Integrated watershed management

Adarsha, Kothapally, India

water scarcity impact

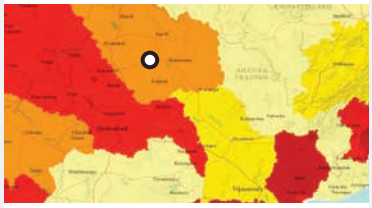
Reduced withdrawal	●
Reduced consumption	
Improved water quality	●
Increased productivity	●
Net basin benefit	●

volumetric impact
330 000 m^3/yr

programme cost
$90 000

estimated unit cost of water
<5 ¢/m^3

Water Stress
Kothapally, India



Arid & low water use
Low (<10%)
Low to med (10-20%)
Med to high (20-40%)
High (40-80%)
Extremely high (>80%)
No data available

Water Stress Map:
Gassert, F., M. Landis, M. Luck, P. Reig, and T. Shiao. 2013. "Aqueduct Global Maps 2.0."

Confidence level
Low Medium High

Water Scarcity Impact Key
Main Minor

Credits
We wish to acknowledge the input of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in the preparation of this case study.

Project Overview

Land degradation is a serious problem in many parts of the world, impacting particularly on rain-fed subsistence or semi-subsistence farming areas where the availability and quality of land and water resources is critical to survival. In India there is an urgent need to address natural resource degradation in rainfed areas. The Adarsha Watershed Management Project at Kothapally in Andrha Pradesh, implemented by a consortium of interested parties, is an example of how sustainable watershed programmes can be successfully carried out.

Kothapally village comprises 465ha of mainly cultivated undulating farmland with a population of 1 492 supported by semi-subsistence agriculture in the area. The level of resource degradation before project implementation was serious, characterised by low rainwater use efficiency, high soil erosion and a lack of soil stabilisation or infiltration enhancement mechanisms. The project has placed an emphasis on community-based integrated watershed management, engaging all tiers of the community. Interventions have resulted in improved infiltration, reduced soil loss, increased groundwater levels, improved land cover and vegetation, increased productivity, and positive changes in cropping patterns.

Key Elements

- Innovative institutional model, comprising a consortium of technical specialists, national and state government and the farmers.
- Effective farmer participation through a co-operation model, supported by wide stakeholder engagement via an active Watershed Committee.
- Delivery of community-scale infrastructure interventions, including check dams and groundwater recharge pits.
- Expert support provided to farmers on planting and cropping.
- Continuous monitoring and evaluation of the impact of the interventions, including use of GIS and remote sensing.

Key Outcomes

- Increased groundwater storage. Over the three years since project implementation, the groundwater table has risen by over four metres equivalent to nearly 1 000 000m^3 of water, or 330 000m^3/year.
- Reduction in soil loss, with reduced sediment load in surface runoff exiting the study area, positively impacting on downstream water quality.
- Changed cropping patterns and increased yields.
- Average 21% increase in average farming incomes; increase is higher in areas not using irrigation.

Kothapally, India

Intervention Features

- Remote monitoring and sensing
- Furrow irrigation
- Groundwater recharge
- Institutional reform
- Education, technical training and capacity building
- Stakeholder engagement

Project Levers

(1) Institutional and financing model:

This project made use of an innovative model comprising a consortium of appropriate organisations providing technical support. The consortia included private organisations, NGOs and national/state government organisations to provide the technical input, working alongside the local community and farmers who were part of the consortium. Financing principally came from the Asian Development Bank. Low-cost labour intensive methods were used for the required soil and conservations structures. Fourteen check dams were built at a cost of $45 370, gully control structures at a cost of $3 525, mini percolation tanks at a cost of $2 090 and a 500m diversion drain and runoff diversion pipe system at a cost of $1 400.

(2) Improved integrated implementation model:

The integrated watershed management model is built on lessons learnt from the consortium's experience. Important components included:

- the use of tools for management and evidence monitoring (GIS and remote sensing);
- an holistic approach integrating people's livelihoods with soil and water conservation measures; a cycle was established of improved crop yields and income resulting from the soil and conservation measures which were then reinvested in additional sustained soil and conservation measures;
- the use of cost-effective, low-cost soil and water conservation measures;
- use of traditional knowledge, with an emphasis on individual farmer-based conservation measures to increase productivity.

(3) Community scale infrastructure:

Community-scale infrastructure measures included the construction or implementation of eleven check dams, ninety five gully control structures and five sunken pits to support groundwater recharge. Wasteland area (10% of total) was partially reclaimed through the planting of custard apple and other trees on field bunds to promote soil stabilisation. Further structures were planned following the end of project support.

(4) Education:

Farmer-focussed activities included education and technical support on alternative cultivation approaches including broad-bed and furrow landforms for soil and water conservation, contour planting and field bunding. Advice was also provided on improved varieties and cropping systems.

(5) Stakeholder participation:

The livelihood-based watershed management project was set up as a result of villagers proposing their involvement. There was a high level of community involvement in the project, for example the Watershed Committee included all 270 farmers and other groups were established which included women self-help groups and user groups for water harvesting structures.

(6) Continuous monitoring and evaluation:

An initial baseline survey was conducted on the socio-economic status of farmers and landless people, crop productivities, livelihood opportunities, soil, water and nutrient management practices. Continuous monitoring has been carried out jointly by researchers and community individuals to ensure that stakeholders are kept aware of progress and can relate it to the interventions made.

Outcomes and Challenges

The main outcome of the project was the increase in water resources through increased groundwater levels and a reduction in silt-laden flood runoff.

Over the three years of monitoring, groundwater levels in the area increased on average by more than 4 metres.

Other project outcomes included:

- Increased productivity and net incomes with yields (kg/ha) for maize more than doubled, for sorghum tripled and increases for intercropped pigeon pea were even higher.
- Increase in vegetation cover from 129ha pre project to 200ha near the end of the project.
- The area for cotton decreased from 200 to 100ha with a simultaneous increase in the more lucrative maize and pigeon pea. This was possible because of improved soil moisture and the availability of water for supplementary irrigation.
- Average net incomes in the project area are 21% higher than those in the adjacent area.