# When every drop of water counts…

## Simple rainwater harvesting structures help farmers in Central Asia to substantially improve rain-fed land management

Central Asia is one of the regions in the world where land use is constrained not by a lack of precipitation, but rather by its highly uneven distribution throughout the year. More than 90% of the land area consists of (semi-)arid rain-fed land, which receives most of its annual precipitation in the cold season between autumn and spring, whereas the summer periods tend to be hot and dry.

Rainwater harvesting can make substantial contributions to enhancing natural resource management in semi-arid regions. Over the past few years simple and inexpensive rainwater harvesting techniques have been developed in Tajikistan and Kyrgyzstan, which offer great potential to support the more productive use of (semi-) arid rain-fed areas not only in Central Asia

Rainwater harvesting: an important element to bridge the gap between water abundance and water scarcity in (semi-)arid areas

Improving kitchen garden production through simple plastic-lined rainwater harvesting structures

To support local farming communities in South Tajikistan so that they can use the land surrounding their farmhouses more productively, efforts to develop and promote affordable rainwater harvesting structures were initiated in 2008. Plastic-lined water storage facilities - supplied in most cases with rainwater from nearby roofs of houses - turned out to be the most feasible option.

Plastic-lined rainwater harvesting ponds can be easily established in areas where the soils consist mainly of fine soil particles and to a lesser extent of gravel and rocks. For their construction semi-UV resistant plastic foils (which are nowadays used in many countries for greenhouses) are very suitable. However, if handled with care and protected from direct exposure to the sun, even ordinary plastic sheets without specific resistance against solar UV radiation can keep rainwater storage ponds waterproof for several years.

Important factors for planning the size and shape of plastic-lined rainwater storage reservoirs include: the existing precipitation pattern; roof area, estimated water run-off co-efficient of the existing roofing material being used, dimensions of available plastic sheets as well as estimated water requirements.

Confirming again the exact dimension of the rainwater harvesting structure under construction

Placement of a car tire on top of a water storage pond through which water intake and outtake is processed

Completed water harvesting pond supplied with rainwater from a nearby rooftop

Investment costs to purchase the required materials for the construction of plastic-lined rainwater harvesting ponds are low. For example, the price of the plastic sheets needed to construct a 2m³ rainwater storage reservoir, with high quality UV resistant plastic sheets, is equivalent to about 6 euros (based on Central Asian market prices in November 2015).

Since its introduction a few years ago, low-cost rainwater harvesting structures and additional simple measures, promoted to improve soil and water management (e.g. the use of organic fertilizer, mulch, the selection of suitable crops and drip irrigation) have supported hundreds of farmers with small farms in semi-arid areas of South Tajikistan to substantially increase their kitchen garden productivity. Some farmers established up to 4 plastic-lined rainwater harvesting ponds with a total water storage capacity of up to 15m³ on their land: this represents a lot of water to foster productive land use during the dry season.

The simple options promoted for improved kitchen garden production in semi-arid areas have been documented in the form of a small training video (link: http://www.youtube.com/watch?v=-loOzgUXShKc). In addition, the World Overview of Conservation Approaches and Technologies (WOCAT) produced a small documentary explicitly about the plastic-lined rainwater harvesting technology (link: http://vimeo.com/74617403#at=0).

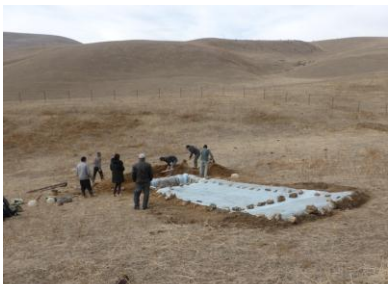
Supporting the restoration of degraded land in distant locations through simple rainwater harvesting structures

In 2013, the concept of low-cost rainwater harvesting was further developed in Kyrgyzstan by inventing an approach which allows low-cost rainwater collection and storage even in distant areas with no road access. Instead of roofs of houses, in this case large plastic sheets are spread in hilly or mountainous areas on portions of levelled ground, which channel the run-off rainwater into reservoirs that are located at the bottom of the water collection areas. In areas with plains, the appropriate micro-topography for the installation of plastic-lined rainwater collection areas can be easily created.

Provided that the soil conditions are generally suitable, this rainwater harvesting system allows to set up water collection and storage points in any part of the open landscape, where water is critically needed during the dry season but naturally not available year-round in the form of streams or open water sources. Making rainwater available in such areas can, among other benefits, help to successfully implement land restoration activities in remote regions, which might during the initial years of restoration require some irrigation e.g. for planted tree seedlings.

Placement of the plastic sheet

Rainwater harvesting in the open landscape



Stones are used to secure the rainwater collection area against strong winds

Where soil conditions are inappropriate for the installation of plastic-lined underground rainwater storage facilities, water collection ponds made out of concrete can combine well with above-ground rainwater collection areas prepared out of plastic foil.

Concrete reservoir with plastic sheet for rainwater collection

Sharing experiences about simple, efficient ways for decentralized rainwater collection

Concrete reservoir covered by roofing sheets, fed by a plastic-lined rainwater collection area

To protect the plastic foil of the reservoir, and to prevent large losses due to evaporation during the dry season, the rainwater storage ponds should be covered. Different technical options exist for this purpose. In order to avoid premature damage of the plastic sheets used for rainwater collection by intense solar UV radiation, removing the sheets during the dry season is recommended.

Decentralized plastic-lined rainwater harvesting structures that use plastic sheets for effective rainwater collection from the ground can be constructed at reasonable costs. Based on market prices from November 2015, an integrated 3m³ plastic-lined water catchment-(designed to fill up the reservoir at least twice per year) and storage system have been constructed with material investment costs equivalent to about 30 euros. If the reservoir is constructed out of concrete with a plastic-lined rainwater catchment area, the costs reach about 150 euros for a 3m³ water storage system.

All in all, particularly in (semi-)arid regions, the combined use of simple rainwater harvesting structures and efficient water use techniques represent a powerful way to support the restoration and productive use of rain-fed areas. In addition, rainwater harvesting can form an important element for climate change adaptation! Until now, the potentials offered by improved rainwater harvesting are often greatly underutilized. It's time to act!

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