Recovered dryland in Burkina Faso using the Vallerani System

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Mechanized microcatchments for harvesting water in degraded drylands – the Vallerani System

The mechanized microcatchment water-harvesting system is an innovation that combines traditional practices and modern technologies to restore land productivity, improve soil conservation and harvest water in degraded drylands.

LOCATION: More than 200 000 hectares of land have been prepared in three geographic regions – Africa, the Near East and Asia – using this mechanized system. Countries: Burkina Faso, Chad, China, Egypt, Jordan, Kenya, Madagascar, Morocco, the Niger, Senegal, the Syrian Arab Republic, the Sudan and Tunisia.

TARGET GROUP: Rural people living in degraded agrosilvopastoral lands, such as graziers, farmers, women and their families. The restoration of degraded agrosilvopastoral lands often requires considerable effort when local communities do the work manually without mechanized support. People living in these areas include peasant communities, displaced people and refugees concentrated in arid lands. Cultivating valuable species for producing specific products – such as argan oil in Morocco and gum arabic in Sahelian Africa – also involves the private sector and related stakeholders (e.g. governments and industries), from production to harvesting, processing and export.

POTENTIAL DONORS: Interested donor countries and funding organizations such as the World Bank and the International Fund for Agricultural Development.

IMPLEMENTING ORGANIZATION: The Food and Agriculture Organization of the United Nations (FAO).

GENDER: Women are key in the practice. They are strongly involved in seed collection, nursery practice, harvesting fruit and collecting wood. They are also involved in developing and improving local markets.

CONTEXT

Land degradation and desertification are economic, social and environmental concerns in many regions of the world. The soils of degraded lands often lack sufficient vegetation cover, are vulnerable to wind erosion, and have low permeability, such that rainwater is mostly lost in runoff and evaporation. **Water-harvesting systems** can help capture runoff and restore vegetation in degraded areas. **The Vallerani System**

Women sowing seeds in microcatchements just excavated by the Vallerani plough. Sahelian Africa

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uses a modified plough pulled by a heavy-duty tractor (about 100 horsepower) **to prepare, on average, 10–14 hectares of land per day with each hectare containing 500–700 microcatchments.** After soil preparation, plant species are sown or planted manually. As they grow, the plants benefit from ploughed soil which, among other things, increases soil permeability, and from the increase in soil moisture provided by the microcatchments. The Vallerani System combines new technologies with cultural traditions and the strong involvement of local people.

CHALLENGE

To improve water harvesting in drylands for increasing seed germination and seedling establishment, support the restoration of degraded agrosilvopastoral systems, and reduce land degradation in drylands by:

- increasing in-country capacity to harvest water in arid zones
- empowering communities to use the mechanized microcatchment water-harvesting methodology, establish nurseries and boost agricultural production
- establishing enterprises and landholder associations to achieve economies of scale and, potentially, to buy tractors and ploughs to carry out the work
- strengthening local markets for wood and non-wood forest products.

TRADITIONAL SYSTEM

Many rural people in drylands have traditionally harvested rainwater in microcatchments, such as excavated furrows protected by contour ridges and semicircular bounds, to **capture limited rainfall, improve productivity and combat land degradation.**

Excavated furrows are sown with seeds or planted with seedlings of local species, including trees, shrubs and grasses. But preparing microcatchments

PLANTING WITH MECHANIZED MICROCATCHMENTS WATER HARVESTING

This system combines environmental and social benefits. Wherever possible, it allows for the recovery and improvement of natural biodiversity, protects soils from erosion and reduces risks for flooding, supports agriculture by protecting crops from evapo-transpiration, increases soil capacity on water infiltration, increases carbon storage, involves local people in the different steps of the process from seed collection to grazing regulation to the management and protection of newly established plantations.

ECONOMIC AND POLICY CONSIDERATIONS

- The Vallerani System requires support from:
  - o Research institutions to underpin extension in seed collection, nursery and planting techniques, soil mechanization and livestock management.
  - o Policy institutions to provide non-governmental organizations and farmer associations with funding mechanisms for transferring financial resources from international donors.
- The Vallerani System allows the preparation of 5000-7000 microcatchments per day (500-700 microcatchments per hectare and about ten hectares per day); a manual worker can only prepare 5-7 microcatchments per day.
- The practice requires an initial financial outlay to buy a tractor and plough of about US$120 000; the unit cost is estimated at US$80-130 per hectare, including labour and maintenance, depending on the cost of fuel.
- Arid-zone restoration can support only low densities of trees and shrubs, and growth rates are typically low. It must be carried out over large areas, therefore, to achieve significant results in economic production and people's livelihoods.

REPLICABILITY AND UPSCALING

The practice has been extended successfully to a number of countries with differing climatic conditions. Its replication and scaling up can be achieved in countries with the necessary institutional and policy conditions to support farmers and smallholders in their land tenure rights.

using manual labour or traditional machinery is difficult, slow, energy-intensive and often impractical on a large scale.

METHODOLOGICAL APPROACH OF THE SYSTEM

- Intensive capacity building on mechanized ploughing and maintaining and servicing equipment
- Capacity building on tree management and cattle management in drylands
- Collecting and treating seeds of endemic species for planting
- Establishing nurseries.
- Preparing soil using the mechanized system
- Planting and sowing the prepared soil with endemic species to provide wood and non-wood forest products and fodder for livestock
- Excluding grazing from planted areas for at least the first three years

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Preparing soil, sowing and growing trees.
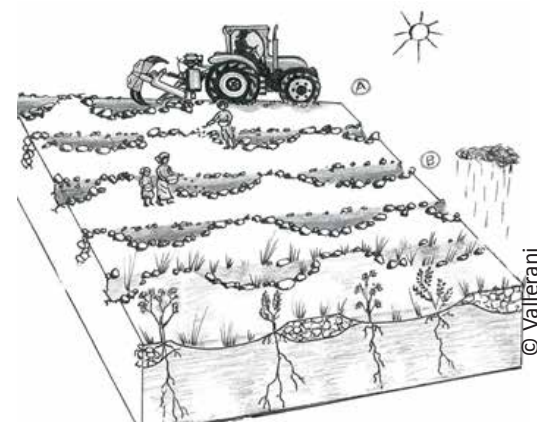
IMPACT

Increased resilience of people's livelihoods in drylands

- More than 200 000 hectares of degraded land already prepared for restoration using the Vallerani System.
- Beneficial effects for both landscapes and the resilience of local communities.
- Improved environmental and socio-economic conditions, including soil and tree cover.
- Increased area of woodlands available for wood and non-wood forest production.
- Development of local markets for wood production.
- Improved economic conditions for rural people.

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Training session on the Vallerani System

FOR MORE INFORMATION

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Forest and Landscape Restoration Mechanism
Restoring Landscapes for Enhanced Livelihoods