



# Unnat Bharat Abhiyan

**IIT Bombay's participation**  
**Presentation at IIT Delhi on September 17, 2015**

**Mechanism & Activities**

# CTARA Highlights

---

- ▶ Centre at IIT Bombay since 1985
- ▶ M Tech. in Technology & Development since 2007
- ▶ Interdisciplinary in nature
- ▶ **Focus on field experience, solving real life problems, targets the bottom 80%**
- ▶ Technology , analysis and quantification – for development
- ▶ Research in Technology and Policy



# CTARA Technologies



Innovation – reduced burden



Improved Herbal oil extraction process

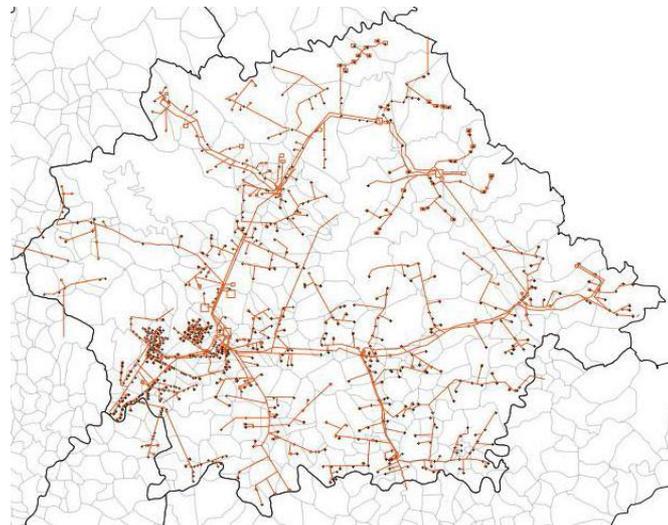
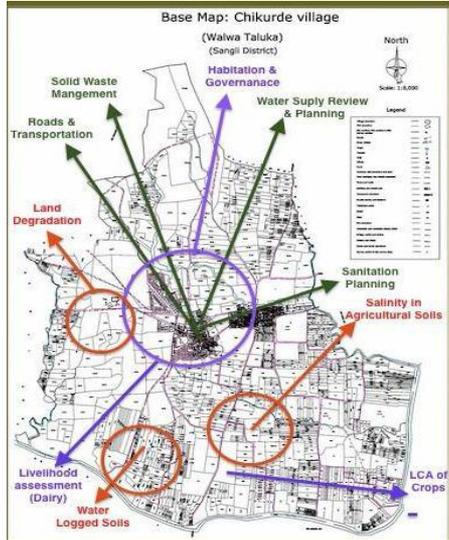


Sold by local blacksmiths

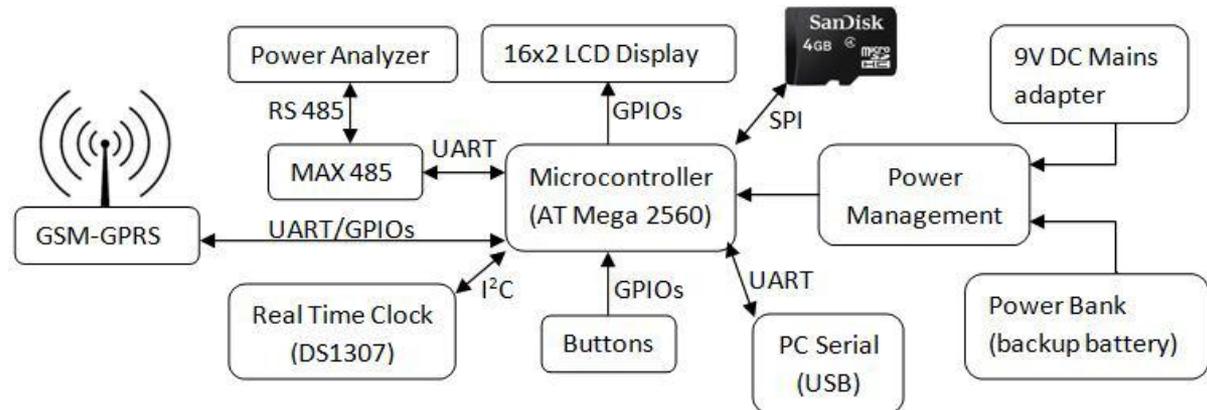


Twisted tape swirlers

# CTARA Research



- ▶ Water
- ▶ Energy
- ▶ Food & agriculture
- ▶ Environment
- ▶ Rural planning
- ▶ Agro-based industries



# I. Unnat Bharat Abhiyan - Mechanism

---

## ▶ Five **GOALS** of UBA

- ▶ *introduce the development agenda within academic discourse and processes*
- ▶ *inculcate a methodology of field-work and inter-disciplinarity in academic processes*
- ▶ *make higher education institutions as regional knowledge providers for regional problems*
- ▶ *improve development outcomes such as sadak, bijli, pani through better knowledge*
- ▶ *inculcate a scientific thinking within society, esp.*

**However the work at CTARA is more systemic or sectoral and not only about specific villages and yet satisfy the broad objectives enshrined by Unnat Bharat Abhiyan.**

# Achieving goals of UBA through CTARA

*Goal 1: introduce the development agenda within academic discourse and processes*

## Academic Programs

- M Tech. program in Technology and Development (TD)
- Ph. D program
- The Technology and Development Supervised Learning (TDSL)
- Minor program in Technology and Development for B Tech.

## Students Enrollment

M Tech.	64
Ph. D	20
TDSL	> 500 since 2010



# Technology & Development Supervised Learning (TDSL)

---

Design of watershed interventions	Electricity supply monitoring
Drinking water security assessment	Documenting pottery making techniques
Brick making practices and interventions	Water sources status mapping
NREGA analysis	Agro-based industrial Development
Understanding public health systems	Chulla dissemination and cooking practices
	Soil and agricultural practices
	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
Survey and analysis of bio-gas plants	Village-level environmental planning
	Low-cost power meters

---

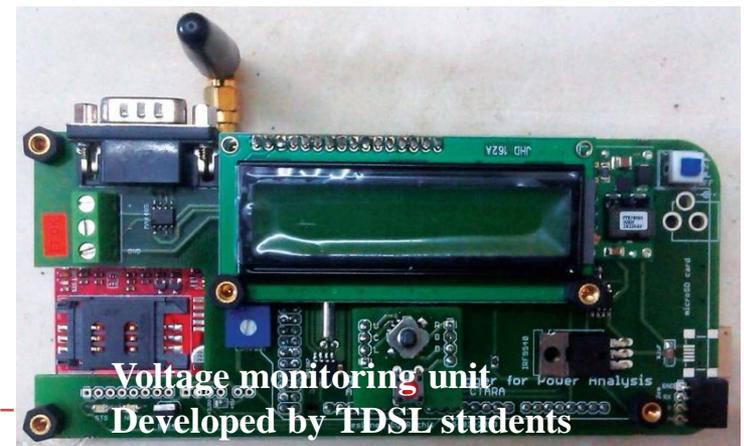
# Achieving goals of UBA through CTARA

*Goal 2: inculcate a methodology of field-work and inter-disciplinarity in academic processes*

A. Extensive field experience for most of the courses such as:

- TDSL - B Tech. fieldwork intensive course with 4-5 field visits
- TD 609 - Field stay (10 weeks field stay in a village)
- TD 602 - Soil, Land use GIS, Agriculture
- TD 605 - Appropriate Technology
- TD 691 - Development Protocol
- TD 603 - Water Resource Management

B. Interdisciplinary research work both by M Tech. and Ph. D students



# Summer Field Stay

March

Identification  
of Village and  
DR

April

Student –  
Project –  
Guide Tieup

May -  
July

Field Work,  
Faculty  
Visits

July

Experience  
Sharing

August

Draft Report,  
Development of  
Indices



# Achieving goals of UBA through CTARA

*Goal 3: make higher education institutions as regional knowledge providers for regional problems*

## Local Collaboration

### **Resolutions of Government of Maharashtra**

Collaboration with local Engineering Colleges

TDSL (project based B Tech. course)

**TDSC (consultant to NGO, GP, Municipal bodies and district authority)**

TEQIP (teachers of regional engineering colleges)



**Parbhani city water supply scheme analysis**



**Rural piped water network design for Tembha village**

# Resolutions of Government of Maharashtra

## GR-Water and Sanitation

## GR-Higher & Technical Education

ग्रामीण पाणी पुरवठा योजनांच्या त्रयस्थ  
तांत्रिक परिक्षणासाठी मार्गदर्शक सूचना.

### महाराष्ट्र शासन

#### पाणी पुरवठा व स्वच्छता विभाग

शासन निर्णय क्रमांक: ग्रापाधो-१११४/प्र.क्र.६१/पापु-०७

७ वा मजला, गोकुळदास तेजपाल रुग्णालय इमारत संकुल, मंत्रालय,

मुंबई-४०० ००१

तारीख: १५ जून, २०१५

#### वाचा :-

- १) शासन निर्णय क्रमांक: ग्रापाधो-१११४/प्र.क्र.२२/पापु-०७, दिनांक ९ जुलै, २०१४
- २) शासन निर्णय क्रमांक: ग्रापाधो-११०९/प्र.क्र.१०४(अ)/पापु-०७, दिनांक १७ मार्च, २०१०

#### प्रस्तावना :-

ग्रामीण पाणी पुरवठा व स्वच्छता क्षेत्रात सुधारणा तसेच विकेंद्रीकरण घडवून आणण्यात महाराष्ट्र राज्य देशात अग्रेसर आहे. राज्याच्या ११२.४ दशलक्ष लोकसंख्येपैकी ६१.८ दशलक्ष (सुमारे ५५%) लोकसंख्या ग्रामीण भागात राहते. राज्याचा लोकसंख्येच्या दृष्टीने देशात दुसरा तर क्षेत्रफळाच्या बाबतीत तिसरा क्रमांक लागतो. राज्यात ३३ जिल्हे असून त्यामध्ये २८,८१३ ग्रामपंचायतीचा व सुमारे ९८,८४२ वस्त्यांचा समावेश होतो.

राज्य शासनाच्या पाणी पुरवठा व स्वच्छता विभागामार्फत पाणी पुरवठा व स्वच्छता विषयक बाबींसंबंधी धोरणे ठरविणे, कार्यक्रमाची अंमलबजावणी व देखरेख या बाबी प्रामुख्याने हाताळल्या जातात. जिल्हा पातळीवर जिल्हा परिषदा व गाव पातळीवर ग्राम पंचायती ह्या कार्यक्रमाची अंमलबजावणी करणाऱ्या प्रमुख संस्था आहेत. महाराष्ट्र जीवन प्राधिकरण आणि भुजल सर्वेक्षण व विकास यंत्रणा या राज्य स्तरावरील तांत्रिक संस्थामार्फत तांत्रिक तज्ञ/कर्मचारी (जिल्हा परिषदावर प्रतिनियुक्तीने), तसेच गरजेनुसार तांत्रिक सहाय्य पुरविले जाते. क्षेत्रिय/प्रादेशिक स्तरावरील वेगवेगळ्या संस्थामध्ये त्यांची भूमिका आणि जबाबदाऱ्या यांची व्यवस्थित मांडणी करण्यात आलेली असली तरी आजही त्यांच्यामार्फत राबविण्यात येणाऱ्या कार्यक्रमाच्या नियोजन, अंमलबजावणी व देखरेख यामध्ये समन्वयाचा अभाव आहे.

संदर्भाधीन क्र.१ येथील शासन निर्णयान्वये ग्रामीण पाणी पुरवठा योजनांसाठी तांत्रिक मान्यता, प्रशासकीय मान्यता, अंमलबजावणी, त्रयस्थ तांत्रिक परीक्षण व देखभाल दुरुस्तीबाबत सुधारित

महाराष्ट्र राज्याच्या विकासाच्या दृष्टीने  
अभियांत्रिकी शिक्षण आणि संशोधन  
यामध्ये सुधारणा करण्यासंदर्भात कार्य  
गटाची स्थापना करणेबाबत...

### महाराष्ट्र शासन

#### उच्च व तंत्र शिक्षण विभाग

शासन निर्णय क्रमांक: बैठक - ३६११/(५६/१५)/तांशि - २

हुतात्मा राजगुरु चौक, मादाम कामा मार्ग,

मंत्रालय, मुंबई ४०० ०३२.

तारीख: २८ एप्रिल, २०१५

#### प्रस्तावना :-

राज्यातील विविध सामाजिक स्वरूपाच्या प्रश्नांची संशोधनाद्वारे उकल करून त्यावर अचूक उपाययोजना शोधण्याच्या दृष्टीने विविध शासकीय यंत्रणा व शैक्षणिक संस्था यांच्या दरम्यान महत्त्वाच्या गंभीर समस्यांसंदर्भातील संशोधन वृद्धिगत करण्याकरिता आणि प्रकल्प निहाय निरनिराळ्या योजनांमध्ये अभियांत्रिकी तसेच अन्य व्यावसायिक अभ्यासक्रमांमध्ये शिक्षण घेणाऱ्या विद्यार्थ्यांचा सहभाग घेऊन त्या अनुषंगाने विविध विभागांतर्गत उपक्रमांमध्ये ठोस उपाययोजना सुचविण्याकरिता मा. मुख्यमंत्री महोदयांकरिता दि. २३.०३.२०१५ रोजी बैठक पार पडली. सदरहू बैठकीत श्री. मिलिंद सोहणी, चेअर प्राध्यापक, सी.टी.ए.आर.ए. अॅण्ड सी.एस.ई., आय.आय.टी., पवई, मुंबई यांनी सादरीकरण केले. सदर सादरीकरणाच्या अनुषंगाने राज्यातील विविध सामाजिक स्वरूपाच्या प्रश्नांची संशोधनाद्वारे उकल करून त्यावर अचूक उपाययोजना शोधण्याच्या दृष्टीने एक कार्य गट स्थापन करण्याचे निश्चित करण्यात आले आहे. त्यानुसार खालीलप्रमाणे कार्य गट गठीत करण्यात येत आहे.

अ.क्र.	कार्य गटाच्या सदस्याचे नाव व पदनाम	पद
१	डॉ. महाजन, संचालक, तंत्र शिक्षण संचालनालय, मुंबई	अध्यक्ष
२	श्री. मिलिंद सोहणी, चेअर प्राध्यापक, सी.टी.ए.आर.ए. अॅण्ड सी.एस.ई., आय.आय.टी., पवई, मुंबई.	सदस्य
३	श्रीमती मृदूल सामरे, वरीष्ठ लेखाधिकारी, पाणी पुरवठा व स्वच्छता विभाग, मंत्रालय, मुंबई ३२	सदस्य
४	श्री. जे. डी. भुतांगे, संचालक, व्यवसाय शिक्षण	सदस्य
५	डॉ. आर.आर. आसावा, प्रमारी संचालक (प्रशिक्षण)	सदस्य
६	श्री. ढोके, उप सचिव, आदिवासी विकास विभाग, मंत्रालय, मुंबई - ३२	सदस्य
७	श्री. एस.ई.ए.हाशमी, क्षमता विकास जल स्वराज्य २, तज्ञ	सदस्य

# Technology & Development Solutions Cell (TDSC)

---

- Address development consultancy / solutions **requirements** of **regional bodies** like municipal corporations & GPs
- **Payment model!**
- Develop **Service model** for the bottom 80% that *engages young engineers*
- Formulate development protocols & **case studies for dissemination** to regional colleges
- Provide launching pad for **entrepreneurial careers** in the development sector
- Development of **course work, manuals** and **training modules**



Watershed intervention at Kurlod Botoshi Mokhada, Thana Dist.



Drinking water model for Themba Village Shahpur, Thane Dist.

---

# Achieving goals of UBA through CTARA

*Goal 4: improve development outcomes such as sadak, bijli, pani through better knowledge*

Collaborations with government agencies and impact through research works:

Ministry of Rural Development fellowship (research to improve ourcomes of flagship projects of MoRD)

**MoUs with towns, district administrations and talukas (e.g., Parbhani, Shahpur, Thane, Manchar)**

Technology and Development Solutions Cell (TDSC)

Hindustan Aeronautics Limited (HAL) -CSR fellowships

NGO (directed research during TD609)

Rural Technology Action Group (RuTAG)

**Assessments/Evaluations for GoM and ZP**



# Achieving goals of UBA through CTARA

*Goal 5: inculcate a scientific thinking within society, esp. about development*

Interaction with communities through different activities such as:

Working with MPs, MLAs, GPs, civil society

Give talk, publish articles, contribute to scientific papers, conduct exhibitions by showcasing innovations & technology in the science community

Cooking energy solutions

Malnutrition among children

Community level biogas plan

Losses and poor voltage regulation on rural distribution network

Drinking water scheme for tanker fed villages in Mokhada taluka



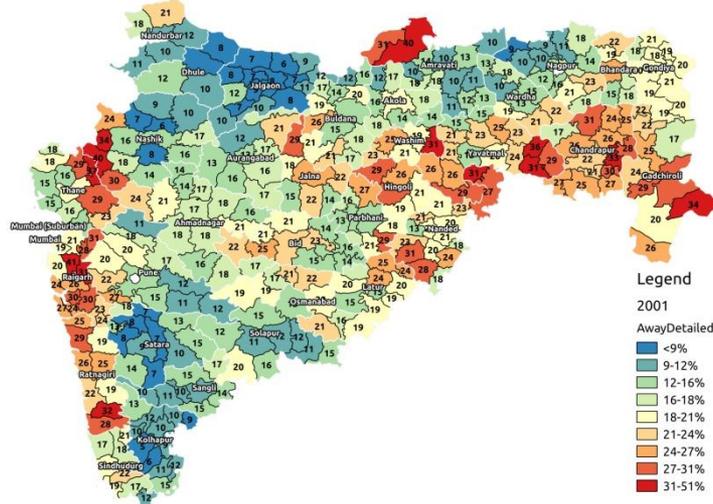
PhD work on fuel efficient cook stove in a tribal village



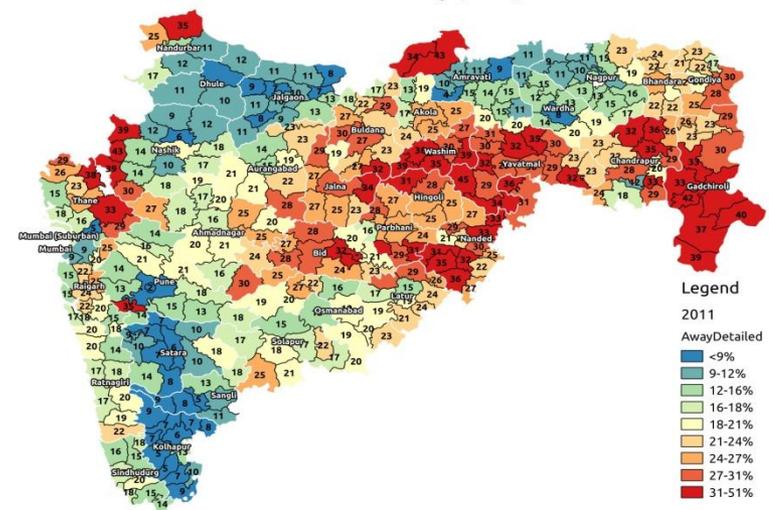
Community level biogas

# Challenges-Development!

Percentage of Rural Households with Primary Source more than 500m away (2001)



Percentage of Rural Households with Primary Source more than 500m away (2011)



- Development outcomes stagnant or worsening- *drinking water, cooking energy, small and medium enterprises, environment*
- Urgent need to reform Higher Education and Research

*UBA an important initial step*

# Challenges: Several Elephants in the room

---

Poor understanding of the development agenda within the IITs/IISERS/NITs

Cooking energy, drinking water, sanitation etc. require the highest amount of intellect and rigour

The road to global excellence is through solving concrete problems



Incentives going the wrong way

Institutions: Main accountability lies in holding JEE/GATE and writing papers

Faculty: Easier to publish and present in Hong Kong than to work in a district. **And it counts!**

Students: Few go to Indian engineering. Very little training/research related to Indian situations.



# Way Ahead

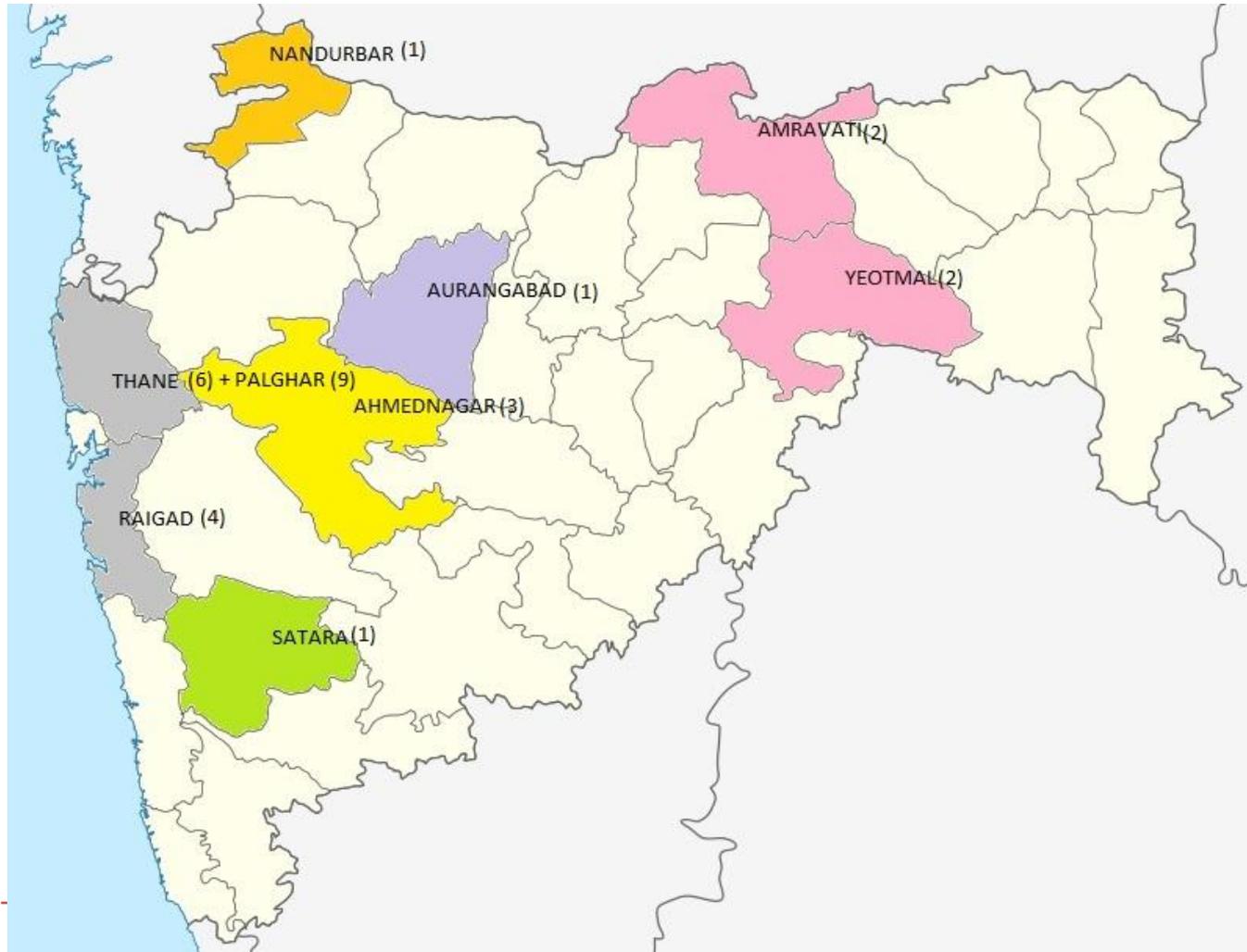
---

- Create space in current academic programs for *inter-disciplinary* development engineering.
  - Develop case-study model as valid academic and research output. Start a Development Engineering Section on *Sadhana* and *Current Science*
  - Allow for cross-disciplinary faculty and create intermediate and adjunct positions
  - Reform TEQIP to enable collaborations with regional colleges on development agenda
  - *Create engagement opportunities between state agencies and academia*
  - Tie fraction of DST/DBT etc. funding to long-term engagement based research
-

## II. Unnat Bharat Abhiyan- Activities

---

### UBA Villages across Maharashtra



# List of Villages/Faculty

	Districts	Taluka	Village		
1	Thane	Shahapur	Sakadbav	Bakul Rao	
2			Vehloli BK	Bakul Rao	
3			Kharade	Bakul Rao	
4			Ambekhor	Bakul Rao	
5			Ambivali	Bakul Rao	
6			Bhivandi	Savaroli	S Kedare/U Bhandarkar
7	Palghar	Mokhada	Khoch	Puru Kulkarni / Milind Sohoni	
8			Palsunde	Om Damani	
9			Dolhare	Priya Jadhav	
10			Koshimshet	N.C.Narayanan	
11			Wada	Kochepada	S Kedare/U Bhandarkar
12			Vasai	Saivan	S Kedare/U Bhandarkar
13				Arnala Fort Village	S Kedare/U Bhandarkar
14			Talasari	Paraspsda	Ganesh Ramakrishnan
15		Vikramgarh	Kondgaon (Bhopoli)	Narendra Shah	

Cont...

# List of Villages/Faculty

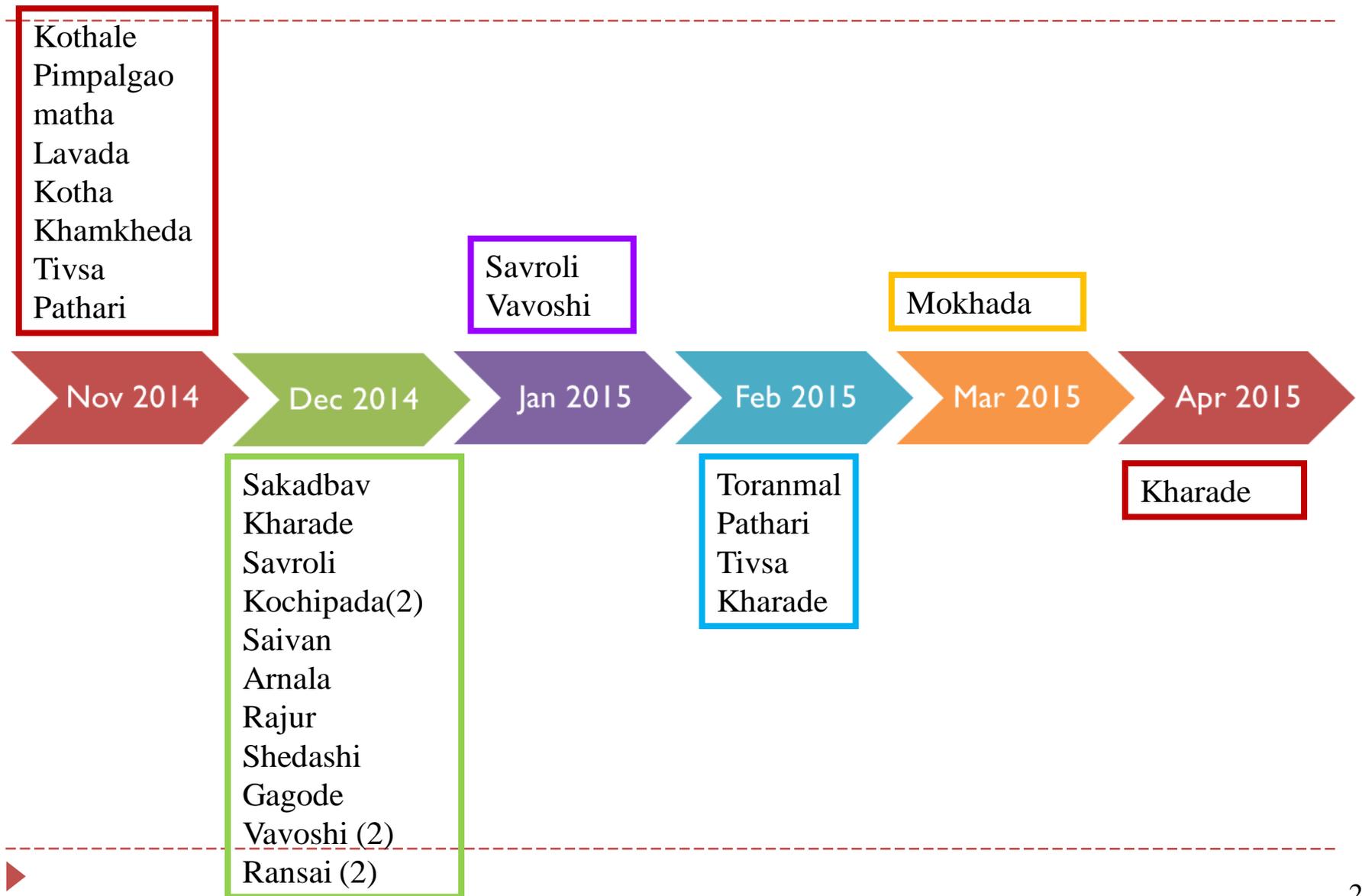
	Districts	Taluka	Village	
16	Ahmednagar	Akola	Rajur	Narendra Shah
17			Kothale	S Kedare/U Bhandarkar
18		Sangamner	Pimpalgao matha	S Kedare/U Bhandarkar
19	Amravati	Dharani	Lawada	S Kedare/U Bhandarkar
20			Kotha	S Kedare/U Bhandarkar
21	Aurangabad	Aurangabad	Khamkheda	S Kedare/U Bhandarkar
22	Yeotmal	Yeotmal	Tivsa	S Kedare/U Bhandarkar
23		Pandarikavra	Pathari	S Kedare/U Bhandarkar
24	Raigad	Pen	Shedashi	Anand Rao
25			Gagode	Anand Rao
26		Khalapur	Ransai	Anand Rao
27			Vavoshi	Anand Rao
28	Satara	Phaltan	Kapshi	Vikram Gadre
29	Raigad		Hirewadi	Ganesh Ramakrishnan

# Research Themes

---

- ▶ Water – Milind Sohoni (15 faculty)
- ▶ Energy – Priya Jadhav (21 faculty)
- ▶ Agriculture – Amit Arora (14 faculty)
- ▶ Health – Santosh Noronha (12 faculty)
- ▶ Education – Raja Mohanty (11 faculty)
- ▶ Livelihood – D Parthasarathy (11 faculty)
- ▶ Sanitation, Food, Planning, Transportation, Governance – few faculty
  - ▶ Detail out goals and activities of thematic groups

# Timeline of UBA team visit to villages



# GP Meeting at Shahapur 11<sup>th</sup> Dec 2014



# Water Survey in Vavoshi 11<sup>th</sup> Jan 2015



# Baseline Survey in Kharade GP (14<sup>th</sup> Feb 2015)

- ▶ Survey was done mainly by NSS students, with the help of Mtech. students from CTARA and IDC
- ▶ Sample size: 173 HH from 10 padas
- ▶ Some of the findings are:
  - ▶ Around 80% people are in BPL status
  - ▶ 70% villagers leave waste water in open due to lack of proper waste water disposal system
  - ▶ Around 64% people have well as their source of drinking water, which may be contaminated
  - ▶ Due to absence of any hospital facility in the village, more than 50% people go to private hospitals in Dolkham, Shahapur or sometime as far as Kalyan for treatment
  - ▶ More than 90% people depend on firewood as fuel for cooking



# PRA in Kharade GP (2<sup>nd</sup> April 2015)

- ▶ Covered 3 padas- Padwalpada, Kharade and Changyachapada
- ▶ Around 30 students conducted this activity
- ▶ Activities: Transect walk, Seasonality, Timeline, Venn diagram, Daily routine, Resource map, Social map, Focused group discussion, Issue ranking



## Projects in UBA villages

---

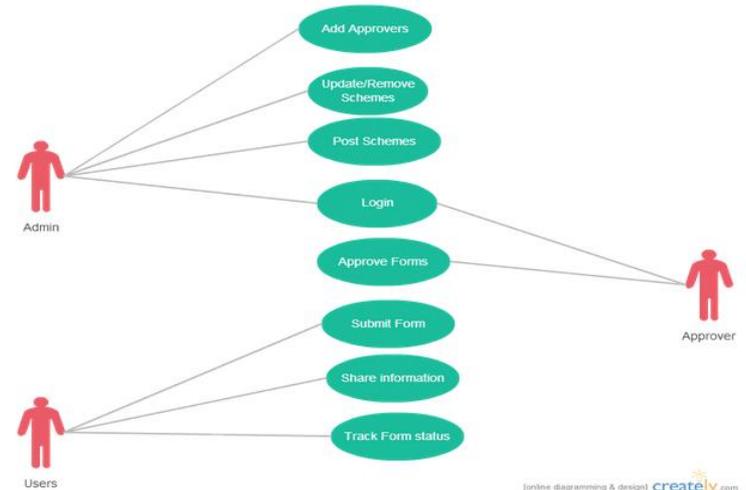
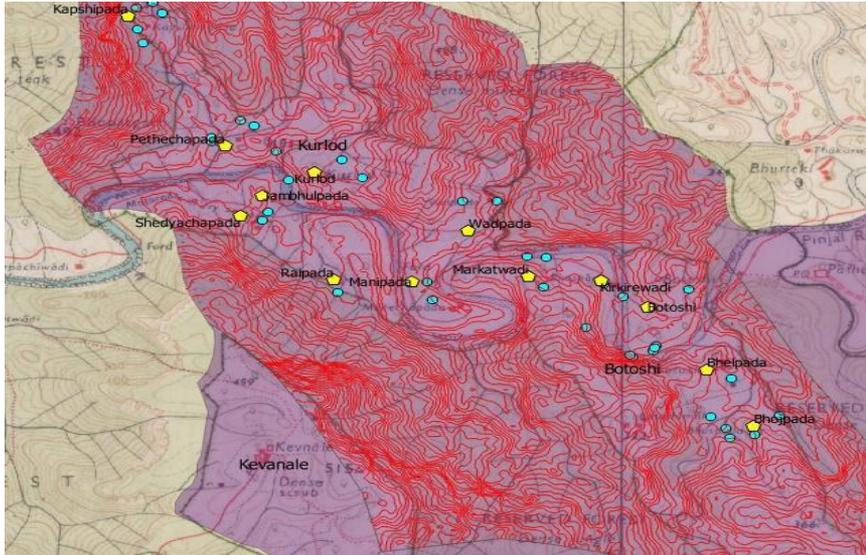
- ▶ RuTAG Projects in rural areas
  - ▶ Technology and development of mobile lab (water, energy, soil, agriculture, envt.)
  - ▶ Affordable ice making machines for boats and affordable desalination machine for boats from available heat in engine exhaust (applied under RuTAG)
  - ▶ Kurlod-Botoshi integrated plan
  - ▶ Developing a computer workflow system for filing and tracking scheme form and use of mobile based IVRS (Interactive Voice Response System) with TRTI
  - ▶ Medical nutrition therapy (MNT) testing
  - ▶ Water quality of available drinking water and other water-related issues conducted, devt. of software EPANET and water quality mapping
  - ▶ Deshelling machine for the marking nut via a project through a Tata Center.
  - ▶ Training and documentation center for Bamboo workers near Kotha and Lavada villages.
- 

## Proposed work in thematic areas

- ▶ Livelihood opportunities: bamboo artisans, organic farming, brick klin
- ▶ Energy: Biogas, solar, biofuels
- ▶ Health-care: Self-learning material and low-cost vital sign measuring device
- ▶ Alternatives to traditional stoves - biogas, improved chulhas, swirlers
- ▶ Rural supply chain of LPG
- ▶ Low cost solution for agro products
  - ▶ Cashew nuts disinfestation
  - ▶ Rice puffing
  - ▶ Agri produce drying

# Kurlod-Botoshi integrated plan & Horticulture opportunity in Mokhada villages

# Biogas and IVRS projects in Talasari



[online diagramming & design] [creately.com](http://creately.com)

# Unnat Bharat Abhiyan

---

- ▶ Ideas / comments welcome
- ▶ Active Participation requested
- ▶ Student engagement – CTARA + rest of Institute
- ▶ Modalities
- ▶ Integration with existing projects, courses
- ▶ Detailed plan – November 2015
- ▶ Subsequently – interactions with Govt, NGOs, Local leaders and request for feedback/ support/ funding

Thank you

---