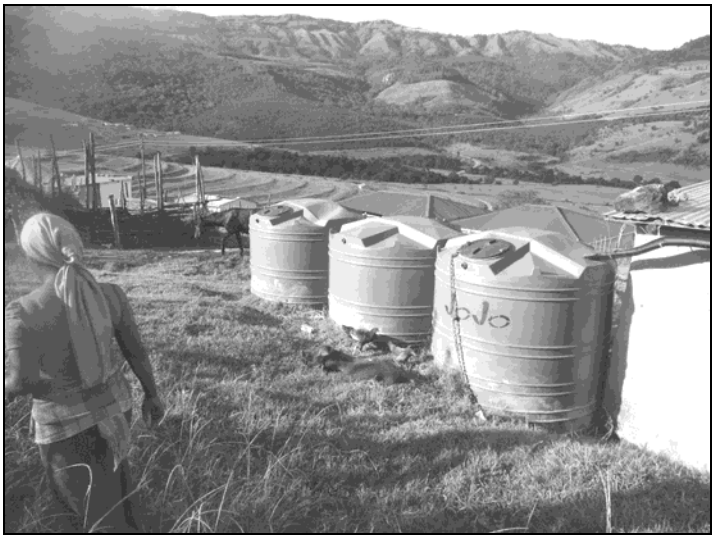
Resources on Rain Water Harvesting

Resources and how to find them –
a guide for trainers and mediators



DRAFT –

NOT FOR DISTRIBUTION

Compiled by Nina Rivers, Tim Wigley
and Robert Berold

Draft resource document for WRC project K5/2074/1

What is the purpose of this booklet?

This booklet is a companion to the resource booklet *Rain Water Harvesting for Homes and Home Food Gardens* which provides basic information about how to catch and store rain water in the context of the Cata area of the Eastern Cape.

This booklet has two purposes:

1. It gives useful references on rain water harvesting, most of them internet-accessible, ranging from research papers to practical manuals. Some of these references focus on technical issues, others on the social, economic and learning environment.
2. It describes how to find relevant references by identifying and contacting knowledge networks in the water sector.

In search of knowledge networks

by Jane Burt

This booklet was originally going to be a catalogue, a list of resources which mediators could draw on to gain a deeper understanding of the content of rainwater harverting. It still is a catalogue, but it has become more than that, because of our experience of putting it together.

Those who did the original internet search [Nina Rivers and Tim Wigley], even though they were experienced researchers, struggled to process the mass of information that they found on the internet. There were hundreds of sites and research reports on rainwater harvesting, so many that it was difficult to know which were important or relevant to the rural Eastern Cape.

To find the best references, we had to consult people who actually worked in the field of rainwater harvesting, using what we have come to call knowledge networks.

Nina, who was new to the water sector, relied on the knowledge networks which I, with more experience researching the water sector, had already established. The WRC project reference group was another helpful network, with much useful information. Working in a university environment was another network – we had access to academic researchers who knew their fields. So were NGOs and Eastern Cape-based consultancies. By contacting all these people, we were able to find the most relevant research references, both nationally and internationally.

What we learned was:

- It is not easy to find resources from an internet search alone. Most sites that come up from a first internet search are aimed at first world 'western' readers. It was only because we knew that that there were organisations such as the RAIN (Rainwater Harvesting Implementing Network) Foundation, that we were able to access more relevant materials.
- We kept the criteria quite narrow, focusing mainly on practical rain water harvesting techniques. We have only included a few references on how people learn these techniques, and only a few of the more academic references on economic, social and environmental issues of rain water harvesting – some of these from other countries.
- We started our search by accessing Water Research Commission documents on rain water harvesting, as the WRC is major South African research organisation. In some cases we were able to follow up directly with the authors of WRC research about where to look for further documentation.
- We drew on our networks of people experienced in working in the rain water harvesting field to find out what they were discussing, and asked them for lists of their learning materials, reports and pamphlets.

The main thing we learned was that it was more efficient to access information through real people and professional networks and then only after that, through internet searches.

But of course to make those contacts, we first had to have some idea of the sector in order to know where to

look and who to ask. The question then became: since this booklet is addressed to mediators in local communities, facing different water issues, would they be able to find and use knowledge networks? How would they access the community of practice?

We think the answer is quite simple: just ask. People who have research knowledge are usually quite willing to be contacted directly and to share it. It's just a matter of finding out who they are. Most authors of research identify the insitutions they work for and often provide their email address on the research paper. Ask yourself who you know within the university who may know about water issue you are investigating. Ask who is working directly with water research or water projects in your local area.

Before you contact anyone, it is best to first clarify your aims. Ask yourself why you need this knowledge and what you need it for. Clarifying these questions means that when you go looking for knowledge you are building on what you know. This is an ongoing process because as you read something or speak to someone both your own knowledge and your network will grow. You yourself will become a resource person within a broader knowledge network.

What follows is a list of organisations that we drew on. Some of these organisations are and were specific to rain water harvesting and to our own experience. As a mediator you will make your own list according to your community's concerns.

Environmental Learning and Research Centre, Rhodes University: This is where Nina and I were working so it was a natural place to start.

http://www.ru.ac.za/elrc/

RAIN: I visited RAIN on a trip to the Netherlands. I had heard about them at a conference at Wageningen University so went to pay them a visit.

http://www.rainfoundation.org/

Umhlaba Consulting: I knew Jonathan Denison when he was a PhD student at the Geography Department at Rhodes University, and then I met him again through his work on small scale irrigation schemes. We asked him to be on our reference group because of his work in the Eastern Cape and on rainwater harvesting.

http://www.umhlabagroup.co.za/

Water Research Commission: The WRC is the major water research institution in South Africa, and I had worked on numerous WRC projects. One of the reasons that we started this project was because we were amazed at how much research knowledge was contained within the WRC even if it didn't always feed into practice on the ground.

http://www.wrc.org.za

Institute of Water Research, *Rhodes University*: As a PhD student who is part of a bigger transdisciplinary team I came into contact with quite a few student researchers and researchers through the IWR. One of them, Jai Clifford-Holmes, had been chair of Galela Amanzi, a student organisation focusing on water issues in the Grahamstown area, including rainwater harvesting. Jai gave us many contacts which we followed up on in search of relevant resources.

http://www.ru.ac.za/static/institutes/iwr//

Mvula Trust: A colleague of mine used to work for Mvula Trust so I contacted them. They are a well-established water sector NGO working in many rural communities.

http://www.mvula.co.za

WESSA:The Wildlife and Environment Society of SA is South Africa's oldest and largest environmental NGO. Several of their educational programmes focus on water.

http://www.wessa.org.za

AWARD does a lot of work on rural water issues. They have not directly focused on rainwater harvesting but their network is wide and contacting them may lead to somewhere else.

http://www.award.org.za

Agricultural Water Use for Homestead Gardening Systems. Volume 2: Resource Material for Facilitators and Food Gardeners

Manual published by: WRC, Pretoria, South Africa, 2006

Authors: CM Stimie, E Kruger, M de Lange & CT Crosby

http://www.wrc.org.za/Knowledge Hub Documents/Research Reports/TT 431 Vol 1 Agriculture Water Management.pdf

This manual is an output of a WRC research project entitled: "Participatory development of training material for agricultural water use in homestead farming systems for improved livelihoods." It draws on this research and a number of South African sources, as well as two international sources: the Food and Agriculture Organisation of the United Nations (FAO, 1997), and a resource [listed later in this booklet] produced by the Lesotho Ministry of Agriculture and Food Security.

Some of the useful practices described in the manual are:

1. Mind mobilisation and the Nutrition Workshop:

This section describes the radical Nutrition Workshop methodology of well-known rural activist MaTshepo Khumbane from Limpopo province, who devoted forty years of her life to mobilising communities in household food security, with many successes. Also described are refinements to her methods.

2. Recognizing the psychological dimension:

This section discusses how to understand the psychological consequences of insecurity about food. It argues that when this dimension is recognised and

overcome, the journey to food security and well-being becomes much more achievable.

3. The role of Garden Learning Groups:

The use of learning groups has been advocated and used with varying degrees of success in agricultural development in South Africa in recent years. Drawing on this research, the manual refines the proper role of a Garden Learning Group: to enable households to support each other morally, while avoiding the conflicts common to economic interdependence among group members.

4. Integration of technology:

In the research leading up to this manual a range of technologies were field-tested, selected for their affordability to poor households, and for how they build up the environment. These technologies include the integration of rainwater harvesting with organic agricultural practices.

This manual has been used in the Household Food Security Facilitators' short learning course at UNISA, as well as further courses planned by UNISA's Human Ecology Department. It is also used by the University of KwaZulu-Natal's elective module on household water management as part of its Certificate in Education: Participatory Development programme, within the School of Education. The Department of Agriculture has also asked the project team to develop specific training courses based on the resource material in the manual.

See also:

"WRC water harvesting short course materials get the nod", Water Wheel 8 March 2011 *http://www.wrc.org.za*

An article by Jonathan Denison on the development of a comprehensive learning package on water harvesting and conservation, structured as a 30 credit short course, which has received resounding approval from colleges and stakeholders nationally. The course is designed to be presented by AgriSETA accredited service providers and Agricultural Colleges, among others.

Water Harvesting and Conservation – Volume 2 Part 3: Facilitation

Published by: Water Research Commission, Pretoria. WRC Research report No. TT 495/11

Authors: Jonathan Denison, Heidi Smulders, Erna Kruger, Hlubi Ndingi, Marius Botha

http://www.wrc.org.za/Knowledge Hub Documents/Research Reports/TT 495-11.pdf

Part of the same research project as the one listed above, this comprehensive learning package for water harvesting and conservation (WH&C) was developed within a 'training of trainers' framework targeting three user groups: 1) learners at training organisations (who will later work with gardeners and farmers) 2) facilitators at training organisations 3) resource-poor gardeners and farmers.

The learning package comprises three main parts: 1) A Technical Module covering water, soils and WH&C methods 2) A Facilitation Module covering facilitation techniques within a Participatory Innovation Development approach 3) A set of Farmer's Handouts with illustrated steps on how to implement the methods. Each of the technical and facilitation modules comprised two volumes. There is a detailed, annotated and illustrated manual for learners, and a Facilitation and Assessment Guide for course facilitators. These are set at the level of NQF 5 on the (new) 10 tier scale.

The set of farmers' handouts are designed for people with low literacy and are illustrated 'how-to' instructions for the water harvesting and conservation methods. The

materials were developed in close consultation with key stakeholders to ensure relevance of materials to likely organisations of learning, and to end-user needs. The draft materials were successfully piloted in a formal learning environment and were reviewed by seven agricultural colleges.

Agricultural Water Use in Homestead Gardening Systems for Facilitators and Food Gardeners: Vol 1

Published by: Water Research Commission, Pretoria.
WRC Report No: TT 430/09, 2010

Authors: CM Stimie, E Kruger, M de Lange & CT Crosby

www.wrc.org.za/Knowledge%20Hub%20Documents/Research%20Reports/TT%20430-09%20Agriculture%20water%20management.pdf

This is the technical report on the research project that led to the resources listed above. The overall objective of the project was to improve household food security through homestead gardening, by developing and evaluating the appropriateness and acceptability of training material for water use management, training the trainers and training of household members in selected areas.

Lirapa brochure

Published by: The Lesotho Ministry of Agriculture and Food Security, Nutrition and Home Economics Division and Horticulture Division: Maseru, Lesotho, 2008

https://docs.google.com/open?id=0B5sig9N4UzIBZDFmYzQ2MDYtNmRlYS00NGIxLTkxYTQtNDk4ZTE0OWQxMzI3

The content includes living and eating well, a case study on the mainstreaming of HIV/AIDS, farmer experimentation, mulching, seedling production, improving soil, bed design, planting vegetables, pest and disease management, saving and using water, homestead irrigation techniques, fruit production, seed saving, conservation farming; and a case study of an integrated farming system

The manual is written in seSotho and English, and is meant for farmers and householders and the facilitators who support them.

The following excerpt provides an idea of how the content is approached:

- *Diversified production:* We plant different types of crops throughout the year. It is possible to grow vegetables, medicinal plants, herbs, flowers and fruit trees in a homestead garden. In this way we can have fresh food throughout the year. Our garden can sustain and balance itself and we can practise natural pest and disease control.
- *Value adding and income generation:* We can sell our produce and store any extra for later use. We can dry and or bottle our produce to add value to it. We can

produce seedlings and seed. These products can also be sold.

- *Keyhole gardens:* Keyhole gardens are small built up gardens that are easy to maintain and are very fertile. They catch rain water through the “key” where run-off is caught. The basket of decaying organic matter in the middle of the garden provides food to the soil and plants and assists with water holding. Mulching of the vegetables planted further assists with using water efficiently, as does the use of grey water (recycled or previously used water) on the bed. These gardens have been introduced in many regions of Lesotho and work very well!
- *Conservation farming:* Furrows and mounds are created on the contour to catch and save rain water. Erosion is controlled and organic matter is incorporated into the mounds where the crops are grown. A mixed system of continuous cropping is possible using the space on the mounds and in the furrows. Crops such as maize, beans, pumpkins and tomatoes can all be grown together. Winter crops such as wheat, cabbages, rape and kale can also be planted.
- *Rainwater harvesting and storage*: Rain water collected from the roof of a house is quite clean and can also be used for household purposes. Water collected from the ground is stored in underground tanks. This water can be pumped into an elevated tank and then used for the garden through taps or drip irrigation.

Water management in homestead farming systems

Conference presentation by E Kruger, CM Stimie and M de Lange. August 2011.

http://www.wrc.org.za/Knowledge Hub Documents/Conference proceedings/Kruger E.pdf

Overall aim: To improve food security through homestead gardening, by developing and evaluating the appropriateness and acceptability of training material for water use management, training the trainers and training of household members in selected areas. Indigenous practices and water related best practises; Developmental constraints and opportunities; Economic incentives -youth. Training needs, developing and testing materials and refining these. Impact assessment on food security.

Rainwater Harvesting for Domestic Use

Handbook published by: Agromisa Foundation and CTA, Wageningen, Netherlands, 2006

Authors: Janette Worm and Tim van Hattum

http://rainfoundation.org/fileadmin/PublicSite/Manuals/AGRODOK_RWH_43-e-2006-small.pdf

This book explains how to collect, store and purify rainwater for direct use at household level. It is a practical guide to creating a rainwater harvesting infrastructure, from design to implementation, and illustrated with pictures, tables and examples from experience.

The book describes how to plan, design and construct systems for harvesting rainwater on a small scale, from 500 to 60,000 litres. It also explains the principles and components of a rooftop rainwater system for collecting and storing rainwater.

The following extract gives an idea of how the content is presented:

> ***Reasons for rainwater harvesting***
>
> The reasons for collecting and using rainwater for domestic use are plentiful and varied:
>
> *1. Increasing water needs/demands*
>
> The increased need for water results in lower groundwater tables and depleted reservoirs. Many piped water supply systems fail. The use of rainwater is a useful alternative.

2. Variations in water availability

The availability of water from sources such as lakes, rivers and shallow groundwater can fluctuate strongly. Collecting and storing rainwater can provide water for domestic use in periods of water shortage. Rainwater may also provide a solution when the water quality is low or varies during the rainy season in rivers and other surface water resources (for example in Bangladesh).

3. Advantage of collection and storage near the place of use

Traditional sources are located at some distance from the community. Collecting and storing water close to households improves the accessibility and convenience of water supplies and has a positive impact on health. It can also strengthen a sense of ownership.

4. Quality of water supplies

Water supplies can become polluted either through industrial or human wastes or by intrusion of minerals such as arsenic, salt (coastal area) or fluoride. Rainwater is generally of good quality.

See also: *Collecting Rain: FAQs*

http://174.34.167.66/$sitepreview/globalrainwaterharvesting.org/faq.asp)

See also: *Articles and factsheets: International Rainwater Catchment Systems Association*

http://www.ircsa.org/factsheets.htm

Rainwater Catchment Systems for Domestic Supply

Editors: John Gould and Erik Nissen-Petersen

http://developmentbookshop.com/rainwater-catchment-systems-for-domestic-supply.html

Using case studies from around the world, this book focuses on roof and ground catchment systems for household water requirements. All aspects of design and construction are covered, including simple methods of sizing systems, erection of gutters, choice of materials, construction techniques, training, operation and maintenance. In addition, non-technical factors such as water quality, health, social, cultural, political, institutional and gender issues are discussed. A detailed illustrated step-by-step account is provided of how to build several different types of household rainwater tanks with volumes from 2 to 90 cubic metres.

Rainwater Catchment Systems is based on practical experience and lessons learnt during over 20 years constructing and researching rainwater systems in Africa and Asia.

See also: *Construction of a Rooftop Rainwater Harvesting Tank* by Safer Future Youth Development Project, Freetown, Sierra Leone, 2006

http://174.34.167.66/$sitepreview/globalrainwaterharvesting.org/construction_rht.pdf

A visual overview consisting mainly of photographs of the construction of rooftop rainwater tanks in Sierra Leone during 2005-2006.

Rainwater Harvesting and Rain Barrels

Online resource series published by: HarvestH_2O 1990-2012

http://www.harvesth2o.com/resources.shtml - barrels

An online series of documents describe easy ways to construct and set up rain barrels and rainwater harvesting starting with used wooden barrels. Aimed at first-world, technically-literate householders.

What is a Rain Barrel: One page overview of a rain barrel system, with pictures of several different styles. Usually a rain barrel system is made up a 55-gallon drum, plastic pipe and fittings, and a sieve to keep out debris and insects. It is relatively simple and inexpensive to construct and can sit conveniently under any downpipe.

Rainwater Collection Video: Introduction to installing a rainwater collection barrel; includes step-by-step instructions, a video, and a list of building materials.

Build a Rain Barrel: Simple two page instruction sheet on how to convert an ordinary wooden barrel into a rain barrel.

Building a Rainwater Harvesting System: Step-by-step video that explains how to build a rainwater collection system using rain barrels.

How to Make a Rain Barrel: A two-page PDF on how to make a rain barrel from a barrel.

Construct a Rain Barrel: Step-by-step instructions and list of parts on how to make a rain barrel from a barrel.

Construct a Rain Barrel for $20: PowerPoint presentation on how to make a rain barrel from a barrel, including a list of materials.

Green Rainwater: A simple and short lesson on how to collect rain, assuming you already have a rain barrel.

Locate a Barrel Near You: Locate a barrel in your area by zip code. These are usually free or low-cost used barrels that the above instructions can be used with to create a low-cost, very attractive rain barrel to collect rain.

Making a Rain Barrel: A short tutorial on how to make a rain barrel from a barrel from AgriLife Extension.

Rainbarrel Maintenance 101: Simple recommendations on how to keep your rain barrel clean and healthy.

12 Water Saving Tips: 2-page brochure with easy steps to save water inside and outside your home.

Outdoors Water Saving Tips: Easy tips to save water around your home.

Methods of Rainwater Harvesting: A thorough article on components of Rainwater Harvesting Systems, including filtration options.

Smart Water Harvesting Solutions

Booklet published by: Netherlands Water Partnership, Stockholm, Sweden, 2007

http://rainfoundation.org/fileadmin/PublicSite/Manuals/2007-08_Smart_Water_Harvesting_Solutions-small.pdf

The booklet describes several creative solutions for situations where 'there seems to be no water'. It gives examples of practical efforts to 'create water', especially in drought prone areas.

Rainwater Harvesting for Improved Food Security: Promising Technologies in the Greater Horn of Africa

Book published by: Kenya Rainwater Association, Nairobi, Kenya, 2003

Author: Dr. Stephen Ngigi

http://www.gharainwater.org/publications

This book begins by explaining how large-scale agricultural interventions, especially large-scale irrigation projects, have not been very successful, and have left a trail of negative environmental impacts that have discouraged further development. Instead, it suggests, small-scale, land-user oriented interventions seem to offer the much needed sustainable solutions to chronic food insecurity. One of the most promising land-users' initiatives is rainwater harvesting and storage for agriculture.

On-farm pond used for irrigation

The book identifies and evaluates the performance of rainwater harvesting systems in the region with the aim of promoting best practices. Various rainwater harvesting technologies and systems were identified and the most promising ones were evaluated under different conditions.

It concludes that in the Greater Horn of Africa region promising technologies already exist which require minimum adaptation for replication in other parts of the region. It seems that the only constraints to the spread of such technologies are inadequate collaboration and networking mechanisms in the region.

RAIN Sand Dam Manual

Published by: RAIN Foundation. Amsterdam, The Netherlands, 2011

http://rainfoundation.org/?&t=n&id=190 - c697

RAIN updated its much consulted 'Sand Dam Manual' after a week-long training session in Ethiopia in April 2011. The training was used to test the existing manual and to update it with lessons learnt from the field and observations from several experts, including implementing partners.

This manual is aimed at NGOs involved in water management and water harvesting, especially those constructing sand dams. It covers the critical steps in the process, from planning and construction to operation, maintenance and monitoring.

Typical Sand dam in Kituï

The manual describes processes of data collection and field surveys, and covers both technical implementation and the process of involving communities. Critical success factors, such as proper siting and good operation and maintenance, are discussed in detail. The manual advocates on-the-job training and advises users to adapt the material to local circumstances with appropriate input from experts.

The RAIN Foundation offers additional information such as checklists, designs (including water storage) and calculation tools, as well as a CD-ROM with more information and tools.

RAIN Guidelines and Practical Tools on Rainwater Quality

Handbook published by: Rainwater Harvesting Implementation Network (RAIN). Amsterdam, The Netherlands, 2008

http://rainfoundation.org/fileadmin/PublicSite/Manuals/RAIN_Rainwater_Quality_Policy_and_Guidelines_2009_v1.pdf

RAIN's guidelines for achieving good water quality by protecting harvested and stored rainwater from contamination and water-borne diseases using simple and practical means. The book is also a guideline for testing and analysing the water quality of rainwater harvesting systems; or for comparing RAIN's water quality standards with national standards for drinking water.

The level and style of the book can be gauged for the excerpt below:

> ***Factors determining water quality of harvested rainwater***
>
> Water quality is determined by the composition of water, as affected by natural processes and human activities. Water quality depends on the constituents dissolved or contained within the water. It is often presumed that the chemical composition of water is the only factor involved. However, especially (micro) biological factors are of main importance when considering water quality. Next to this there are also physical factors.
>
> It is not possible to find completely pure water in nature, since water droplets already begin to dissolve a whole range of substances in the atmosphere, such as gases, airborne dust particles and salt from sea spray. Atmospheric pollution can have a major effect on the

composition of rainwater. Water that reaches the earth as rain, acquires other substances from processes such as leaching, weathering, and dissolution. Living organisms may enter the water. All these processes affect the composition of the water. Depending on the source of the contamination, three types can be distinguished:

- *(Micro)biological contamination:*

The most common hazard in water sources obtained from roof or surface catchments is microbial (biological and microbiological) contamination, especially enteric pathogens. Enteric pathogens are micro-organisms (bacteria, viruses, and protozoa) that cause gastrointestinal illness. These organisms are introduced into drinking water supplies by contamination with faecal material (from human or animal origin) or dead animals and insects (enHealth, 2004). The most important indicator is E-Coli.

- *Chemical contamination:*

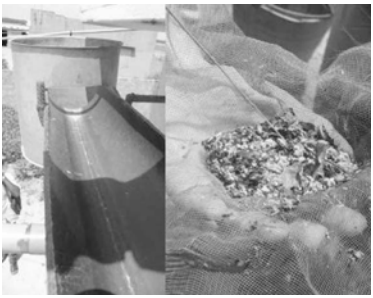
Chemical contamination results from air pollution (industrial and traffic emissions), runoff and leaching of chemical substances (agricultural and human activities) and toxic material use. All these factors can pose a serious a health threat. However, in rural areas of developing countries, these activities are mostly absent or very small scale (for example: fireplaces near a roof or having a chimney can cause soot to settle on the roof), and are therefore unlikely to cause significant impacts on the quality of the collected rainwater (en Health, 2004).

- *Physical contamination:*

Physical contamination includes inorganic and organic sediments like sand, silt, clay, or plant material. Physical contamination affects the colour, odour or taste of the water, but it poses no direct health risk. Users can

however object to water if its colour, odour and taste are found less attractive.

Besides these contamination hazards, another significant health risk is the breeding of mosquitoes in or near RWH systems (see also annex 1). Mosquitoes can breed in a storage tank, but also in blocked rainwater collection gutters, drains, puddles and pools around a storage system, due to inappropriate operation of the RWH system or poor construction. Of particular concern are species of mosquitoes that can be a vector for viruses, for instance dengue virus (enHealth, 2004). malaria, yellow fever and filariasis diseases. A clear link exists between the presence of mosquito larvae and rainwater storage containers lacking secure covers or screens (Kolsky, 1997).



Contamination can be avoided by frequently cleaning gutters, inlet pipes and collection inlet canals.

Sustainable Techniques and Practices for Water Harvesting and Conservation and their effective application in resource poor agricultural production through Participatory Adaptive Research

Authors: C Everson, TM Everson, AT Modi, D Csiwila, M Fanadzo, V Naiken, RMB Auerbach, M Moodley, SM Mtshali and R Dladla

http://www.wrc.org.za/Knowledge Hub Documents/Research Reports/1465-1-11.pdf

From this research report, published in 2011:

"Although it has wide application for the provision of drinking water, water for livestock and water for irrigation, the percentage of households using rainwater harvesting in rural areas of South Africa is low. However, with increasing populations and high unemployment there is more pressure on agriculture to provide food. Rainwater harvesting has the potential to improve food production for communities who have a high dependence on agriculture. In particular, the study focused on determining the following: The structure and composition of households and the role of gender and generation in agricultural production; The effect of seasonality on agricultural activities; The current practices and techniques used in water harvesting and conservation; The attitudes and constraints of households concerning water harvesting and conservation; Opportunities available to support socio-economic development".

See also: *Water resources management in rainwater harvesting: An integrated systems approach*

http://www.wrc.org.za/Knowledge Hub Documents/Research Reports/1563-1-08.pdf

WRC Report No 1563/1/08

Rainwater harvesting in challenging environments: Towards institutional frameworks for sustainable domestic water supply

Authors: Saskia Nijhof, Basja Jantowski, Robert Meerman and Ard Schoemaker

http://rainfoundation.org/fileadmin/PublicSite/publications/Rainwater_harvesting_in_challenging_environments.pdf

As interest in rainwater harvesting (RWH) has grown over the last two decades, several governments of Southern countries have taken the initiative to scale up community-based RWH approaches. Networks have been established between Southern and Northern civil society organizations, governments, private sector and research institutes to support and promote upscaling of RWH.

This journal article describes the approach taken by one of these network organizations in water-scarce, remote and marginalised areas, and discusses lessons learned and challenges. The main challenges are: 1) the multi-layer institutional model requires substantial initial investment and effective communication between organizations, water users and governments; 2) women's involvement in community management of RWH systems is still weak; and 3) initial investment costs for rainwater harvesting tanks are relatively high, limiting replication by communities in challenging environments.

See also:

Rainwater harvesting policies from:

India

http://www.rainwaterharvesting.org/Policy/legislation.htm

Sri-Lanka

http://www.lankarainwater.org/rwhsl/udaact.htm

Australia

http://rainharvesting.com.au/

Multiple-Use Water Service Implementation in Nepal and India – Experience and Lessons for Scale-Up

Authors: Monique Mikhail and Robert Yoder

http://rainfoundation.org/fileadmin/PublicSite/Manuals/Multiple-Use_Water_Service_Implementation_in_Nepal_and_India.pdf

A report from the RAIN Foundation on a project to develop guidelines for multiple-use water services delivery as an effective way to use water for poverty alleviation and gender equity.

Multiple-use water services (MUS) is a term for a participatory, integrated, and poverty-reduction focused approach that takes a community's diverse water needs as the starting point for providing services. Multiple-use water services move beyond the conventional sectoral barriers of the domestic and productive sectors and provide for all water needs in a community.

Traditional spring structure built in 1989

Micro-credit and Rainwater harvesting: Pumps, Pipes and Promises

Authors: Saskia Nijhof, Bala Ram Shrestha

http://rainfoundation.org/fileadmin/PublicSite/publications/IRC_symposium_nov.2010_Micro-credit_RainwaterHarvesting-Nepal.pdf

Rainwater Harvesting (RWH) is often the only solution for water supply particularly in areas where groundwater levels are very deep or contaminated due the composition of geological aquifers; or lands that are arid or semi-arid lands; or small coral and volcanic islands; or in remote and scattered human settlements.

One of the main challenges in relation to the construction of RWH systems is that initial investment costs are relatively high, limiting replication in poor communities. Access to micro-credit could empower households in remote and underserved areas to finance their own RWH systems. Micro-credit could also replace subsidy, making it a more sustainable water supply option, especially if it is combined with income generating activities and programmes.

Climbing the Water Ladder – Multiple-use water services for poverty reduction

Authors: B. van Koppen, S. Smits, P. Moriarty, F. Penning de Vries, M. Mikhail and E. Boelee

http://rainfoundation.org/fileadmin/PublicSite/Manuals/Climbing_the_Water_Ladder_-_Multiple_use_water_services_for_poverty_reduction.pd

The challenge of bridging the gap between people's water needs and water services provision was taken up by the action research project 'Models for implementing multiple-use water supply systems for enhanced land and water productivity, rural livelihoods and gender equity'. The project was supported by the Challenge Program on Water and Food (CPWF-MUS).

Envisaging multiple-use services as a promising new approach, the project sought to expand and deepen knowledge of what MUS is and could be, in a range of different contexts. Its aims were twofold: identifying how MUS could best be implemented in communities and how MUS models identified in communities could be scaled up to ensure better services for, in principle, everybody. This book synthesises the experiences of CPWF-MUS. It is written for anyone interested in providing water services to improve the livelihoods of water users in rural and peri-urban settings, including policy makers, engineers, planners, financers, social mobilisers, community activists, private water service providers, or academics.

Life Cycle Costs study on rainwater harvesting

Authors: C. Batchelor, C. Fonseca and S. Smits

http://rainfoundation.org/?&t=n&id=190 - c697

In this RAIN research study, the comparative utility and benefits of RWH are assessed from a life-cycle costs (LCC) perspective. In the context of water services delivery, life-cycle costs relate to the expenditure that is needed to ensure that water supply systems deliver sustainable and equitable services, throughout its life-cycle, from planning to implementation, operation, maintenance and replacement. In addition, the study looks into historical trends and drivers of RWH adoption, and the life-cycle costs of RWH systems compared to life-cycle costs of other water supply systems.

Performance assessment of rainwater harvesting in Ethiopia

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RAIN recognised that despite the many traditional and modern rainwater harvesting (RWH) technologies and practices in Ethiopia, there was very limited information on their performance in relation with their technological success, management, benefits, impacts, limitations and related issues. Such lack of information has been a constraint in the promotion and development of RWH in Ethiopia.

The main objective of the research was to assess the performance of existing traditional and modern RWH practices for domestic supply and other productive uses in selected rural parts of the country. RWH performance in the context of the research refers to RWH technologies in use; their operation and management; the benefits and impacts; and technological and management limitations.

Indigenous water harvesting and conservation practices: historical context, cases and implications.

Published by: Water Research Commission report No. TT. 392/09, Pretoria, RSA.

Authors: Denison, J. and Wotshela, L., 2009.

http://www.wrc.org.za/Pages/KH_AdvancedSearch.aspx?k=water+harvesting+and+conservation

This report identifies 13 indigenous rainwater harvesting and conservation practices across South Africa. It reviews 10 of these in detail, of which one is distinctly indigenous (Gelesha practice), five are a product of local and external influences, and the remaining four use contempory scientific methods.

It observes that indigenous water harvesting techniques in South Africa have evolved to a lesser degree than other more arid regions of the continent, due to historical settlement in wetter parts of the country and a cattle-based culture.

Film: Lessons learned from the RAIN programme 2005-2010

This film provides an overview of the lessons learned so far in the RAIN programme and shows interested actors such as donors, non-governmental organisations, private sector organisations as well as the general public good insights into RAIN's programmes in Nepal, Ethiopia, Burkina Faso, Senegal and Mali.

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Holistic Management and water harvesting: the Savory system

http://www.savoryinstitute.com/holistic-management

Alan Savory in Colorado, USA, has developed an effective way of restoring grasslands by using livestock to simulate the effect of wild grazing animals under which our grasslands evolved. Anyone interested in restoring the water harvesting capacity of grazing areas can learn from the methods he has developed.

The Savory Institute promotes large-scale restoration of the world's grasslands by 'holistic management': managing livestock so as to heal the land. It has a branch based in Zimbabwe called the Africa Centre for Holistic Management (ACHM) which trains farmers to use livestock to restore degraded watersheds and croplands.

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Change Orientated Learning and Water Management Practices

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