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Using tech to preserve natural resources

A Case Study on Composite Landscape Assessment and Restoration Tool: CLART

An innovative landscape assessment and restoration tool developed by the Foundation for Ecological Security is helping communities in Odisha and Rajasthan with soil and water conservation efforts, while ensuring better income and quality of life.

For the residents of Angul district in central Odisha, struggle was a way of life. With almost 90% of the population dependant on agriculture, in the absence of any infrastructure support available for land and water, growing a crop was nothing short of climbing a mountain. Adding to their misery were erratic spells of rain and drought, sometimes both in the same year. The unfavourable conditions triggered large-scale migration from parts of the district and led to frequent scuffles over water use. However, a lot of that changed in 2016, when the Foundation for Ecological Security (FES) introduced the Composite Landscape Assessment and Restoration Tool (CLART) here.

CLART is a Geographic Information System (GIS)-based open-source mobile tool that provides location specific information and recommendations on soil and water harvesting structures for recharge, discharge and regeneration activities depending on the recharge potential, slope and land use/land cover. "*CLART runs on the android platform using various applications that have been developed in-house. Through this tool, a user can view a map of the area on the basis of the recommended treatment code which indicates where a good recharge engineering structure can be constructed to increase the groundwater table,*" says Dron Kumar Chandrakara, FES' Block-Level Team Coordinator in Angul.

A surface storage engineering structure can be created in an area where the suitability of groundwater recharge is difficult. In a higher slope area, regeneration activity and an increase in green cover are the only options to check soil erosion as these reduce surface runoff. "*Agriculture in Angul is largely rainfed. The share of agricultural land is nearly 50% of the total geographical area and the average land holding is 1.24 hectares. Over 97% of holdings come under marginal and small farmers. In such conditions, a tool like CLART helps in protective irrigation in case the monsoon gets delayed or there is an extended dry spell,*" adds Chandrakara.

Aiding survival by enhancing livelihoods

In such a scenario, uplands play a critical role in the survival of agriculture-practicing communities. However, steady degradation has adversely affected their land and water resources. "*The key to the sustainability of agriculture lies in reviving the linkages with the natural resource base in the area — the biodiversity, nutrients, water — and adopting a farming approach encompassing agriculture, animal husbandry and Commons,*" explains Chandrakara, who, being an engineer, strongly backs the effectiveness of CLART.

As of today, the GIS-based mobile tool is being used in 36 villages in Angul. "*People mostly grow paddy, gram, ragi and vegetables in this region. Irrigation was a major problem until a few years ago when CLART was introduced here. My well used to dry up by March every year, but now, it retains water throughout the year. This has helped me support two families and has added nearly INR 20,000 to our income,*" says Basant Sahoo, a farmer

from Bhagatpur village. Since 2016, villagers in Bhagatpur have constructed several contour stone bunds, stone gully plugs, water absorption trenches, check dams and farm bunds.

Informed decision-making

CLART also assists communities and village authorities in taking informed decisions concerning development works under government welfare schemes. For instance, under MGNREGA, village communities are tasked with preparing work-related plans. Due to limited understanding and availability of scientific information and data, such plans are mostly based on intuitive knowledge. "*Our tool helps in bringing science and local knowledge together by enabling people at the village level to prepare plans and reduces the dependence on government engineers,*" says Chandrakara.

CLART takes into account the recharge potentiality derived from lithology, drainage and slope, along with land use and landcover, to provide a colour coded map interface for easy understanding. The user can locate himself on the map through GPS, even without an internet connection, and understand the activities that could be planned for that particular location based on the colour coded recommendations. The tool also allows the user to document evidences (latitude/longitude, photographs, etc.) from the CLART-based survey, which then gets uploaded onto the server once the device is connected to the internet. In this way, officials can access the data to prepare a planning document or a detailed project report (DPR).

After a specific water harvesting structure has been identified for a particular location, the user can take some basic measurements (such as length/width/height) which can be entered into the design-estimation tool (available as an extension on the mobile device with CLART) to generate the approximate cost, manpower and time required for a particular intervention.

Currently, CLART can be accessed and downloaded on Android devices from https://apps.fes.org.in/clart/

Self-sufficiency and sustainability

About 1700km from Angul, lies Picholiya village in Rajasthan's Ajmer district. In 1992, the local administration had granted the villagers access to the 300-acre revenue wasteland lying in the outskirts. The village set up a cooperative and has since been growing fodder trees such as Indian Rosewood and Ardosa on 100 acres of that land. CLART was first used here in 2018 for determining appropriate land restoration activities and preparing an estimate for development works on pastureland.

"The land assessment tool has been used to map the area for various soil and water conservation and regeneration measures. In order to determine the appropriate land treatment activities as per the terrestrial conditions, the villagers used CLART to identify zones for appropriate recharge activities. Based on the data generated from the

tool, they prepared a detailed plan with cost estimates and submitted it to their Gram Panchayat for inclusion in the annual MGNREGA plan," says Kumar Rupam, Program Manager with FES in Rajasthan.

Due to efficient water use and soil health management, Picholiya residents have started growing enough fodder for their animals. *"We now have a system where we auction fodder among the residents. A kilogram of fodder from the market comes for INR10. We sell it for half the price. Sometimes when we have excess fodder, we sell it to shepherds and cattle-rearers in the neighbouring villages,"* says Nami Chand, president of the Tree Growers Cooperative Society.

"With the help of CLART, the villagers have so far undertaken appropriate restoration measures through MGNREGA on more than 200 bighas (50 acres) of land," adds Rupam.

CLART has been developed by India Observatory (IO), the technology arm of the Foundation for Ecological Security, which aims to enable end users take informed decisions by making available spatial and temporal data on India's social, ecological and economic parameters to restore degraded ecosystems and improve economic opportunities in rural areas

By collaborating with various organisations and initiatives, India Observatory
- *brings together data, analytics and tools,*
- *contextualizes them and lastly*
- *takes them to supplement the decision making of village people, NGOs and local government officials*

India Observatory helps address the 'last mile deficit' and extends available spatial and temporal knowledge to ground level action. It also nudges end users to factor ecological considerations in their pursuit of economic progress.

At another level, India Observatory promotes a culture of data sharing and collaborative action to address pressing problems facing the planet and people.

CLART contributes to Goal 6, i.e. Clean Water and Sanitation of the 17 Sustainable Development Goals (SDG).

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