Centre for Technology Alternatives for Rural Areas

Presentation at TEQIP workshop on Water 12th September, 2014 at IIT Bombay

CTARA Highlights

Centre at IIT Bombay since 1985,
M.Tech in Technology and Development since 2007

Interdisciplinary centre

Focus on field experience, solving real life problems, focus on the bottom of the pyramid

Technology , analysis and quantification – for development
Research in Technology and Policy

Core Faculty

Amit Arora
Food Processing,Agriculture, Bio-energy

Anand Rao
Energy and Environment
Climate Change

Anil W. Date **Appropriate Technology**

Bakul Rao
Environment Analysis and Assessment

Milind Sohoni
Water, Optimization

Narendra Shah **Food, Agriculture and Agro-Industry**

N. C. Narayanan
Water and Governance, Development Theory

Om Damani **Water, Modeling**

Priya Jadhav
Electricity, Energy

Puru Kulkarni
Water, Public Systems

Rangan Banerjee
Energy

Adjunct Faculty

Prasad Modak
Environment

Subodh Wagle
Policy and Governance

Vishal Sardeshpande
Energy, Rural Enterprises

Course Work

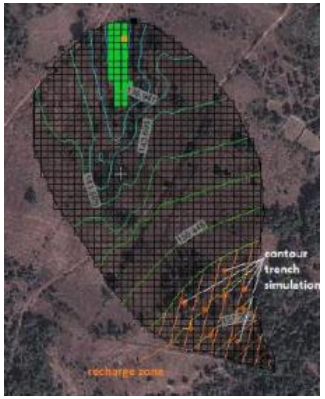
The course work provides students a development perspective, understanding of Natural Resources, skills in Financial concepts, Project management and Economics, Electives in specialized sectors, and extensive experience of Field work

Perspective courses:
Development Discourse, Governance and the Role of Policy, Social Science Research Methods

Sectors:
Water, Energy, Agriculture, Environment, Rural Planning, Electrification, Agro-based Industries, Biofuels, Appropriate Technology

Skills :
Project Management, Statistics, System Dynamics

Practice :
9 week structured rural home stay (summer), M.Tech. Projects (over 1 year)



CTARA Courses

Semester 1

- Development Theory & Policy: Indian Context
- Soil, Land Use, GIS and Agriculture
- Water Resources
- Appropriate Technology
- Ecology and Environment
- Communication and Presentation Skills
- Seminar

Semester 2

- Social Science Research Methods & Statistics/ Systems Dynamics
- Public Policy and Governance in Tech. & Dev.
- Energy Sources and their utilization
- CTARA Elective I
- CTARA Elective II
- Institute Elective

Semester 3

- Project Management and Project Analysis
- CTARA Elective III
- M.Tech Project I

Field study (Summer)

M.Tech. Project II (Semester 4)

CTARA Electives

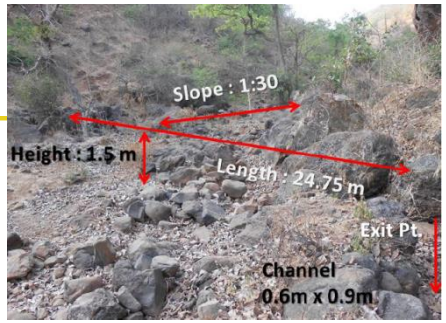
- Technology in Practice
- Development in Practice
- Rural Environmental Services Planning & Design
- Development Protocols
- Biofuels: Technology & Policy Perspective
- Agro-based Industries: Design and Case Studies
- Rural Electrification and the Power Sector in India
- Rural Enterprises

Summer Field Stay

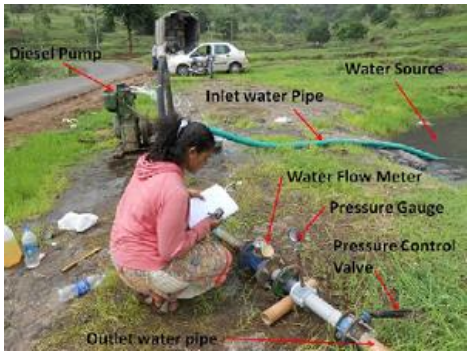
9 Week summer field stay in a village in teams of two

Participatory Rural Appraisal, Resource-technology-need linkages, Familiarization with rural setting

Research on a specific local issue – involving design, analysis, and/or implementation



Designing a Diversion Irrigation scheme in Patan, Pune



Cost benefits analysis of diesel pump-sets in a drawdown farming area

Assessing the drinking water access
Chikurde, Maharashtra

Optimizing Hydram performance, Himachal Pradesh

Field Stay- Experiental Learning

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Technology Development and Supervised Learning

Centre for Technology Alternatives for Rural Areas

Design of watershed interventions

Electricity supply monitoring

Drinking water security assessment

Documenting pottery making techniques

Water sources status mapping

Brick making practices and interventions

Oral histories of peoples issues

Agro-based industrial Development

NREGA analysis

Soil and agricultural practices

Chulla dissemination and cooking practices

Understanding public health systems

Low-cost pulse recorder

Design of piped-water supply schemes

Economic analysis of weekly markets

Analysis of sewage mgmt. techniques

Analysis and design of solar based pumping systems

Techno-economic analysis of poultry farms

Failure analysis of water schemes

Village-level environmental planning

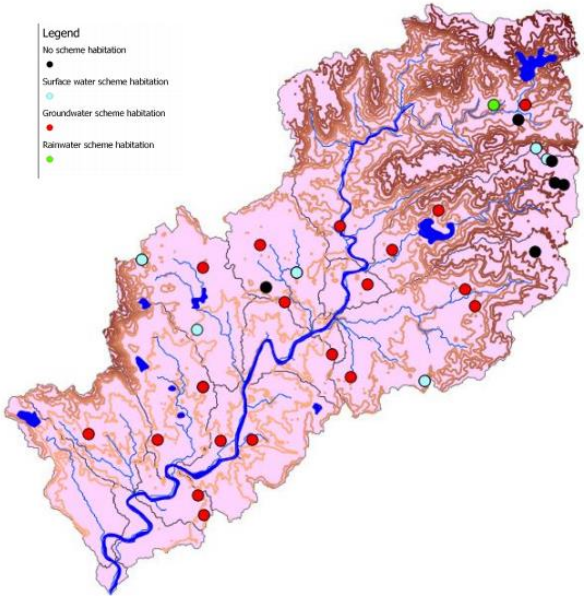
Survey and analysis of bio-gas plants

Low-cost power meters

M.Tech Projects

BIOETHANOL FROM ARECANUT HUSK

Operational Efficiencies of small Irrigation Pumping systems



Rural Drinking water security

Design, fabrication and testing of a bagasse briquetting machine
Processing Microalgae to Biodiesel
Supply chain analysis of leaf plates
Evaluation of SRI in comparison to conventional method of Paddy cultivation
Beneficiation of Wastes from Fruits and Vegetable Processing Plants
Practicing Dissemination of Biogas: Promoting a Low-cost Model and Developing a Manual

CTARA Interfaces

- RuTAG – Rural Technology Action Group – Govt of India funded – solutions to NGO technical problems

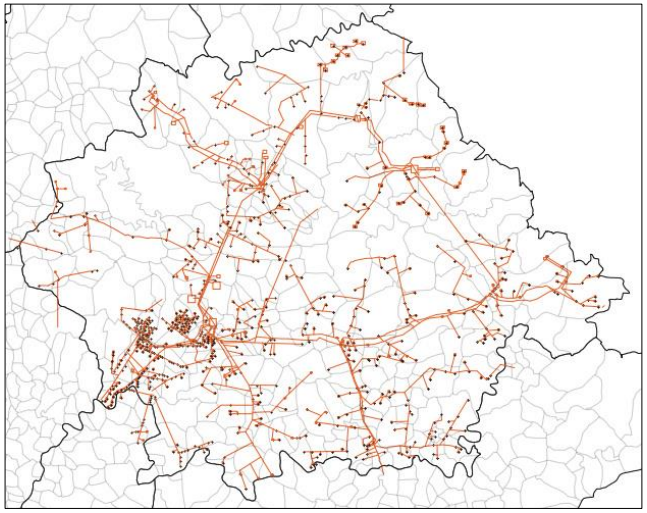
- Technology and Development Solutions Cell (TDSC)-Consults to self-help groups, NGOs, gram panchayats, village, taluka and district administrations, municipal bodies and operational departments etc.

- CTARA – Industry CSR Collaborations

A rural ‘smart grid’

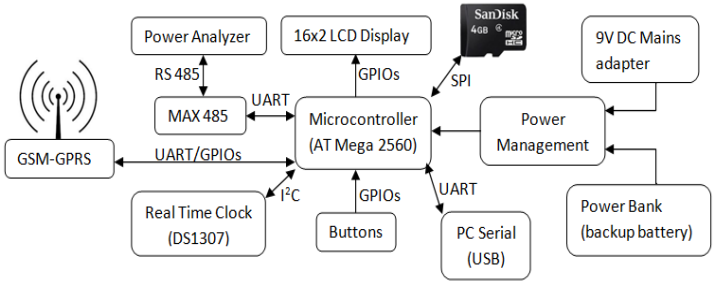
Technical systems to meter, log, and manage energy usage, could result in a better system for all players – farmers, utilities, state

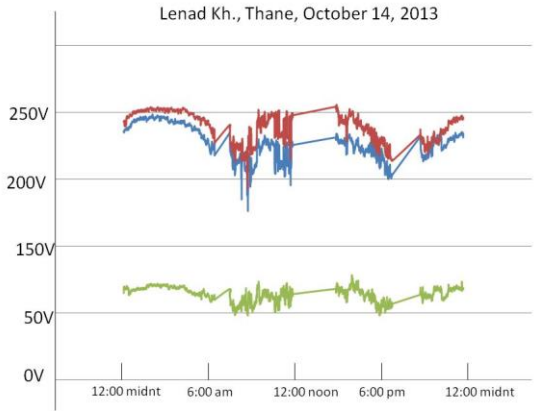
- Large towns are being upgraded with GIS systems through the R-APDRP scheme, a low-cost system using open-source technologies could help in voltage regulation, reduced theft, load management.
- Remote monitoring systems for reliable energy auditing
- Promote rural cooperatives through local management solutions



GIS power distribution system for Shahapur Taluka, Thane

Monitoring and Data loggers



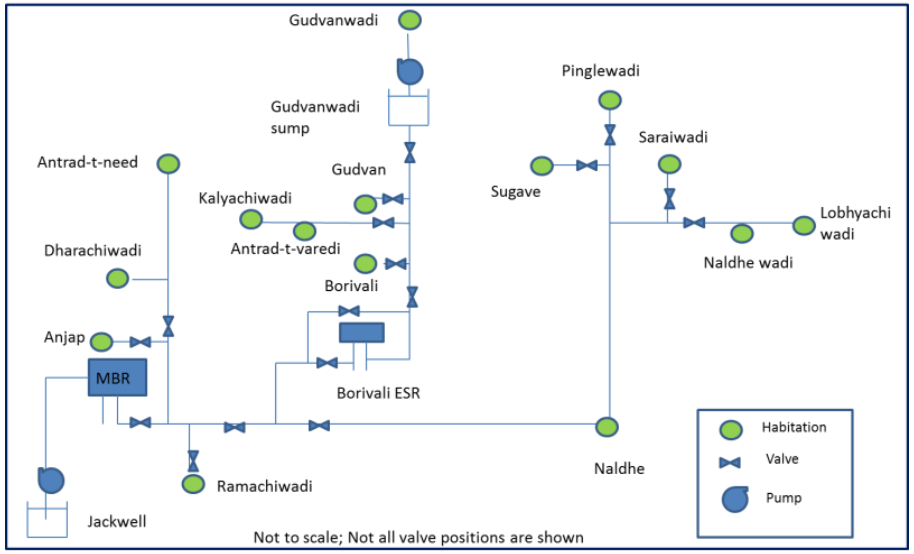


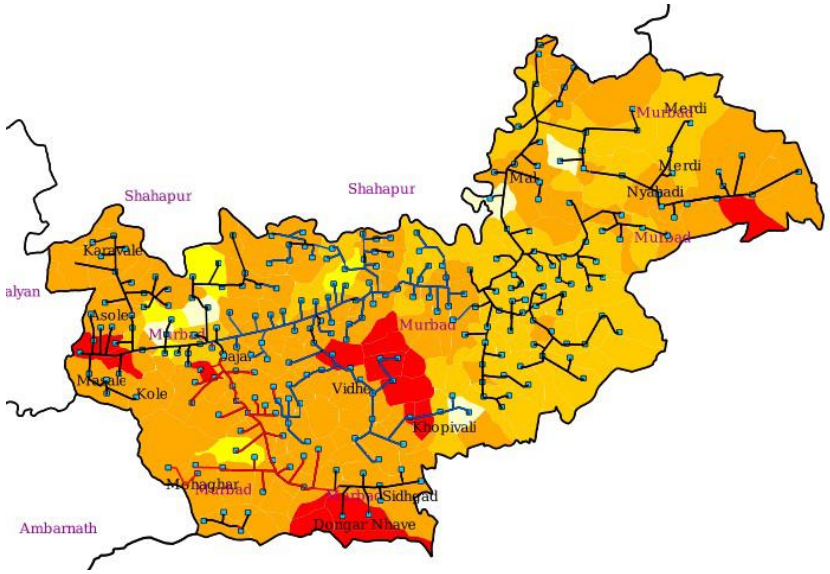
Design of Multi Village Schemes

Given the weakening of groundwater sources in various habitats, it is imperative to explore Multi Village Piped Water Networks based on perennial surface water sources

- Research focus: Multi-criteria constrained optimization of multi-village schemes
  - Variables: Water Source, Storage Reservoir Locations, Pipe Diameters
  - Constraints: Per capita Capital cost norm
  - Optimization: Operation cost

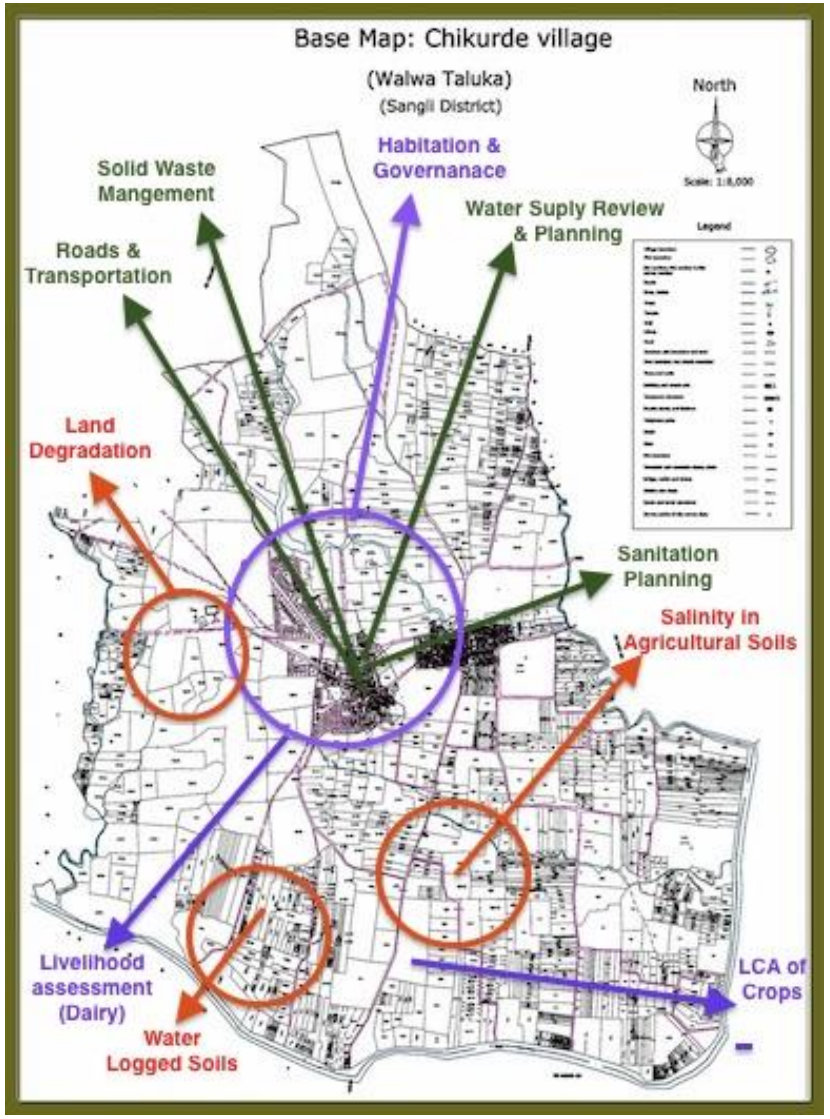
Schematic of infrastructure currently used for seasonal supply





Integrated Development Planning of Gram Panchayats

- Environmental Services Planning & Design
  - Sector Interventions in association with GPs
- Decentralized Planning for Gram Panchayats
  - Convergence with District Level Planning & GOI/State Programmes
- Engagement with Karjat Municipal Council, Gram Panchayats of Chikurde, Bhilawadi, Manchar ...



Appropriate Technology

Reducing drudgery for women

A simple innovation to lessen the everyday burden

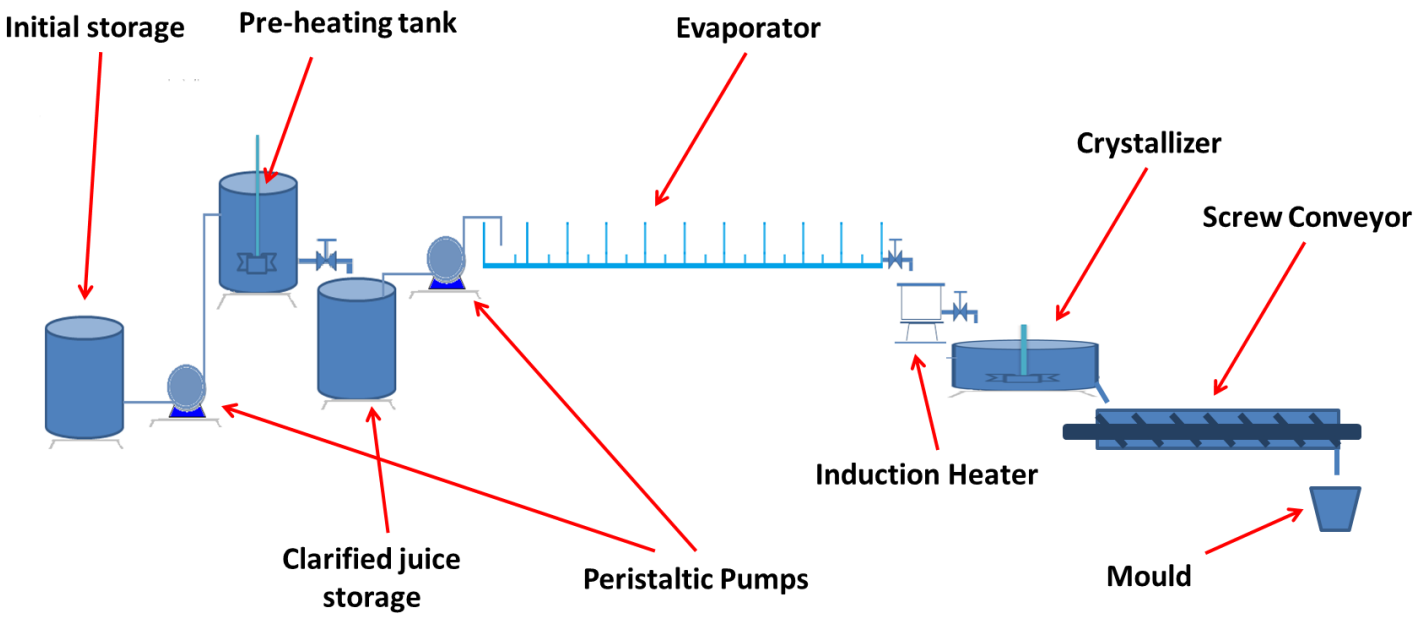
Twisted tape swirlers in a traditional cookstove

Reduce fuel usage by 20%, reduce emissions, being sold by local blacksmiths

Oil extraction

Improved efficiency of herbal oil extraction over the traditional process

Improvements Jaggery Making



Demonstration projects

Gasification

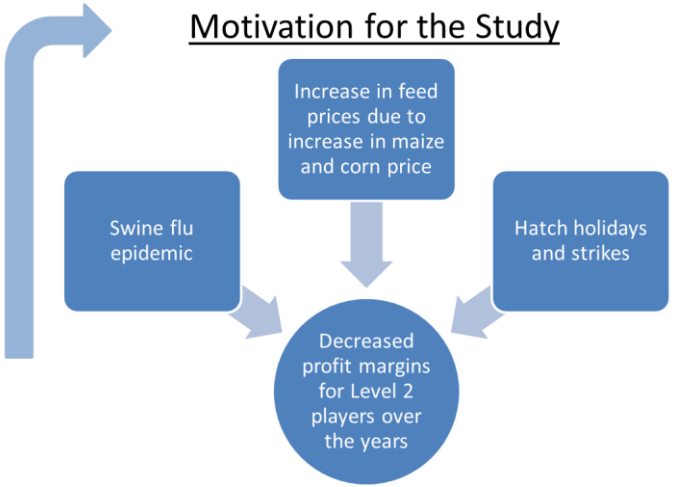
Downdraft baggase Gasifier

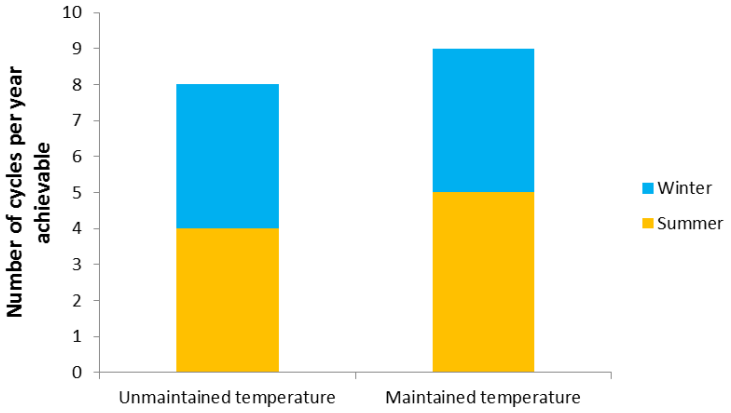
Heating rate equivalent to 500 kg jaggery/day. No emissions

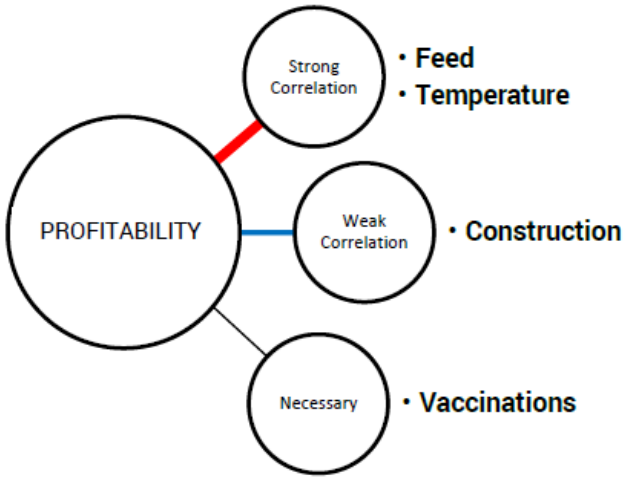
Vertical Shaft Brick Kiln

Study of Poultry Practices

Type of player	Birds per batch	Practices employed
Level 1	5000+	• Using advanced techniques of poultry management
Level 2	500-5000	• Majorly operate as independent poultry farmers (practice poultry as allied business to agriculture) • Allied to Level 1 players in supply
Level 3	50-100	• Customized practice







Policy and Governance Studies

- Water policy reforms in India and governance implications (Routledge)
- Ganga River Basin Environment Management Plan (pan-IIT research)
- Scope for Decentralised technological and institutional solutions for urban water and sanitation services
- Localization of Solar Energy Through Local Assembly Sale and Usage of 1 Million Solar Study Lamps
- Panchayat planning for Solar Integration in Kerala
- Renewable Energy Policy in Maharashtra- Climate Parliament
- Climate Change Policy Process in India (funded by the Norwegian Research Council)
- Water Engineering: Normalization, Development and Social History (funded by ANR, Paris)
- Bamboo Integration in Housing
- Scaling up Systems for Rice Intensification

Collaborations

- MoUs with towns, district administrations and talukas – e.g. Parbhani, Shahapur, Thane, Manchar
- Collaborations with colleges – Karjat, Islampur (Sangli), TEQIP
- Partners with Development Impact Lab, University of California, Berkeley (http://dil.berkeley.edu/), Projects with AMR, Paris, Norwegian Research Council
- Interactions with SMEs
- Work with KVIC, Gov. of Maharashtra (e.g. Minor Irrigation, Public Health), Gov. of India (e.g. MoRD)

Interaction – Engineering Colleges

- Sponsored PhD- QIP, College Teacher – attracting students for M.Tech/ PhD
- Continuing Education Programmes , Workshops – Water, Energy, Food and Nutrition, Rural Industry , Livelihoods, Health and Sanitation – Training/ Capacity Building
- Protocol /Methodology Development
- Mentorship/ Joint Research
- Research that makes a difference to rural India

End Note

The future of India lies in its villages

M.K. Gandhi

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Thank you