Managing the Water Buffer With 3R

A pragmatic approach for delivering results

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Introduction

People living in drought-prone areas are one of the most difficult groups to reach with the millennium development goal efforts. Climate change and increased incidence of extreme weather events will even have a further negative impact on water security. This challenge requires innovative solutions, one of which we refer to as 3R. It is a promising development track, which deserves promotion and funding, combining rainwater harvesting, groundwater management and efficient water use.

What is 3R?

3R stands for **Recharge**, **Retention** and **Reuse** of all types of water including groundwater.

Recharging water is a hydrologic process in which rain- and storm water moves downward from surface water to groundwater. Water **retention** refers to the technologies for the storage of water, which may vary according to local conditions and available materials. **Reuse** of water involves technologies, which enable available water to be recycled in times of need and scarcity.

3R is both an approach and an initiative that deals with the management of the water buffer. It presents an alternative concept in storing rain and storm water in the landscape. Water is stored in many small systems, in tanks, groundwater, soils moisture or surface water reservoirs. It will be available in the dry period. Through a range of simple 3R technologies, the buffer function of an area will improve. This can be applied at different levels, from watershed scale to farm/community level. A combination will lead to maximum resilience.

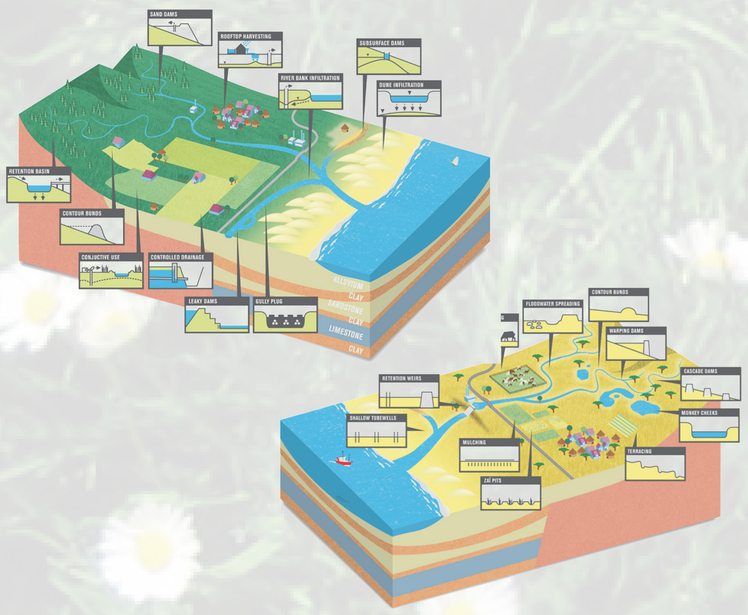

Fig. 1: 3R applications within a river basin (Steenbergen & Tuinhof 2009)

Examples of 3R techniques are sand- and subsurface dams for riverbed storage, valley dams and ponds as open reservoir storage, rock catchments and rooftop harvesting for storing in closed tanks. The use of bunds, terraces and mulching helps in retaining more water in the soil profile (Figure 1).

For information on two current 3R projects in Tanzania and Bangladesh please refer to the posters presented by Rolf et al. and Matin.

Managing the Water Buffer with 3R

The advantages are plenty. 3R solutions are decentralized solutions that when applied at scale do not disrupt the local environment, but add value to it. 3R technologies can be applied in many different circumstances. Combined with relative low investment costs this makes 3R an alternative that is highly feasible for sustainable water supply on a local scale. By storing water in the soil profile 3R technologies can also contribute to diminish the risk of crop failures in rain-fed agriculture.

A combination of 3R techniques, specifically designed for the local context, allows for short term results (increased water supply) as well as effects on the longer term (e.g. resilience to climate change). It systematically improves the resilience of local communities and businesses to water scarcity, food insecurity and climate change.

Fig. 1: A typical sand storage dam during the dry season in the Kitui District, Kenya

In general the benefits of 3R interventions are:

- Sustainable water supply
- Water and food security
- Mitigation of effects of longer dry periods
- Diminished risk of floods during intense rainfall events
- Increased resilience of communities
- Low investment costs
- Flexibility in application and appearance

How do we work?

3R partners work on projects and programs aiming to deliver a structural contribution in solving water scarcity issues. We promote technologies to assist people in water scarce areas and to maximize the use of available water with a systematic approach (see box on the right).

3R partners try to stimulate major planning and financing agencies and also the private sector to include these effective technologies in their programs and investments. In recent 3R projects our systematic approach has proven to be a valuable contribution to larger donor programs with a primary focus on water & sanitation or water & agriculture. The 3R approach combines a technological basis with capacity building and training of local water practitioners, always based on a demand driven inventory.

Some stunning 3R facts

- Water harvested from a rock outcrop of 1 hectare can harvest around 900.000 litres of fresh water from a mere 100 ml of rainfall;
- Plastic mulch is successful in decreasing the amount of water lost through evaporate-transpiration and increase yields up to 50%;
- The average time spent to fetch water decreased from 140 to 90 minutes after the introduction of sand storage dams;
- Grass strips planted along contour lines help in slowing down runoff and augmenting soil moisture with yields increases of up to 40%.

Where is 3R? In many countries, like

Mozambique	The Netherlands
Kenya	Senegal
Nepal	Uganda
Mali	Ethiopia
Burkina Faso	Bangladesh

What are we looking for?

The 3R group actively seeks:

- Program partners - to develop and implement effective programs to increase water availability and climate resilience;
- Financing - to leverage and develop programs or implement pilot projects which serve as an example for up scaling;
- Network and support- to promote this innovative approach, find partners and funding to join forces and to exchange useful information and experiences.

The 3R Roadmap

Which 3R technique, or combination of 3R techniques, is most favorable depends on both the physical as socio-economic circumstances. The 3R consortium developed a step wise approach, in which different phases are distinguished to translate the request and the local demands into a selection process of the most favorable 3R technique(s) and their implementation. Key in the stepwise approach is that both the landscape and the local possibilities and preferences play an important role in the selection of the techniques. Capacity building during all phases is an important part of the approach.

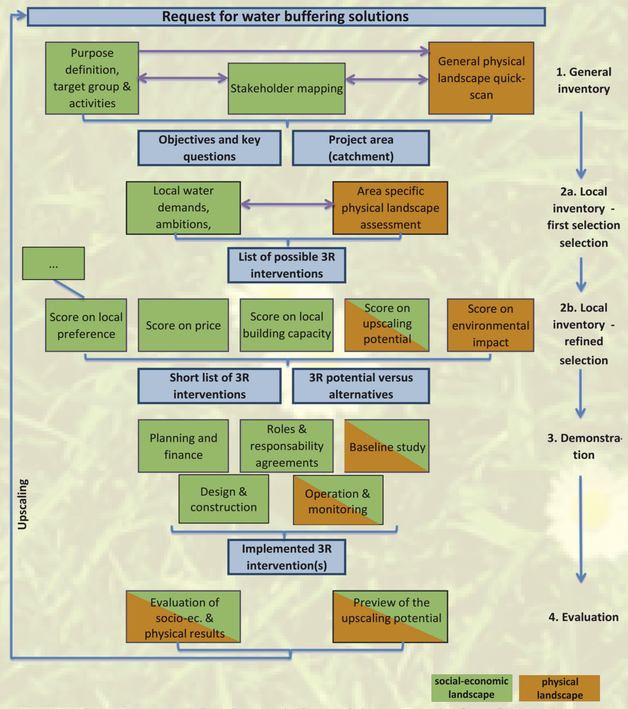

Fig. 3: The 3R approach scheme (adapted from Tuinhof et al. 2012)

1) General inventory

On the one side an inventory of the socio-economic landscape has to take place; what target group and relevant stakeholders, target activities (kind of use, scale, challenges, i.e. climate change) and what is the target region. Next to that a quickscan should be done of the geo-physical landscape, to indicate what areas have high 3R potential.

2) Local inventory

a - first selection: The local inventory focusses on local water demands, ambitions and challenges in a local stakeholders process. The area will be further analyzed be means of desk and field studies, also looking at local existing situation, 3R opportunities, expected impact of climate change, population change etc.

b - refined selection: Promising 3R interventions should match the local context and demands and scored on environmental impacts, resulting in a first list of possible 3R interventions. This leads to a clear idea on the water demand and if this van be best addressed with (the selected) 3R solutions. This is a go/ no go moment in the process.

3) Demonstration

Before starting the pilot implementation phase, the a socio-economic and physical baseline & goals should be noted, including a monitoring plan. Agreements will be made concerning roles and responsibilities for construction, operation and maintenance.

4) Evaluation

Evaluation and documentation of socio-economic and physical results are important input for determining upscaling potential, and preview financing opportunities. Upscaling might lead to integration of the 3R approach into policies, trainings or existing (governmental) programs. Large scale 3R area inventories can be part of that process. Sharing of results, knowledge and documenting best practices can further improve the 3R approach.

Cited Literature

Steenbergen, F. van & A. Tuinhof. (2009): Managing the water buffer for development and climate change adaptation. Groundwater recharge, retention, reuse and rainwater storage. Wageningen, The Netherlands: MetaMeta Communications.

Tuinhof, A., F. van Steenbergen, P. Vos & L. Tolk (2012): Profit from Storage. The costs and benefits of water buffering. Wageningen, The Netherlands: 3R Water Secretariat.

What do we offer?

- Growing network with ongoing programs and implementing partners, both from public and private sector in many countries;
- Developing & sharing tools and knowledge;
- Expertise to help face water buffering challenges and development of new programs.

Further Information

For more information please contact the 3R Secretariat or visit our website

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Rainwater Harvesting Implementation Network

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