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# Making Small-Holder Farming Climate Smart: Experiences from Rainfed and Semi-Arid Regions of India

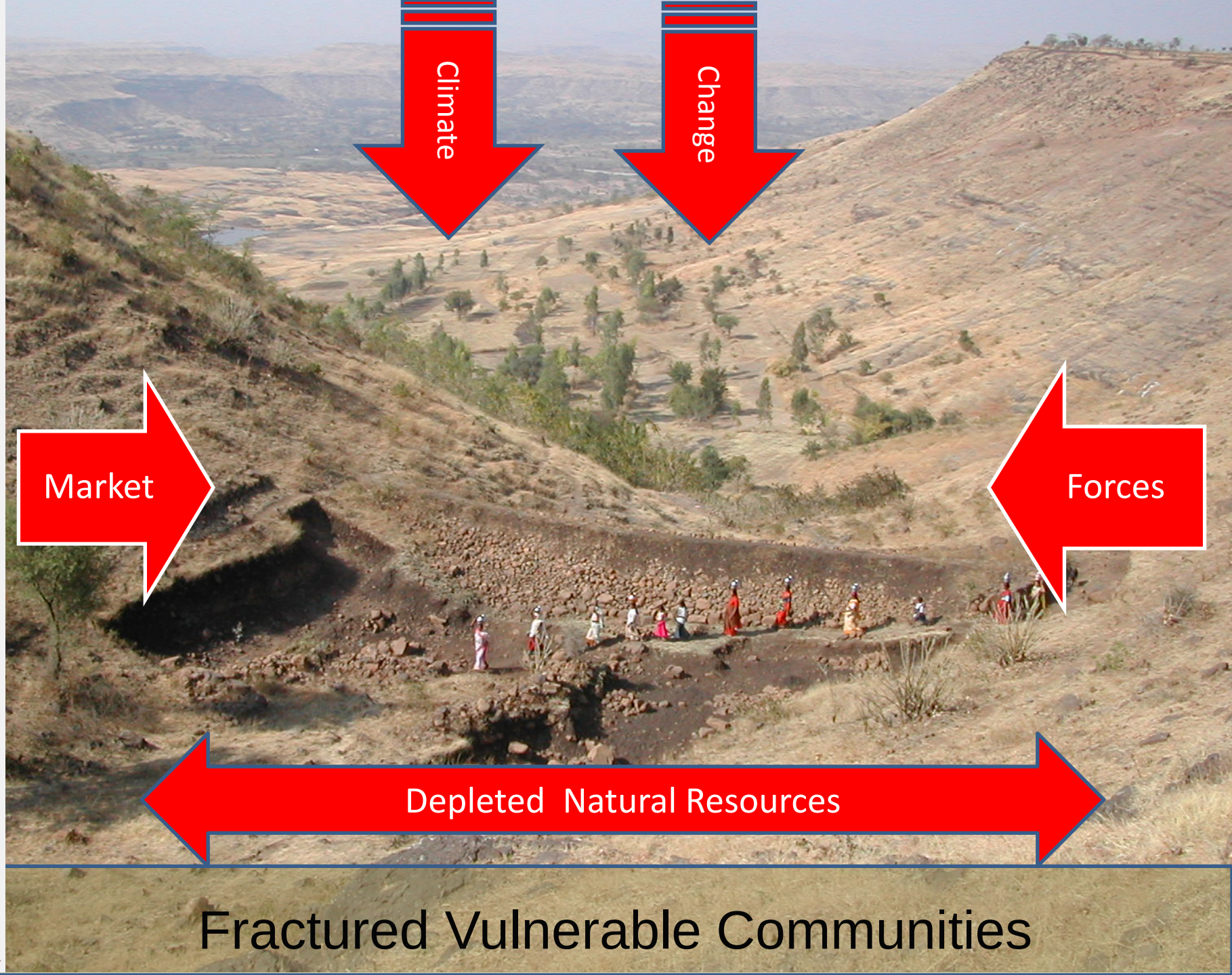
***Crispino Lobo, WOTR***

# Organizational Overview


| | |
|---|---|
| **People impacted** | > 1.8 million |
| **Watershed Villages** | 1,992 |
| **Project Villages** | 3,594 |
| **States** | 7 |
| **Area covered** | ~2 million acres |
| **People trained** | > 350,000 |
| **Personnel** | >165 |
| **Group Personnel** | >300 |
| **AgMet/IT Personnel** | >20 |

Support provided to Projects in Somaliland, Kenya, Tanzania and Malawi .

The Context


Climate
Change
Market
Forces
Depleted Natural Resources
Fractured Vulnerable Communities

# The Problem

- **Weather variability and extreme meteorological events are becoming a new "normal" in India**: 11 of the 15 years since 2000 have experienced rainfall deficiency (73%); in 8 of these years (53%), the deficiency ranges from 8-23%.

- **Unseasonal rains, strong winds and hail storms are causing huge losses to farmers**: In March 2014, in MP and Maharashtra alone, farmers suffered weather related crop losses exceeding Rs. 8,300 crores ( $1.4 B)

- In March 2015 – 5 million ha affected in 5 states alone ; crop damages are estimated between 10-20% at a minimum
- **Indigenous agricultural knowledge** is proving insufficient to cope with weather variability, biodiversity is declining and indigenous cultivars disappearing
- **Increasing % of population depending on agriculture** from 185 m (1991) to 263 m (2011) – 42% increase - of whom landless are 55% and growing
- **Agrarian Crisis** : Low agriculture productivity, Poor price realization , **> 296,000 farmer suicides (India:1995-2013**) and > 550 in Maharashtra (2014-15)
- **Haphazard Urbanisation** -slums, aspirational mismatch, unemployment, social unrest

# The Response: Making Agriculture Climate Smart

- Acquisition of village level weather data and short range high granularity local weather forecasts
- Crafting of Agro-Advisories based on local weather forecasts, the crop and soil type of the farmer
- Dissemination through Wall Paper, SMSs and Public Address System and on-field extension support
- Development of an Automated Content Management System for weather-related Agro-Advisory Generation and Dissemination (AGRIMATE and UPS)
- Regular feedback of impact of agro-advisories from the farmers and fine-tuning of advisories
- On farm demonstrations and technology transfer

# Locale-Specific Meteorology

Automated Weather Station


**Automated Weather Stations installed in 84 villages (75 with telemetry up-links)**

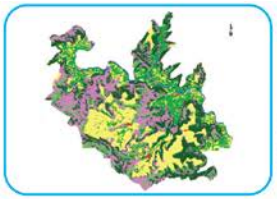
**Weather information displayed on boards in villages**

**Awareness creation amongst villagers**

**Farmers use the information to plan for agricultural operations and livestock management**

# The Agro-Met Advisory System: An Overview

Awareness building and sensitization of local communities



GIS Database: Land, Farm Resources and Crops

Indigenous Knowledge & Traditional Systems


Automated Weather Stations installed in villages

Weather Data Transfer



Indian Meteorological Department (IMD)

3 day weather forecasts


AGRIMATE:Crop Weather CalendarSystem


Farmers Feedback /Training Sessions

Farmers' Feedback


Locale and Farmer Specific Agro-advisories


User Profiling System (UPS) Recipient /Subscriber details

Multi-channel dissemmination to Farmers: SMS, Wallpapers, Public Address System

# Agro-Advisory Provisioning

- **Farmer-crop-phenology specific advisories which integrate the following:**
  - crops, varieties and cropping pattern
  - cultural practices
  - irrigation management
  - nutrient management
  - pest and diseases management
- **Environmentally friendly, promote soil health, reduce costs and increase productivity**
- **Multi-Institutional Collaboration (formal MOUs):**
  - Indian Meteorological Department (IMD)
  - Mahatma Phule Krushi Vidyapeeth (MPKV)
  - Central Research Institute for Dryland Agriculture (CRIDA)

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# Targeting and Monitoring: Farmer, Crop and Field Specific

| | |
|---|---|
| Area | 0.95 |
| Area_1 | 0 |
| Bajra | 0.1 |
| bajra_new | 1 |
| BPL | No |
| Buffalo | 0 |
| Bull | 2 |
| Bull_cart | 0 |
| caste | Hindu-Mahadev Koli |
| category | ST |
| Chawli | 0.1 |
| Class | IV |
| commonid | 23/23/1 |
| Cow_dung | 32 |
| Cross_calf | 0 |
| Cross_cow | 0 |

| | |
|---|---|
| FID | 1817 |
| Id | 0 |
| Polygon_ID | 1818 |
| Area | 11594 |
| Polygon__1 | 1818 |
| Farmer_Nam | Sudam Bahiru Sawant |
| H_H_I_D | |
| Crop2 | Bajara |
| Crop_Name | |
| Crop1 | |
| Variety | 204 |
| Local_Hybr | Local |
| Crop_area | 0.1 |
| Soi_Type | light |
| Irrigation | |
| Method_Of | Rainfed |
| Source_Of | Rain |
| Irrigati_1 | |
| Distance_O | |
| Type_of_Pu | |
| No__of_pum | |
| Power_of_p | |
| Avg_ | |
| No__of_p_1 | |
| Dia__Of_pi | |
| Fertilizer | No |
| Quantity | |
| Cost | |
| crop_produ | 0.5 |
| Reason | Home |

Tour Guide 2007 19°20'20.32" N 74°07'41.59" E elev 2646 ft eye alt

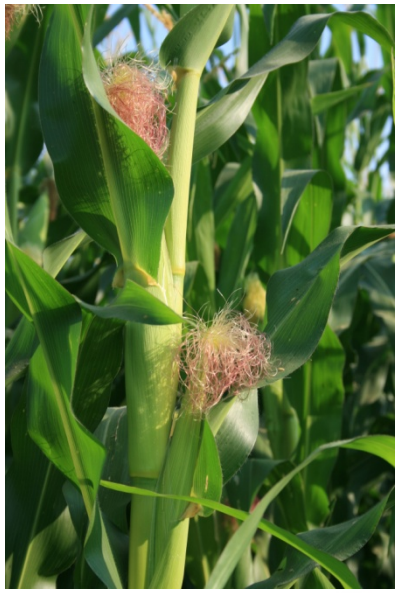
# Adaptive Sustainable Agriculture

FOOD & WATER

Conservation, Management, Use Efficiency

# Impact

- Total farmers benefiting: > 11,000 through wallpapers and public address system; > 8,200 thro' SMSs
- All the sections of the community including marginalized communities are included
- On average, 30-80% increase in agriculture productivity
- On an average 15-30% reduction in costs attributed to onsite advisories, Wallpaper, SMSs and public announcements.



# Impacts: Testimonies

**Sachin Vitthal, Pimpaldari village** grows tomatoes and was advised to intercrop his tomatoes with marigold flowers to avoid root-knot nematodes. *"The attack of root-knot nematodes has been very less this time",* says Sachin.

**Shantaram Raghu Dhokre, Khandgedara village**

*"Krushi Salla informs us of the minimum and maximum wind speed. This is very important for tomato cultivators as wind speeds can affect uniform spraying. Since years I used chemical fertilizers for the tomato crop. This has resulted in decreased soil quality and a decreased yield. Last year I had made two tomato plots: the first was given organic and biological inputs and the second plot was given the usual dose of chemicals. The tomato crop grown on organics continued giving fruit even after the chemical one was done for."*

# Learnings for Relevance and Up-Scaling -1

- **Need to have village level weather forecasts, customize crop advisories to the farm level and make it available “on demand”**
- **•Need to move from “push” to “pull” model of dissemination – technology becoming available**
- **•High resolution actual weather data needs to be obtained for model fine-tuning – case for establishing low-cost rainfall and temperature gauges in each GP.**
- **•Micro agro-climatic zone-wise, Crop-Weather Calendars for key crops need to be developed**
- **•Automate advisory generation and dissemination (Content +Decision MS) and link it to multiple data bases.**

# Learnings for Relevance and Up-Scaling-2

- **Multi-modal dissemination channels should be deployed-especially loud speakers and radio (community)**
- **•A field based, quick-response “feedback system” needs to be established to fine-tune advisories , knowledge acquisition and systems development**
- **•E-Agricultural advisories need to be supported by on-farm extension, technology transfer , capacity building of farmers and favourable market linkages**
- **•Multi-institutional collaborations across sectors and regions to be promoted.**
- **•NGOs can play an important role in knowledge generation, crafting locale-specific advisories, providing “last mile connectivity”, extension support, value addition, feedback and market access**

# *Thank You.*

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