



## Working Towards Sustainable Irrigation Methods in India

### STORING RAIN WATER

Farmers in Telangana, India use water from ponds for irrigation, which is critical in a region where irrigation water must be saved from the rainy season to use throughout the year. These man-made ponds also collect silt, as soil enters the ponds when it rains. Periodically, humans de-silt ponds by removing the silt onto the banks of the ponds to restore the storage capacity of the pond. However, this silt is nutrient rich and can be to be used in farm fields as a fertilizer. Removed silt can also be used to reinforce the structure of the ponds.

Improving the process of de-silting can play a key role in the local agriculture. There are more than 45,000 irrigation ponds in the Telangana region that need to be periodically de-silted in dry seasons to maintain their water storage capacity. Better management of the de-silting process can provide rural employment, and improve storage of rainwater for use during the dry season. Also, silt can be used as a fertilizer to improve land productivity and reduce the environmental footprint of farming in the region. An interdisciplinary student project team of Dow Sustainability Fellows at the University of Michigan (U-M) identified a need for systematic planning to include de-silting best practices into mainstream agriculture.

### PROJECT GOALS

The project team outlined efficient de-silting practices to build a new economic model focused on sustainable solutions. Two key goals of the assessment include:

- Fully understand the effects of de-silting ponds on agricultural, hydrological, health and economic systems; and
- Use the data from these studies to work with partners and collaborators to develop policy that encourages more sustainable farming practices.

### GOVERNMENT INTEREST

The Telangana state government is interested in improving agricultural methods, as the state's economy depends mainly on agriculture. Telangana officials want to reduce the migration of farmers to cities and the number of farmer suicides, due to debt. Also, officials want to implement changes in agricultural practices, in line with existing policy supporting rural farm labor employment. Integrating de-silting best practices into existing agricultural practices could improve the economy and provide sustainable water, and health solutions.

### PROJECT RECOMMENDATIONS

As discussed above, de-silting serves multiple purposes. Hence improving the methods to de-silt the ponds will provide multiple benefits for the community. Some of the benefits outlined are:

**Economic Impact:** Currently, ponds are de-silted using rural labor and machines, but these practices limit the number of ponds that can be de-silted each season. The silt is used as a fertilizer and to reinforce the banks of the pond. If the silt is removed mainly through machines more silt can be extracted – increasing and improving farm productivity, as silt can be spread on barren lands. More silt also results in increased employment to spread the silt as fertilizer on farm land.

**Improving Local Water Tables:** More than 75% of the land in Telangana is used for agriculture. Erosion is a problem due to agricultural activities, the arid landscape and warm climate. The catchment areas surrounding the ponds direct erosion into the ponds. Silt keeps water from entering the groundwater table, and stops aquifers from recharging at a sustainable rate. De-silting can improve recharge rates while





improving storage capacity through the year.

The student team collected silt samples from 33 ponds to analyze the effects of de-silting on water capacity of the ponds and improving soil quality of fields where silt is applied. The analysis showed that the use of silt from ponds in farm fields provides nutrients and reduces fertilizer/pesticide consumption and a 40-90 percent reduction in green house gas emissions.

**Health Impact:** There is a high incidence of fluorosis, darkening of tooth enamel due to high fluoride content in water, throughout India. This is due to over exploitation of the water table. The team is analyzing how the local water tables can be recharged through a larger volume of water infiltrating through de-silted ponds using machines.

## SUPPORT

Made possible by The Dow Chemical Company, the Dow Sustainability Fellows Program at the University of Michigan supports full-time graduate students and postdoctoral scholars at the university who are committed to finding interdisciplinary, actionable, and meaningful sustainability solutions on local-to-global scales. The program prepares future sustainability leaders to make a positive difference in organizations worldwide.



## PROJECT PARTICIPANTS

University of Michigan, Flame-thrower for Rural Education, Environment, and Development Oriented Movement (FREEDOM), Government of Telangana, Central Research Institute for Dryland Agriculture.

## TEAM MEMBERS

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## SOURCE

Dahagama, A., H., Espira, L., Monnat, De-silting Minor Irrigation Ponds in South India: The Sustainability of Decentralized Resource Distribution, University of Michigan, School of Natural Resources and Environment, Taubman College of Architecture and Urban Planning and the School of Public Health. Faculty Advisor: Shellie Miller, PhD. See complete report: [sustainability.umich.edu](http://sustainability.umich.edu).

## READ MORE

- School of Natural Resources and Environment (SNRE) <http://snre.umich.edu/tip>
- Taubman College of Architecture and Urban Planning <https://taubmancollege.umich.edu/news/2014/11/26/march-student-takes-first-place-sustainability-work-india>

