The GEOSS Portfolio for Science and Technology

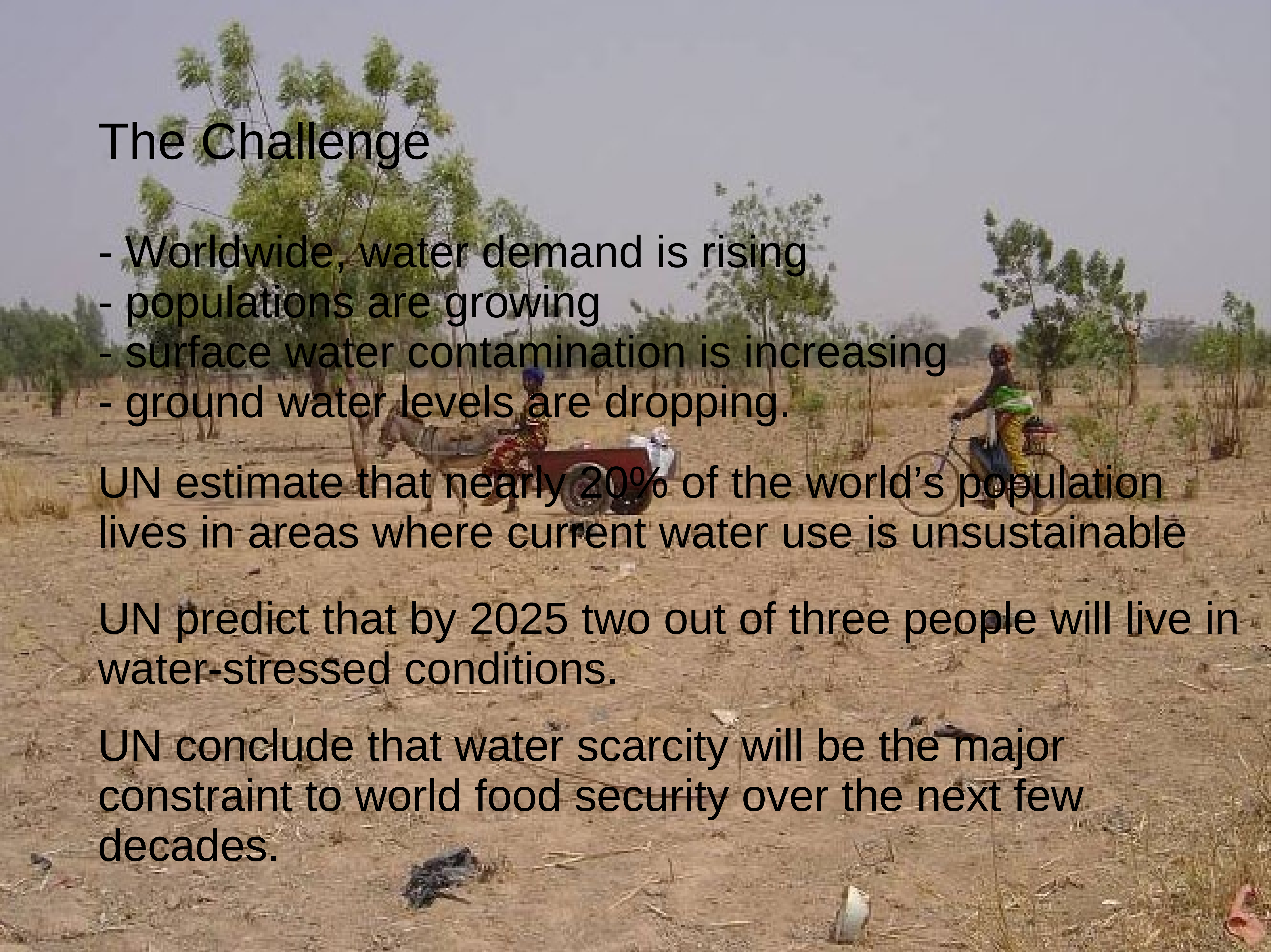
Produced by ST-09-02

Featuring:

Water: Pilot Projects for Improved Water Availability and Quality

Pilot Projects for Improved Water Availability and Quality

“The challenge of securing safe and plentiful water for all is one of the most daunting challenges faced by the world today…”
Water is essential to survival. Unlike oil, there are no substitutes.
UN Secretary-General Ban Ki-moon, addressing the 2008 World Economic Forum



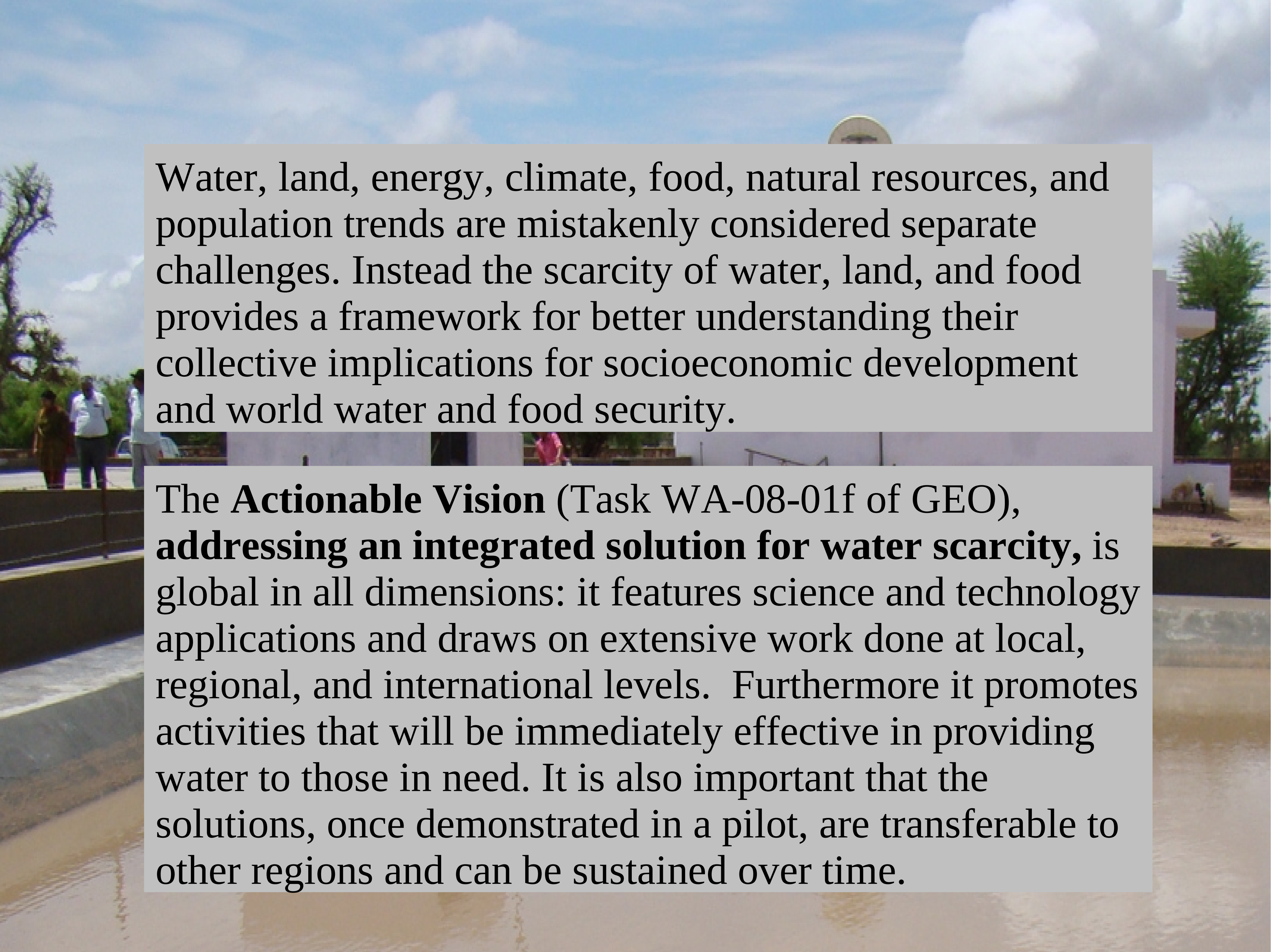
The Challenge

- Worldwide, water demand is rising
- populations are growing
- surface water contamination is increasing
- ground water levels are dropping.

UN estimate that nearly 20% of the world’s population lives in areas where current water use is unsustainable

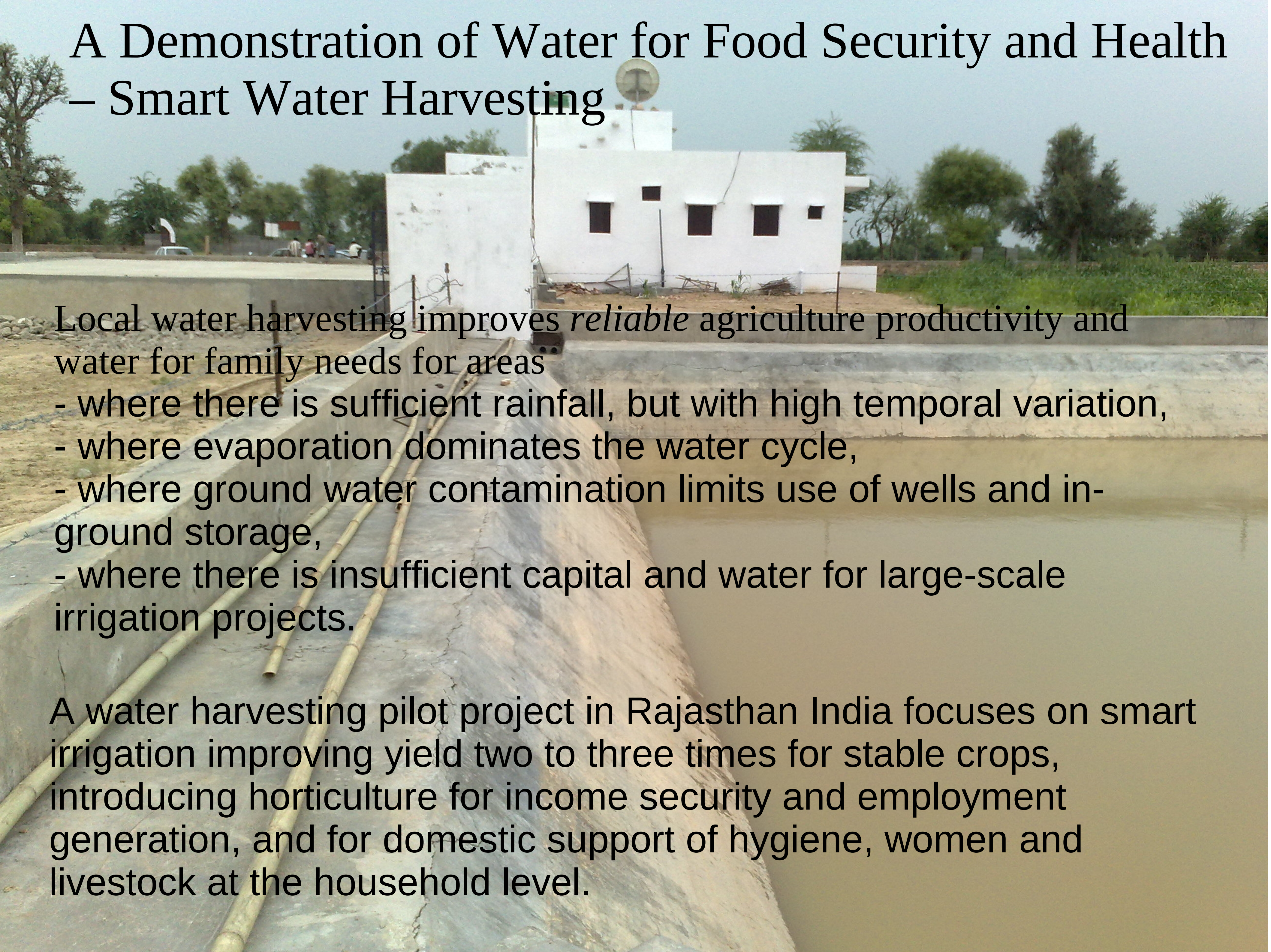
UN predict that by 2025 two out of three people will live in water-stressed conditions.

UN conclude that water scarcity will be the major constraint to world food security over the next few decades.



Water, land, energy, climate, food, natural resources, and population trends are mistakenly considered separate challenges. Instead the scarcity of water, land, and food provides a framework for better understanding their collective implications for socioeconomic development and world water and food security.

The **Actionable Vision** (Task WA-08-01f of GEO), **addressing an integrated solution for water scarcity,** is global in all dimensions: it features science and technology applications and draws on extensive work done at local, regional, and international levels. Furthermore it promotes activities that will be immediately effective in providing water to those in need. It is also important that the solutions, once demonstrated in a pilot, are transferable to other regions and can be sustained over time.



A Demonstration of Water for Food Security and Health – Smart Water Harvesting

Local water harvesting improves *reliable* agriculture productivity and water for family needs for areas
- where there is sufficient rainfall, but with high temporal variation,
- where evaporation dominates the water cycle,
- where ground water contamination limits use of wells and in-ground storage,
- where there is insufficient capital and water for large-scale irrigation projects.

A water harvesting pilot project in Rajasthan India focuses on smart irrigation improving yield two to three times for stable crops, introducing horticulture for income security and employment generation, and for domestic support of hygiene, women and livestock at the household level.

Goal

Food security and improved sustainability in semi arid environments through smart rain water harvesting and capacity building

Objectives

Capacity building of farmers in harvesting and efficient use of water and water quality and agricultural practices

Long term sustainability of project outcomes by empowering locals

Micro-level application of Earth observations in support of these objectives

Provision of methodologies to local farmers and villages

The target area is the village Melva and the surrounding cluster of villages of Rajasthan State, India.

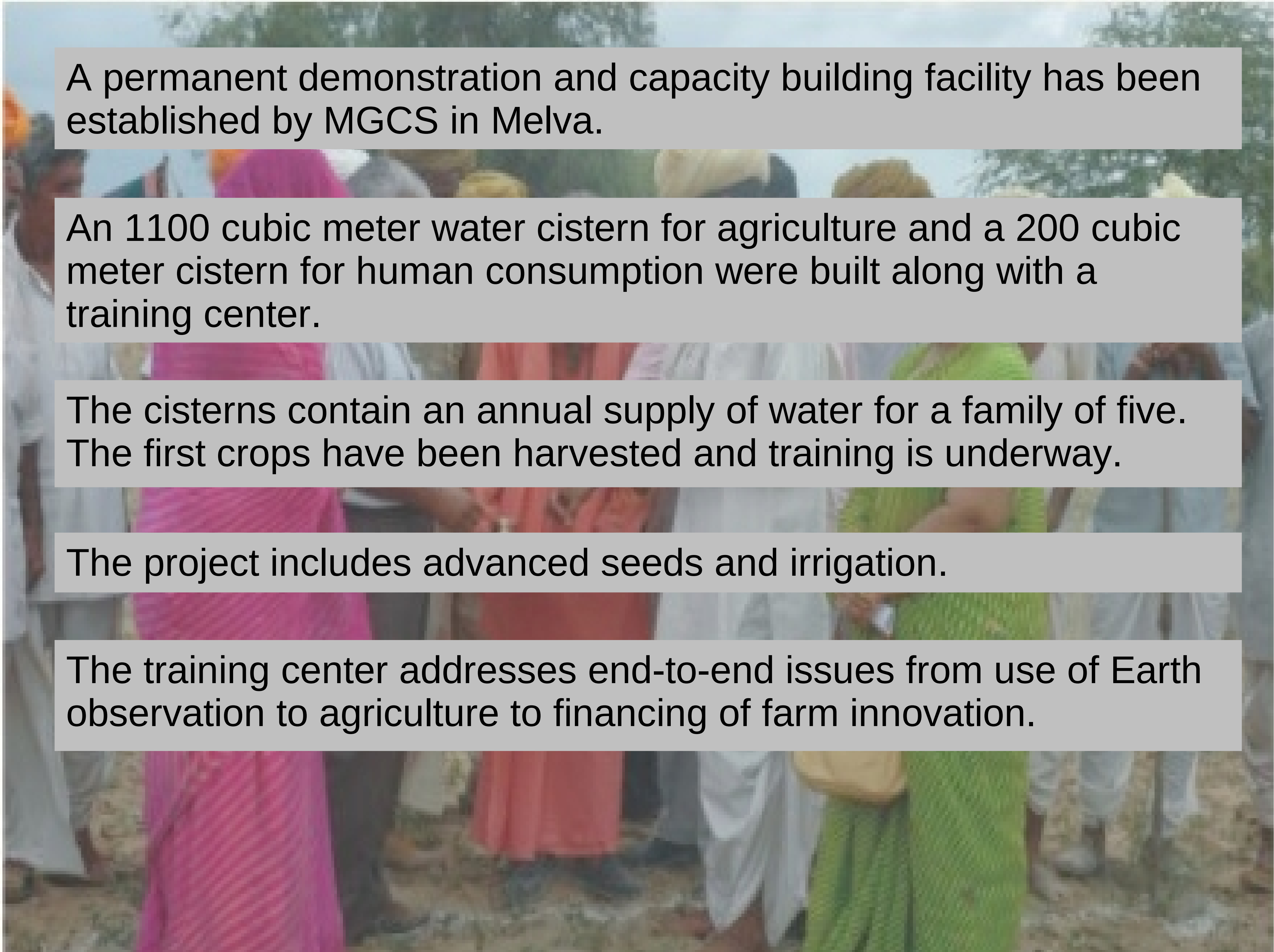
The dominant economy is subsistence rainwater fed farming with an average household of five people and five cattle.

The mean rainfall is 386 mm per year with a very high variability coefficient.

Evapotranspiration is 1500-2000 mm per year or five times the precipitation.

Ground water is 200 feet below the surface and is saline and unsuitable for drinking.

For consumption, people rely largely on the village pond, where domestic animals and wildlife also have their share, leading to health issues.



A permanent demonstration and capacity building facility has been established by MGCS in Melva.

An 1100 cubic meter water cistern for agriculture and a 200 cubic meter cistern for human consumption were built along with a training center.

The cisterns contain an annual supply of water for a family of five. The first crops have been harvested and training is underway.

The project includes advanced seeds and irrigation.

The training center addresses end-to-end issues from use of Earth observation to agriculture to financing of farm innovation.

Earth Observation for Rain Water Harvesting in Semi –Arid Regions

The key goal of Earth observation (EO) in the project is to develop and implement practical information for operational smart rainwater harvesting (SRWH) in semi-arid environments and adopting “more crop per drop” approaches.

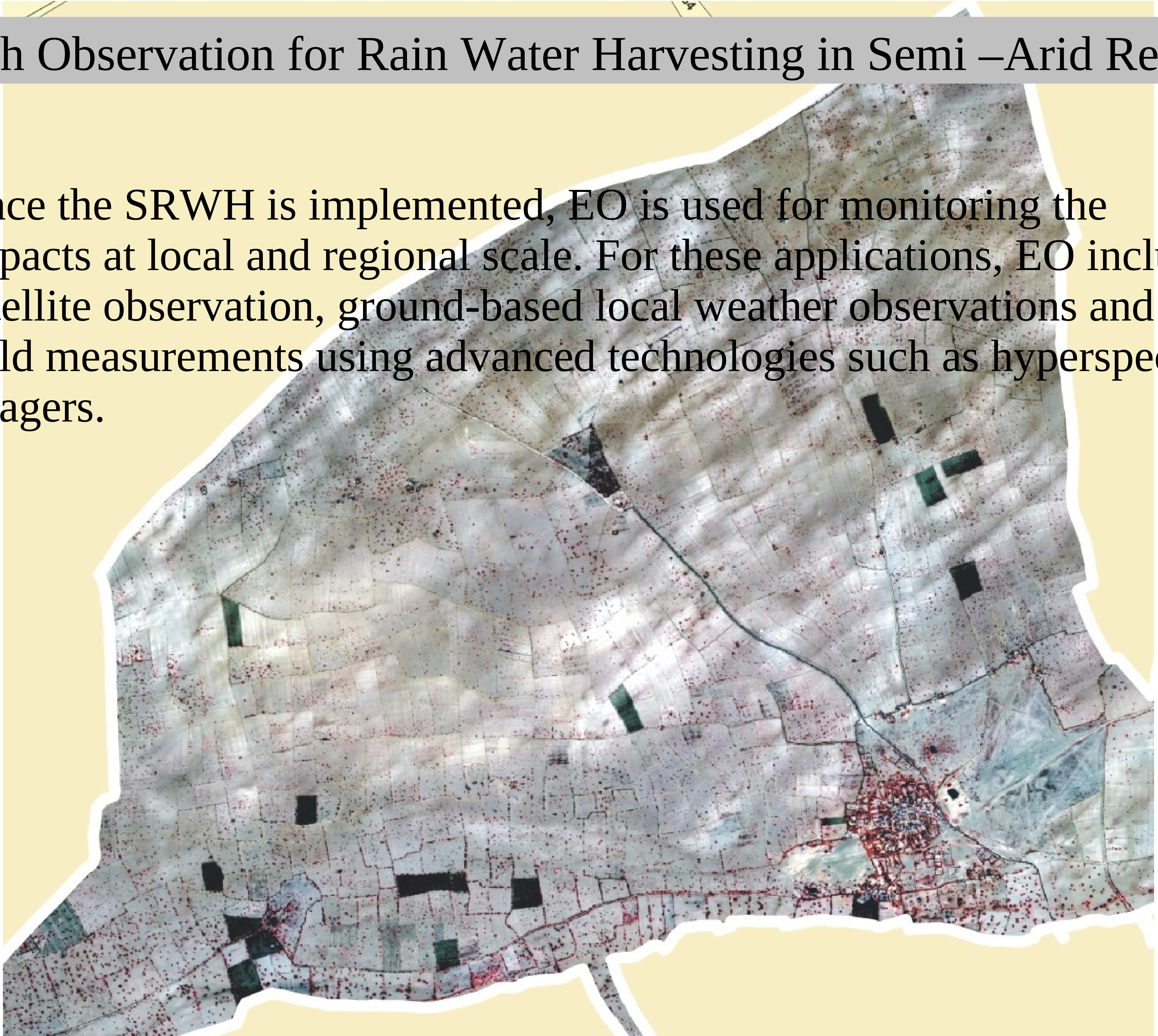
Characterizing areas for SRWH at a local scale has not been done systematically. EO will provide accurate, up to date time series for selecting sites and monitoring operations.

Site selection depends on many factors including rainfall, geological formations, soil type, current land use, hydrologic features and the general socio-economic conditions. This information is integrated though a geographic information system to bring useful information to decision makers such as farmers and village leaders.

Capacity building supports use and uptake of the information.

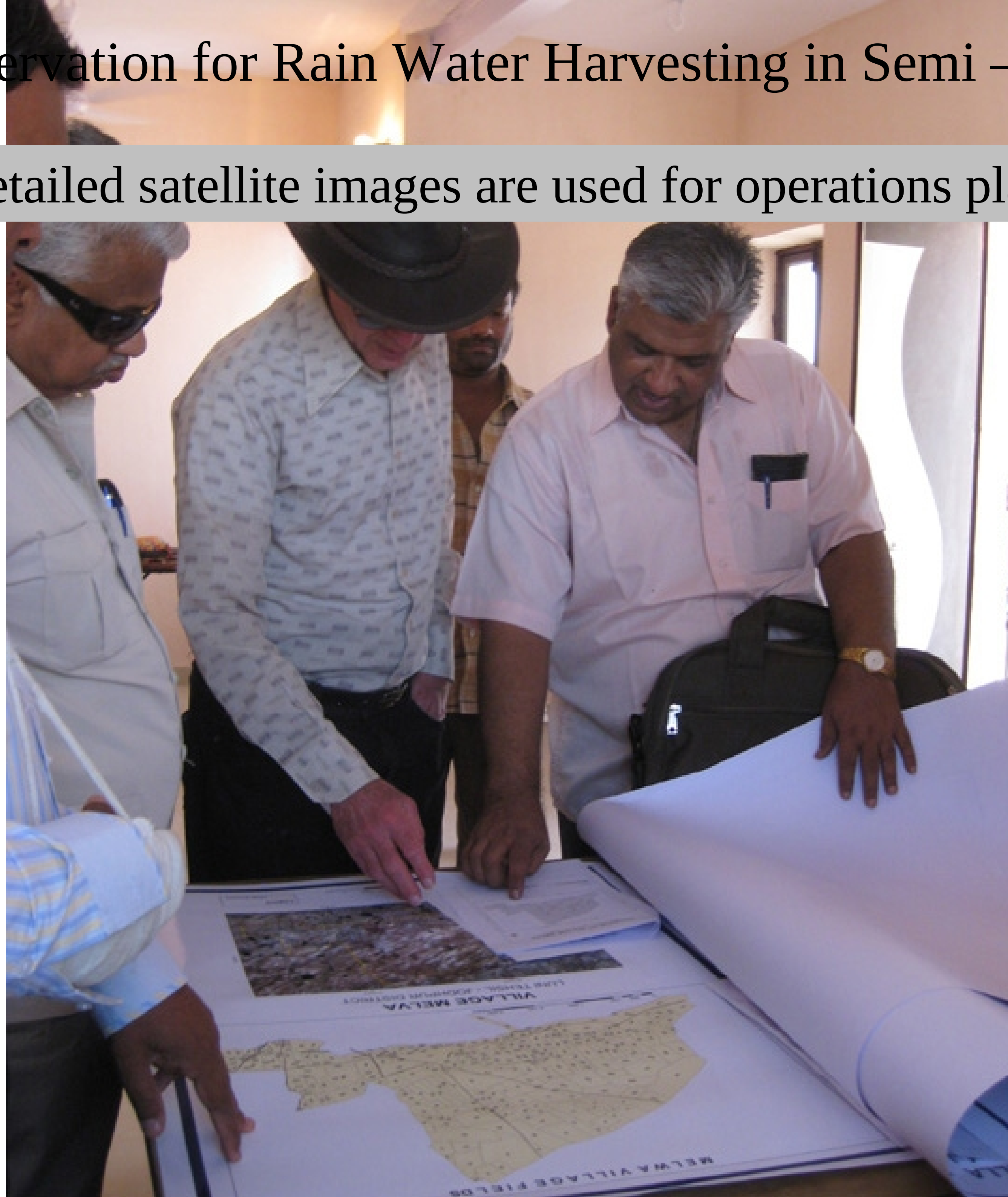
Earth Observation for Rain Water Harvesting in Semi –Arid Regions

Once the SRWH is implemented, EO is used for monitoring the impacts at local and regional scale. For these applications, EO includes satellite observation, ground-based local weather observations and in-field measurements using advanced technologies such as hyperspectral imagers.



Earth Observation for Rain Water Harvesting in Semi –Arid Regions

Detailed satellite images are used for operations planning



The Way Forward

Rain-fed agriculture deserves special attention from the international community. Making best use of available water and land requires a sustainable, repeatable and scalable approach build on traditional wisdom and modern technology. Through GEOSS and science and technology collaborations, new capabilities are being adopted to move subsistence agriculture to a sustainable economic solution where use of advanced seeds and fertilizer can be justified because of the reliable availability of water through rainwater harvesting.

For further information, contact
Dr. JR Sharma (jrsharma@hotmail.com) or
Dr. Prasad Thenkabail (pthenkabail@usgs.gov).

This project has been supported by MGCS, IEEE, IEEE Foundation, ISRO and NASA.