The emerging role of the developmentalist

Milind Sohoni
Centre for Technology Alternatives for Rural Areas
IIT-Bombay

www.ctara.iitb.ac.in
Agenda

- Introduction to CTARA
- Core CTARA operational values and the T&D program
- Projects and Thane district
- The engineer-consultant and the way forward
Centre for Technology Alternatives for Rural Areas

- An academic center of IIT-Bombay, started in 1985
- To study and to develop solutions for problems from rural India

Initial work:
- Agricultural machines and implements
- Energy and drudgery saving devices
- KVIC nodal center
  - Herbal oils extraction process
  - Bio-diesel from waste oil
Later work

- **2005**: Check-dam at Gudwanwadi, 85m, 20,000 cu.m. for Rs. 25 lakhs
- **2009**: Vertical Shaft Brick Kiln at Pen taluka

Department ⇒ End-Use ⇒ Stakeholders
Civil, CSE ← Drinking Water ← Gudwanwadi

---

Academic Initiatives

- **2007**: M.Tech. program in Technology and Development
- **2010**: TDSL-interaction with other departments and UGs
Core Faculty

- A. W. Date - Appropriate Technology, Rural systems
- U. N. Gaitonde - Mechanical Engineering, Energy and Thermal system
- Anand Rao - Energy and Environment, Climate Change
- N. C. Narayanan - Water and Governance, Development Theory
- N. Shah - Food, Agriculture and Agro-Industry
- Milind Sohoni - Water, Rural systems

Adjunct Faculty:

- S. Wagle - Policy and Governance
- Bakul Rao - Environment Analysis and Assessment
- P. Modak - Environment and Natural Resource Mgt.
- S. Agnihotri - Governance and Govt. Programs
The T&D core operational values

- Concrete beneficiary/stake-holder—the bottom 80%, households, hamlets, gram-panchayats, villages, towns and cities
- Basic areas—soil, water, energy, livelihoods, public health
  - end-user defined or demand-driven
- Concrete deliverable—as close to implementation as possible
  - solutions and knowledge—technology, policy, study, capacity
- Act locally and then think globally

Objectives of the M.Tech./Ph.D. program

To produce the developmentalist/development practitioner

- Analyse ”development” situations and design solutions
- Build on grassroot understanding to work on national/global issues
Karjat City—a small taluka town in Maharashtra

- Request from Municipal Council to analyse City Development Plan
- **Ongoing work**—water, sewerage, solid waste, municipal budget
- **Skills**: GIS, simulations, social and governance analysis

**water system**

- 3 zones OK but higher capital costs, 1 zone poorly designed
- Pump efficiencies lower (51%, 60%) than standard (70%)
- Financial stress— unmetered system, commercial and residential
- Competition with private bore-wells
Drinking water system for Boriwali GP (Karjat tal.)

As requested by Borivali Sarpanch.

Development problems demand:
- field-work and inter-disciplinarity
- creativity, innovation, honesty and hardwork
The corollaries

- Foremost learn the real **Engineering loop**: analyse, design, deploy, satisfy
- **Accept Inter-disciplinarity**—necessary and in the multi-stakeholder form
- **Engage**—with the unorganized sector, directly or through the State or the Market, if present. Through NGOs, CSOs
- **Do Field work**—sensitization, proofing, participative and beyond

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-4 common courses</td>
<td>2-3 common courses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain coursework and electives</td>
<td>Fieldwork and delivery specifics</td>
</tr>
</tbody>
</table>
The current M.Tech./Ph.D. in T&D

Coursework

- **Perspective** - philosophical nuts and bolts
  Development Theory, Appropriate Technology, Policy and Governance

- **Sectors** - the knowledge base
  Water, Soil and Agriculture, Energy, Environment

- **Skills** - to bring rigour to field work
  Social Sci. Res. Meth, System Dynamics, Project Mgt. and Analysis

- **Field work** - 10 week structured rural stay, field visits

- **Two-Stage Project** - Ideally
  - 1st Stage - Situation and alternatives - Appreciation
  - 2nd Stage - Technology or Policy - Generation
Our students (and our faculty) in the field
Our locations-Naldhe
At our 10-week field stay
Selected M.Tech. Projects

- Study and design of cages for aqua-culture
- Development of nutritional supplement for malnourished children
- Design enhancement and dissemination of improved cooking chulha in a village
- A process model for regulation in infrastructure development
- Analysis of groundwater regulation in various states of India
- Simulation of hybrid energy systems for village applications using HOMER
- Convergence of NREGS and Watershed improvement programs in Kerala
- Assessment of Herbal Initiatives in a Rural System
What after M.Tech?

What do we train them for-

- An initial stint with an NGO/CSO in a particular sector
- Or a company in the development sector
- An independent consultancy, business
- A Ph.D. in development subjects and teaching
- Advisor-ship, expert consultant to collectors, ministers, banks and agencies
- Leadership role in flagship NGOs, government, regulatory bodies, or independent Centers
- Corporate roles-new companies and new areas

OK-but what about starting with big companies?
What after M.Tech?

What do we train them for-

- An initial stint with an NGO/CSO in a particular sector
- Or a company in the development sector
- An independent consultancy, business
- A Ph.D. in development subjects and teaching
- Advisor-ship, expert consultant to collectors, ministers, banks and agencies
- Leadership role in flagship NGOs, government, regulatory bodies, or independent Centers
- Corporate roles-new companies and new areas

OK-but what about starting with big companies?

- Is there a big company delivering water to the bottom 80%?
- Veolia, a French water company with turn-over of $50 billion, started as a company to serve Lyon
Supervised Learning in Tech. and Dev. (TDSL)

- Unique opportunity for faculty members to float live development projects and for students to take them
- Guidance and Liaison from CTARA
- **Objectives**: extension, field study, entrepreneurship in the public space. Also pre-research

<table>
<thead>
<tr>
<th>Course</th>
<th>TD390</th>
<th>TD490</th>
<th>TD491</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Title</td>
<td>Study</td>
<td>Analysis</td>
<td>Design</td>
</tr>
<tr>
<td>Reporting</td>
<td>IIT</td>
<td>+stakeholders</td>
<td>+ stakeholder</td>
</tr>
</tbody>
</table>

- Since January 2011, 3rd offering—extremely popular—13 students this semester, 30+ students overall
Sampler

- North Karjat Tal. Drinking water scheme - Design
- Rural Bio-gas Alternatives - Two case studies - Study
- The Anjap-Sugave multi-village scheme - a failure analysis - Analysis
- Transport provisioning in Karjat taluka - Study
- Incentives from Medical companies to retailers - Study
- Karjat City Development plan - Design

This semester - Thane district, Bio-gas, Slum Rehabilitation schemes

- Budding consultants, entrepreneurs, researchers - Opportunities in the development agenda
Some pictures
The TDCC-Consultancy Cell

- to respond to consultancy and knowledge needs of civil society
- to liaison between student output, stake-holders and delivery
- to position CTARA with implementation, govt, agencies and to develop thematic output
- to administer TDSL and to organize CTARA research output

Currently led by Pooja Prasad (B.Tech Chem., 2000) and an M.S. from Stanford. 8 years experience in logistics in Silicon Valley

- Grow as number of projects grow- 1-2 people needed soon
- Yearly reports on expenditure and value generated-first economic and eventually financial viability
In the water sector

- **Drinking water** - Urban and rural, access, design, feasibility study, failures
- **Groundwater** - Regional data analysis, simulations
- **Surface water** - Watershed interventions, masterplans
- **Policy** - Membership in the planning commission working groups

**Engagement**

Largely in Karjat taluka and Thane district.
Area | 9000 sq km.
---|---
Pop. (Rural) | 81 (23) lakhs
Taluka (Tribal) | 15 (5)
Habitations (GPs) | 8000 (900)
Cities (Mun. Coun.) | 37 (12)

- Roughly one rural drinking water engineer and one surface/groundwater engineer for every 20,000 people, 40 habitations and 50 sq.km.
- Huge development agenda-groundwater security, drinking water systems, institution building
The Big Question

So how are these 1 hydraulic engineer and 1 surface/groundwater engineer and 4-5 gram-sewaks to serve 20,000 people over 40 habitations ranging over 50 sq.km.?

The challenges

- design for technical, financial and institutional sustainability
- requiring composite and inter-disciplinary skills
- capacity of society to monitor and shape the system

A possible approach

- close cooperation between field-level administrations and educational and research institutions including local engineering colleges
- movement of funds to local R&D and avenues for innovation
- training of a new engineer-social scientist-consultant
The issues—why ITRA should be careful!

- Roughly 5,00,000 students join engineering every year—so the numbers are there.
- The ITIs won’t do—needs a more systemic and technological training.
- Needs a more hands-on, societally oriented, inclusive engineering paradigm—*but not old Rourkee*
- Our current systems—abstract engineering in subjects of doubtful relevance and a faculty unable to teach it

- Firmly entrenched pecking order—IITs, NIITs, a few others and then *losers*
- Firmly entrenched jobs order—Finance, Banks, consultancy, commoditized research, IT, foreign engineering consultancy/work, *losers*
The special relationship route

- Temptation—sidestep the education issue and collaborate with the govt. agencies directly.
- The Project/SPV mode - popular with many donor/banks such as WB, Unicef etc., also popular with bureaucracy and political establishment.
- Project builds parallel system with its own accountability - Jal-Swarajya, JNNURM
- While delivery and financial accountability is better, political accountability is poor—off balance-sheet, off-discussion
- Jal-Swarajya—so called demand-driven. Poor cross-subsidy structure, stress on financial sustainability, tends to increase differences.
- Pet companies, increasing influence of the big consultancies—poor access to educational institutes and smaller local companies.
The Vision

Have a **Department of Technology and Development** in every engg. college, starting with the IITs. These would bring together researchers, practioners and administrators in a novel curriculum focussing on engineering, policy and sustainability.

- Excellence through delivery and engagement with government and implementation agencies, NGOs and CSOs.
- A pedagogy of engineering-colleges as local solution and knowledge providers
  - to develop the *engineer-social scientist-consultant*
- Intellectualize the role of the university/institute and to mediate on behalf of society

Foremost

To make engineering inclusive and social so as to deliver development – see [www.cse.iitb.ac.in/~sohoni/RD.pdf](http://www.cse.iitb.ac.in/~sohoni/RD.pdf)
Thanks