tribals, forest dwellers or communities dependent on forest resources. In India, bamboo is found naturally almost throughout the country except in Kashmir region. It is estimated that, there are about 2 million traditional artisans in our country whose livelihoods depend on harvesting, processing, value addition and selling of bamboo products such as baskets, mats, handicrafts etc. Major advantage of bamboo is its versatility in making a variety of products by small entrepreneurs without any major initial investment. Necessary amendments under Indian Forest Act 1927 through the Indian Forests (Amendment) Ordinance, 2017 for bamboo grown in non-forest areas has helped in better accessibility and trade of bamboo *(Source: India State Forest Report 2021/Forest Survey of India)*.

Bamboo has been widely used as a sustainable building material. Due to some reasons among others, bamboo can be easily cultivated and harvested in a relative short time and can be reused. Bamboo as building materials is easy to bend and lithe. Those characteristics makes bamboo very suitable for organic shaped building construction and as a potential alternative building material other than steel and concrete, whereas, certain challenges like relatively quicker deterioration, climate sensitivity and cost hinder its universal acceptance. Interestingly, there is an increasing demand for bamboo-based construction in recent times. This is both at the higher end (like eco-resorts where people want to stay in natural surroundings) and also at the lower end like bus stop sheds, road side dhabas, cow and goat sheds, small extension to house etc. In fact, many traditional artisan entrepreneurs are increasingly taking up bamboo construction units as well which is much more profitable and gives quicker cash flow.

STRC with an artisan centric approach, engaged in developing a cadre of skilled human resource for the purpose. Under the joint initiative of RGSTC, Mumbai Govt. of Maharashtra and IIT, Bombay, STRC is engaged in implementing a bamboo polyhouse pilot (as a tool for controlled farming operations) in Gadchiroli utilizing locally available bamboo. Subsequently, STRC envisages to develop products like small sheds and sit-outs to meet local institutional demands.

Strategic efforts in the coming months to develop an entrepreneurial ecosystem in bamboo-based structures utilizing locally sourced bamboo to promote livelihood development of local artisans is something that STRC is looking forward to.

Integrated Fish Farming: A Boon for the Rural Economy

> *Integrated Fish Farming (IFF) is a sustainable agricultural system that combines fish cultivation with other farming components such as livestock (e.g., poultry, pigs, cattle) and crops (e.g., rice, vegetables) to maximize resource use efficiency and productivity. IFF promotes nutrient recycling, enhances farm income diversification, and ensures food security by producing multiple commodities from the same unit of land and water.*

India is geographically poised to be the world leader in the fisheries sector. Being the biggest peninsula in the world, with its vast coastline of 7,517 km along with network of lakes, rivers and numerous other inland water bodies, it can easily surpass any other nation in fish production. The poverty- stricken and protein-deficient population in the country can find an income source as well as address nutrition deficiency for a healthier life from fish farming. The nutrition value of fresh water and marine fish products have been measured and proven to be one of the highest, as compared to any other commonly available food products. A vast population, especially the young generation, in rural India can be deployed in the fishing industries. *(Alice Mitchel, The Pioneer)*

One such initiative in this context can be Integrated Fsh Farming (IFF). IFF is a system of producing fish in combination with other agricultural/livestock farming operations centered around the fish pond. The main advantages of integrated fish farming are; efficient waste utilisation from different culture practice for fish production, promotes optimum resource utilization, helps reduce additional cost for supplementary feeding as well as fertilisation. IFF is an artificially balanced ecosystem where there is no waste and it provides sustainable employment avenues.

Gadchiroli region with its vast spread of common and individually owned water bodies, has a lot of potential for scientific fishery leading to boost rural economy. Considering this, STRC, Gondwana University Gadchiroli, under its Aquaculture and Livelihoods wing has initiated Integrated Fish Farming (IFF) targeting interested individual marginal fish farmers.

STRC has begun implementing IFF in five sites in Armori Block and 20 sites in Aheri Block of Gadchiroli district using the Fish and Poultry Chicks Model. Farmers with adequately sized farm ponds and sufficient space for integrating poultry farming will receive essential inputs, including an in-house developed patented bamboo poultry shed. STRC will also provide comprehensive technical guidance and business support throughout each production cycle. This initiative is expected to generate an additional annual income of approximately fifty thousand rupees per farmer.

Communities and Conservation: An overview of Community Conserved Areas (CCAs) of Central India

> *Indigenous and Community Conserved Areas (ICCAs) are defined as: "Natural and modified ecosystems including significant biodiversity, ecological services and cultural values voluntarily conserved by indigenous and local communities through customary laws or other effective means".*

Sacred groves, mountains, rivers, trees, birds and animals – the diverse array of India's biological diversity has benefited greatly from the untiring efforts of rural communities across the country. Conserved by communities as a way of life, these biodiversity rich areas, typically called community conserved areas, are central to India's biological heritage. It is well known that every community effort to protect India's biodiversity contributes significantly to and supports the government's mandate on conservation.

Rural communities in India and elsewhere have played a critical role in conservation of a variety of natural environments and species since ages. Their understanding of the conservation values originates from their close association with their landscape owing to various economic, cultural, spiritual or aesthetic reasons. There are a large number of sacred forests, wetlands, village lakes, catchment forests, rivers and coastal stretches, marine areas, etc. in India that are being protected and conserved by the local communities. These communities have been conserving these areas even before modern day biodiversity conservation practices came into being and the government took up a dominant role in the conservation of forests and other natural areas.

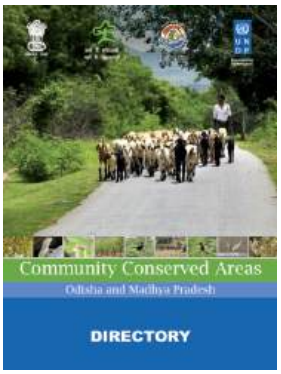
Modern day conservation is primarily based on the concept of Protected Areas (PAs) such as National Parks, Wildlife Sanctuaries, etc. covering around 4.9% of the total geographical area of our country. Though substantial, the PAs in India are still discrete and isolated patches of forests and other ecosystems managed exclusively for wildlife and/or biodiversity conservation. In addition, there are large numbers of areas rich in biodiversity which are outside the domain of PAs and are protected

and managed by the communities in those areas. These Community Conserved Areas (CCAs) such as sacred groves, community forests, private interspersed forests in tea, coffee and cardamom gardens and other production landscapes, farm lands, wastelands, wetlands, coastal habitats, etc. have varied tenurial status as well.

The Ministry of Environment and Forest in India had formed a committee for looking into the management and funding of CCAs in 2009, which in its draft report recognized the importance of such habitats as corridors for wildlife between PAs, thus ensuring connectivity in the landscape. India's Wildlife Action Plan (2002-16) also provides for protection of wildlife in multiple use areas including CCAs. Government has consequently acknowledged the existence of these community driven conservation efforts, and has decided to support such efforts through technical and financial support. This effort by the GoI recognizes the fact that substantial biodiversity exists outside the Protected Areas which are being conserved by various communities for long and it now intends to support such community initiatives and practices in order to mainstream them into the core conservation efforts. We can find many such examples in the Vidarbha region of Maharashtra too, especially in the Gadchiroli region where Community Conserved Areas (CCAs) are integral to the forest conservation and sustainable livelihoods.

The primary aim should be to support and strengthen the capacity of communities in conserving or managing the CCAs in a sustainable manner and to derive equitable benefit from the sharing of traditional knowledge. A parallel goal is to develop and apply strategies that will bring recognition to community led conservation initiatives and mainstream such efforts in the broader policy framework in respective states and at the national level. The first step in this direction is to identify such community initiatives across the state, map them and collect basic information on them.

There have been such efforts made in central India, especially Odisha and Madhya Pradesh, where I was leading the effort in Odisha, culminating in form of a directory 'Community Conserved Areas : Odisha and Madhya Pradesh 2012 (UNDP India)'.



Non-Timber Forest Produce and Rural Economy

> *In developing counties such as India, forests provide significant social and economic benefits at all level, especially for the forest dependent tribal communities.*

Forest is an important renewable natural resource which greatly influences the socio-economic development in any rural community *(Ghoshal, 2011)*. Economics of people living in forests has traditionally been dominated by subsistence agriculture. However, non-timber forest produces play vital role among the tribal people and provide a source of subsistence income and livelihood security *(Peters et al.,1989; Hegde et al.,1996)*.

Non Timber Forest Produces (NTFPs), also known as Minor Forest Produce (MFPs) are useful substances obtained from forests. As compared to timber, NTFPs having smaller rotation periods, do have continuous flow of return. An estimated 80% of the population in the developing countries uses MFPs to meet some of their health and nutritional needs. NTFPs provide greater opportunities to the people by providing employment during the lean agriculture season. Most of the activities pertaining to NTFPs like collection, processing, transportation, marketing etc. are labour intensive and provide employment. India holds monopoly in world trade over some of the natural resins and gums such as lac, gum karaya and guar gum. Tribal communities derive 20% to 40% of their annual income from minor forest produce on which they spend major portion of their time. It has been established that a number of tribal, rural and forest department communities derive a significant part of their needs, income, food and nutrition.

However, factors such as; destruction of natural habitats, unsustainable harvesting / collection and storage methods, transportation facilities, fluctuating market prices, non-availability of good market and commercialization in production of the NTFPs are deterring in nature to the long-term sustainability ecosystem and economic services offered by forests. Management of forest resources in a sustainable way, improving harvesting and processing techniques are necessary for improving the livelihood of people and thus enhancing the use of NTFPs in a better way.

Science & Technology Resource Centre is engaging with local communities, especially tribal hunter gatherers to streamline collection and storage mechanism by employing Good Forest Conservation Practices (GFCP), scientific collection and Good Storage Practices (GSP), leading to avail better value of the collected forest produce in the market through a community collection, storage and primary processing related efforts. Till date, over 500 families have been directly benefitted.

Harnessing the Potential of Agroforestry for Sustainable Livelihoods: STRC's perspective

> *The year 2014 marked a significant milestone in India's journey towards environmental sustainability and resilient livelihoods. In a landmark move, India became the first country in the world to adopt a comprehensive National Agroforestry Policy, promoting the integrated cultivation of trees, crops, and livestock on the same parcel of land - a holistic approach to land use with long-term ecological and economic benefits. It refers to agricultural systems that integrate livestock and crop production or integrate fish and livestock and may sometimes be known as integrated biosystems.*

At Science & Technology Resource Centre (STRC), we view agroforestry as a transformative model capable of fostering sustainable agricultural practices while enhancing land productivity and building climate resilience. The unique landscape, favorable climatic conditions, and fertile soils of Gadchiroli offer an ideal environment for implementing agroforestry systems that can significantly benefit local farmers. This approach aligns closely with STRC's mission: to explore and assess the viability of agroforestry as a development pathway for tribal communities in the region. We believe that leveraging science and technology can unlock new opportunities for agroforestry-based livelihoods. To realize this potential, it is imperative to reimagine existing agricultural practices through participatory, inclusive methods that place community knowledge and well-being at the forefront. By investing in such sustainable and adaptive land use strategies, STRC aims to contribute meaningfully to both ecological conservation and the socio-economic empowerment of tribal farmers in Gadchiroli

Integrated Farming Systems (IFS) in Kondawahi, an ideal example -

IFS enables farmers to develop a framework for an alternative development model to improve the feasibility of small sized farming operations. Such small sized operations are aplenty in Kondawahi. Hence, it is particularly useful and suitable to apply principles of IFS to STRC's intervention site in Kondawahi village.

STRC recognizes that integrated farming system is a holistic approach to farming compared to monoculture approaches.

In the initial phase of this experiment, STRC is in the process of introducing a change in farming techniques for maximum production in the cropping patterns and optimal utilization of resources. By providing our beneficiaries with Good Agriculture Practices for high-value bitter-gourd and ridge-gourd crop trailing, it is STRC's vision to increase diversification, resource integration and create market linkages.

Biological Diversity Act 2002: Access & Benefit Sharing and Safeguarding Indigenous Medicinal Knowledge in Gadchiroli

> *India's Biological Diversity Act (BDA), 2002, and subsequent amendments serve as a legislative response to the Convention on Biological Diversity, emphasizing conservation, sustainable use, and equitable benefit sharing. For forested and indigenous-rich regions like Gadchiroli, this Act holds particular significance in protecting tribal medicinal knowledge and ensuring fair compensation for the use of biological resources.*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MINISTRY OF LAW AND JUSTICE
(Legislative Department)

THE BIOLOGICAL DIVERSITY (AMENDMENT) ACT, 2023

ABS: Equity Through Biodiversity Governance

The Act mandates that any individual or corporation seeking to access India's biological resources or associated traditional knowledge must obtain approval and enter into a Benefit Sharing Agreement. This includes provisions for both monetary (royalties, license fees) and non-monetary (technology transfer, joint R&D) benefits.

In Gadchiroli, where communities rely on ethnobotanical knowledge passed down through generations, Access and Benefit Sharing (ABS) is key to empowering Biodiversity Management Committees (BMCs) and supporting local livelihoods.Protecting Tribal Medicinal Wisdom

Gadchiroli's rich biodiversity and tribal heritage-including the use of local herbs like Satavari, Ashwagandha, and Kuda-is often at risk from unsustainable harvesting and bio-piracy. The People's Biodiversity Registers (PBRs), mandated under the BDA, help document this traditional wisdom, offering both legal protection and a platform for benefit sharing.

Initiatives like the Traditional Knowledge Digital Library (TKDL) and Geographical Indication (GI) tagging further safeguard this knowledge from misappropriation.

Challenges and Local Opportunities

Despite the framework, several challenges persist in Gadchiroli:

- Limited awareness among tribal communities.
- Weak enforcement and coordination between institutions.
- Low private sector engagement due to procedural delays.

However, grassroots efforts such as local capacity building, integrating ABS into community health and enterprise models, and strengthening BMCs-can transform these challenges into opportunities.

Conclusion

The BDA, 2002, backed by local participation, is a powerful tool for both biodiversity conservation and tribal empowerment in Gadchiroli. By aligning traditional knowledge with equitable benefit-sharing models, we can ensure that the custodians of nature are also its primary beneficiaries.

Chapter 3

Education, Capacity Building, and Youth Empowerment

Reviewing 2024, Envisioning 2025!

> *It is my privilege to present the first edition of the STRC Newsletter for 2025, a reflection of our journey, milestones, and aspirations. This edition encapsulates our unwavering commitment to advancing scientific inquiry, fostering innovation, and empowering communities through the transformative power of science and technology.*

The past year has been a remarkable chapter for STRC, reaffirming our vision of harnessing science and technology for sustainable development. As we continue bridging traditional knowledge systems with modern innovations, STRC remains a catalyst for research-driven solutions and enhanced livelihoods in the Gadchiroli region.

Key Achievements of 2024

In 2024, our focus was on translating research into action, strengthening community partnerships, and addressing critical challenges in resource optimization, sustainability, and biodiversity conservation. We spearheaded social entrepreneurship initiatives that seamlessly integrate skills, knowledge, and low-cost technology with livelihoods. Our efforts in developing value-added products from forest resources have contributed significantly to economic empowerment at the grassroots level.

A major highlight of the year has been our investment in capacity building, particularly among local youth, women, traditional artisans, fish farmers, paddy and vegetable growers, traditional healers, and grassroots organizations. By equipping them with scientific knowledge and practical skills, we have nurtured a new generation of change makers capable of addressing ecosystem-specific challenges. Our collaborations with academic institutions, government bodies, industries, and private enterprises have further strengthened a multi-disciplinary approach to problem-solving, enriching our collective impact.

As we reflect on our journey, we recognize that each milestone achieved is a testament to the dedication of the STRC team, our partners, and the communities we serve. Our core belief remains steadfast science and technology, when deeply rooted in local contexts and aspirations, have the power to transform lives.

Vision for 2025

Looking ahead, STRC is committed to deepening its impact by championing community-driven innovation, sustainable resource management, and indigenous knowledge integration. Building on our decade-long commitment to empowering tribal and rural communities, we will focus on scalable, technology-enabled solutions for:

- Biodiversity conservation
- Community-led resource management
- Climate-smart agriculture and on-farm activities
- Livelihood development through social entrepreneurship
- Value-added processing of forest produce

A key priority for 2025 will be strengthening collaborations with academic institutions, research bodies, and grassroots organizations to drive holistic development. Through targeted capacity-building programs and skill development initiatives, we aim to create self-reliant, technology-adaptive communities while ensuring ecological sustainability and cultural preservation.

A Call for Collaboration

As we embrace the opportunities and challenges that lie ahead, I invite all stakeholders, government agencies, academia, the private sector, industry partners, and civil society to join us in this shared mission of empowerment and sustainability. Together, we can drive meaningful contributions toward an inclusive and sustainable future for India.

I extend my heartfelt gratitude to Padma Vibhushan Dr. Anil Kakodkar for the opportunity to nurture his vision for STRC, Team at RGSTC, Mumbai, Dr. C. D. Mayee, Chairman, and esteemed Governing Body and Program Advisory Board Members - STRC, Hon'ble Vice Chancellor, Gondwana University, Dr. Prashant Bokare and all concern authorities and faculties of the University, Smt. Pragati Gokhale, Advisor RGSTC, my dear team at STRC and everyone who has been part of STRC's journey in 2024 and to those who will walk with us in the years to come. Let us continue to push the boundaries of innovation, collaboration, and impact.

Empowering Rural Youth in India with Future-Ready Skills for Emerging Industry Demands

> *Skilling India's rural youth is essential for tapping into the country's vast demographic potential, especially as industries evolve with new technologies and global demands. A targeted approach to skill development could bridge the gap between rural talent and current industry needs. It is important to understand industry demands, hence, we must delve into the different emerging aspects of it through a framework to address these goals.*

Emerging Scenarios

With industries undergoing digital transformation, digital literacy has emerged as a key aspect. Rural youths need training in basic IT skills, coding, data management, digital marketing, and use of emerging technologies like AI and IoT. Green and Renewable Energy is another important aspect as India shifts towards sustainable energy, industries will require skilled professionals in solar, wind, and other renewable energy sectors. Similarly, the tourism industry, including eco-tourism and local heritage, offers immense potential for job creation through skill development in customer service, travel management, and local entrepreneurship. We can also include agri-business, food processing, healthcare and biotechnology etc.

It would be crucial to develop localized skill development programs by collaborating and partnering with industries and businesses to design curriculum and training programs aligned with their future requirements can ensure that skills taught are directly employable. High quality vocational training through vocational centers in rural areas can offer certifications in sectors like construction, automotive repair, healthcare, and digital skills. Other tech-enabled learning platforms such as making use of mobile-based apps and online learning platforms can deliver content to rural students. This allows for flexibility and wider reach, even in remote areas. Along with these, there must be greater focus on soft skills like communication, problem-solving critical thinking, and leadership alongside technical skills, which will prepare rural youth for varied roles in industries. Instilling entrepreneurial skills among rural youths through entrepreneurial education would help youth start their ventures, especially in agriculture, crafts, small manufacturing, and tourism.

Central and State Priority

Government has been very pro-active in offering institutional support and relevant schemes like Skill India, PMKVY (Pradhan Mantri Kaushal Vikas Yojana), and Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) and Pramod Mahajan Kaushalya Vikas Yojana (PMKVY) etc. to target specific regional skill needs and improving outreach. Other ways like Public-Private Partnerships (PPPs) to collaborate

with private companies for funding, equipment support, and curriculum development. CSR initiatives can play a key role here. Along with the above stated framework, other sector-specific initiatives such as Agriculture and Agri-Tech, i.e.; skills in precision farming, drone technology, and smart irrigation can modernize agriculture, boost productivity, and make farming a viable option for rural youth. Similarly, focussing on manufacturing and MSMEs through Make in India movement, pushing for increased manufacturing, up skilling youth in areas like machine operations, quality control, and lean manufacturing practices can contribute to the sector.

Another vital cog in the wheel is the localized entrepreneurship and micro-enterprises by promoting local start-ups through incubators in rural areas focussed on agriculture, crafts, renewable energy, and small scale manufacturing. And cooperatives and SHGs can be strengthened as cooperatives with skill training and financial literacy can enhance economic participation. Hence, a community driven approach to engage local leaders, schools, and panchayats to promote skill development programs can ensure higher participation and retention to help build a rural workforce ready for the future.

University Initiatives

In an effort to promote social entrepreneurship in bamboo, STRC Gondwana University runs a Model Production Unit around which community level CFCs have been formed. This effort has created sustainable jobs for over 200 local artisans in the region. STRC is also a registered Training Partner (TP) and a Training Centre (TC) under Maharashtra State Skill Development Society (MSSDS), Govt of Maharashtra. Gondwana University, in collaboration with district administration and Tata Technologies has established Centre for Invention, Innovation, Incubation and Training (CIIIT), a state-of-the-art skilling centre in modern technologies. Similarly, to promote micro-enterprises and local start-ups, Tribe-Tech Community Entrepreneurship Foundation (TRICEF), an university incubation centre has been registered as a Section-8 Company.

Along with the above efforts, to address the needs of the Industry-Academia connect, Lloyds Metals Energy Pvt. Ltd. has collaborated with Gondwana University, with a vision to establish the University Institute of Technology (UIT) which would foster developing a cadre of skilled professionals catering to varied industry demands of the region, slated to become the 'Steel Hub' of the country.

India holding the 18th presidency would be a watershed moment in the history of the largest democracy and the fastest growing economy in the world. As we move onward and upward in the quest of seeking pragmatic global solutions for the wellbeing of all, and in doing so, manifest the true spirit of 'Vasudhaiva Kutumbakam' or 'The World is One Family'.

Come the December 1st, 2023, a momentous day in India's history as we assume G20 Presidency taking over from Indonesia. The G20 summit is an annual affair with rotating Presidency. This year, India holding the 18th presidency would be a watershed moment in the history of the largest democracy and the fastest growing economy in the world. With an aim to accelerate the progress of sustainable development boards and to address social and economic development concerns of developing countries by facilitating discussions among G20 nations, India would to be hosting delegates from across the globe, flocking in to participate in this world event at the national capital.

India's G20 priorities are aligned to accelerate progress towards the Sustainable Development Goals and to secure a better and a shared global future for the generations to come. India with its multi city events planned between December 2022 and March 2023, across the country leading to the 2023 Summit will strengthen India's agenda and the six thematic priorities of India's G20 presidency, such as;

- Green Development, Climate Finance & LiFE (Lifestyle for Environment)
- Accelerated, Inclusive and Resilient Growth
- Accelerating Progress on SDGs
- Technological Transformation & Digital Public Infrastructure
- Multilateral Institutions for the 21st century
- Reforms for Women led Development for socio-economic progress

India's G20 priorities are aligned to accelerate progress towards the Sustainable Development Goals and to secure a better and a shared global future for the generations to come.

Roadmap for Greener India Panchamrit

Reach non-fossil energy capacity of 500GW by 2030	Fulfil 50% energy requirements via Renewable Energy by 2030	Reduce 1 billion carbon emissions by 2030	Reduce carbon intensity below 45% by 2030	India will achieve the target of Net-Zero by 2070

Role of Experiential Learning in Indian Education System and Meeting Industry Demands

> *Experiential learning is certainly transforming the way we approach education today. Experiential learning, not just as a concept but has always been integral to the ancient Indian educational system or gurukul.*

In ancient India, *Gurukuls* encouraged students to participate in real world activities including their daily chores which helped them to learn modesty and discipline in the process. However, in the past few decades, with the need of the changing times and effects of modernization, the typical grading system has been enforced itself in to the system.

Traditional system of education giving relevance to the grading system in India has been followed for a long time, however, the modern industry demands are differently placed. Grades may help students stand out in the crowd, but it does not necessarily indicate holistic development or job readiness. The goal of education is to develop good leaders of tomorrow who can solve societal problems, innovate, influence, and motivate. To ensure that this core value is maintained, experiential learning has to play a greater role. Refer to the data generated by NASSCOM, it is evident that India is experiencing a talent shortage, with a demand-supply gap of 21.1%. The report suggests that, scarcity of talent can be attributed to significant skill gap and curriculum designs not aligned with the current industry demands resulting in existing skilled workforce not able to cope with the needs of rapid technological advances. This has led to a stage where only a small percentage of graduates getting hired by reputable organizations out of millions every year.

Changing the landscape of the education system needs the best practices from experiential learning such as *'learning with doing'* to develop reflective practice habits and *'beyond the classroom'* learning to cultivate leadership qualities. Improvising the educational experience by bringing industries close to academia and facilitating proper communication between students, teachers and industry is the need of the hour. Students must be provided with real-life organizational situations to develop an element of problem-solving. This would help them strengthen their decision-making abilities. Active hand-holding of the industries to aid students to make crucial life choices and early preparation for getting career ready.

Creating platforms for regular interface between students and industry experts will leverage the knowledge bank of the students while giving them an insight into the skills in demand for the industry. With on campus experiential learning, students can interact with mentors through one-on-one sessions, develop new skills, participate in apprenticeships, gain experience through internships and expand their network, which could facilitate their professional development. It will help bridge the skill-gap and address the bigger concern now.

(Source: The Times of India/August 2022/NASSCOM Report/India Tech Industry Talent Demand-Supply Analysis)

STRC's initiatives on Education for Sustainable Development

Traditionally India has been a sustainable society. In order to promote the value of sustainable development through education, the Indian government directed its various education departments to actively work on an Environment Education component as part of the curriculum.

Education for sustainable development promotes the development of the knowledge, skills and improved understanding of values and actions required to create a sustainable world, which ensures environmental protection and conservation, promotes social equity and encourages economic sustainability.

Gadchiroli region is heavily forested, largely tribal and among the most underprivileged part of the state. STRC, sees a realistic possibility of leveraging local resources, relevant knowledge and technology for capacity building of local youths at different layers such as Artisans, Students and Faculties to promote knowledge enabled development.

Along with the above categories and layers of target groups, STRC believes that school going children must be part of this inclusive development approach and to address this STRC is striving to create a supplementary template for a sustainable education ecosystem. STRC, under the aegis of Gondwana University has already rolled out an under graduate Diploma in Bamboo Entrepreneurship and Design and an Environment Education Program for Tribal Schools in the process to collaborate with MAFSU, Nagpur and other national/regional institutes, to introduce multiple certificate courses such as; Certificate Course in Scientific Fishery, Sustainable Harvesting Practices for important forest produce, post-harvest management and supply chain, Farmers' School and Web based Community Interaction Platform (WCIP) as a distant education opportunity amongst others to create a cadre of adequately skilled youths. Aim is to go beyond the regular vocational slant and to develop a knowledge and technology enabled workforce. Similarly, for faculties, researchers and even NGOs with bona-fide inclination for applicable R & D, STRC has introduced 'STRC Assistance for S&T Application Scheme'; short-term small research grants.

Considering the existing realities, it is of paramount importance that STRC plays the role of a 'community enabler'; develop knowledge and skill driven communities which are self-reliant and progressive.

Nurturing the Research and Innovation Ecosystem in the University

“The present inadequacies are very much evident through the dwindling number of researchers in India which compares very unfavorably with the other top 10 economies in the world, with all the attendant impacts on publication, patent applications and industrial growth involving indigenous technologies. NEP 2020 highlights the critical need to better manage research at all levels. The NRF is born out of the felt need to increase the quantum and scope of quality research across all disciplines and to create a much larger workforce for trained researchers within the country” says former Chairman of Indian Space Research Organization (ISRO), K. Kasturirangan.

National Research Foundation (NRF) came into existence as part of implementation of the National Education Policy 2020 (NEP 2020), which is believed to help nurture a vibrant research ecosystem through adequate funding, mentoring and careful monitoring.

STRC, Gondwana University Gadchiroli strives to adopt an exploration strategy which involves creating a conducive environment that encourages creativity and innovative ideas. Launching the 'STRC Assistance for Science & Technology Application' scheme is one such effort to encourage researchers, faculties, and students by providing small grants and a platform to carry out intensive research on subjects in line with STRC mandate. STRC's bamboo-based R&D efforts have not only led to design of products in the utility craft and lifestyle space but also has able to generate design patents for five products. The ‘One year Undergraduate Diploma in Bamboo Entrepreneurship and Design’ is envisaged to create skilled human resource enabling local youths to become rural entrepreneurs.

STRC's herbal plant initiatives have generated well documented best practices on sustainable harvesting of 10 commercially important medicinal plants and germination protocols for selected medicinal plants. Our efforts on digital documentation of traditional medicinal knowledge and traditional healing practices have led to the first of its kind booklet featuring local traditional healers and showcasing their plant based traditional healing practices backed by scientific evidence-based research. Our aim is to generate validated database leading to recognition of Traditional Healers. Efforts are still on to make it more comprehensive and accessible to the scientific community.

Our S&T Efforts

Conventional Wisdom in School Education or Otherwise; Change is Inevitable

> *School education system in India is an essentially classroom-based concept with a theoretical approach. What's being focused is what the child is good at, academically, rather than the overall development of the child.*

Long-established patterns that society has traditionally used in schools are strong patterns inculcated deep in to the system, which hinders the overall development.

We must break these patterns, whether its in our education system or otherwise. Children at a very young age are conditioned to such conventional wisdom which gets imprinted in to their psyche. Mode of education to young children needs to be more visual than text-book centric, more practical and hands-on, more experimental, logical and evidence based. What a child knows, what he / she loves and what the current job market demands; when the marriage happens among all these factors, it leads to a brighter future for the child.

Citing a few generic examples of conventional wisdom, we can refer to these following popular ones; 'Cows give us milk', no, the cow doesn't give milk on its own, one has to milk it. Same goes for 'success', it doesn't come on its own, one has to work towards it. Conventional wisdom says, 'to get something one needs to lose something', no, the fact it, to get something one has to make that effort! Similarly conventional wisdom says, 'there is success beyond fear', no, there is pain beyond fear, one creates opportunities of success only when he learns from it ! In another example, conventional wisdom says, 'cut your coat according to the size of the cloth', no, make efforts to buy a bigger size cloth to stich a coat that fits you !

Children must be given conducive learning environment, encouraged and taught to inculcate better habits, are helped to embark beyond text-books, develop better friend-circle and move ahead in life !

STRC through its Environment Education Program for Tribal Schools of Gadchiroli, aims to contribute by inculcating a sense of responsibility among tribal children towards the local biodiversity using innovative teaching learning methods, various visual tools and modules. Into its second phase, STRC is addressing 15 such schools catering to over 60 teachers and 600 children in the age group of 12 to 14.

Innovative Informal ways of Knowledge Sharing STRC's Initiatives to connect with Farmer Groups and School Children

Past few years have witnessed that knowledge sharing has moved to the centre of global development as a third pillar complementing financial and technical assistance. In this day and age, knowledge sharing can be a driver for achieving our goal to educate, enable and empower underserved communities through multiple innovative ways and means of disseminating needful information and development ideas.

STRC is engaged in finding solutions to developmental challenges of the tribal communities of Gadchiroli region through application of appropriate science and technology. STRC believes, various community platforms can be created to share knowledge and address developmental concerns of focused community groups such as; Artisans, Farmers (Vegetable/Fish/Paddy), Traditional Healers, School Children etc. This article lays emphasis on STRC's recent efforts on knowledge sharing with Farmers' Groups and School Children.

Under this, STRC is working on developing multiple platforms of knowledge sharing through innovative action-oriented modules, namely; Farmers' Open School (FOS) catering to groups of marginal farmers (05 farmers' schools, 100 farmers with 20 farmers per school) will be targeted and Environment Education Program for School Children (EES); a uniquely designed module based curriculum with informative content using innovative teaching, learning methods using ICT and field tools, to garner greater interest among the target group of young children in the age group of 12-14, from 15 select local schools of the region with over 600 students and 60 teachers.

While FOS would disseminate hands on knowledge through action-oriented modules in multiple focused group sessions on Advance Agronomy Practices (sowing to harvesting), productivity enhancement and post-harvest technologies, EES on the other hand, would focus on providing beyond-the-classroom knowledge on environment, conservation, floral and faunal diversity in the immediate vicinity for young school children.

Creating a Cadre of Young Entrepreneurs in Bamboo Sector

Considering the naturally renewing properties, Bamboo is one of the eco-friendly plants and sustainable alternatives. Bamboos are scattered across the tropical and sub-tropical areas to mildly temperate regions. It is a multipurpose forest product that plays a significant role in the domestic and industrial economies across the globe. Bamboo and products derived from bamboo have a wide range of indoor and outdoor applicability by the way of its multifarious use case and relatively faster growth. As we see, bamboo from its use as a consumer product, it tends to have immense potential as an industrial raw resource. In the context of the Indian subcontinent, Bamboo has multiple usages and is a renewable resource in social, economic, ecological, cultural, functional, and climatic context with 1500 recorded applications in India. Vidarbha region in Maharashtra is blessed with a healthy spread of natural bamboo cover which is an integral part of the lives and livelihoods of the local communities especially in Gadchiroli.

STRC, Gondwana University Gadchiroli sees a great opportunity in tapping the resource, nurturing young minds and their traditional skills to develop a cadre of young entrepreneurs in the bamboo sector. A one year diploma in Bamboo Entrepreneurship and Design has been rolled out with a uniquely designed course curriculum is aimed at developing bamboo craft and entrepreneurship skills and to provide them handholding support in establishing businesses. Along with the said diploma course, specifically designed certificate courses and short-term training programs will be rolled out to have cadres with different levels of skill-set. Young students graduating from here with practical experience and exposure in bamboo would have a lot of employable potential in this sector such as food manufacturing, pulp and paper, replacement to wood, handicrafts, cottage industries, medical products, fabric and biochar manufacturing and of course as an entrepreneurship.

Moulding Local Youth as Change Agents: Driving the Community Development Mandate at STRC

> *The future of any community rests in the hands of its youth. At Science and Technology Resource Centre (STRC), this belief is not just a philosophy - it is a guiding principle. STRC has been actively working to shape the youth of tribal regions into informed, responsible, and action-oriented leaders who can spearhead sustainable development from within.*

Youth at the Centre of STRC's Vision:

Rather than being passive recipients of developmental aid, local youth are being positioned as architects of change. STRC's approach emphasizes participatory learning, leadership development, and skills training-ensuring that young men and women from the region become catalysts for community-driven innovation.

Through fellowships, internships, hands-on exposure, and mentorship by experts, these youth are gradually becoming rooted development facilitators-understanding the nuances of local ecosystems, indigenous practices, and the evolving aspirations of their people.

Learning by Doing: Youth Involvement in Key STRC Initiatives

- **NTFP Collectivisation and Livelihood Enhancement**

Youth are actively engaged in organizing forest produce gatherers into collectives, supporting the value addition, storage, and market linkage of NTFPs like tamarind, honey, and mahua. Their efforts are helping tribal families earn more and secure their forest-based livelihoods.

- **Bamboo Craft and Rural Enterprise Development**

STRC has trained youth in bamboo processing, design innovation, and entrepreneurship. Many of them now lead craft collectives or act as community trainers, reviving traditional skills and creating sustainable income avenues.

- **Herbal Plant Initiatives and Community Nurseries**

Youths are involved in establishing and maintaining nurseries for medicinal and aromatic plants. These nurseries are not only generating awareness about traditional healing systems but are also becoming centres of economic activity and biodiversity conservation.

- **Environment Education in Schools**

Recognizing the importance of ecological awareness from a young age, STRC has initiated environment education programs in schools across tribal blocks. Trained local youth conduct sessions, lead nature trails, and facilitate activities that instill a sense of environmental responsibility among schoolchildren.

Youth as Cultural and Ecological Ambassadors

STRC trained youth are not only development facilitators-they are also knowledge bearers and cultural ambassadors. They are documenting indigenous knowledge systems, conducting community consultations, and bridging the gap between traditional wisdom and scientific methods. Their work in eco-tourism, for example, has enabled them to lead guided nature trails and heritage walks that celebrate

local biodiversity and tribal heritage.

Voices from the Ground

“STRC has transformed my life. I used to be unsure about my future. Today, I run a small bamboo products enterprise and also train others in my village.”

— *Bhojraj Madavi, Bamboo Artisan and Youth Trainer, Kurkheda*

“Through the Community based NTFP collectivization project of STRC, over 500 households in 17 villages are able to engaged in organized NTFP trading leading to additional and assured income generation.”

— *Saduram Madavi, Community Leader, Dhanora*

The Way Forward

STRC envisions the creation of a vibrant, youth-led ecosystem where every tribal village has access to skilled, locally rooted changemakers. To achieve this, STRC is expanding partnerships with educational institutions, civil society, and government departments to scale its youth engagement model.

By moulding youth into change agents, STRC is not only investing in the next generation of leadership, it is ensuring that tribal development remains grounded in local knowledge, sustained by local capacities, and driven by local aspirations.

Chapter 4

Community Engagement, Indigenous Knowledge, and Social Entrepreneurship

Organizational Sustainability: Strategies and Challenges Ahead!

> *Sustainability of a techno-social development organization refers to a business approach to create long term value by taking into consideration how a given organization operates in the ecological, social and economic environment. Sustainability is built on the assumption that developing such strategies foster organizational longevity.*

The term sustainability is broadly used to indicate programs, initiatives and actions aimed at the preservation of a particular resource. However, it actually refers to four distinct areas: human, social, economic and environmental known as the four pillars of sustainability.

According to Forbes, if an organization or a business entity intends to become sustainable, the leadership group must have a clearly defined methodology for achieving this goal. There are not enough resources for starting down a path of sustainability that doesn't produce a viable result and then starting all over again.

Knowing what sustainability means to the organization, followed by a structured assessment as the starting point, the best way to ensure an organization is on the right track is to get feedback and more feedback and never stop getting feedback. Nurturing the right collaborations with the right people and inculcating the fundamentals of sustainability into the roles and responsibilities of the team is vital. Creating a vision to anchor the team and the organization helps in devising strategies to achieve the desired goal.

In the last 6 years or so that STRC expended, building on the core mandate of science and technology-based development in the Gadchiroli region, a very specific vertical based approach was adopted. Efforts in the last few years have reaped benefits as a result of the replicable implementation models in bamboo craft, scientific fisheries, medicinal plant initiatives and human capacity development across the board. This has led us to believe that having an integrated approach towards building capacities through leveraging knowledge, skill and low-cost technologies, is the key to sustain the impact of the program. STRC also believes that implementation of specific initiatives must be centred around having a core facility as the 'driver' on one end and a cadre of knowledge driven community level workforce as 'change agents' on the other. The challenge lies in its collective understanding and persistent efforts to drive that change.

We must understand that credibility of an organization is based on the tangible impact it manages to create through its past and on-going programs. It also helps in building the trust and ownership among beneficiaries, government, policy makers and potential funding sources.

Hence, STRC must drive home the fact that best practices of sustainable value creation, and its wider adoption, commercialization of products and services, establishment of a progressively sustainable revenue model through social entrepreneurship are important to attain sustainability.

National Workshop on Indigenous Medicinal Knowledge (IMK-2025)

Bridging Ancient Healing Traditions with Modern Scientific Rigour for Sustainable Healthcare

It is with great pleasure and pride, Science and Technology Resource Centre (STRC), Gondwana University, Gadchiroli, successfully organized a two-day national workshop on Indigenous Medicinal Knowledge System (IMK-2025) on 11th and 12th March 2025 at the Chandrapur Forest Academy of Administration, Development and Management, Chandrapur in collaboration with esteemed institutions and knowledge partners. This workshop managed to foster collaboration between traditional healers, researchers, and policymakers to revive the Indigenous Medicinal Knowledge (IMK) systems.

STRC believes, this workshop was a crucial step towards reiterating the importance of recognizing, documenting, and strengthening the extensive repository of indigenous medicinal knowledge that has been carefully preserved by generations of traditional healers and communities across India.

There is a shared understanding that, indigenous medicinal knowledge is not just a legacy of the past; it holds immense relevance for the present and future. Forest dependent tribal communities, especially the local Traditional Healers or *Vaidus* across the Gadchiroli region, nestled in the lush green forests with rich diversity of valuable plant resource, are known to share a symbiotic relationship, have plethora of indigenous medicinal knowledge and are known to be the sole custodian of the age-old wisdom in ethno-medico botany. Such valuable indigenous knowledge inherited from previous generations, *gurus*, old texts and observations, is now facing an eminent danger of being irretrievable in the absence of scientifically documented evidence and validation.

In an era where sustainable healthcare solutions and biodiversity conservation are of paramount importance, the wisdom embedded in traditional healing practices can offer valuable insights into holistic wellness, ecosystem-based healthcare approaches, and sustainable livelihoods.

To address the concern, STRC had initiated the Van-aushadhi Abhiyan in 2017, series of Vaidu Sammelan in 2019 and development of the Vaidu Directory in 2021 to document this

traditional wisdom and practices, culminating in the establishment of the STRC Vaidya Chikitsalay in 2022. This initiative aims to promote traditional healers and their healing practices, and provide them due social recognition. Furthermore, this unique initiative opens the door for intensive research leading to the marriage of traditional healing practices with modern healthcare, ensuring holistic well-being for all, going forward.

IMK-2025 successfully convened a unique and diverse assembly of researchers, practitioners, policymakers, industry leaders, and community representatives. The convergence fostered meaningful dialogue, exchange of experiences, and collaborative exploration of pathways to integrate indigenous medicinal knowledge with contemporary scientific advancements.

The event featured expert-led technical sessions on ethnobotany, pharmacology, intellectual property rights, and policy dimensions. Complementing these discussions was a vibrant exhibition showcasing ayurvedic products, community-driven initiatives, and innovations in the sustainable utilization of medicinal plants.

The workshop proved instrumental in enabling STRC and other leading institutions to forge cross-disciplinary collaborations, advocate for ethical, community-centric approaches to knowledge preservation, and advance policy frameworks that uphold the rights of traditional knowledge holders.

As we embark on this journey of learning and co-creation, I urge all of you to actively engage, share insights, and contribute towards strengthening a knowledge ecosystem that values and respects indigenous wisdom. Let us work together to ensure that traditional knowledge systems continue to thrive, benefiting not only local communities but also global healthcare and conservation efforts.

On behalf of all my dear colleagues, I, as the head of the organization, extend my heartfelt gratitude to all contributors, partners, and participants who made this workshop a platform for meaningful exchange and action. I look forward to consolidate and share the insightful discussions and impactful outcomes to help shape the future of indigenous medicinal knowledge in India.

Ethnobotany of Key Plant Resources Among the Forest Dependent Tribal Communities of Gadchiroli Region

> *The south-eastern part of Vidarbha (Gadchiroli and Chandrapur region), is heavily forested and largely tribal, where 'ethno-botany' plays a crucial role in understanding the interaction between forest-dependent tribal communities (Gond, Madia etc.) and their surrounding environment.*

Local communities in Gadchiroli region rely on forests, not only for subsistence but also for cultural and medicinal purposes. The rich biodiversity of the region provides an invaluable resource base, making plants central to their livelihoods, healthcare, and traditions. Some key aspects of ethno-botany of important plant resources in the context of local tribal communities include, edible plants and forest produces, medicinal plants, fibre and construction materials, cultural and ritualistic plants etc.

Selected and commonly available plants with ethno-botanical relevance under each categories are as follows;

Edible Plants and Forest Produces

- *Madhuca longifolia* (Mahua): The flowers are a key source of food and are used to make local beverages. The oil extracted from the seeds is used for cooking and in cosmetics.
- *Dioscorea spp.* (Wild Yams): An essential food source during times of scarcity, wild yams are gathered from the forest by many local tribal communities.
- *Tamarindus indica* (Tamarind): Tamarind trees provide fruits that are used as a souring agent in food and also for medicinal purposes, particularly in digestive health.
- *Syzygium cumini* (Jamun): The fruit is consumed for its nutritional and medicinal properties, especially in managing diabetes. Jamun trees are valued for their fruits and their potential medicinal benefits.
- *Phyllanthus emblica* (Amla): The fruit is rich in Vitamin C and is used in dietary supplements, herbal medicines, and for preserving food. Amla is widely used for its health benefits and forms a part of traditional medicine and food preservation practices.
- *Diospyros melanoxylon* (Tendu): Tendu leaves are used to make beedis (traditional Indian cigarettes), which is a major source of income for forest dwellers. Economically important due to the beedi industry; also used for its fruits and wood.

Medicinal Plants

- *Terminalia arjuna* (Arjun): Known for its cardio-protective properties, the bark is used in traditional medicine to treat heart conditions.
- *Tinospora cordifolia* (Guduchi): Often used to boost immunity and treat fever, this plant is an important part of Ayurvedic and tribal medicine.
- *Azadirachta indica* (Neem): Used in the treatment of fever, headache, ulcers, respiratory disorders, cancer, diabetes, leprosy, malaria, dengue fever, chickenpox, and skin complications.
- *Andrographis paniculata* (Kalmegh): Used in the treatment of fever, liver disorders, and respiratory infections, it holds a significant

place in local health practices.

Fiber and Construction Materials

- *Bamboo*: Used for constructing houses, crafting baskets, and making other utility items. Bamboo also serves as an important material in making tools and everyday items like mats and fences.
- *Tectona grandis* (Sogun): While the wood is used for construction and fuel and the tree has medicinal properties.

Cultural and Ritualistic Plants

- *Butea monosperma* (Palash): This tree has spiritual significance in many tribal rituals. Its bright orange flowers are used in religious ceremonies, while the bark, seeds, and leaves are used in traditional medicine.
- *Ficus religiosa* (Peepal): The Peepal tree holds sacred importance, and its leaves and bark are often used in rituals and local healing practices.

Sustainability and Conservation Practices

Sustainable practices adopted over generations of the forest dependent tribal communities have ensured the continuous availability of these plant resources in Gadchiroli. Their deep understanding and indigenous knowledge of the forest ecosystem allows them to harvest plants without depleting the natural resources. Practices such as rotational harvesting, seed preservation, and selective cutting ensure that the forest regenerates and remains a viable source of livelihood.

Threats and Conservation Needs

While the ethnobotanical knowledge of these communities is invaluable, modern challenges like deforestation, extensive mining in recent years, and changing climate patterns threaten both the biodiversity and the tribal way of life. There is a growing need for initiatives to document and preserve traditional knowledge, promote sustainable resource management, and involve tribal communities in conservation efforts.

STRC, Gondwana University, through its herbal plant initiatives, has been engaged in scientific documentation of indigenous medicinal knowledge and treatment processes adopted by local traditional healers. STRC has also developed a directory of traditional healers and a checklist for over 300 important locally available plant species. Gondwana University through its Ekal Gramsabha initiative, is engaged in capacity building of local tribal communities with regard to sustainable resource utilization and income generation. Incorporating ethnobotany into eco-tourism initiatives in Gadchiroli could further enhance the engagement of local communities while promoting the sustainable use of plant resources, as their rich traditional knowledge and interaction with the forest could be central to educational programs, nature trails, and cultural experiences for visitors.

Empowering Local Communities through Rural Entrepreneurship

> *Science and Technology Resource Centre (STRC) plays a pivotal role in empowering the under-served communities of the heavily forested and largely tribal region of Gadchiroli, Maharashtra. STRC is driving a transformative change by blending traditional knowledge with modern technology to create sustainable livelihoods, particularly focused on strengthening micro-enterprises and small businesses.*

The key initiatives that STRC is currently implementing are based on years of assessment of need and community aspiration.

- **Fostering Rural Entrepreneurship around Bamboo**

Aimed at transforming locally available bamboo into high-value products, skilling local artisans and promoting entrepreneurship around bamboo based lifestyle-utility products.

Through the Undergraduate Diploma in Bamboo Entrepreneurship and Design, STRC equips students with essential skills in bamboo craft, product design, and business management. The program offers hands-on training to help students develop innovative bamboo-based products such as furniture, home decor, and construction materials, enhancing their employability in bamboo sector. Till date, over 250 jobs have been created for local artisans generating over INR 12.0 lakhs of revenue.

- **Gondwana Craft – A Gateway to Market Access**

To help rural artisans and entrepreneurs access wider markets, STRC has created an umbrella brand, Gondwana Craft, to preserve and promote unique yet dying traditional art forms of the region through a sustainable and viable social entrepreneurship platform.

This physical and digital marketplaces in form of product outlets across nagpur and chandrapur and social media business platform, will showcase handcrafted goods from Gadchiroli region and expected to provide more than 500 artisans with relevant skills and an avenue to sell their products to the national and international audience. Such platforms are envisaged, not only to highlight the rich cultural heritage of the region but also to ensure fair pricing and enhanced returns, empowering rural entrepreneurs to grow their businesses sustainably. Till date, artisan groups associated with Gondwana Craft have successfully generated over INR 5.0 Lakh in revenue, collectively. By exposing the local art-forms to the global markets, STRC is creating a powerful eco-system that supports artisan economy.

- **Fish Farmers' Interest Groups (FIGs) as Units of Fish Business**

Considering the huge potential of fish farming as a sustainable livelihood option for local communities in the region, STRC has taken up good quality fish seed production through portable carp hatcheries. Constituting multiple cluster based FIGs, comprising of 25-30 small fish farmers, huge business opportunities can be created.

Ensuring proper market linkages with large buyers and selling of live fishes in and around local market places will surely boost their

income.

- **Reviving Traditional Healing Practices**

Focusing on reviving and promoting traditional healthcare practices, rooted in ancient wisdom of Ayurveda and indigenous medicinal knowledge through university platforms like Vaidya Chikitsalays, supports local traditional healers (Ths) to offer holistic health services in a dignified manner. This initiative not only creates opportunities to preserve traditional healthcare system but also help integrate it with modern healthcare solutions. It provides an avenue for local healers, to formalize their practices and create employment. Since its inception, in September 2022, nine THs associated with STRC Vaidya Chikitsalay, have successfully treated over 2500 patients.

- **Collectivization of Selected Non-Timber Forest Produce (NTFP)**

STRC's NTFP Collectivization Project at Kharkadi, Dhanora is a vital community-led initiative involving a cluster of 17 villages, supporting about 500 households. This project aims to generate sustainable livelihoods by facilitating the scientific collection and marketing of commercially important forest products such as honey, tori, kusum beej, raw bamboo, mohua seeds and flowers. The initiative emphasizes good storage practices, primary processing, and effective marketing strategies. The project has already completed two cycles generating over INR 7.0 lakh amount out of the total collection of 20 ton of forest produce.

Gradually, a small primary processing unit would ensure development of multiple products and subsequent commercialization. This approach is designed to improve both the profitability and sustainability of NTFP sales, benefiting primary collectors and expanding market reach. The key focus of the project is on selling the collected produce, with STRC ensuring business linkages for sale of remaining stock and initiate collection of forest produce in the current cycle.

The Capability-Commitment Matrix
Nurturing a Team to Optimize Performance

> *In the realm of an organizational set up, the pursuit of excellence often centers around building a high-performing team. The team is not merely a group of individuals working together but a cohesive unit that synergies their skills, knowledge, and dedication towards a common goal.*

While numerous factors contribute to team success, the model that stands out for its effectiveness is the Capability-Commitment Matrix. In this day and age, developing a high performing team by getting the best out of each available human resource, needs professional nurturing.

Having a fair understanding of the capabilities and commitment levels of individual staff, helps the leadership group in creating a more balanced and cohesive team. This can lead to enhanced performance as each member is appropriately challenged and supported to attain full potential. While the team which is tuned to deliver, depends on optimized individual skill and commitment, the collective character of the team is developed around how the leader pursues the organizational vision and embed the dynamic Capability-Commitment Matrix into the team's culture by emphasizing the importance of continuous improvement, accountability, and collaboration.

In a professional set up, presented through a Capability vis-a-vis Commitment matrix, one generally gets to experience a team broadly classified in to these four categories:

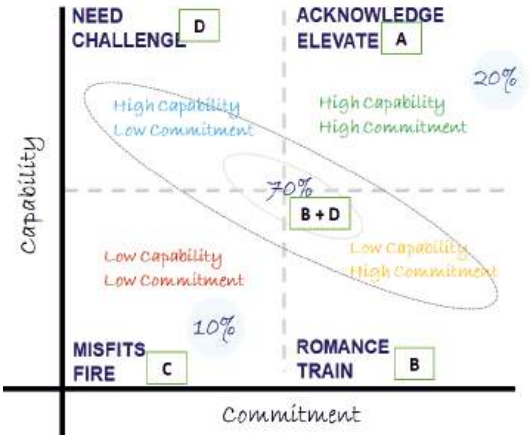
a) Low Capability - Low Commitment

b) Low Capability - High Commitment

c) High Capability - Low Commitment

d) High Capability - High Commitment

Every team would have a few human resources falling in to the Low Capability - Low



Commitment category which constitutes about 10% of the total human resource. These are a liability to the organization, hence may be termed as ‘misfits'. To maintain synergy and pace of progress, the management would prefer to lay them off, guilt free, which sets the right precedent for the rest of the team.

Typically, about 70% of the total human resource fall in to the categories of High Capability - Low Commitment and Low Capability - High Commitment combined. For the leadership group, this is the trickiest set of professionals to handle. While the individuals in the High Capability - Low Commitment category have the necessary skills, their lack of commitment hinders their effectiveness. They are not a disciplined lot, are not natural leaders and essentially perform independently but not in a group. Staff falling in this category are the

'need' of the organization and have their fair share of 'ego'. Hence, the leader should, not only give them the credit where its due, for the results they produce, but also pose them with new challenges to take up. They must be challenged. On the other hand, the staff in the Low Capability - High Commitment category are 'highly trusted low-performing' ones and have a perpetual 'romance' with the leadership group. Their capacities must be built. The dilemma that the leader face is; he wouldn't like to get rid of either of them as one gets the job done and the other can be trusted blindly. However, the more interesting fact is, the ratio between these two categories depends on the character and personality of the leader and the carrot and stick policy he adopts. Leader's personality breeds the kind of people!

The last and the most important group of staff fall in to the High Capability - High Commitment category. These are the super heroes of the organization, the 'A' players and may constitute only 20% of the total human resource. A leader must acknowledge them, express gratitude and elevate them to nurture a second line of leadership group. These high performing staff are not necessarily born with leadership qualities, however, must be assigned with leadership roles.

Another aspect of modern day corporate employees is to become Intrapreneurs;

I know, we all know and understand 'entrepreneurs' / 'entrepreneurship', but, do u know about 'intrapreneurs'?

Confused ?, Read on...

Intrapreneurs are the employees who have the mind-set and spirit of an entrepreneur for their organization. Still confused?? Continue to read.

While organizations today want to hire proactive employees who take ownership of their work, intrapreneurs fit the bill and do the job as if it's their own business!

They are passionate, free-thinkers who go the extra mile to get the work done and look for innovative ways to solve the problem.

Unlike traditional employees, intrepreneurs think and act like entrepreneurs.

Major characteristics:

Self-Starters | Team Players | Problem-Solvers

Every employee can be an intrapreneurs, if they are provided with a growth driven work atmosphere.

Organised Social Entrepreneurship: An enabler of 'Artisan Economy'

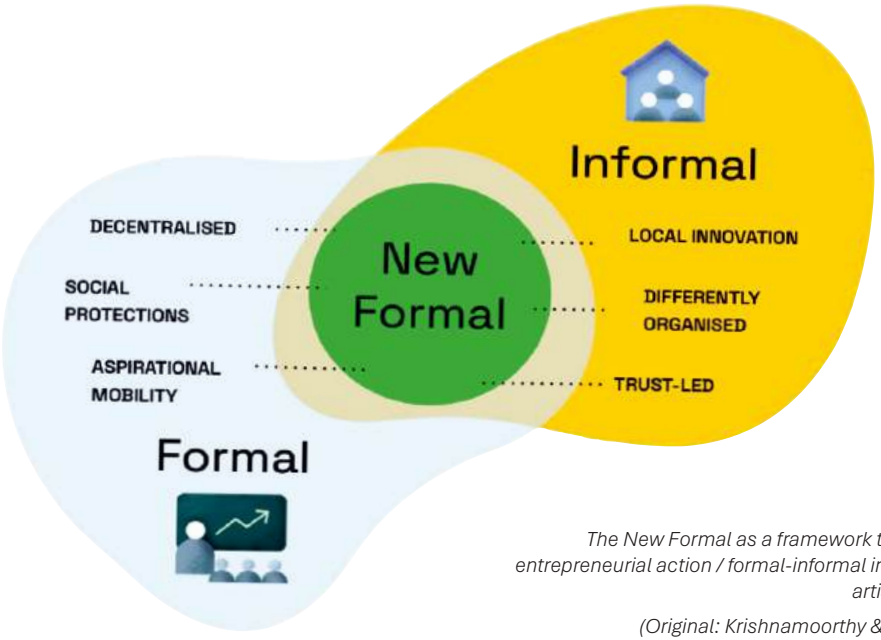
The artisan ecosystem as it exists today in India is deeply linked to our agricultural ecosystems. While agriculture remains the largest source of raw materials, the artisan economy is where much of the value-add happens. Often, those who farm during the day are also artisans in their spare time. Today, this ecosystem in India supports traditional and non-traditional artisans and creative producers, a multitude of small businesses (artisan-led enterprises, social / creative enterprises), nonprofit organisations, producer companies and self-help groups, small and large marketplaces and many others. However, the informal nature of India's artisan sector for instance, comes through in the absence of reliable figures on how many artisans or craft-based enterprises operate in this sector.

Enterprises in the artisan sector are differently motivated and cannot be reverse engineered to meet traditional definitions of growth; scale is definitely possible but is achieved via decentralised collectivisation. For example, true inclusion of women in the workforce cannot happen without acknowledging that much of their labour within the artisan sector (and otherwise) remains invisible. The decentralised approach significantly lowers entry barriers for differently skilled communities; especially women. As Judy Frater puts it so eloquently, “Because commercialisation of craft has been based on an industrial model, the assumption is that craft must scale up to succeed. But when craft is pushed into the world of industrialised production, the structure of artisan societies inevitably changes from horizontal to vertical. Economically stronger individuals become ‘Master Artisans’, employ previously equal status artisans as workers, and gain higher social as well as economic status. The

perception of the artisan as a worker is thus reinforced in a new, socially threatening form." *(Business of Handmade 2021 : 47)*

Given the myriad political, socio-cultural, linguistic, and historical realities in India, a one size approach cannot cater to the diverse needs and requirements of diverse artisan enterprises. This applies to policies and interventions aimed at both informal artisan communities and formal enterprises working in the artisan sector. Market-based solutions do not recognise that craft production cycles are unique and seasonal, often part-time, rural and decentralised, women-led and creativity-based; unlike assembly line manufacturing models.

STRC through its 'Gondwana Craft' initiative, is striving to bring all traditional art forms of the region under one umbrella, with an artisan centric approach to preserve and promote these unique yet dying art-forms on a sustainable and viable social entrepreneurship platform.



The New Formal as a framework to understand entrepreneurial action / formal-informal interplay in the artisan economy

(Original: Krishnamoorthy & Kapur, 2021)

I am greatly inspired and sincerely acknowledge the outstanding work carried by Priya Krishnamoorthy and Aparna Subramanium (The Jugaad Project / www.thejugaadproject.pub / activating-handmade [Date of access 30th Oct 2023] along with the 200M Artisans / Business of Handmade initiatives). This article is a direct reference of the same.

Essential Networking Strategies for Social Entrepreneurship

STRC has recently embarked on to the social entrepreneurship sphere by creating a consortium of various local agencies working towards preservation, promotion and development of sustainable businesses around traditional art-forms. Traditional but dying art-forms such as Bamboo Craft, Dokra Craft, Gond Paintings, Earthen Pottery / Terracotta, along with wild honey and other tribal food items are now being proposed to be placed under one umbrella brand 'Gondwana Craft', ready to cater the niche market.

As a social entrepreneur, an important part of our job is to get connected with like-minded individuals who can help the business reach its full potential. Networking enables building relationships that are mutually beneficial. Through networking, one would discover new business opportunities, land high-quality leads, make reliable connections leading to increase in the visibility of the business. Persistent efforts in networking would also result in access to various funding sources. Connecting with people online, attending networking events and making a good first impression are the essential ingredients to create a strong base for the social entrepreneurship venture.

Social Enterprise Networks (SENs) can bring together individuals and organizations from various communities, social businesses, and places to form supportive networks where they can collaborate, have a collective voice, and access to resources, advice, and peer support. In order to obtain these resources, social entrepreneurs must build and maintain trusting relationships with their networking members. Networks are highly useful to enable the businesses to identify potential partners with common goals to work collectively and collaborate. Other benefits of networks include the ability to inter-trade, to be able to reach a wider market and to raise the profile collectively.

To help get the sales and marketing for the social enterprise up and running as the umbrella organization we understand the following

If the product(s) is good enough, sales isn't a dirty word. One must know who the customers are and get the pricing right, accordingly. The social enterprise must keep in mind to sell benefits, not features. The other vital cog in the wheel is gaining more visibility is through referrals, referrals and more referrals! The social enterprise must learn from rejections and must have a 'never give up' attitude.

Idea of a STRC Vaidya Chikitshalaya in the University Campus

> *A unique university platform to promote traditional healers and their healing practices. The STRC Vaidya Chikitsalay, so far has successfully treated over 2500 patients since inception. It is poised to become a cornerstone of traditional healing in the region.*

India has a very rich tradition of herbal medicines used in the treatment of various ailments. Tribal communities practice different types of traditional healing practices. Govt of India, in the year 2014, formed an exclusive Ministry of AYUSH with a vision of reviving the profound knowledge of our ancient systems of medicine and ensuring the optimal development and propagation of the AYUSH systems of healthcare. Historically, the traditional healers have not been given the due importance and wider recognition beyond their locality. The traditional legitimacy which the lineage offers reinforces the thought that the older the practitioner, the richer the knowledge, and thus, the stronger the following. These healers typically do not demand monetary compensation for consultation they accept whatever is given to them. Sometimes, clothes and fruits are given by a recuperated patient, or payment is made for the preparation of medicines. Traditional healers historically in a way played their cards close to their chest by not willing to divulge their knowledge as trade secrets. Moreover, in absence of an established system for wider acceptance or recognition and lack of rewarding opportunities, there has been a gradual loss of interest in inheriting the knowledge or taking it up the profession among the younger generation.

Considering the importance of traditional healing, role of traditional healers in the society and its impact on the local communities, STRC, Gondwana University Gadchiroli initiated digital documentation of traditional medicinal knowledge through platforms such as Vaidu Sammelan and one to one interactions. As an outcome of the Indigenous Medicinal Knowledge (IMK) project supported by National Academy of Sciences India (NASI), Govt of India, STRC came up with a Vaidu Directory; a compendium of local traditional healers and their healing practices. These efforts led to a series of open discussions and better rapport with the local traditional healers which gave birth to the idea of a Vaidya Chikitshalaya; a platform for treatment and consultation. STRC is launching Vaidya Chikitshalaya (or Vaidu OPD), a unique initiative to provide a platform to the locally renowned and lesser-known Traditional Healers and to promote traditional healing practices among local communities.

Vaidya Chikitshalaya would be formally launched in the month of September 2022 and would be open to function as once in a week / fortnight facility (with couple of THs at a time) for consultation and treatment of specific ailments for people from local and peripheral villages.

Status of India's Forests: Indian State Forest Report 2021

The Indian State Forest Report 2021, developed by Forest Survey of India, was released in January 2022. The ISFR 2021 presents the latest status of the 'Forest cover' and 'Tree cover' of the country, estimates of growing stock, the extent of trees outside forests, mangrove cover, bamboo resources, and assessment of forest carbon stock. The report denotes Andhra Pradesh, Telangana, Odisha, Karnataka and Jharkhand are listed as the top five states with increased forest cover.

The 17th biennial assessment of India's forests by the Forest Survey of India, an organisation under the Ministry of Environment, Forest and Climate Change (MoEFCC) was published in 2021. The ISFR 2021 presents the latest status of the 'Forest cover' and 'Tree cover' of the country, estimates of growing stock, the extent of trees outside forests, mangrove cover, bamboo resources, and assessment of forest carbon stock.

A special chapter on "Forest Cover assessment in Tiger reserves and Tiger corridor areas of the country and decadal change in Forest Cover" has been included this time round. Along with these, new initiatives taken up in the last two years by the Forest Survey of India (FSI) team are also being presented as a special chapter.

India's progress towards achieving the Nationally Determined Contribution commitments is also included as part of the chapter on Forest carbon assessment.

Major Findings

The total forest and tree cover of the country is 80.9 million hectare which is 24.62 percent of the geographical area of the country. As compared to the assessment of 2019, there is an increase of 2,261 sq. km. in the total forest and tree cover of the country. Out of this, the increase in the forest cover has been observed as 1,540 sq. km. and that in tree cover is 721 sq. km.

Increase in forest cover has been observed in open forest followed by very dense forest. Top three states showing increase in forest cover are Andhra Pradesh (647 sq. km.) followed by Telangana (632 sq. km.) and Odisha (537 sq. km.).

Area-wise Madhya Pradesh has the largest forest cover in the country followed by Arunachal Pradesh, Chhattisgarh, Odisha and Maharashtra. In terms of forest cover as percentage of total geographical area, the top five States are Mizoram (84.53%), Arunachal Pradesh (79.33%), Meghalaya (76.00%), Manipur (74.34%) and Nagaland (73.90%).

While the 2021 assessment of forests of Maharashtra shows a marginal increase in overall forest cover, the heavily forested Gadchiroli district shows a decrease in forest cover of over 14.0 sq. kilometres which is alarming considering the intensity of large scale mining operations leading to extensive loss of green cover.

Community as Net Exporters, Not Just Mere 'Consumers'

> *'The irony is that the communities inhabiting the resource rich areas are not necessarily 'rich'. Perhaps lack of knowledge, skills, appropriate technology, and exposure to optimum utilization and sustainability of nature and natural resource are the reasons behind that or can we actually say that? If it is so, then how communities and nature have lived, thrived and sustained together in harmonious co-existence since beginning of the human race? Despite that why are they still reeling under the claws of poverty? Whether, higher yield, improved skills, entrepreneurial approach and appropriate rural technologies would enable communities to become 'net exporters', not just mere 'consumers'?*

Gadchiroli, a forest rich district in eastern Maharashtra, stands as a paradox in India's development narrative. Despite being blessed with abundant natural wealth-dense forests, non-timber forest produce (NTFP), medicinal plants, bamboo, and mineral resources-the region continues to face entrenched poverty and economic isolation.

Why do communities living amidst such abundance continue to reel under deprivation? Could the solution lie in leveraging science and appropriate rural technology to complement their traditional knowledge?

Rethinking the Role of Rural Communities

Rural and tribal communities are often viewed as passive participants in the economy-consumers, dependents, or recipients of aid. But this perspective overlooks their potential as value creators and net contributors. These communities, especially in regions like Gadchiroli, have sustained themselves and their environments for generations.

It's time to reposition them as net exporters-of products, services, skills, and culture rather than just buyers or spenders in the economic equation.

Tradition Meets Technology

The indigenous knowledge systems of Gadchiroli's Adivasi and forest-dependent communities are deeply rooted in sustainable practices.

However, their capacity to create surplus and access larger markets is often hindered by:

- Lack of value addition and modern processing techniques
- Poor access to infrastructure and technology
- Limited exposure to market dynamics

By introducing appropriate rural technologies, we can bridge this gap:

- Agro-processing units for minor millets, mahua, and tendu leaves
- Solar-powered storage and drying solutions for perishable NTFPs
- Eco-craft tools to improve productivity in bamboo composite crafts
- Digital platforms for artisans and farmers to access markets directly

These interventions, when integrated with traditional practices, unlock new possibilities.

Skilling, Enterprise, and Economic Inclusion

To catalyze this transition, capacity building and enterprise development must go hand in hand. Skill development programs tailored for youth, artisans, and farmers-focused on technology adoption, business planning, and market access can transform subsistence producers into competitive entrepreneurs.

Imagine a tribal woman processing and packaging wild honey for urban markets, or a youth-led cooperative exporting scientifically collected mohua. These are not pipe dreams but achievable outcomes with the right ecosystem support.

Creating a Rural Value Chain Economy :

Communities equipped with skills, tools, and market linkages can move up the value chain

- From producers to processors
- From artisans to brand creators
- From gatherers to green entrepreneurs

In doing so, they contribute to a resilient, decentralized economy that values biodiversity, respects traditional knowledge, and fosters equitable growth.

Conclusion: The Road Ahead

Gadchiroli's story need not be one of missed potential. With the right mix of context-sensitive technology, local ownership, and ecosystem enablers, the region can become a model for rural transformation in India.

The future lies not in charity, but in capacity and connection where communities are not just surviving, but thriving. Where they are net exporters, not just consumers.

Let's move from margins to markets sustainably, inclusively, and with dignity.