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## WATER HARVESTING INCREASES PRODUCTIVITY OF DEGRADED RANGE IN MOROCCO

Preliminary results with water harvesting show promise for restoring the biodiversity and productivity of large areas of communal rangeland in eastern Morocco

Some 70% of the land in eastern Morocco is used collectively by local communities, largely for extensive grazing. But large areas have been stripped of their vegetation, and wind and water erosion are widespread. Key rangeland species are being lost, including *Artemisia herba-alba*, a shrub that is one of the most palatable range species and a major part of the diet of sheep and goats in the re-



The Vallerani plow in action. The furrows capture rainfall and runoff water, encouraging range regeneration.

*Source: "pictures from project managers"*

### Points to Consider

- A recognized and functioning governance mechanism, such as a cooperative or traditional institution, is essential to ensure the restored range is sustainably managed.
- A strong business case—financial or political—is needed to acquire the funds needed to set up the operation.
- Drivers and mechanics must be trained to use and maintain the Vallerani plow, and sources of spare parts identified or developed.
- Local communities will need to be trained in seed collection and production to support range regeneration.

### Purpose

This brief describes preliminary results from a range-rehabilitation effort in Morocco. It is intended to inform policy-makers, donors, and other potential partners and supporters.

### Suitability

This approach is suited to degraded rangeland areas on a wide range of soil types with slopes of up to 12%. It does, however, depend on effective governance mechanisms being in place to manage the utilization of the rehabilitated rangelands.

### The project in numbers

- 1200 hectares
- 2 pastoral cooperatives, 600 members
- US\$85,000 – total project cost
- Threefold increase in yield (15–20 kg/tree to 45–65 kg/tree)
- Threefold increase in price received (0.6–0.8 Dinar/kg to 1.5–2.5/kg)

### Partners

- High Commission on Water and Forests and Efforts to Combat Desertification
- Ministry of Agriculture and Marine Fisheries
- Global Environment Facility
- United Nations Industrial Development Organization

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A project co-funded by the Global Environment Facility (GEF), entitled “Participatory Control of Desertification and Poverty Reduction in the Arid and Semi-Arid High Plateau Ecosystems of Eastern Morocco” is working with local communities to identify ways to stop and reverse the degradation of the rangelands and to boost local livelihoods. Partners include the United Nations Industrial Development Organization (UNIDO), the High Commission on Water and Forests and Efforts to Combat Desertification, the Ministry of Agriculture, Rural Development and Marine Fish-ery, and the Department of the Environment.

Starting in 2011, the project has been working with pastoralist cooperatives in the Eastern Plateau of Morocco to test the Vallerani system—a special plow that produces a furrow consisting of crescent-shaped pits—as a means of harvesting rainfall and making it available to rangeland plants.

Over a period of two and a half months in late 2012, the Vallerani plow was used to prepare some 1200 hectares of degraded land previously used by two pastoralist cooperatives.

Preliminary results show that the furrows cut by the Vallerani plow have successfully captured and concentrated rainfall, providing a microenvironment that encourages the establishment and growth of range species, including Artemisia and saltbush (*Atriplex nummularia*), and have encouraged the recolonization of the area by range species from seed blown in from neighboring rangeland areas. The establishment of shrubby species has helped protect the soil from wind erosion, while the furrows have reduced run-off and water erosion. The areas prepared using the Vallerani plow are now lushly green, while neighboring areas that received no treatment are largely bare.

Members of the cooperatives have been actively engaged in the revegetation process, collecting seed of desirable indigenous range species and planting them in the Vallerani pits.

Previous results with the Vallerani system in Morocco indicate that the restored areas will have to remain closed to grazing for up to two seasons for the vegetation to establish sufficiently to be able to withstand grazing. But given that the areas being rehabilitated have been abandoned by the local communities as unproductive, this is a small price to pay. The cooperatives have recently asked the project to bring in experts to monitor the development and growth of the re-established vegetation and to advise them on stocking rates and grazing management to ensure that the restored range continues to flourish.

The Vallerani system has proved well suited to restoring degraded rangeland. One of its principal advantages is the speed at which it operates—a skilled operator can prepare two hectares per hour, or more if the furrows are widely spaced. As a result the cost is moderate—US\$75 per hectare for the 1200 hectares prepared to date. The cooperatives will charge members a fee for use of the regenerated range, using the funds to cover the cost of future range rehabilitation work.

Constraints include the high up-front investment—the equipment costs in the region of US\$170,000—the need for skilled operators and mechanics, the limited availability and high cost of spare parts for the machinery, and limited availability of seed of indigenous range species. In



Range vegetation growing in furrows prepared using the Vallerani plow.

Source: “pictures from project managers”

the case of the eastern rangelands, the Government of Morocco has identified the area as of strategic importance for regeneration and, together with GEF, has invested in the machinery on behalf of the local people. The project has provided training for operators and mechanics and is working with local companies to develop the capacity to make spare parts for the machinery to ensure the sustainability of the system. The project is working with the cooperatives to develop seed nurseries, either through planned planting of desirable species or protecting areas specifically for seed collection.

It is too soon to give a definitive verdict on the success or validity of the use of the Vallerani system in the eastern rangelands of Morocco, but early indications are promising. Further monitoring is needed, as is development of improved grazing and land management practices to ensure the long-term benefits of the restoration work.

