

## Where every drop of water counts!

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

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

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

To support local farming communities in South Tajikistan to use the land surrounding the farm houses more carefully and 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 house roofs – 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 against direct exposure from 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: existing precipitation pattern, estimated water run-off coefficient of the roof area used and dimensions of available plastic sheets.



Re-confirming the exact dimension of the rainwater harvesting structure under construction



Placement of a car tire at the top of a water storage pond through which water in- and outtake are achieved



Completed water harvesting pond supplied with rainwater from nearby rooftop

To produce long lasting benefits, plastic lined water storage facilities need to be constructed and used with care (e.g by smoothening of the walls with loam before the placement of the plastic lines and by avoiding water extraction through buckets with sharp edges).

Investment costs to purchase required materials for the construction of plastic lined rainwater harvesting ponds are low. For example, the price for the plastic sheets to construct a 1.5 m<sup>3</sup> rainwater storage reservoir –based on Central Asian market prices in March 2014– is equivalent to approximately 4 Euro.

Since its introduction a few years ago, low cost rainwater harvesting structures and additional simple measures to improve soil and water management (e.g. use of organic fertilizer, mulch, selection of suitable crops and drip irrigation) have helped hundreds of small farmers in semi-arid areas of South Tajikistan to substantially increase kitchen garden productivity. Some farmers established up to four plastic lined rainwater harvesting ponds with a total water storage capacity of up to 15 m<sup>3</sup> on their land: a lot of water to strengthen productive land use during the dry season.

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

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

During 2013 the concept of low cost rainwater harvesting has been further developed in Kyrgyzstan by inventing an approach that allows low cost rainwater collection and storage even in remote areas without road access. Instead of using roof catchments, in this case large plastic sheets are spread on hilly or mountainous areas on portions of levelled ground surfaces. These channel the run-off rainwater into reservoirs located at the bottom of the water collection areas. In plains, the appropriate micro-topography for the installation of plastic lined rainwater collection areas can be easily created manually.

Provided that the soil conditions are suitable, this rainwater harvesting system allows the flexible setup of water collection and storage points in those parts of the open landscape, where water is critically needed during the dry season, but not naturally available year round in the form of streams or open water sources. Making rainwater available in such areas can help to implement land restoration activities in remote regions, which might during the first few years require some irrigation e.g. for planted tree seedlings.



Placement of the plastic sheet



Rainwater harvesting in an open landscape



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

Where soil conditions are inappropriate for the installation of plastic lined underground rainwater storage facilities, above ground rainwater collection water using plastic foil can be combined with water collection ponds made out of concrete.

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

Decentralized plastic lined rainwater harvesting structures using plastic sheets for effective rainwater collection from the ground can also be constructed at reasonable cost. Based on market prices in Central Asia from October 2013, an integrated 3 m<sup>3</sup> plastic lined water collection and harvesting system has been constructed with materials costing about Euro 23,-.

All in all, particularly in (semi-)arid regions, the combined use of simple rainwater harvesting structures and efficient water use techniques represents a very powerful way to promote the restoration and productive use of rain-fed areas. In addition, rainwater harvesting can form an important element for climate change adaptation! Not only in Central Asia up to the present the potential offered by improved rainwater harvesting are often greatly underutilized. Time to act!

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