

# SUSTAINABLE use of NATURAL RESOURCES

Resources managed for use

Resources available for communities

Adapted to climate change

Be water neutral – energy neutral – carbon neutral

1



## Finite and Depleting Natural Resources

- Economic growth, globalization and changing food habits are increasing pressure on already scarce land and water resources.
- Changing land use and over exploitation of groundwater resources have reduced surface and groundwater availability and resulted in intrusion of seawater, increasing salinity and depleting wetlands.
- Urgent need to develop, demonstrate and scale up sustainable natural resource management options to achieve food and nutritional security for growing population.

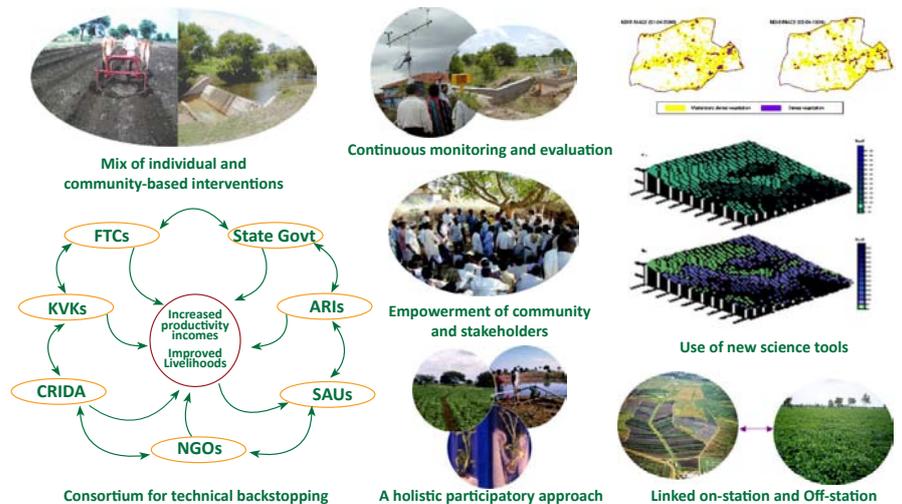
India has 4% of the fresh water resources and 17% of the global population

Agriculture uses 70% of the water resources



## The impact pathway - How it can be implemented

### Community Watershed: An Entry Point to Manage Climate Change



## Positive impacts from interventions

Farmers' participation and partnership through consortia in India, China, Thailand, Vietnam and Ethiopia have helped communities to address food security and livelihood issues without degrading natural resources. This led to:

- Increased crop productivity upto 4 fold
- Increased cropping intensity by 100%
- Increased greenery coverage by 30%
- Reduced surface runoff by over 30% and facilitated groundwater recharge Groundwater table on an average increased by 4 meters
- Reduced soil erosion by 70%
- Annual soil loss reduced to 1/3 of conventional practices
- Increased fodder availability resulted in 30% increase in mulch for animal population
- Doubled family incomes in 4 to 5 years (eg, from ₹50,000 to ₹125,000 (approx US\$760-1900) in Parasai-Sindh watershed, Jhansi)
- Empowered women to undertake microenterprises increasing their incomes eg, incomes tripled in Lucheba in China in four years.

## ► Adarsha Watershed, Kothapally, India

Before 1999, this village was suffering from acute water shortage, land degradation and poor agricultural and livestock productivity.

### Process

For implementing various activities, a consortium was formed, of research (ICRISAT, CRIDA, NRSC) and development (WDD and MV Foundation) institutes along with the farming community (1999-2004).

### Interventions

♦ Various soil and water conservation practices (in-situ and ex-situ) ♦ Productivity enhancement ♦ Crop diversification and intensification along with knowledge based entry point ♦ Income generating activities

### Impact

- The average crop yields of sole maize increased 2-4 fold
- Family incomes doubled in four years.
- Groundwater availability increased from 3.5 m to 6.0 m
- Cropping intensity increased from 85 to 150%, with a major shift from low value to high value crops
- Reduced soil loss ( $10 \text{ t ha}^{-1}$  to  $2 \text{ t ha}^{-1}$ ), reduced surface runoff (30-40%), increased base flow, improved water quality (pesticide residue free), increased green cover and carbon sequestration .



Open well recharge.



Low-cost water harvesting structure.

## ► Lucheba Watershed, China

A cluster of villages with 340 households from Lucheba in Pingba County, Guizhou province in southern China was selected. The village had severe water scarcity and migration was high in search of livelihood options.

### Process

ICRISAT along with consortium partners and the community undertook drinking water schemes as an entry point activity. Community participation and collective action helped to resolve serious water scarcity issues.

### Interventions

♦ In-situ and ex-situ soil and water management practices ♦ Improved cropping systems ♦ Crop diversification and intensification ♦ Integrated nutrient and pest management practices ♦ Other income-generating activities such as poultry and pig rearing

### Impact

- Annual average household income increased 3 fold (from US\$500 to US\$1650)
- Crops like rice, corn, rape, soybean, sunflower and kidney bean were replaced largely with high value crops like cabbage, watermelon and vegetables like tomato, pumpkin, chillies and eggplant (from 40 ha in 2003 to 113 ha in 2005)
- Public-private partnership helped the community to establish animal health centers and the computer-aided internet-enabled farmers' training center, which was linked with Vegetable Growers' Association for better marketing.



View of the Lucheba watershed, China showing large area under vegetable and cash crops.



**International Crops Research Institute for the Semi-Arid Tropics**



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