International Rainwater Harvesting Alliance
Alianza Internacional para la Gestión del Agua de Lluvia *(IRHA)*
Alliance Internationale pour la Gestion de l'Eau de Pluie *(IRHA)*

bRAINstorming

NEWSLETTER NO. 30 – MAY 2010

Our Newsletter focuses on the activities of the International Rainwater Harvesting Alliance (IRHA), its partners and the wider world of rainwater harvesting.

Topic of this issue: Agricultural Rainwater Harvesting Pt 2

Editorial

Dear Rainwater Harvesters, Readers, the IRHA Members and Friends,

In our last Newsletter we introduced you to agricultural rainwater harvesting; where it is needed and how it can combat food scarcity and poverty.

This Newsletter looks at how rainwater harvesting can contribute to the world of farming, including the different systems and methods that are involved.

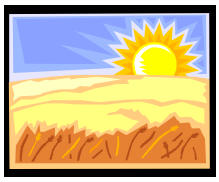
We have identified three regions as hotspots for water-constrained, rainfed agriculture: Africa, South Asia and East Asia. Each of these regions hosts more than 100 million people who live below the poverty line and who depend on rainfed agriculture in water-constrained environments. The total number of people in these three areas constitutes around 80% of all people living in water-constrained, rainfed agricultural areas, amounting to 426 million people (Rockström and Karlberg, 2009).

As the people who would benefit the most from rainwater harvesting are predominantly located in developing countries, it is important that the techniques are relatively cheap and simple to implement and maintain. Rainwater harvesting has the advantage of being made up of numerous different methods, consequently it can be tailored to suit the requirements of the local area and people.

We will conclude the Newsletter with some case studies that have successfully implemented rainwater harvesting and are now reaping the benefits.

Hannah Price

An Agricultural Testament by Sir Albert Howard (1873-1947)



"The main characteristic of Nature's farming can therefore be summed up in a few words. Mother earth never attempts to farm without live stock; she always raises mixed crops; great pains are taken to preserve the soil and to prevent erosion; the mixed vegetable and animal wastes are converted into humus; there is no waste; the processes of growth and the processes of decay balance one another; ample provision is made to maintain large reserves of fertility; the greatest care is taken to store the rainfall; both plants and animals are left to protect themselves against disease."

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Rainwater Harvesting Systems

Agricultural rainwater harvesting falls into three broad categories, depending on the landscape. All systems require three components: a catchment area where runoff is produced; a storage area; and a cropped basin where the runoff is utilised. The distance between the catchment area and cropped basin determines which category the system is in.

The first category is in-situ rainwater harvesting; this is where the catchment area and the cropped basin are in the same location.

The second category is internal (micro) catchment rainwater harvesting; this is where there is a division between the catchment area and the cropped basin, but the areas are adjacent to each other.

The final category is external (macro) catchment rainwater harvesting; this covers systems where the catchment area is some distance from the cropped basin.

Read more about the different categories of rainwater harvesting.

Important Parameters

Several parameters must be considered before rainwater harvesting can be implemented in an area. These help identify whether the area is suitable for rainwater harvesting and then in choosing which system and specific methods are most appropriate. The parameters include:

- Rainfall
- Land-use and vegetation cover
- Topography and terrain profile
- Soil type and depth
- Hydrology and water resources
- Socioeconomic and infrastructure conditions
- Environmental and ecological impacts

Click here for more information on these parameters and how they influence rainwater harvesting.

Storage Structures

Systems store rainwater in two ways, either directly in the soil or in a separate structure. In-situ rainwater harvesting always stores water directly, as the catchment area and the cropped basin are the same. Internal and external catchment rainwater harvesting can exist in both forms.

Storage in the soil can only supply water during the rainy season, if supplemental irrigation is needed during the dry season or in dry spells, then a storage structure will be required. These can be divided into above ground and underground.

Above ground water storage structures range from ferrocement tanks of a few cubic metres to large reservoirs that can store many millions of litres of rainwater. This category includes both open and enclosed structures, though enclosed structures are preferable as they are not susceptible to evaporation loss, siltation or pollution.

Underground water storage is not as common, but has the advantage of not taking up any agricultural land. These are usually manmade cisterns with plastered walls that minimise losses from deep percolation and evaporation. The construction of cisterns has been around for thousands of years; traditionally made with chalky rocks, nowadays they are constructed out of concrete (Prinz and Singh, 1999).

Rainwater Harvesting Methods

To harvest rainwater for agricultural purposes, the individual characteristics of the area and society must be taken into account. This has led to the development of numerous different methods of rainwater harvesting around the world. Here are some examples of a couple of techniques.

Conservation Tillage

This is a form of in-situ rainwater harvesting. It is defined as any tillage that leaves at least 30% of the soil surface covered by plant residue after planting. This reduces water and wind erosion and creates an environment where it is possible to grow crops while optimising the conservation of soil and water resources (Ibraimo and Munguambe, 2007).

Click here for more information on conservation tillage and other forms of in-situ rainwater harvesting.

Earthen Bunds

A form of internal catchment rainwater harvesting; these are earth-works that can be constructed in various forms to fit different landscapes. They create structures that collect the runoff rainwater, allowing it to pond and infiltrate into the soil. Variations of this system include contour bunds and semi-circular bunds (Ibraimo and Munguambe, 2007).

Click here for more information about earthen bunds and other forms of internal rainwater harvesting.

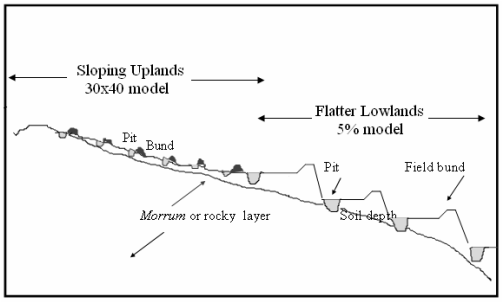
Hillside sheet/rill runoff utilisation

This is a form of external catchment rainwater harvesting. It takes advantage of the runoff from hill-tops, sloping ground, grazing land and other compact areas, which naturally collects in low lying flat areas. If there is enough rainfall, farmers plant their crops in the low lying areas and use the runoff without any further management. However, in many parts of the world, runoff is not high enough so the landscape needs to be manipulated. Bunds are often constructed on the cropped area to trap the water and increase infiltration (Hatibu and Mahoo, 1999).

Case Studies

The Jaldhar Model in India – A technology developed by PRADAN, one of our IRHA Members

This in-situ rainwater harvesting technique has been developed in the East Indian Plateau to counter the frequent agricultural droughts that are affecting the upland paddy crops. There are two forms of this model; the 'Jaldhar 30x40 model' and 'Jaldhar 5% model'. The 30x40 model is for sloping land and is used to reduce erosion while increasing soil moisture content. The 5% model, used on flatter land (less than 5% slope), holds water so it's available during dry periods and increases the moisture content of the soil. Ideally the two models are used together, with the 30x40 model on high ground and the 5% model on lower ground (see picture). *Click here* to read their full paper.

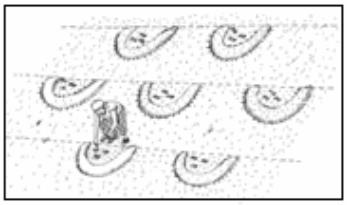


The Zai System in Mali

These are a series of man made pits dug on unused land to capture runoff and increase permeability of the soil. They are filled with organic matter and then planted with annual crops such as millet and sorghum. Their use in Mali and the wider Sahel region is well documented; they don't require special equipment or training and the start up costs are low, aiding their widespread use (International Federation of Agricultural Producers, 2005). *Read More*.

Earthen Embankments in Sukhomajri, India

Sukhomajri, a small hamlet located in the Shiwalik foothills of India, was completely reliant on rainwater. Consequently, an integrated watershed development programme was initiated; including the construction of six metre high earthen embankments to store rainwater from a 4.2ha catchment area. Crop yields doubled in response to supplementary irrigation and improved land management and livestock and domestic water needs were also met (Sharma, 2009). *Read More*.



Source: CTA (2007)

Semi-Circular Hoops in Kenya

Hoops are a form of bund constructed in semi-circles on gently sloping land (see left). The hoops capture the rainwater that runs down the slope, allowing it to soak into the soil. A family in Kenya was taught to use semi-circular hoops by the Kenya Agricultural Research Institute (KARI) research station at Kiboko in 2000. Before this, they did not have enough grass to feed their cattle, but afterwards they were able to plant 11 hectares of grass, increase their herd from 6 to 12 indigenous zebu cattle, sell surplus hay to their neighbours and rent grazing land out to other farmers (CTA, 2007). *Read More*.

IRHA News

"Rainwater Harvesting in the Heart of the Micro-Farming and Food Security in Watershed Development Programmes"

The IRHA is pleased to announce a new training session will take place in Maharashtra, India, in July 2010. This aims to improve the capabilities of professionals to implement rainwater harvesting projects to improve food security. If you are interested in attending, please visit our website for more details or send us an email.

The IRHA is now on Facebook. Join us online and get involved!

If you have any ideas, examples or questions about rainwater harvesting, please share them with us on our new page. We want this to be interactive, so the more contributions the better! In return we will keep you up-to-date on all the IRHA activities, including updates of current projects and details on ones we hope to implement soon.

Upcoming Newsletter

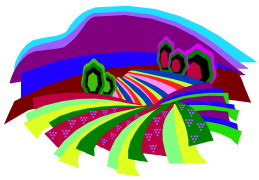
Our next Newsletter (No. 31) will look at alternative forms of rainwater harvesting; including snow, dew and fog harvesting. You can still contribute!

For Members

For our 32nd Newsletter we wish to give the floor to our IRHA Members, promoting the work they are doing in the area of rainwater harvesting. Please send your articles, photos or comments to the email below. We thank you in advance for taking the time to contribute to the Newsletter and helping the IRHA spread the word of rainwater harvesting.

References

This Newsletter was written with the help of several papers in the area of agricultural rainwater harvesting. A list of the articles used can be *found here*.



Become a Member

The IRHA Members benefit from our extensive network and contribute to increasing the global use of rainwater harvesting.

Become a Member online:

Visit our website at:

http://www.irha-h2o.org/en/become_a_member.html

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