Water Use Master Plan + 3R

Facilitator's Manual

December 2015

HELVETAS Swiss Intercooperation NEPAL

META META

aidenvironment

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Introduction

In many areas of the world, people experience periods of water scarcity even though there is enough rainfall and run-off on an annual basis. At moments when water is plentiful, often a large portion of it disappears unused through floods, surface run-off, and evaporation. Nepal, despite being one of the most water-abundant countries in the world with over 6,000 rivers, is experiencing severe water challenges hampering both economic development and poverty alleviation. Nearly 85 per cent of the country's annual rainfall occurs during the monsoon months, from June to September. This means there is an overabundance of water during these months and a shortage outside of this period. Better water buffer management is needed to avoid localized scarcity and prepare for future climate change shocks and increased climate variability.

HELVETAS Swiss Intercooperation, MetaMeta and Aidenvironment have developed a WUMP + 3R approach. WUMP + 3R builds on the Water Use Master Plan (WUMP) approach, developed and implemented by the Water Resource Management Programme of HELVETAS Swiss Intercooperation, and on the concept of 3R (retention, recharge, and reuse), as developed by the 3R consortium (including Aidenvironment and MetaMeta).

The **objective of the WUMP + 3R approach** is to mainstream the issues of recharge, retention, and reuse in operational and inclusive water use planning in Nepal for climate change adaptation and enhanced water resource management. The approach is developed for implementation at the village development committee (VDC) level, which is the lowest administrative unit of the Government of Nepal. An average VDC has about 5,000 inhabitants in an area of about 35 km^2. However, both area and population vary greatly across ecological regions and districts. The WUMP + 3R approach emphasizes low-cost and small-scale water conservation and inclusive management solutions that can be implemented at the local level. It envisions giving women and men from all walks of life and disadvantaged communities the means and confidence to protect their livelihoods in response to climatic changes, and to improve local water management to ensure reliable and sustained access to water, economic development, and environmental integrity.

This document is prepared as a **Training Manual for WUMP + 3R facilitator**s who facilitate the inclusive WUMP + 3R process in the field. The focus of the manual is on developing the knowledge and skills necessary for a facilitator. This manual also provides links to the knowledge, skills, and resources necessary for trainers who train the facilitators. The manual is organized into three components:

1. **Modules**:
   - Module 1 provides an introduction to the basics of water resource management;
   - Module 2 provides detailed steps of the WUMP + 3R process; and
   - Module 3 provides examples of the final results of a WUMP + 3R development process. These modules concisely and clearly present the concepts, ideas, and processes behind WUMP + 3R and refer to annexes for further details.
2. **Annexes:** The WUMP + 3R process involves 17 steps, each of which has specific sub-steps, procedures, and corresponding checklists, formats, forms, and procedural guides. All checklists, forms, formats, and procedural guides are included in the Annexes.
3. **USB stick:** Additional relevant material for trainers is compiled on a USB stick.

This manual can be used as a standalone guideline for WUMP + 3R facilitators in the field and as training material for trainers of WUMP + 3R facilitators.

The WUMP + 3R training programme (presented in Table 1) is designed for current or upcoming WUMP + 3R facilitators. For additional reference material and teaching aids, refer to the separate USB stick for Trainers. The salient features of the training are shown below:

Title	:	WUMP + 3R Facilitators Training
Purpose	:	Provide WUMP + 3R facilitators with knowledge, skills and tools to facilitate and guide the inclusive WUMP + 3R development process
Target group	:	Local WUMP + 3R facilitators (with participation of women and disadvantaged groups)
Objective	:	At the end of the training, the trainees will be able to: • appreciate WUMP + 3R as an effective and inclusive water governance tool • facilitate a stepwise and inclusive WUMP + 3R development process at the VDC level
Training duration	:	5 Days (30 h)
Methodology	:	The training uses a wide range of learning methods like lecture, group discussion and exercises, visual presentations (e.g., PowerPoint, flip charts), site visits, self-study, and question-answer
Trainee evaluation	:	A multiple choice objective test at the end of each module
Training evaluation	:	Elicits trainees' opinions on training content, trainers' knowledge, training methodology, and logistics

Table 1: Training Programme

Day	Session-I	Session-II	Session-III	Session-IV
1	Registration, introduction of participants, objective of the training	**Module 1:** The Basics - water cycle; global water distribution; blue, green, and brown water	**Module 1:** Introduction to the water management landscape: Introduction to IWRM, the local IWRM context, and justification for the local unit of management (including watershed concept); Gender equality and social inclusion in IWRM	**Module 1:** Introduction of 3R concept and its relevance, climate change adaptation, and WARM + 3R Chair
2	**Module 1:** Introduction to 3R technologies	**Module 2:** WUMP + 3R process: phases and steps	**Module 2:** Preparatory and capacity building phase	**Module 2:** Assessment phase: Socio-economic assessment and need identification sub-steps and relevant instructions
3	**Module 2:** Overview of socio-economic assessment (incl. gender and social inclusion analysis tools) and needs identification formats and checklist	**Module 2:** Exercise on social/resource mapping	**Module 2:** Assessment phase: technical assessment sub steps and relevant standards	**Module 2:** Assessment phase: Technical assessment formats and checklist (source measurement, ward profile, scheme inventory)
4	**Module 2:** Assessment phase: Field exercise on source measurement, inventory of existing water schemes, and ward profile	**Module 2:** Assessment phase: Technical formats (proposal formats, 3R opportunity verification formats)	**Module 2:** Assessment Phase: Group exercise on proposal format filling	**Module 2:** Planning phase: Ward level planning instructions and formats, table of contents for report
5	**Module 2:** Planning phase: VDC level planning instruction and formats	**Module 3:** WUMP + 3R Examples	Action plan preparation	Evaluation of training and closing

Module 1: The Basics

Module objectives:

To provide an introduction to the general concepts of water management (the water cycle, global water distribution), the WUMP + 3R approach, and the 3R techniques of water buffering, focusing on meaningful access and control for women and poor and disadvantaged people for equitable benefit sharing.

By the end of the module the trainee is expected to:

- Understand the water cycle and its impact on water management at the local level
- Understand the inclusive concept of WUMP + 3R
- Understand the potential of 3R techniques and their scope in the context of local water planning and management.

Chapter 1: The water cycle

1.1 Introduction to the water cycle

Water on planet Earth is in constant motion and continuously changes its state between solid, liquid, and vapour. Precipitation in the form of snow and rain falls from the sky, forms snow packs, melts, directly runs off, flows into rivers, and infiltrates the ground. Part of the precipitation directly evaporates from water bodies and soil or transpires from plants and goes back into the atmosphere. Some water flows to the sea or to lakes before evaporating, forming clouds. All these processes are part of a large system called the **water cycle** (figure 1). Although it is constantly recycled through the earth's system, the total amount of water circulating is finite: there is a total of approximately 1,400 million km^3 water on Earth.

Water has great social and economic importance. Human society, culture, and livelihood depend on availability, access, and control of water sources. Women have high attachment to water, as they spend many hours each day collecting water for domestic, farm, and livestock use. Traditional stereotypical views, such as untouchability, create constraints to access and control over water resources and its equitable distribution of benefits, e.g. for women during menstruation and for Dalits. Water should not only be considered from basic needs approach, but rather from the perspective of cultural heritage and economic value for a prosperous and equitable society.

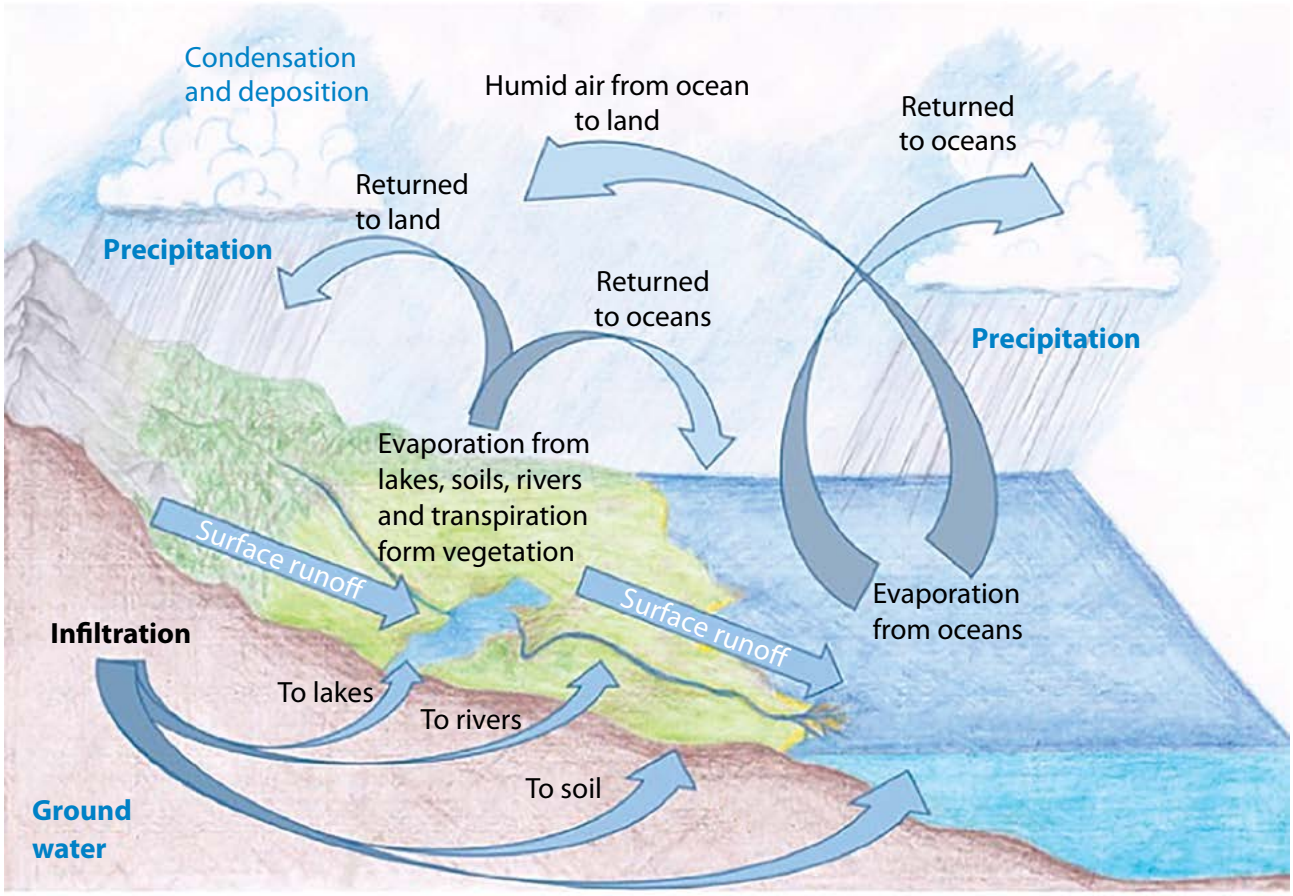


Figure 1: The global water cycle (S. van Poelgeest)

The water cycle is currently undergoing significant alterations due to climate change. Climate change not only results in rising or changing temperatures, but it also affects the water cycle as a whole. An increase in global temperatures means that the atmosphere has the capacity to hold greater moisture, bringing with it changes in the amount of water vapour, rainfall, and circulation of water in the atmosphere. The 20th century has seen an increase in precipitation in northern latitudes, but a downward trend in the tropics, particularly after the mid-1970s. Areas that have experienced an overall reduction in precipitation are also likely to have seen an increase in extreme rainfall events. It is predicted that the intensity of rainfall events will increase even further, leading to more water running off the land and less being retained in the soil. Therefore, it will become even more important to implement water retention and storing measures for use during periods of less precipitation.

1.2 Global water distribution

The water that is directly accessible for domestic, agricultural, and industrial requirements is only a small fraction of the total water available on the planet (see : Global Water Distribution (Source: Shiklomanov, 1993). Most of the water is saline and found in the oceans. Of the available fresh water, most is stored in the form of ice in glaciers and ice caps, whereas only 1.3 per cent is directly available as surface water.

1.3 Blue, green and brown water

When we talk about water, we mostly refer to the water that we drink or that we can pour into a bucket. This is the water that moves in the form of rivers, runoff, and groundwater from one point to another as visible flows. It follows the "blue water flow" and is called "**blue water**"- water in rivers, lakes, and wells, captured in livestock pans, and that can be easily collected with a jerry can (see also figure 3 and 4).

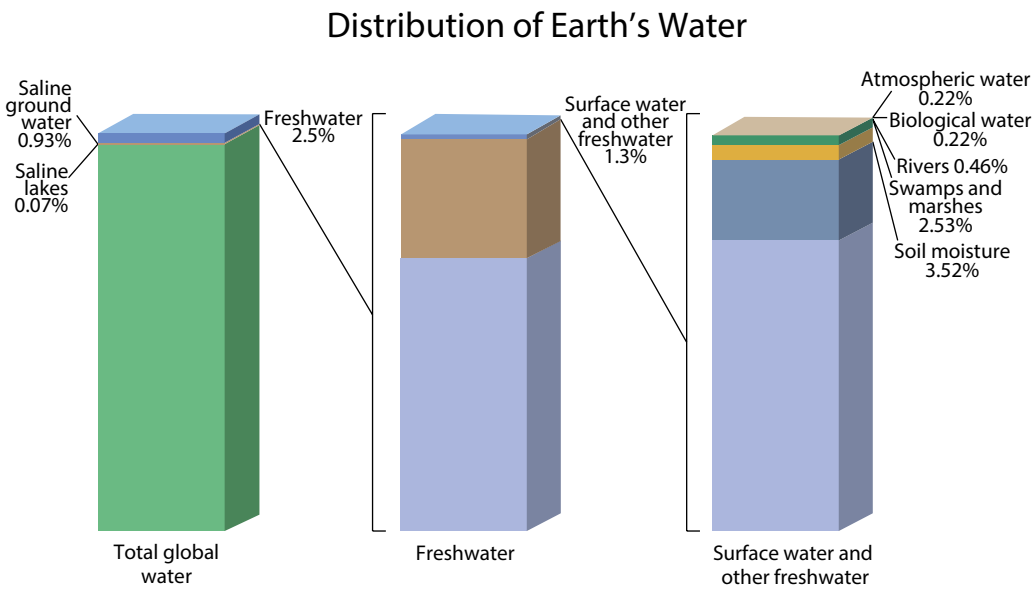


Figure 2: Global Water Distribution (Source: Shiklomanov, 1993)

Blue water
rainfall, runoff, surface water and groundwater

Green water
water in vegetation, water in soil layer

Brown water
waste water from irrigation, domestic and industrial use

Figure 3: Blue, green and brown water

Some of the surface water infiltrates into the ground and adds to the moisture content of the soil. If sufficient in quantity, it may move further down and enrich the groundwater. The groundwater table is located in a layer of fissured rock, soil, or weathered rocks that trap the water like a big sponge. Groundwater slowly moves underground and it emerges again to feed springs, rivers, and lakes. Particularly during the dry season, the stream flow component that is fed by groundwater is often considerable. Runoff from rain is seasonal in nature, and it only occurs during the rainy season, whereas groundwater flow is much steadier during a given time period.

Water that moves back to the atmosphere through the process of transpiration from plants and evaporation from soils follows the "green water flow", and is called "**green water**". Green water cannot be fetched with any kind of bucket, jerry can, or pump. The only pump able to use this

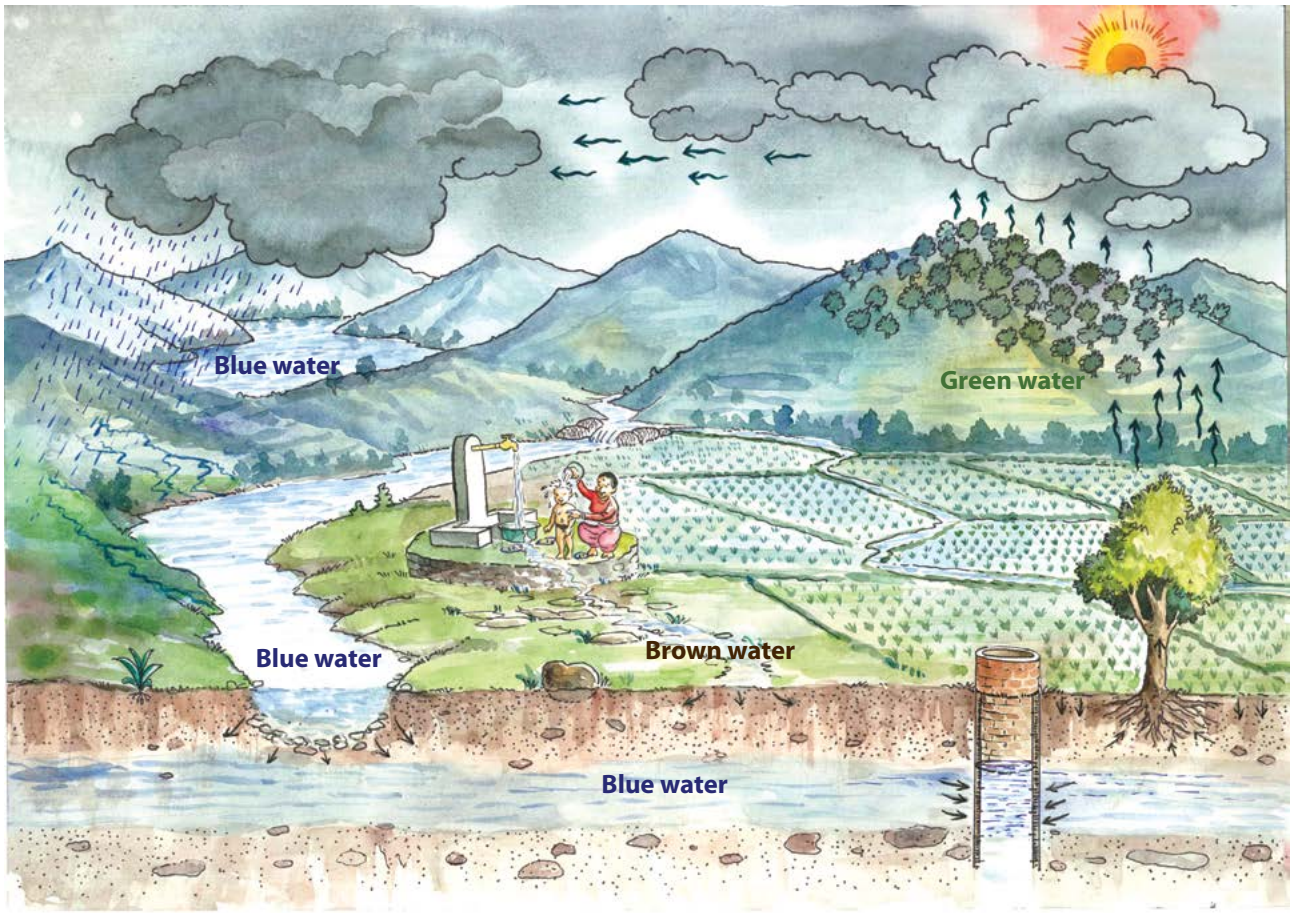


Figure 4: Blue, green, and brown water flows on a Nepali farm

water is the root systems of plants. Once the plants have used the water to grow and thrive, the water transpires back into the atmosphere.

The wastewater resulting from different uses of blue water, such as water used for washing household items, clothes, or vehicles, or water from drainage of irrigation systems is called "**brown water**". This water is of lower quality, but it can be reused for other purposes, augmenting the efficiency of the water cycle.

The WUMP + 3R approach addresses the issue of water management at landscape scale, combining the two schools of thought. The final WUMP + 3R product (i.e., the plan) is based on the administrative boundaries of the VDC. The watershed approach, though considered, will focus on the VDC under assessment as well as directly adjacent villages. This is due to the administrative boundary norms related to water sharing. This implies that neighbouring VDCs, if sharing the same watershed, will need to be thoroughly involved when planning, designing, and

Box 1: How to define a watershed?

On a topographic map, the landscape is represented as a flat drawing of reality. This representation can be imagined as the view – without colours and perspective – that you might have from a plane flying over the mapped area. Cartographers needed to represent altitude, and for this purpose contour lines are used in topographic maps. Contour lines connect points with the same altitude. For example a hill on a map is shown as a series of lines, each representing one altitude, and the closer the lines are to one another, the steeper the slope. When seen from the sky, these contour lines will appear as a group of concentric circles. In most cases, the smaller circle will be the mountaintop while the external circle represents the base of the mountain (figure 5a).

To define watershed boundaries, it is necessary to draw a line that starts from the outlet of the catchment and that passes the high points that surround the catchment. This line passes from hilltop to mountaintop. Finally, the divide line will join the watershed outlet after having enclosed the watershed area (as shown in figure 5b).

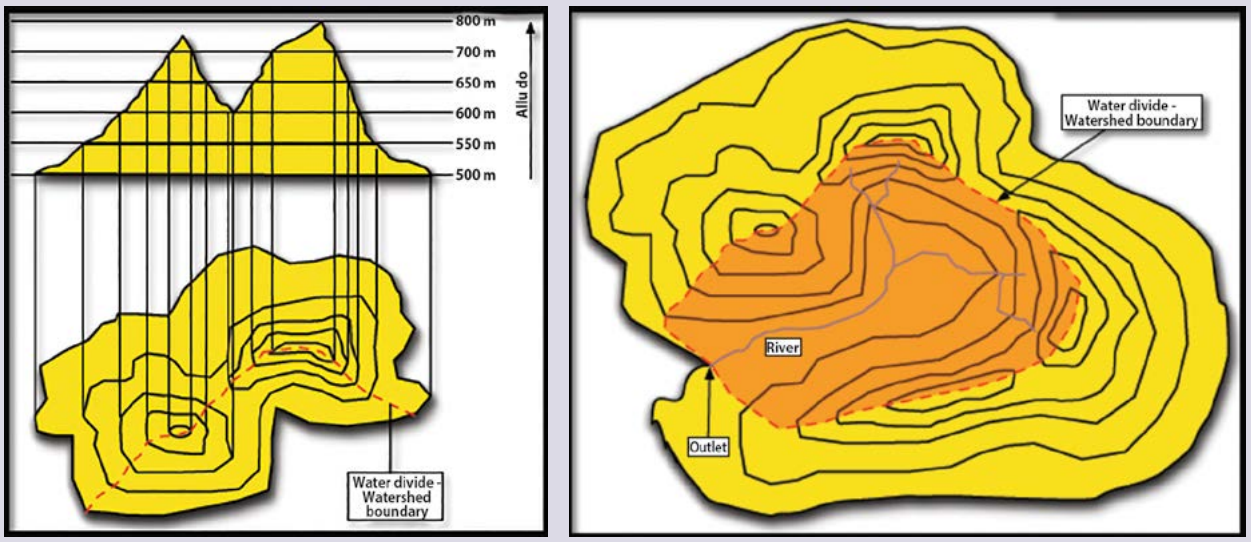


Figure 5: a) How to delineate a watershed divide on a topographic map; b) final watershed (Source: Sambalino, Visscher, Demissie, & Van Steenbergen, 2013)

implementing certain projects through a stakeholder platform and dialogue. In the case of water sources to be shared between one or more villages, the communities of the concerned VDC should initiate the signing of an agreement between the two committees to share and manage the water sources.

Sustainable water resources planning and management is very difficult without taking the larger landscape into account by only looking at the administrative boundary. Costs saved in this phase could become a burden for communities in the future. Therefore, if time and resources allow, adjacent administrative units (VDCs) should also be involved in the planning and implementation process.

1.4 Climate Change

- *Climate is the statistical representation of weather over days, months, seasons, years, decades, and longer.*
- *Weather describes the details of what we experience over the course of hours and days. It can change a lot within a very short time.*

Climate change is a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature. According to the Intergovernmental Panel on Climate Change, climate change is a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes, external forcing, or persistent anthropogenic changes in the composition of the atmosphere and/or land use.

Today, most of the world relies on fossil fuels to meet energy needs. Burning fossil fuels releases carbon dioxide, a heat-trapping gas, into the atmosphere, which is the main reason that the climate is changing so rapidly. Also, deforestation and urbanization are responsible for such changes. Life on Earth is made possible by energy from the sun, which arrives mainly in the form of visible light. About 30 per cent of sunlight is reflected back into space by the outer atmosphere, but the remaining 70 per cent passes through the atmosphere to warm the earth's surface (see figure 6).

The earth's surface in turn radiates energy back by emitting infrared or thermal radiation. Various gases in the atmosphere form a blanket to absorb and emit heat. These heat-trapping gases are also called greenhouse gases, and they are naturally part of the atmosphere, helping to keep the earth warm enough for plants and animals to live, which is essential for life on Earth. This process is the fundamental cause of the greenhouse effect. The main greenhouse gases in the earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and ozone. All of these gases, except chlorofluorocarbons, occur naturally, but human activities have increased their emission. All these gases released excessively into the atmosphere are causing the earth to get warmer and to experience the effects of climate change.

1.5 Effects of climate change

Climate change affects the balance of local ecosystems, its weather patterns, and the multiple economic sectors that rely on them (examples in figure 7). As an example, the production of food crops is the most climate-dependent economic activity. Changes in climate can be expected to have significant impacts upon crop yields through changes in both temperature and moisture. As climate patterns shift, changes in the distribution of diseases and pests may also have an impact on agriculture. Increased temperature and rainfall variability have resulted in the shifting of agro-ecological zones and prolonged dry spells. Studies have shown that new alien and invasive species are also spreading as their suitable habitat is extending at a faster rate.

Temperature drives the hydrological cycle, directly or indirectly influencing hydrological processes. In a warmer climate more evaporation occurs, resulting in more precipitation. Such changes may affect the spatial and temporal distribution of runoff, soil moisture, groundwater reserves, etc. More evaporation from land may increase the frequency of droughts and more precipitation may increase the frequency of floods.

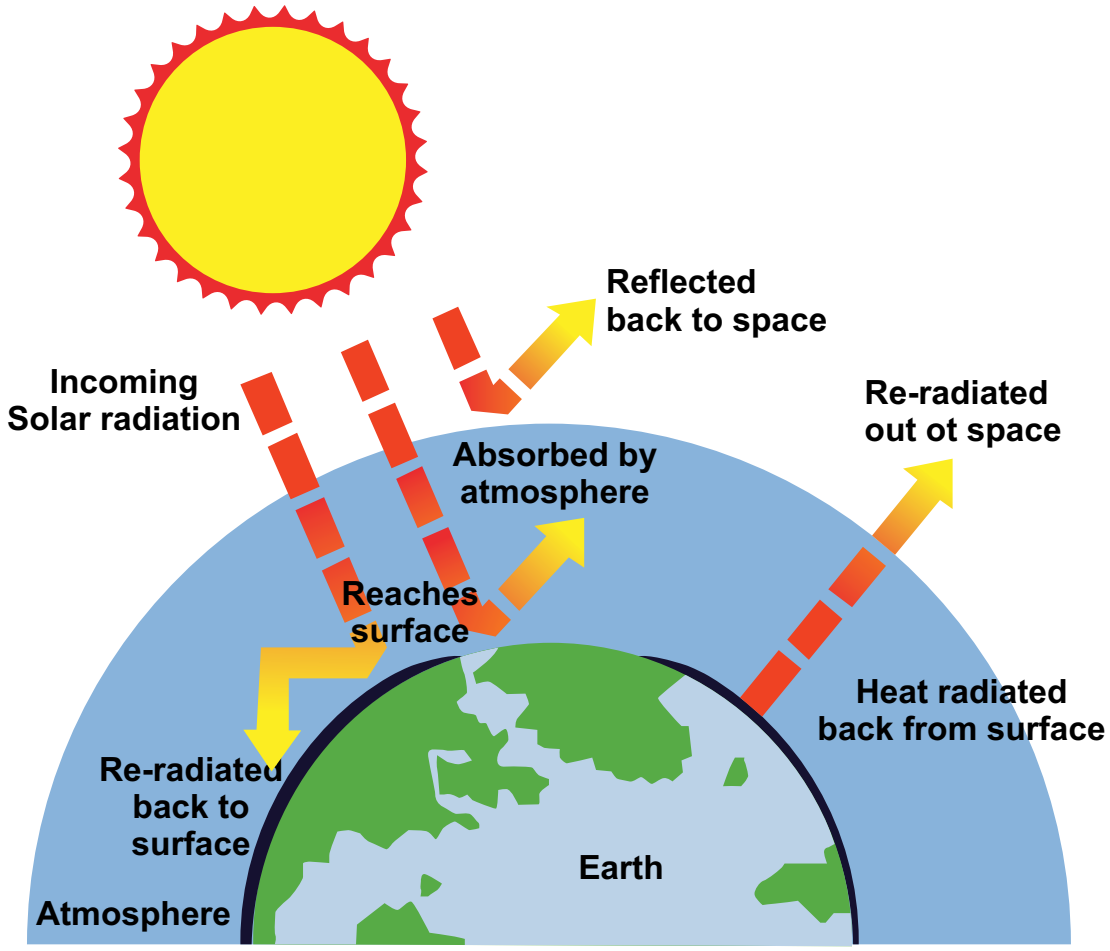


Figure 6: Greenhouse effect

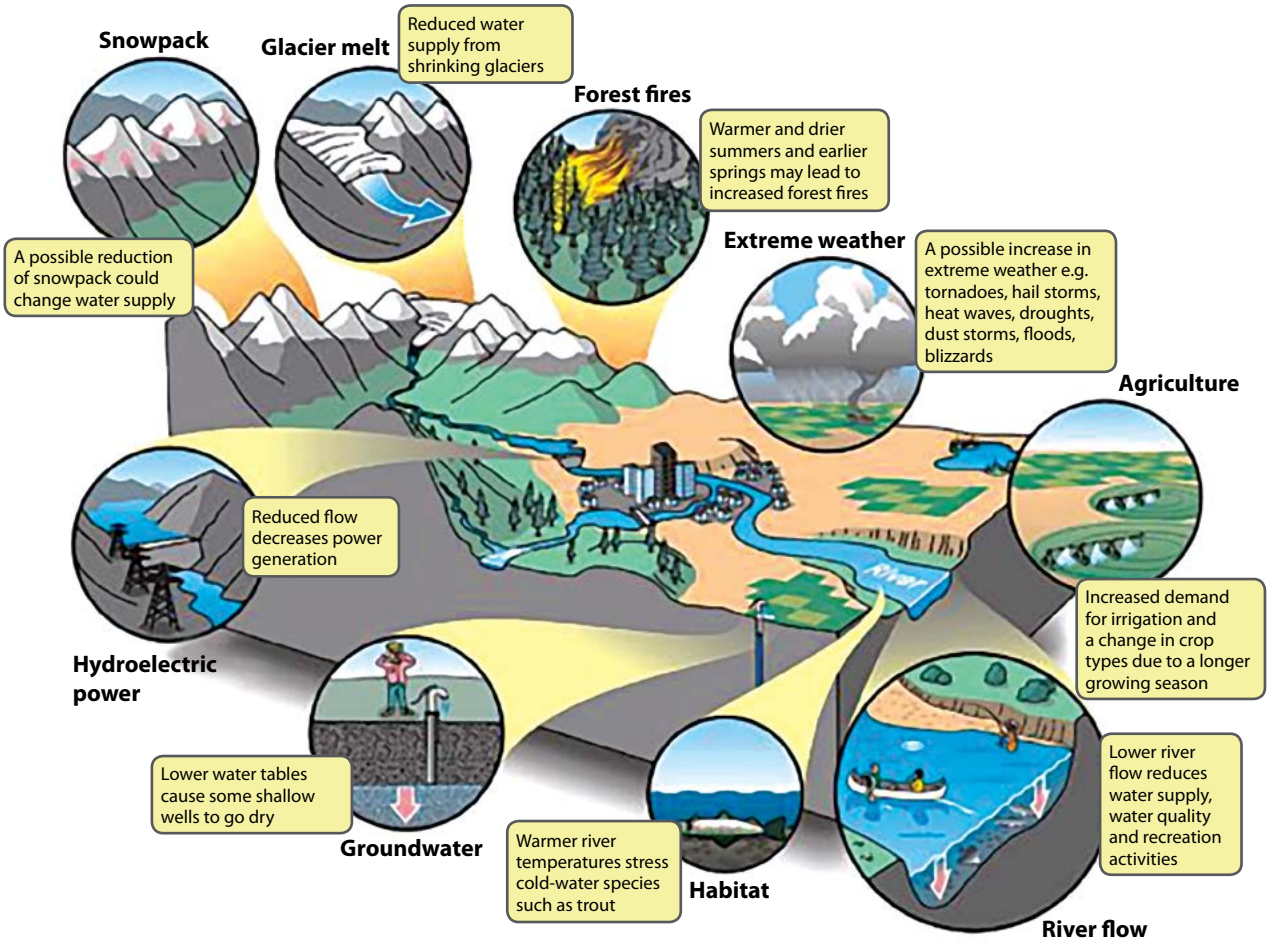


Figure 7: An illustration of impacts of climate change on water resources, ecosystems, and human activities (Source: www.nrcan.gc.ca)

1.6 Climate change in Nepal

Nepal is a hotspot for most hydro-meteorological disasters. Nepal is ranked the 30th most at-risk country with respect to water-induced disasters. Climate change will result in more intense precipitation events causing increased floods, landslides, avalanches, and mudslides that will cause increased risk to human lives and properties (IPCC 2001).

Nepal is one of the most vulnerable countries to climate change impacts. A recent study of Maplecroft (2011) has ranked Nepal fourth in the list of climate vulnerable countries. Despite Nepal's insignificant contribution to climate change, with only 0.025 per cent of the total greenhouse gas emissions in the world, Nepal will be affected exceedingly by the changing climate. The topographic complexity of Nepal makes projecting climate change more difficult

Box 2: Glacial Lake Outburst Floods

Glacial lakes are present near glaciers where the water is trapped in the valley behind an ice or unconsolidated material (moraine) barrier. If this barrier fails to hold, the water is released down the valley with great destructive force. Climate change is likely to augment the volume of these lakes and exert pressure on retaining barriers.

than usual; therefore, any projection needs to be interpreted with caution. Nevertheless, the majority of global climate change models for Nepal predict an increase in temperature for the whole of the country between 0.5 and 2.0 degrees °C up to 2030 and an increase between 3.0 and 6.3 °C by the 2090s. In addition, Himalayan glacier melt and retreat has been observed, and Glacial Lake Outburst Floods (see Box 2) have become a great threat to mountainous Nepalese settlements.

The Himalayan mountain range and the South Asian monsoon rains influence Nepal's climate. The projected data indicate an increase in summer monsoon and post-monsoon rainfall as well as an increase in the intensity of rainfall and a decrease in winter precipitation. All of these variations may cause natural disasters, catastrophes, and calamities. As local rural communities and people living in poverty have less capacity to adjust to the effects of such disasters, they will be affected the most. In Nepal, there are over 10 million rural people at risk of floods, landslides, droughts, changing seasonal weather patterns, and new tropical diseases, specifically women, poor and disadvantaged people, children, the elderly, and the disabled. These predictions pose important water challenges. Therefore, it is even more important to be able to manage the water buffer to prevent water from becoming the destructive force it can be. For example, during the monsoon season in Nepal in 2013, floods and landslides claimed more than 60 lives and damaged numerous houses. People must store water when it is abundant and to make it available for longer periods.

Water resources, agriculture, forests, and biodiversity are major sources of livelihood of most people, particularly those living in rural areas. These sectors are considered very vulnerable to climate change. The effects of climate change on these sectors have already been observed and experienced. People are already facing the stress of acute shortages of water for both drinking and irrigation purposes. In some cases, this situation has compelled people to leave their villages. The inclusive WUMP + 3R approach is specifically designed to enable communities, particularly women and poor and disadvantaged people, to better cope with these extremities by creating resilience through holistic planning and water buffering.

Although global climate change is a serious force to be reckoned with, there are also substantial anthropogenic causes for diminishing groundwater levels and (flash) flooding. Much can be done on the ground to reverse this trend in terms of specific 3R measures that can improve the water retention capacity of the soil, for example through groundwater recharge and decreased flooding.

Chapter 2: The WUMP + 3R approach

2.1 Integrated Water Resource Management – An introduction

> *"**There is a water crisis today. But the crisis is not about having too little water to satisfy our needs. It is a crisis of managing water so badly that billions of people -and the environment- suffer badly.**" (Cosgrove and Rijsberman, 2000)*

Effective and efficient water management has emerged as one of our greatest challenges. Approaches have shifted over the last few decades. During the 1960s to 1970s, the paradigm of water resources development dominated. Water was a resource to be exploited with the engineering approach of predicting and providing and with an emphasis on infrastructure and individual projects. In the 1980s to 1990s, it was recognized that water can be over exploited. Ecological and social constraints were taken into account in regional and national planning instead of a project approach. The focus on demand side measures came into existence, and the paradigm shifted towards water resources management. Since the 1990s, the concept of integrated water resources management (IWRM) has dominated, encompassing overall policy for socio-economic development including physical planning and environment protection with people at the centre (public participation) and a focus on sustainability.

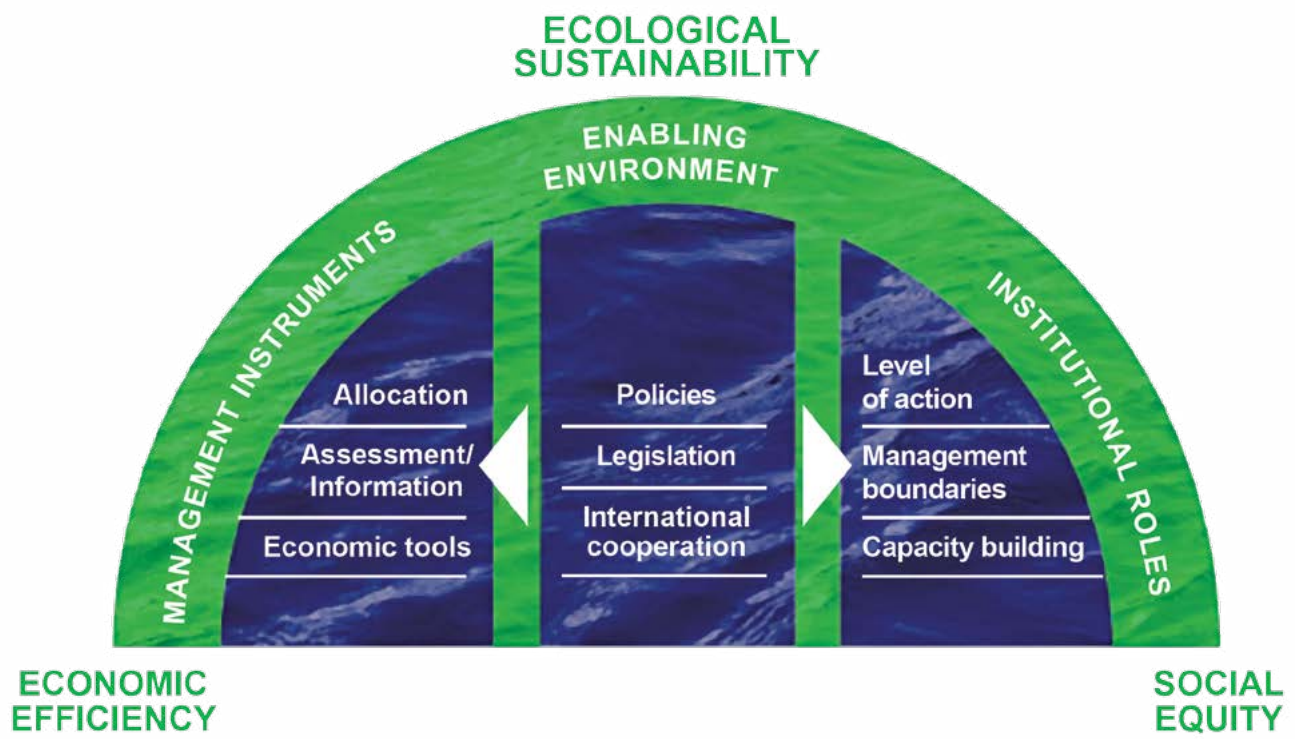


Figure 8: Economic efficiency, ecological sustainability, and social equity in integrated water resources management (Source: Global Water Partnership, 2013)

Box 3: The Dublin Principles

Principle No. 1: Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
Principle No. 2: Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
Principle No. 3: Women play a central part in the provision, management and safeguarding of water.
Principle No. 4: Water has an economic value in all its competing uses and should be recognized as an economic good.

IWRM is a process that promotes the coordinated development and management of water, land, and related resources to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Global Water Partnership, 2000). The general framework for this approach has three dimensions: economic efficiency, ecological sustainability, and social equity (see figure 7).

The concept of IWRM was recognized in Agenda 21 of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, to a large extent based on the four Dublin Principles developed earlier that year:

In relation to Principle 4, a major debate emerged at the time of its formulation. The United Nations declared that access to drinking water and sanitation is a basic human right. However, this does not mean that people may not have to pay for water, but that the water should be affordable if not free.

Similar to other planning processes, IWRM has a systematic planning cycle, and WUMP + 3R is one of its practical examples.

2.2 IWRM – The local context

The water sector in Nepal is highly fragmented and there are many agencies involved: more than 13 ministries and departments have multiple water resources acts, rules, strategies, and plans and overlapping roles (See Annex 15). Challenges in the management of water resources often arise due to lack of coordinated and proper planning, lack of participation of disadvantaged people in planning and management, frequent source disputes due to mounting competition over water sources, and the poor functionality and sustainability of the water schemes.

2.3 The WARM + 3R Chair

The Water Resources Management and Retention, Reuse, and Recharge Chair – in short WARM + 3R Chair – consists of four legs, stretchers, a seat, and a backrest (see figure 9). Each of these parts stands for an integral component of the approach: the legs represent the different water uses, the stretchers represent the retention, recharge and reuse opportunities, the seat stands for the stakeholder dialogue, and the backrest represents capacity development.

Water Use Master Plan

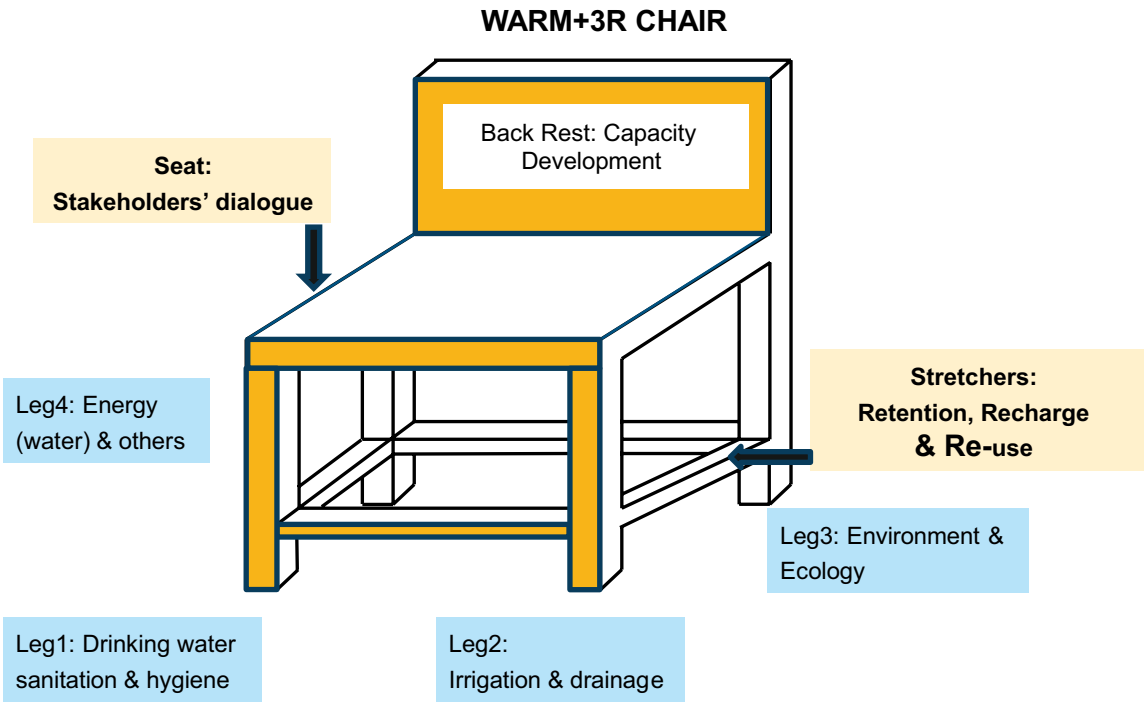


Figure 9: WARM + 3R Chair, the basis for the WUMP + 3R approach

The WARM + 3R Chair is the basis for the WUMP + 3R approaches: the combination of the WUMP and 3R approaches. The 3R approach works towards implementation and upscaling the use and management of rain, soil, and groundwater for livelihood security (focusing on water, sanitation and hygiene and food security) and climate change adaptation in a certain watershed or sub-watershed. The WUMP approach focuses on inclusive planning of water resources and allocation of its use based on the decisions of local communities and governments. It facilitates a stakeholder dialogue attempting to ensure meaningful participation of all local stakeholders, with particular focus on women and poor and disadvantaged people. Integrating the 3R approach into the basic WUMP allows local communities and governments to make informed decisions, not only taking into account conventional water supply options, but also emphasizing the potential of community level as well as small-scale 3R solutions in their water plans.
The WUMP experience in Nepal realizes the institutional feasibility of low cost and inclusive planning and implementation of integrated water resources management components within administrative boundaries. The larger idea is that the 3R approach emphasizes integrated water resources management from a watershed perspective.

Though the requirement of water resources management at river basin is pronounced in these strategies and plans, the mechanism of local management at basin levels is still lacking. This leaves local institutions (districts and VDCs) as the sole unit of management, which is also spelled out in the Local Self-Governance Act, 1999.

2.4 The water management landscape

Water moves from higher ground to the flat lands. It follows ridges and flows into natural depressions. It always uses the same pathways and concentrates at the lowest point. The landscape area at which runoff water resulting from rainfall is collected and drained through a common point (the outlet) is called a **watershed** (Desta et al., 2005). A watershed area includes all natural resources in the area, such as water, land, and vegetation. A watershed boundary is also called **divide**, and it is an imaginary line that runs through the highest points surrounding the watershed such as mountaintops and ridges (see figure 10). On each side of the divide the runoff water will run away in opposite directions.

Administrative boundaries follow human made constructed divisions. Political, administrative, and any other human boundaries are not respected by water. River courses, for example, may pass through several regions and states and crosscut through several political boundaries. These boundaries are important for decision making, such as elections, resource allocation for development activities, and development planning including census units and local administration.

2.5 3R: The concept of storage and how to buffer

> *"**Not even a little water that comes from the rain must flow into the ocean without being made useful to man**" (Paräkramabähu I, ruler of Sri Lanka 1153 - 1186)*

The essence of water buffering is to manage natural recharge and to retain water for longer periods so that it becomes usable in periods of water scarcity. In many areas of Nepal, rainfall is often concentrated within a limited period. Typically it rains for a few months, and for the rest of the year there is little or no rainfall. Most of the regions suffer from violent storms that, due to their high intensity, favour runoff and not infiltration. Steep slopes, crusted soils, and high rainfall intensity are some of the common factors that favour runoff rather than infiltration. It follows that water is abundant during the rainy season, but it becomes quickly scarce during the dry season as it flashes out of the system as runoff and non-productive evaporation. Therefore, it is necessary to integrate water buffering measures in the development of water and agricultural schemes. In

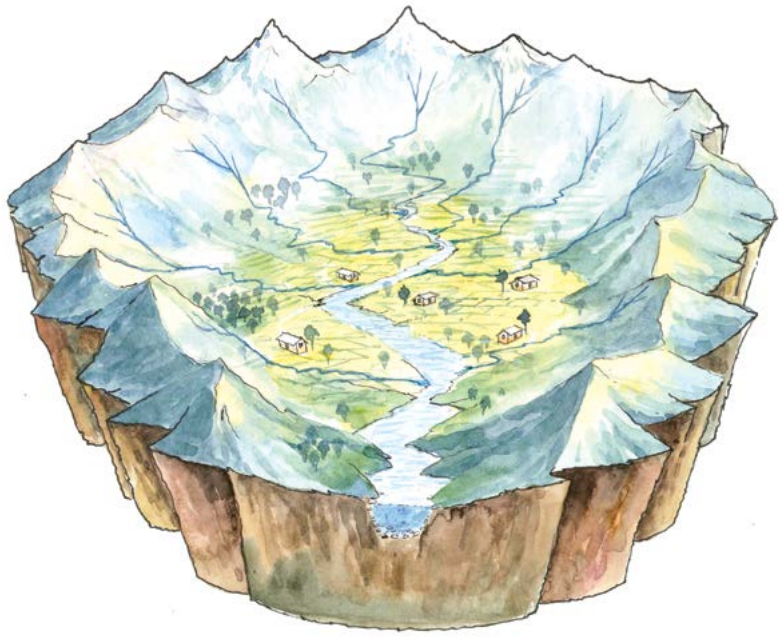


Figure 10: Watershed area

this manner, runoff and evapotranspiration can be reduced. The larger idea is that tackling a local water crisis is not so much about reallocating scarce water, but storing water when it is plentiful and making it available for dry periods and extending the chain of uses. Storage is, thus, the central concept. Often storage is associated with large surface reservoirs and mega-dams. However, 3R, or the concept of **R**echarge, **R**etention, and **R**euse, presents an alternative approach – using many smaller systems and storing water within the landscape:

- **Recharge** is about optimizing the infiltration of rainfall and runoff water, improving groundwater recharge.
- **Retention** is important, as it keeps water in the area and slows the outflow. It can help to make groundwater more easily available by creating barriers that raise its level. Likewise, many small reservoirs act as storage to retain runoff and make it available for reuse.
- **Reuse** makes the water recharged and retained available as drinking water, water for productive use, or water for ecologic services. In other words, it is the extended use of retained water. Reuse can include recycling water multiple times.

Much water storage is invisible: it takes place in the ground in the upper part of the soil (the unsaturated zone) or below the water table (the saturated zone). Four types of storage can be distinguished (see also figure 11):

A. Groundwater storage;
B. Soil moisture storage;
C. Closed reservoirs;
D. Open reservoirs.

The advantages of decentralized storage as promoted by the 3R approach are numerous. The range of geographic and livelihood settings in which 3R solutions can be applied is significant and almost universal, including arid and humid areas, hilly and mountainous topography, and flat lowlands. Storage in the soil profile or in aquifers does not lose water in the form of evaporation, as is the case in large surface reservoirs. When storing water in the soil or in small reservoirs, sedimentation is usually not a problem and soil deposits may even be assets, as they improve fertility. The introduction of many small decentralized storage systems does not disrupt

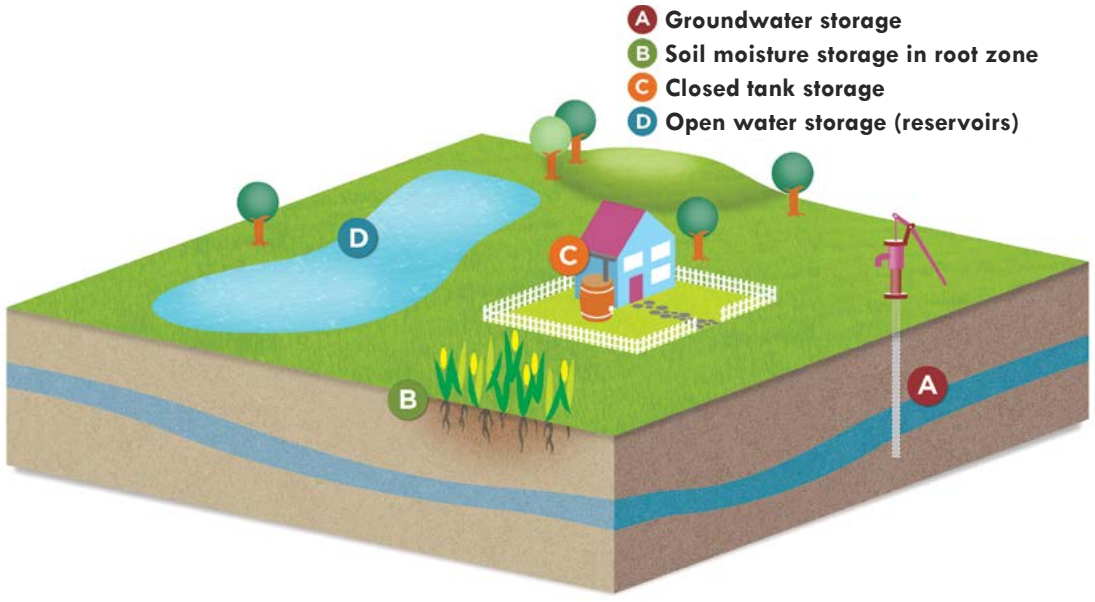


Figure 11: Storage types (Source: Tuinhof, 2012)

life (as opposed to large storage systems), but adds value to livelihoods in the area (Tuinhof, 2012).

Many small measures can improve the local water buffering capacity of the target area. The envisaged measures need to be applied jointly in the overall landscape following the 3R principles (see figure 13). There are many techniques associated with 3R that can be used to create extra water storage. All technologies can be used as stand-alone measures, but to create an improved water buffer they work best when integrated with each other all over the landscape at high density and scale. There are many examples of 3R techniques that are successful in one place but for various reasons are not in use elsewhere. In general, many opportunities are often unused. An array of 3R techniques is provided in Annex 1. This has been developed by IWMI for the Happy Strategies Rain Water Management tool[1], which will be explained in this report.

Another important lesson in water buffering is to work at scale and intensity, which needs to be taken into account during the WUMP + 3R process. It is important that the entire area be transformed; piecemeal interventions will not add up. If landscapes are transformed at scale, many processes will also change: the hydrology, the sedimentation processes, the microclimate, the soil chemistry and nutrient cycle, and the regeneration of vegetation cover. Most importantly, with scale also comes the transformation of economies and institutions (Sambalino et al., 2013).

The graphics below depict a typical Nepali landscape with and without 3R measures in place.

2.6 Looking at the landscape with 3R Glasses

The creation of a healthy water buffer with 3R principles and measures requires a deep understanding of the target area. The landscape with its natural and human features needs to be explored to seek potential storage. These features can be explored with a variety of participatory tools such as PRA tools. One example is participatory mapping.

When looking at any area, it is important to look at **water movement patterns together with existing water sources and soil moisture status**. During the rainy season, it is easy to understand the movement of runoff water. In the dry season some indicators can be used, but in some cases it is necessary to visualize the water movements: walking through the area and imagining how the water would move in each portion of it. Some points that should be taken into consideration are:

1. **Water sources**: A proper overview of existing water sources helps in understanding where alternative water sources are needed the most. It also gives an indication of what kinds of technology are already in use and are familiar to the local community.
2. **Presence of rills and gullies**: Rills and Gullies collect dispersed runoff water from surrounding areas and quickly drain it away towards bigger natural courses. They are not stable and tend to expand year after year, subtracting precious land, water, and soil nutrients from farmland. Gullies also act as drains that suck water out of the surrounding soils and shallow groundwater.

1 *http://happystrategies.wikispaces.com/*

Figure 12: Landscape without 3R measures

Figure 13: Landscape with 3R measures

3. **Seasonal streams**: In tropical regions, perennial rivers are rare and seasonal streams are common. Water flows in seasonal streams only for a short period of time. The water often passes by without being productively used and then evaporates or moves downstream towards the desert plains. During the dry season – especially in sandy riverbeds – water may flow under the surface as base flow.
4. **Road drains and culverts**: Roads often change watersheds drastically. A road can divide a watershed into two minor watersheds and collect a noticeable amount of water in their drains. Commonly, the water is not safely disposed of or used and causes damage downstream where it erodes big portions of land. Alternatively, this water can be collected, retained, or recharged in the aquifer.
5. **Runoff from rocks and roofs**: Hard and not fractured rock outcrops, a common feature in many countries, can generate considerable runoff. Also, laminated, tiled, and cement roofs can produce substantial runoff water.
6. **Dispersed runoff**: Before concentrating in gullies, drains, and streams the water moves over the land as a dispersed sheet of water (called **dispersed runoff** or sheet runoff). By checking the movement of this water over the land, it is possible to achieve two objectives. First, erosion of soil and consequent loss of soil nutrients can be limited. Second, the water can be retained for longer in the field, where it infiltrates the soil and enriches the soil moisture storage. This water can also infiltrate more deeply and recharge the groundwater.
7. **Evapotranspiration**: It is important to improve the recharge of soil moisture storage, but it is also important to limit its depletion. Reducing wind speed and augmenting shade in the fields and over surface water can limit evapotranspiration. Additionally, some agronomic measures such as mulching and composting help to keep soil moisture in the system for a longer time.
8. **Excess water from agricultural fields**: Drains from irrigation schemes can be reused and re-introduced into the water buffer. Accordingly, the efficiency of water buffer use is thus improved. Also, waste water from kitchens and light industries can sometimes be reused.
9. **Soil moisture**: A soil moisture scan should be undertaken together with the community. The first areas that show signs of water stress and the areas that are greener for longer during the dry season must be identified and mapped. When the most moisture stressed areas are known, it is possible to think of solutions to increase green water storage, thereby augmenting crops and livestock production.

3R technology examples

Below some examples of 3R technologies such that the trainee can get a sense of what is included in the 3R approach (Knoop, Sambalino, & van Steenbergen, 2012). There are many techniques that can be included in the list. Some directly provide fresh water for multiple uses, while others make water available for rainfed agriculture production.

Road water harvesting

Runoff from roads during rainy seasons is often considered undesirable, as it can damage the road by creating gullies. However, this runoff can be harvested and utilized. During a 30 mm rain shower, a 1 km long, 4 m wide road catches 96,000 litres of water (calculated using a runoff coefficient of 0.8). Depending on the road surface (less water is lost on tarmac roads with lined

Figure 14: A pond collecting drainage water from aroad drains (Source: Francesco Sambalino).

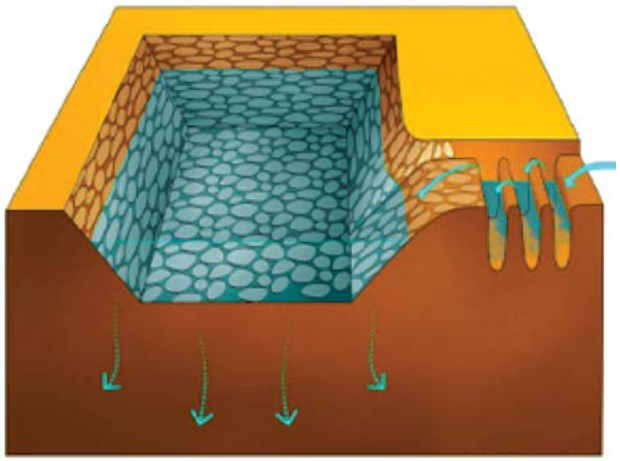


Figure 15: Percolation pond (Source: MetaMeta)

drains than dirt roads) a substantial amount of this rainwater can be harvested in reservoirs (figure 14) or special ponds that permit infiltration and groundwater recharge.

Percolation ponds and contour trenches

Percolation ponds (figure 15) and contour trenches are often used on impermeable soils to control runoff, improve groundwater recharge processes, and increase the biomass production of the agro-ecosystem. Percolation ponds are used to capture runoff and augment the water buffering capacity of the region. Infiltration trenches protect fields from runoff and let the water infiltrate the soil. They are both commonly used to rehabilitate degraded landscapes.

Figure 16: Rock catchments allow the capture of water (Source: MetaMeta)

Water from rock catchments

Rock outcrops can be a precious resource to create an extra source of good quality water (see figure 16). Rocks generally have low infiltration rates, which implies that all the rain will move down as runoff water. This water can be easily harvested in tanks, dams, or ponds. The amount of water generated by rock catchments is significant: a rock surface of 1 ha can harvest around one million litres of water from 100 mm of rain.

Contour bunds

Contour bunds (figure 17) are a physical measure to control erosion, enhance infiltration, and increase yields. Bunds are constructed on hillsides along contours – dividing the slope into several smaller micro-catchments. By slowing the speed of runoff, water is given time to infiltrate and soil moisture is augmented. Bunds exist in many different designs and have been used globally as a means of water buffering and soil conservation. Soil bunds, stone bunds, tied ridges, and stone-faced bunds are some examples of how the basic principles of contour bunds can be applied in many different ways.

3R technologies facilitate water buffering within in a watershed. The technologies can be classified according to their function, measure type, and/or the type of storage they address. Sambalino et al. (2013) classify the technologies into five functions, as shown below:

- Direct infiltration and proper retention management of runoff to improve recharge of the water buffer.
- Augmentation of groundwater availability, which flows downstream the same way as surface water does, through the creation of barriers.
- Redirection of excess water from drainage systems, waste water, and water losses from inefficient systems into the water buffer, as every drops counts.
- Adoption of smart technologies to maximize water use efficiency and to optimize production.
- Reduction of non-productive evapotranspiration

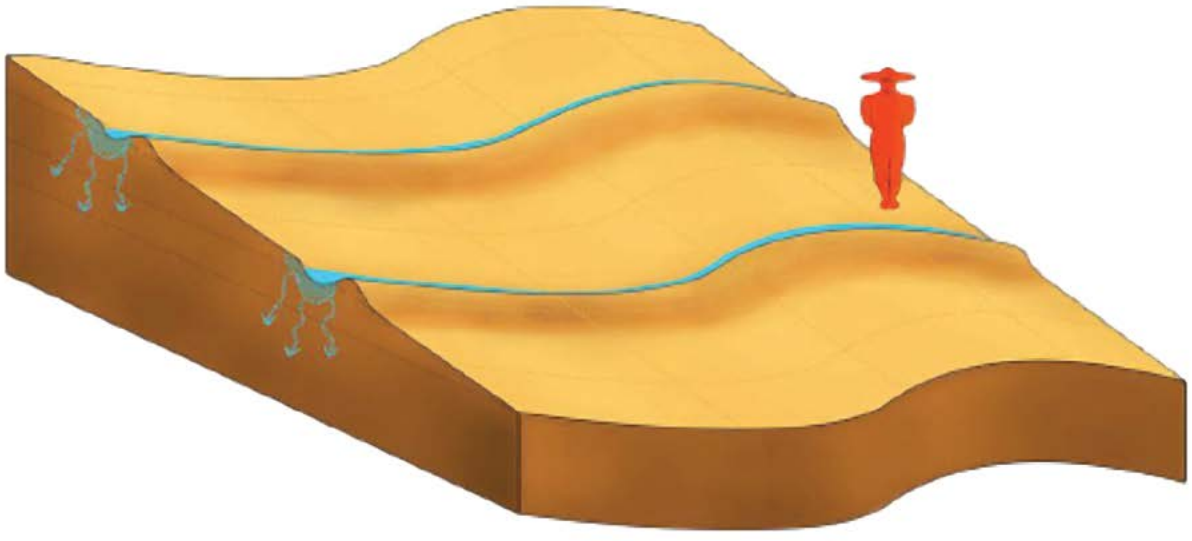


Figure 17: Soil bund (Source: MetaMeta)

The technologies can further be classified according to their measure type as proposed by WOCAT (2007):

- Agronomic measures
- Vegetative measures
- Structural measures
- Management measures

Table 2 presents examples for 3R measures for each leg of the WARM + 3R chair, classified according to function and measure types.

Box 4: Water Bucket (the bucket is the watershed)

To improve watershed efficiency, three actions are possible:

A. Augment the amount of water entering the bucket (Recharge);
B. Close as many holes as possible (Retain);
C. Make the water in the bucket easy to be reused (Reuse).

Once the water is in the bucket, it is easier to keep it for longer time, but it is also easier to access it and make a productive use of it during the dry season. The point is to direct the seasonal rainfall into many water storages, where it is more efficient and easy to recharge, retain, and reuse water for sustainable and multiple uses. There are a number of obvious advantages to better water buffers:

- They retain water during high rainfall or flood events and ensure water or moisture is available during the drier part of the year, avoiding drops in soil moisture.
- Storing water in the soil profile or in shallow aquifers decreases the amount of water that is lost to evaporation.
- When water is stored in the soil or in shallow aquifers, runoff erosion is decreased and sedimentation of downstream structures is not a problem.
- The higher soil moisture that comes with well-managed water buffers improves the local micro-climate: secure soil moisture, for instance, improves natural nitrogen fixation in the soil and contributes to higher fertility.

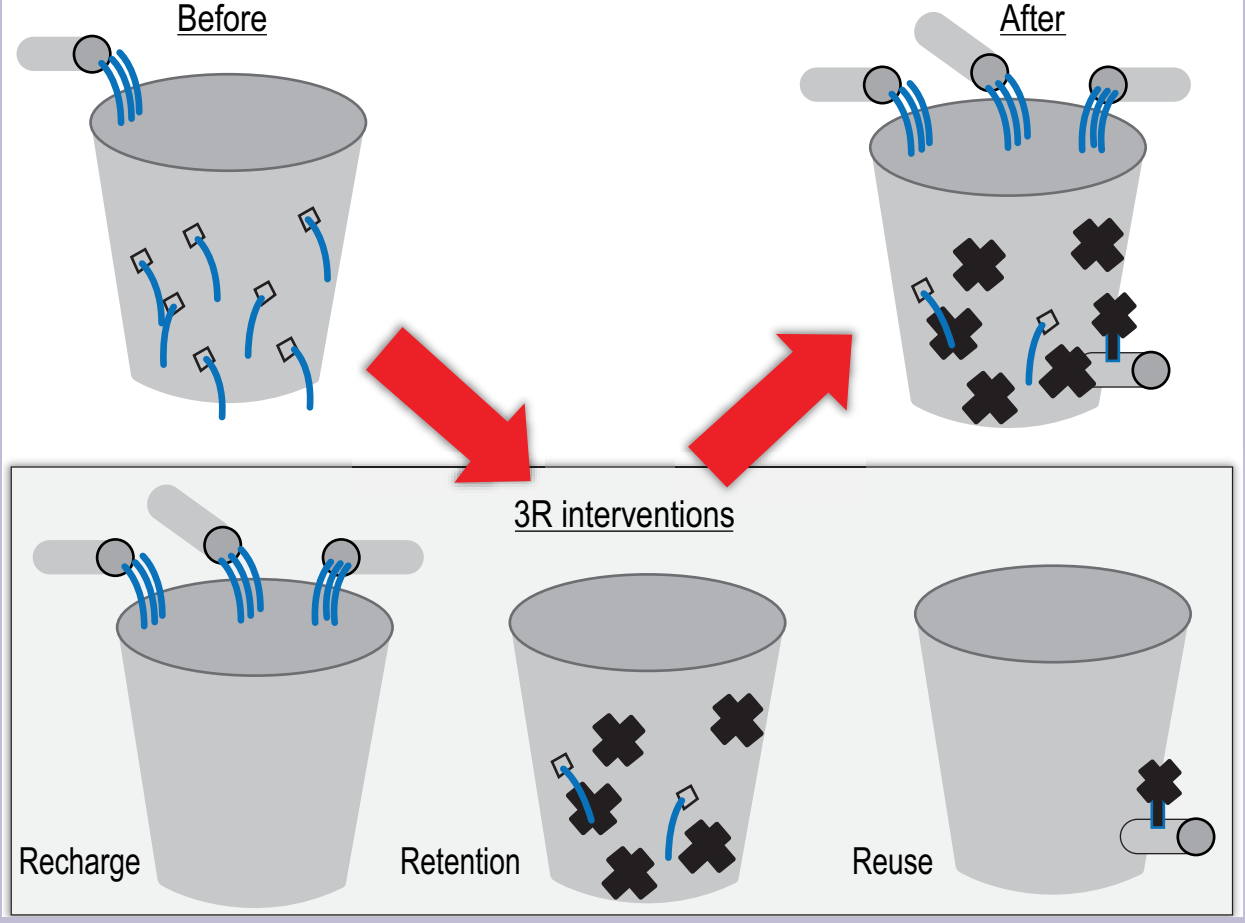


Figure 18: the 3R logic explained with the 3R bucket

Table 2: Possible 3R techniques

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
Source improvement/ conservation in new or existing scheme	√	√	√	√	To ensure availability of water for schemes developed	√	√				√	√	√	√	N.A,	All	Above (upper part of) water sources
Percolation ponds and tube recharge	√	√	√	√	To recharge the groundwater table	√	√	√				√			N.A.	All	All parts of catchment, preferably in natural depressions
Roof water harvesting	√		√		To provide drinking water		√	√				√	√		N.A.	All	On roofs of households, schools, and health clinics all around the watershed
Surface water harvesting ponds for improved recharge and multiple uses	√	√	√		To retain water and provide water for community multiple use		√	√				√			5%	All	Gentle slope or in available depressions
Sub-surface dams and sand dams	√	√	√	√	To improve water storage in dry riverbed	√	√	√	√			√			Less than 5 %	High Seasonal variation	Dry river beds with less than 30m width and coarse sediments on top of impermeable riverbed

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
Runoff farming with in field water harvesting measures																	
• Runoff farming with soil bunds, stone faced soil bunds, stone bunds, and Fanya Juu		√	√		To increase soil moisture for biomass production	√	√			√	√	√			<15-20%	High Seasonal variation	Mostly applied on farmland. Best when the structure is reinforced with plants
• Grass strips along the contour		√	√		To build up soil, slow runoff, and increase infiltration	√	√			√	√				< 20 %	High Seasonal variation	Mostly on farmland. Vetiver grass has high potential, because sturdy and not invasive
• Terracing		√	√		To increase soil moisture and level the land for improved crop production	√	√			√		√			< 55 %	High Seasonal variation	On farmland
• Terrace improvement		√	√		To control runoff, soil erosion, and available land for farming	√	√		√	√	√	√	√	√	15 - 55 %	High Seasonal variation	According to use and agro climate
• Demi-lunes		√	√		To trap runoff and increase biomass production	√	√			√		√			< 5 %	High Seasonal variation	Mostly used in semi-arid areas
• Trapezoidal bunds		√	√		To trap runoff and increase biomass production	√	√			√		√			< 3 %	High Seasonal variation	Mostly used in semi-arid areas

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
• Planting pits (zai pits)		√	√		To trap runoff and increase biomass production, especially on crusted soils	√	√			√		√			2 - 8 %	High Seasonal variation	Always integrated with the application of compost or improved farmyard manure
Water harvesting from rock outcrops	√	√			To harvest water and store for multiple use		√	√					√		All	All	On Big rock outcrops that generate copious amounts of clean runoff water
Mulching		√	√		To increase fertility, reduce ET, and augment soil moisture retention		√		√	√					All	High ET	All soil. Applied mainly on high value cash crops.
Composting and the use of improved farmyard manure		√	√		To increase fertility, reduce ET, and augment soil moisture retention	√			√	√					All	All	All soils. Organic matter can hold water up to 20 times its weight.
Bio-char		√	√	√	To increase soil moisture retention and stimulate fertility improvement. It is also an excellent carbon sink.	√			√	√					All	All	Usually in plots near the homestead. Only applicable when enough char can be produced with locally available material
Microclimate control with shade trees and windbreaks to reduce water use and water losses		√	√	√	To reduce evaporation and retain soil moisture				√		√		√		All	Dry	South terrain aspect

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
Agroforestry		√	√	√	To reduce ET and increase wood, food, and fodder production. To increase soil fertility and soil moisture storage capacity.	√	√	√	√					√	All	All	All parts of catchment
Gully treatment with plugs and vegetation	√	√	√	√	To avoid excessive runoff and increase recharge		√	√			√	√			< 10 %	All	All soils. In rills and gullies.
Road drainage could be used to collect water for recharge		√	√					√				√				All	Culverts and side drains of road can provide water for recharge ponds and retention ponds
Slope treatment to limit soil erosion and improve recharge of soil moisture and groundwater																	
• Contour trenches		√	√		To decrease runoff and increase recharge	√	√					√			< 100 %	All	Viable in area closures and source protection
• Eyebrow basins		√	√		To decrease runoff and favour reforestation	√	√				√	√			< 100 %	All	Viable in area closures and source protection
• Herring bone basins		√	√		To decrease runoff and favour reforestation	√	√				√	√			< 5 %	All	Viable in area closures and source protection
Controlled sand and gravel mining			√		To limit degradation				√				√		All	All	Applicable according to policy and bylaws

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
Protection of footpaths	√	√	√		To protect land and safely dispose runoff water			√			√	√	√		All	All	On all slopes and soils integrated with multi-purpose plants. Excess water can be diverted to reservoirs
Wetland protection			√		To retain water and protect flora and fauna	√	√	√		√	√	√	√		Flat	All	To protect the natural water buffering characteristics wetlands
Controlled (intensive) grazing	√	√	√	√	To protect grass and shrubs and consequently retain soil moisture				√	√			√		All	All	In common grazing land in order to enhance biomass infiltration and regenerate soils with low permeability; It requires strong rules and management
Safe drainage of sloping farmland																	
• Use of cut-off drains and lateral drainage		√	√		To protect farmland from erosion and deviate runoff to reservoir and recharge pond		√	√		√		√	√		On slopes < 50 %, side gradient of the drains < 1 %	Medium - high	Along the contour with gentle side gradient to divert water to the main waterway

Technology	WARM + 3R Chair leg				Purpose	Buffering function				Wocat classification					Slope	Rainfall	Features
	WASH	Irrigation and Drainage	Environment and Ecology	Water for Energy		Direct rainfall use	Dispersed runoff use	Concentrated runoff use	Managing evapo-transpiration	Agronomic	Vegetative	Structural	Management	Combined			
• Water ways			√	√	Drain water downstream following the natural drainage of the landscape			√		√	√	√			Any	All	Needed integration with plugs and vegetation when steep and prone to erosion. Water can be diverted to storage or recharge structures.
Improving conventional rural ponds (Ahal)		√	√		To retain water and augment infiltration of water to groundwater table	√		√				√	√		N.A.	All	Previously existing areas where enough runoff can be collected using local slopes and depressions
Improving recreational/ religious ponds		√	√		To retain water and use for multiple use			√				√	√		N.A.	All	Previously existing areas
Inline hydropower	√	√	√	√	To generate power from drinking water system			√				√	√		N.A.	N.A.	In schemes where head and quantity is sufficient
Micro hydro/water mill and irrigation scheme		√	√	√	To use water as a source of clean energy	√		√				√	√		N.A.	N.A.	Where head and quantity is sufficient

Chapter 3: Self-evaluation questions

This is an individual evaluation of your understanding of the information presented in this module. Answer the multiple choice evaluation questions and check your answers (ANNEX 16). More than one option might be correct. If you answer questions incorrectly, it is suggested that you review the module before proceeding.

Q1: What is the difference between evaporation and transpiration?

A. Nothing. Transpiration and evaporation are the same thing.
B. They both imply the passage of water from liquid to vapour state that is then transferred to the atmosphere. Evaporation takes place from the soil or from surface water. Transpiration is the water that is transferred from plants to the atmosphere.
C. With transpiration, plants adsorb water from the soil. With evaporation plants lose part of the water to the atmosphere.

Q2: What is blue water?

A. The water – in all its forms – that is present on the planet
B. The water of lakes, rivers, and oceans
C. The water present in surface water bodies, groundwater tables, and flowing as runoff
D. Soil moisture and atmospheric water

Q3: What is green water?

A. It is the waste water from the kitchen
B. It is the soil moisture
C. It is all the water that is present in plant tissues

Q4: What is a watershed?

A. Any landscape area in which runoff water resulting from rainfall is collected and drained through a common confluence point
B. The line that connects all the highest points in a landscape and encloses a catchment
C. A planning area that is defined by administrators. It follows political boundaries

Q5: What is the main idea behind the water buffering approach?

A. Store water when it is abundant and make it available during the dry season
B. Create water storage all over the landscape, in a dense and organic way
C. Build big reservoirs to keep water in a central location for the use of all local stakeholders
D. Create piped systems and deep boreholes to satisfy local community needs

Q6: What are the four types of storage used in water buffering?

A. Big reservoirs, ponds, soil moisture, and groundwater
B. Open reservoirs, closed reservoirs, soil moisture, and groundwater
C. Open reservoirs, closed reservoirs, ponds, and groundwater

Q7: What is the meaning of 3R?

A. Retain, Recycle, Reuse
B. Recharge, Retain, Reuse
C. Restore, Recycle, Retain
D. Restore, Recharge, Reuse

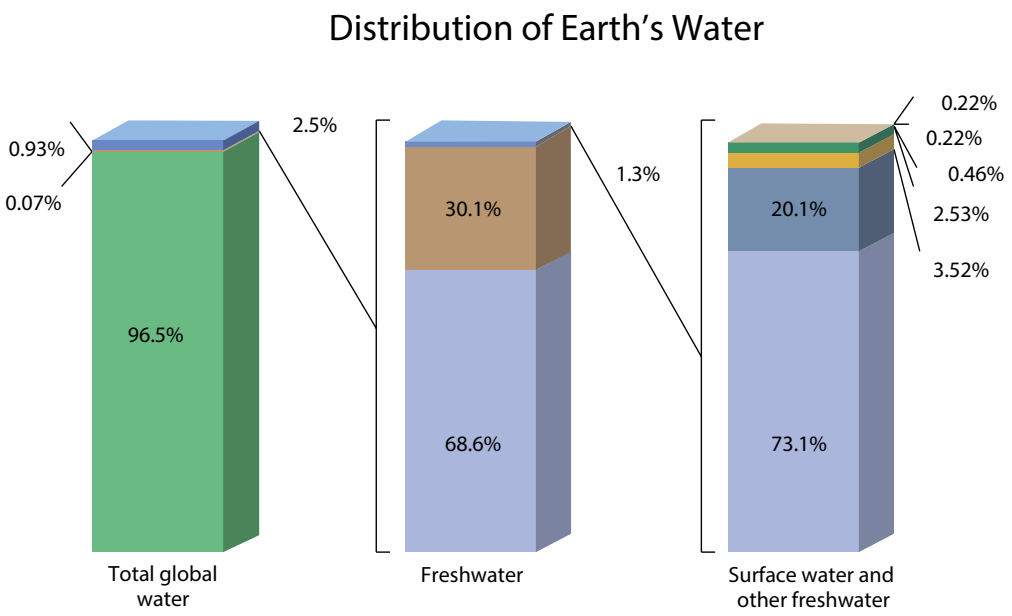
Q8: What is climate Change?

A. The change in temperature from night to day and vice versa
B. A long-term change in the earth's climate
C. The sum of all interventions needed to improve the local climate situation

Q9: What do the four legs of the WARM + 3R chair represent?

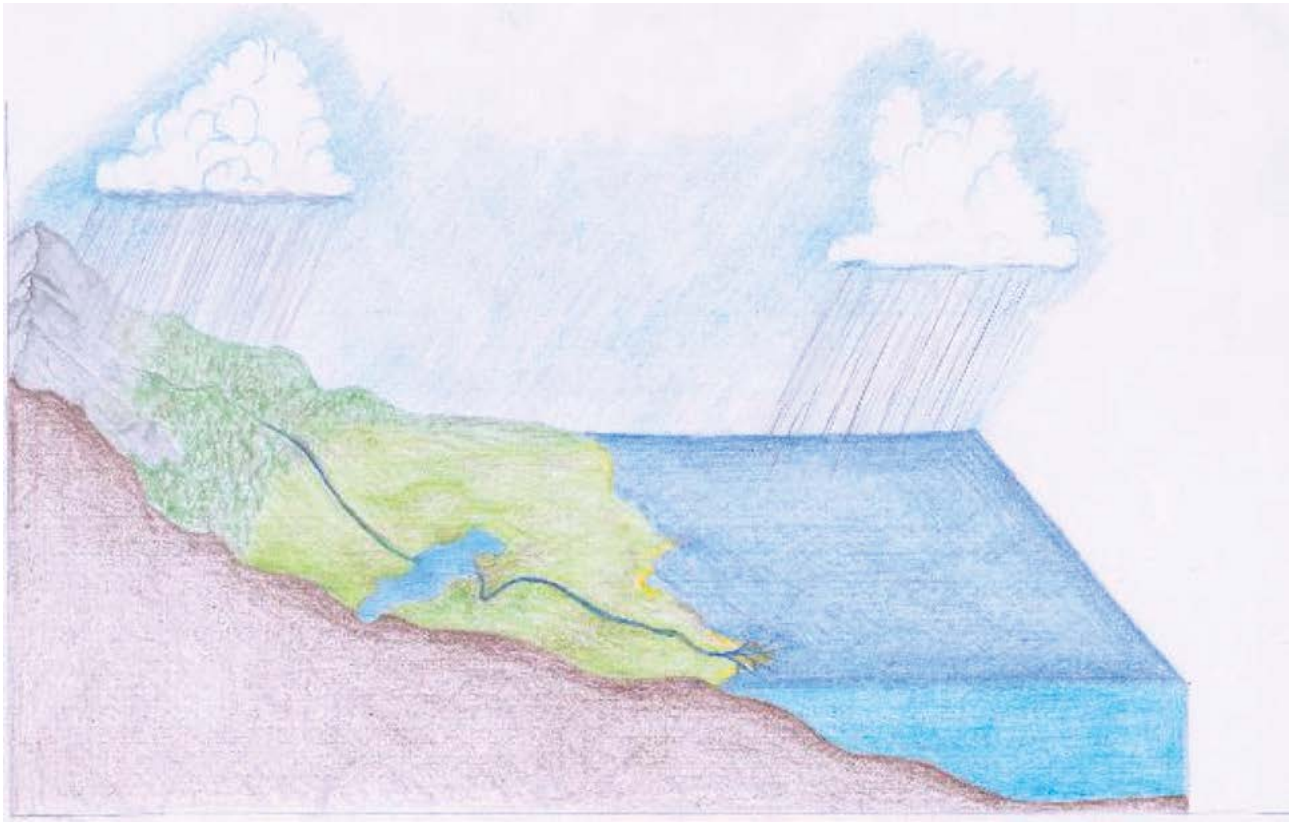
A. Water supply, sanitation and hygiene; irrigation and drainage; environment and ecology; energy generation and other
B. Agronomic measures, physical measures; management measures; biological measures
C. Recharge; Retain; Reuse; Recirculate

Exercise: Please fill in the missing types of water in the following figure. You can check your answers by referring to the picture in the main text of Module 1.



Source: Igor Shiklomanov's chapter "World fress water resources" in Peter H. Gleick (editor), 1993 Water in Crisis: A Guide to the World's Fresh Water Resources.

In the following figure, please indicate using text and arrows how water moves through the water cycle. You can check your answer in figure 1 in the main text of Module 1.



Please check annex 16 for the answers.

Module 2: The WUMP + 3R process

Module objectives:

To familiarize the trainees with the steps that need to be followed to facilitate the development and implementation of a participatory and inclusive WUMP + 3R plan and to clarify the roles and responsibilities of stakeholders who are envisioned to be involved in the WUMP + 3R preparation.

By the end of the module the trainee is expected to:

- Understand the steps in the inclusive WUMP + 3R process in a certain VDC or community.
- Understand the division of roles and responsibilities of the various stakeholders in the WUMP + 3R process.
- Be able to facilitate a participatory and inclusive WUMP + 3R process in a certain community, guided by an implementing organization.

Chapter 1: Introduction and overview

1.1 The essence of the WUMP + 3R process

A water use master plan is a participatory and inclusive approach for integrated planning and management of water resources. It identifies the total water budget and its potential uses focusing on a unit area. As a participatory and transparent process, it improves water governance, empowers women and poor, disadvantaged, and vulnerable people to claim their right to equitable sharing of water within and between communities. A water use master plan is not developed around a particular project or for a specific water sector (e.g., drinking water or irrigation), but looks at water resources, water demands, and potential uses in a broad and integrating way, hence the term "Master Plan".

The impact of climate change has created variability on the availability of water; the challenge is that there is either too much or too little. 3R deals with the management of the water buffer in relation to development as well as adaptation to climate change. It involves managing buffer function through recharge, retention, and reuse. Thus, the WUMP + 3R approach focuses on participatory and inclusive planning and allocation of water resources as well as integration of small scale 3R technology solutions in the water resources development plan.

In short, the overall objective of WUMP + 3R is **to facilitate equitable, efficient, and sustainable management of water for well-being and improved livelihoods**.

Specific objectives are:

- Assessment of water resources availability, existing uses, and requirements.
- Participatory prioritization and planning of inclusive water resource development (all uses of water, including hygiene and sanitation), considering adaptation to climate change and disaster risk reduction.
- Coordinated water resources development by different stakeholders (communities, government, and non-governmental organizations).
- Promotion of conservation of water resources, environmental sanitation, and 3R measures
- Strengthening of local institutional capacity and participation of economically and socially disadvantaged groups.

The WUMP + 3R process applies participatory principles in its approach in identifying water resources and needs for the use of water resources in different competing uses in a VDC. The uses of these identified water sources are categorized as per the four legs of the WARM + 3R chair depicted in Module 1.

The WUMP + 3R preparation is a process-oriented approach with 5 phases and 17 sub-steps, as illustrated in figure 19 and detailed in Table 3. WUMP + 3R preparation needs to be closely coordinated and steered by the concerned VDC authorities to ensure commitment to and ownership of the plan by the local authorities, political parties, and communities. Similarly, district development committees should endorse the final WUMP + 3R and should thus be involved in its preparation. However, village and district development committees do not have all required human resources and professionals to make the WUMP + 3R alone. External financial and human resources are necessary to facilitate and assist communities in the participatory resource inventory and planning process.

It is important to note that throughout the WUMP + 3R process, meaningful participation and inclusive decision-making are prerequisites for an inclusive plan. For this reason, representation of women, men, and disadvantaged people has to be ensured at each step and in all committees.

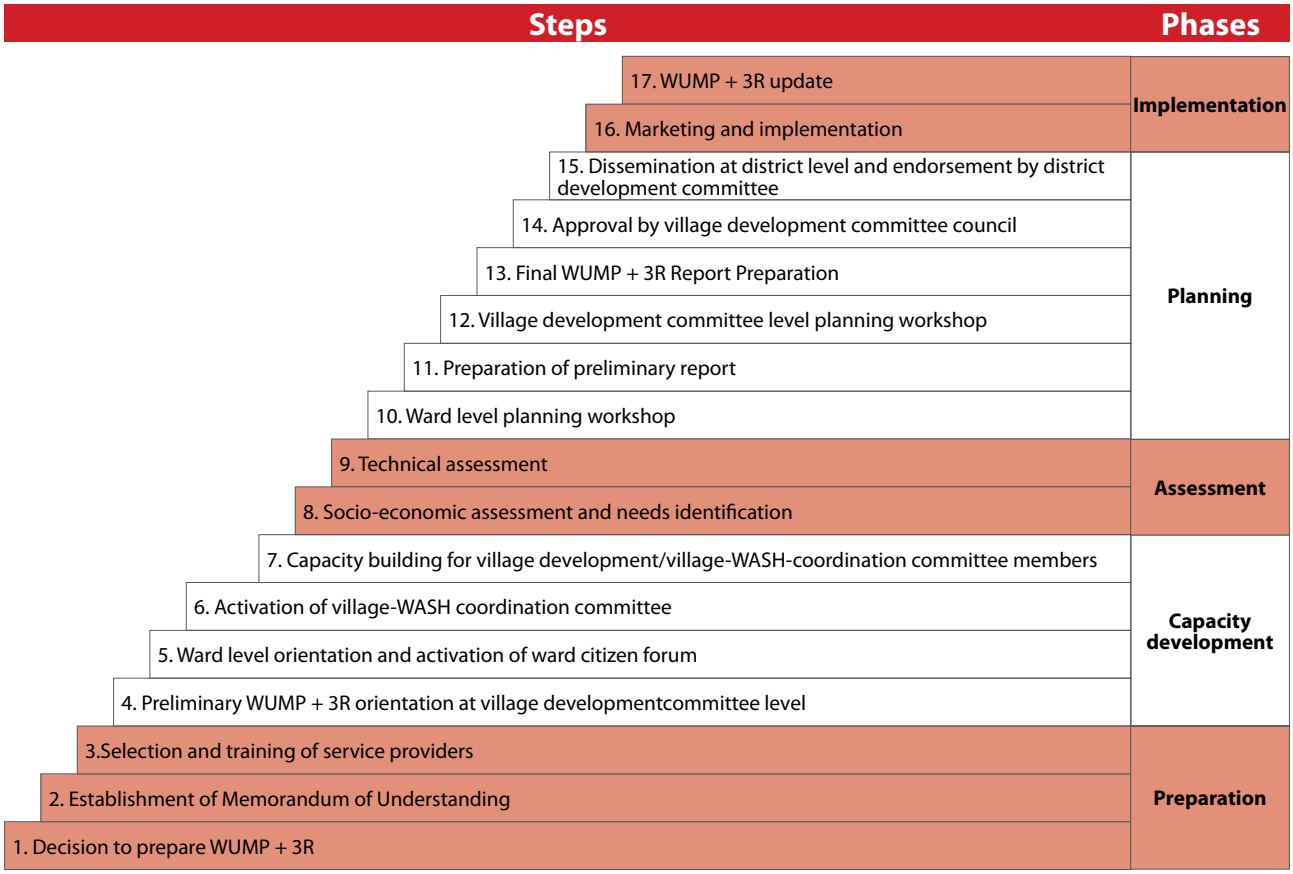


Figure 19: Step-wise WUMP + 3R development process

***Attention**: The steps presented below indicate the inclusive process for WUMP + 3R development if it is initiated and implemented by a VDC. Some of the steps may differ if support organizations initiate the process of WUMP + 3R development.*

Table 3: WUMP +3R steps

Phase	Step	Time	Detailed Step	Participants	Methodology	Responsibility
Preparatory (1 month)	1. Decision to prepare WUMP + 3R	Month 1 (0.5 week)	Advocacy interaction on WUMP + 3R development process with VDC authorities	VDC members, V-WASH-CC, other relevant committees	Meeting	VDC secretary (initiative at DDC level planning meeting, support by support organization)
			Decision/consensus by VDC authorities	VDC members	Consultative meeting	VDC secretary
			Identify support organization (if required)	VDC, support, organization	Meeting and consensus	VDC secretary
	4. Establishment of Memorandum of Understanding	Month 1 (0.5 week)	Interaction on WUMP + 3R development process with district authority	VDC, DDC, support organization	Meeting	VDC
			Memorandum of Understanding among DDC, VDC, and the support organization(s)[2]	VDC, DDC, support organization	Signing memorandum of understanding	VDC
	6. Selection and training of service providers in an inclusive manner	Month 1 (3 weeks)	Selection of service providers or WUMP + 3R[3] facilitators in an inclusive manner	VDC and support organization	As per VDC guidelines (if procured by VDC) or support organization guidelines (if procured by support organization)	VDC and support organization
			WUMP + 3R facilitators' training	WUMP facilitators, VDC social mobilizers, VDC representatives, VDC Secretary for first two days	Training workshop	Support organization

2 *Organization(s) that support VDCs for preparation of WUMP + 3R*

3 *Could be an individual or an organization*

Phase	Step	Time	Detailed Step	Participants	Methodology	Responsibility
Capacity Building (1 month)	8. Preliminary WUMP orientation at VDC level	Month 2 (1 week)	WUMP orientation meeting at VDC level	VDC, V-WASH-CC, other relevant committees selected key persons from different wards in inclusive manner	Orientation workshop	Service provider and VDC
			Inclusive identification of water-related stakeholders		Stakeholder mapping	Service provider
			Secondary information review	WUMP + 3R facilitators	Review secondary data visit	Service provider
	11. Ward level orientation and activation of ward citizen forum	Month 2 (1.5 weeks)	Ward level WUMP + 3R orientation	Ward citizen forum with members from as many households as possible	Meeting	Service provider
			Activation of ward citizen forum		Meeting	VDC
	13. Activation of V-WASH-CC	Month 2 (0.5 week)	Activation of V-WASH CC	VDC, V-WASH-CC members, selected representatives from ward citizen forum	Meeting	VDC
	14. Capacity building for VDC/V-WASH-CC members[4]	Month 2 (0.5 week)	Capacity building training for VDC and all V-WASH-CC members	VDC, V-WASH-CC members	Training workshop	Service provider

4 *Depending upon the contextual needs training at ward level could also be organized to ensure participation of women, and socially disadvantaged*

Phase	Step	Time	Detailed Step	Participants	Methodology	Responsibility
Assessment (2.5 months)	15. Socio-economic assessment and needs identification	Month 3 - 4 (6 weeks)	Participatory social/ resource mapping at ward level	Ward citizen forum, representation of households	Meeting applying PRA tools	Service provider with support of ward citizen forum
			Participatory needs identification at ward level	Ward citizen forum, representation of households	Community Meeting and discussion	
			Collection of disaggregated socio-economic data	Key informants	Focus group discussion	
			Participatory 3R potential mapping at ward level	Ward citizen forum, representation of households	Meeting applying PRA tools	
	18. Technical assessment	Month 3 - 4 (6 weeks)	Secondary data review	WUMP + 3R facilitator	Data analysis/desk study/validation/ triangulation of data with community	Service provider with support of ward citizen forum
			Water resources inventory and discharge measurement	Key informants from community, WUMP + 3R facilitator	Field mapping and measurements	
			Inventory of water infrastructures	Key informants from community and WUMP + 3R facilitator	Field mapping and measurements	
			Verification of 3R opportunity map	Key informants from community and WUMP + 3R facilitator	PRA tool – transect walk	
			Pre-feasibility assessment of potential schemes	Key informants from community and WUMP + 3R facilitator	Field observations and measurements	Service provider with support of ward citizen forum

Phase	Step	Time	Detailed Step	Participants	Methodology	Responsibility
Planning (2.5 months)	22. Ward level Planning workshop	Month 4 - 5 (2 weeks)	Prioritization at ward level	Ward citizen forum, household representatives	Workshop with ward citizen forum members and community	Ward citizen forum with support from service provider
			VDC level meeting	VDC, V-WASH-CC, selected ward citizen forum members	Consultative meeting	Service provider
	24. Preparation of preliminary report	Month 5 (3 weeks)	Preparation of preliminary report for VDC level prioritization	WUMP + 3R facilitator	Desk work	Service provider
	25. VDC level Planning workshop	Month 5 (1 week)	Prioritization at VDC level	VDC, V–WASH-CC (representative of ward citizens forum) and water related stakeholders	Workshop	VDC with support from service provider
	26. Final WUMP + 3R Report Preparation	Month 5 - 6 (3 weeks)	Development of plan	WUMP + 3R facilitator	Desk work	Service provider
	27. Approval by VDC council	Month 6 (1 week)	Approval by VDC Council	VDC council members	Council Meeting	VDC
	28. Dissemination at district level and endorsement by DDC	Month 6 (1 week)	Dissemination of the plan at district level	VDC, DDC, line agencies, other water stakeholders	Workshop meeting	VDC
			Recognition of the plan and its endorsement by DDC	DDC	Meeting	DDC, VDC

Phase	Step	Time	Detailed Step	Participants	Methodology	Responsibility
Implementation	30. Marketing and implementation	Continuous	Dissemination and marketing of plan with line agencies and donors	VDC, line agencies, resource organizations	Meeting/workshop/ regular community meetings	VDC
			Implementation of prioritized schemes by VDC and other resource organizations	VDC, line agencies, resource organizations	Investment planning in the VDC annual plan	
	31. WUMP + 3R update	Each year	Monitoring and review of plan	VDC, V-WASH-CC, other relevant committees	Meeting	VDC
		Each 5 years	Plan update	VDC, V-WASH-CC, other relevant committees	Workshop	VDC

1.2 Stakeholders and their Roles and Responsibilities

The main stakeholders of the WUMP + 3R approach are:

- Communities represented by women, men, and disadvantaged groups who all participate in the WUMP + 3R process, plan water use, and manage water schemes;
- Local authorities who take a lead role in the WUMP + 3R process and assure endorsement and ownership over the plan and responsibility for its implementation;
- Local service providers/WUMP + 3R facilitators who support communities by facilitating the planning process, social, technical assessments, and capacity development. Examples of service providers are non-governmental organizations and private consulting firms.
- Support organizations that support VDCs in the preparation of WUMP + 3R. These organizations include development projects, donors, or sector agencies, which provide financial and technical assistance.
- Resource organizations that support VDCs in the implementation of prioritized schemes in WUMP + 3R. These organizations include the development projects, donors or sector agencies that provide financial support to the VDC for the implementation of schemes.

The details of the stakeholders and their roles and responsibilities for each of the main steps and sub-steps of the WUMP + 3R preparation are described in Table 3.

Chapter 2: The WUMP + 3R steps

2.1 Preparatory phase

Phase objectives:

- To prepare the ground for successful WUMP + 3R planning and full ownership of all stakeholders
- By the end of this phase the following achievements are expected:
- The area in which to develop a WUMP + 3R is identified
- A formal agreement of the VDC members is made
- A memorandum of understanding among different stakeholders is singed
- WUMP + 3R facilitators are identified and trained

Step 1: Decision to prepare WUMP + 3R

The first step of the WUMP + 3R development process is the decision of a VDC to prepare the plan. The VDC has the responsibility to take the following steps to reach to a decision:

Step 1: VDC decision to prepare WUMP + 3R				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
1.1 Advocacy interaction on WUMP + 3R development process with VDC authorities	Information sharing meeting, if possible, inviting completed WUMP + 3R VDC members	VDC, V-WASH-CC, other relevant committees	VDC secretary (initiative at DDC level planning meeting, support by support organization)	Month 1 (0.5 weeks)
1.2 Decision/ consensus by VDC authorities	Consultative meeting	VDC members	VDC Secretary	
1.3 Identify support organization if required	Meeting and consensus	VDC, support, organization	VDC Secretary	

1.1. The VDC secretary calls for a meeting among VDC members, V-WASH-CC members, other relevant committees, and any other relevant stakeholders[5] working in the VDC. The VDC secretary facilitates the meeting. The meeting provides the participants with information on the WUMP + 3R: why it is prepared, how it is prepared, and financial and human resources required for its preparation. The participants discuss the need for preparing WUMP + 3R and evaluate the capacity of the VDC for this task. The participants

5 *Government line agencies, national and international non-governmental organizations, that are active in the VDC for water supply, sanitation, hygiene, irrigation, climate change, environment or renewable energy*

also discuss the human and financial resources required for WUMP + 3R preparation and evaluate whether these resources are available within the VDC or whether assistance from support organizations is required. If support is required, the meeting participants identify potential support organization/s. The meeting provides its recommendations to the VDC for preparing a WUMP + 3R.

1.2. The VDC makes a decision on preparing WUMP + 3R. The VDC includes its decision in the annual plan and gets it endorsed at the next VDC.

1.3. If it is decided that the VDC needs assistance from support organizations to prepare WUMP + 3R, the VDC meets the potential support organizations and discusses the assistance it is seeking. The VDC and the support organizations then reach consensus on their specific roles and responsibilities in the form of meeting minutes.

Step 2: Establishment of Memorandum of Understanding

The second step of the WUMP + 3R preparation is the establishment of a memorandum of understanding, involving the following sub-steps:

Step 2: Establishment of Memorandum of Understanding				
Sub-step	**Methodology**	**Participants**	**Responsibility**	**Month 1 (0.5 weeks)**
2.1 Interaction on WUMP + 3R development process with district authority	Meeting	VDC, DDC, support organization/s	VDC secretary	
2.2 Memorandum of understanding among DDC, VDC, and support organization/s	Signing memorandum of understanding	VDC, DDC, support organization/s	VDC secretary	

2.1. The notification of the DDC by the VDC for any type of planning is very important to maintain DDC support in future. The VDC organizes a meeting to inform district authorities on how a WUMP + 3R is prepared and what support they expect from the DDC.

2.2. A memorandum of understanding is signed between the DDC, the VDC, and support organizations (if any, as identified in step 1.3) to prepare the WUMP + 3R. The memorandum of understanding describes the roles and responsibilities of each stakeholder.

A template of the memorandum of understanding is shown in Annex 2.

Step 3: Selection and training of service providers

The WUMP + 3R process requires intensive field assessments, which are facilitated by WUMP + 3R facilitators in a participatory and inclusive manner. These facilitators could be individuals or people affiliated with local service providers (non-governmental organizations, consulting firms). Local non-governmental organizations are generally preferred over individuals to ensure institutional ownership and to avoid the sudden withdrawal of a facilitator. The involvement of local non-governmental organizations further supports capacity development at the local level.

Step 3: Selection and training of service providers				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
3.1 Inclusive selection of service providers or WUMP + 3R facilitators	As per VDC guidelines or support organization guidelines (if procured by support organization)	VDC and support organization	VDC secretary and support organization	Month 1 (3 weeks)
3.2 WUMP + 3R facilitators training	Training workshop	WUMP + 3R facilitators: VDC social mobilizers, VDC representatives, VDC secretary for first two days	Support organization	

3.1. The VDC, in consultation with support organizations, selects the local non-governmental organizations for the facilitation of WUMP + 3R. VDC follows its procurement guidelines to select and contract local service providers. However, if a local service provider is selected and contracted by the support organization according to step 2.2, it follows its own procurement guidelines. In both cases, the Terms of Reference of WUMP + 3R facilitators remain same as those presented in Annex 3. However, VDC guidelines or support organization guidelines are followed to select the non-governmental organizations according to their procurement procedures. After selection, an agreement is signed among the VDC, the support organization, and the non-governmental organization.

3.2. The support organization organizes the WUMP + 3R facilitators' training. The WUMP + 3R facilitators are comprised of one social and two technical persons. The facilitators are trained on the WUMP + 3R process before mobilization in the field.

The Terms of Reference for WUMP + 3R facilitators and the schedule for the facilitator training are described in Annex 3 and Annex 4 respectively.

2.2 Capacity building phase

Phase objectives:

- To activate local institutions for WUMP + 3R development
- By the end of this phase the following achievements are expected:
- Local institutions are oriented about the WUMP + 3R process
- Village WASH coordination committees are trained

Step 4: Preliminary WUMP + 3R orientation at VDC level

The WUMP + 3R facilitators are mobilized to the field after the training explained in step 3.2. The information sharing with concerned community people and stakeholders is very important for their active participation and support. During this step, the following sub-steps are carried out:

Step 4: Preliminary WUMP + 3R orientation at VDC level				Month 2 (1 week)
Sub-step	**Methodology**	**Participants**	**Responsibility**	
4.1 WUMP + 3R orientation meeting at VDC level	Orientation workshop	VDC, V-WASH-CC, selected key persons from different wards	Service provider and VDC secretary	
4.2 Identification of water-related stakeholders	Stakeholder mapping	VDC, V-WASH-CC, selected key persons from different wards	Service provider	
4.3 Secondary information review	Review secondary data visit	WUMP + 3R facilitators	Service provider	

4.1. To inform all local level stakeholders about the WUMP + 3R process, the VDC organizes a VDC level orientation meeting. The WUMP + 3R facilitators lead the meeting. Participants include V-WASH-CC members (e.g., VDC secretary, representative from health facilities, non-governmental organizations, community based organizations, development partners, user committees, local development organizations, female community health volunteers, headmasters/principals, child clubs, women's groups). Other key persons of the VDC are also invited to the meeting.

4.2. After completing the orientation session, the WUMP + 3R facilitators guide the members of the concerned local authority in carrying out the mapping of water-related stakeholders including water supply, sanitation, hygiene, irrigation, energy production, etc. with support of participants of the orientation meeting. Various stakeholder mapping tools are explained in Annex 5.

4.3. Together with other fieldwork, the WUMP + 3R facilitators review the secondary information such as census data, hydro-meteorological data, VDC profile, and other available plans of the VDC (e.g., village development periodic plan, local adaptation plan of action).

For the content of WUMP + 3R orientation, refer to Annex 6.

Step 5: Ward level orientation and activation of ward citizen forum

The WUMP + 3R facilitators organize a series of orientation meetings. After conducting a VDC level orientation meeting, they visit all wards. The following sub-steps are conducted:

Step 5: Ward level orientation and activation of ward citizen forum				Month 2 (1 week)
Sub-step	**Methodology**	**Participants**	**Responsibility**	
5.1 Ward level WUMP + 3R orientation	Meeting	Ward citizen forum, including members from as many households as possible	Service provider	
5.2 Activation of ward citizen forum	Meeting	Ward citizen forum, including members from as many households as possible	VDC	

5.1. An orientation meeting is also organized at ward level to inform the community of the WUMP + 3R process and its importance, the impact of climate change, and local adaptation measures. The expected support from their side is explained during the meeting. During these this session, the water runoff and soil erosion experiment is demonstrated to emphasize the added value of water use planning and implementation of 3R measures. The experiment can be viewed at www.youtube.com/watch?v=og9cQKxlFnE. The experiment can be easily replicated locally with readily available materials.

5.2. As per VDC planning guidelines, the ward citizen forum is provisioned for the planning of the development activities in the VDC. These forums are activated during the ward level orientation meeting. The ward citizen forum will be the ward level local institution for the community mobilization, consultation, and discussion and planning events of WUMP + 3R. For the ward level orientation schedule, refer to Annex 7.

Step 6: Activation of V-WASH-CC

The provision of local level institutions is necessary for community mobilization and development activities. The National Sanitation and Hygiene Master Plan 2011 sets out the provision of VDC water, sanitation, and hygiene coordination committees (V-WASH-CC). The main role and responsibility of these committees is the preparation and updating of the water sanitation and hygiene profile of the VDC, preparation of a short term and long term plan, and coordination of the implementation of the plan.

To avoid creating similar local institutions, the WUMP + 3R approach relies on the same committee as a local level institution for WUMP + 3R development. In order to ensure the involvement of other sectors, new members may be added to this committee or other committees may be entrusted with this responsibility based on the local context.

Step 6: Activation of V-WASH-CC				Month 2 (0.5 weeks)
Sub-step	**Methodology**	**Participants**	**Responsibility**	
6.1 Activation of V-WASH-CC	Meeting	VDC, V-WASH-CC members, selected representatives from ward citizen forum	VDC	

6.1. The V-WASH-CC needs to be activated for the WUMP + 3R process. The VDC organizes a meeting among V-WASH-CC members to assess the activeness of the existing members, representation from all wards, and proportionate representation of women and poor and disadvantaged groups. According to the current provision in the National Sanitation and Hygiene Master Plan, the members of a V-WASH-CC are: VDC chairperson, VDC secretary, representative from health facilities, non-governmental organizations, community based organizations, development partners, WASH users committees, local development organizations, female community health volunteers, headmasters/principals, child clubs, women's groups, etc.
If needed, new members replace less active members. At least 33 per cent of women are ensured and two representatives (one male and one female) from each ward citizen forum are also ensured as members of the V-WASH-CC. Similarly, transboundary representation of members in the V-WASH-CC should also be considered when some of the potential water sources are situated in adjacent VDCs.

In the V-WASH-CC, one member from each political party in the VDC should be either a member or sit on an advisory panel formed with the representation of active political parties to advise the V-WASH-CC if current VDC bodies/representatives are unavailable.

Step 7: Capacity building for VDC/V-WASH-CC members

The WUMP + 3R is a process-oriented approach. Capacity development of the local community and institutions is very important for the preparation of the WUMP + 3R and its implementation. It is noted here that capacity building is a one short activity and is needed in the future as well.

Step 7: Capacity building for VDC and all V-WASH-CC members				Month 2 (0.5 weeks)
Sub-step	**Methodology**	**Participants**	**Responsibility**	
7.1 Capacity building training for VDC and all V-WASH-CC members	Training workshop	VDC, V-WASH-CC members	Service provider	

7.1. The WUMP + 3R facilitator will organize a three-day capacity building workshop for V-WASH-CC members to inform them of their roles and responsibilities. Their training includes, but is not limited to, the following subjects:

- WUMP + 3R approach and integrated water resources management principles
- Climate change, disaster risk reduction, and adaption measures to climate change using the WUMP + 3R approach
- Legal provisions related to development of water resources, their uses, operation, and maintenance of water infrastructure
- Planning procedures, participatory planning tools
- Conflict management related to water sources
- Crosscutting issues such gender equity and social inclusion

The schedule of the capacity building training for V-WASH-CC members is described in Annex 8.

2.3 Assessment phase

Phase objectives:

- To assess the current socio-economic conditions, technical feasibility of the sources, and 3R measures within the landscape as well as people's needs in terms of water and water resources management.
- By the end of this phase the following achievements are expected:
- Socio-economic (including gender and social inclusion) assessment and needs identification conducted
- Technical assessment conducted
- Preliminary report compiled

Step 8: Socio-economic assessment and needs identification

The socio-economic assessment (including gender and social inclusion) and needs identification is an important step of the WUMP + 3R. It provides the foundation for the technical assessment delineating women's and men's priorities in the WUMP + 3R. For the social assessment, several participatory rural appraisal tools are used.

It is expected that the WUMP + 3R facilitator will encourage participation and inclusion of all communities and people of all strata in the social/resource mapping and needs identification. During the social assessment, the communities will be sensitized and motivated for hygiene and sanitation promotion, climate change adaption measures, etc. This step is further divided into following sub-steps:

Step 8: Socio-economic assessment and needs identification				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
8.1 Participatory social/resource mapping at ward level	Meeting applying participatory rural appraisal tools, specifically resources mapping (explained in Annex 5)	Ward citizen forum, representation of households (incl. women, disadvantaged groups)	Service provider with support from ward citizen forum	Month 3-4 (6 weeks)
8.2 Participatory needs identification at ward level	Community meeting and discussion	Ward citizen forum, representation of households (incl. women, disadvantaged groups)		
8.3 Collection of socio-economic data	Focus group discussion	Key informants in each category of stakeholders		
8.4 Participatory 3R potential mapping at ward level	Meeting applying participatory rural appraisal tools	Ward citizen forum, representation of households		

8.1. Participatory social/resource mapping is carried out for each ward. Social mapping identifies the number of the clusters (settlements) based on common water sharing, households (specify women headed), water sources in the VDC, land use patterns, and other natural resources (see figure 20). The identified water sources are listed against existing and potential uses according to the needs of local people. An example of a resource map is provided below.
For an explanation on how to develop such a resource map, please refer to Annex 5.

8.2. A list of necessary water-related development activities are prepared based on the participatory needs identification of the local people and available water sources. Subsequently, these are indicated on the resource map prepared under 8.1.

8.3. The WUMP + 3R facilitator also collects disaggregated socio-economic data such as households (including the household head), population, and caste/ethnicity, major occupations, and livelihood opportunities. A seasonal calendar is also prepared to gain insight into the busy period(s) of the community. An explanation of how a seasonal

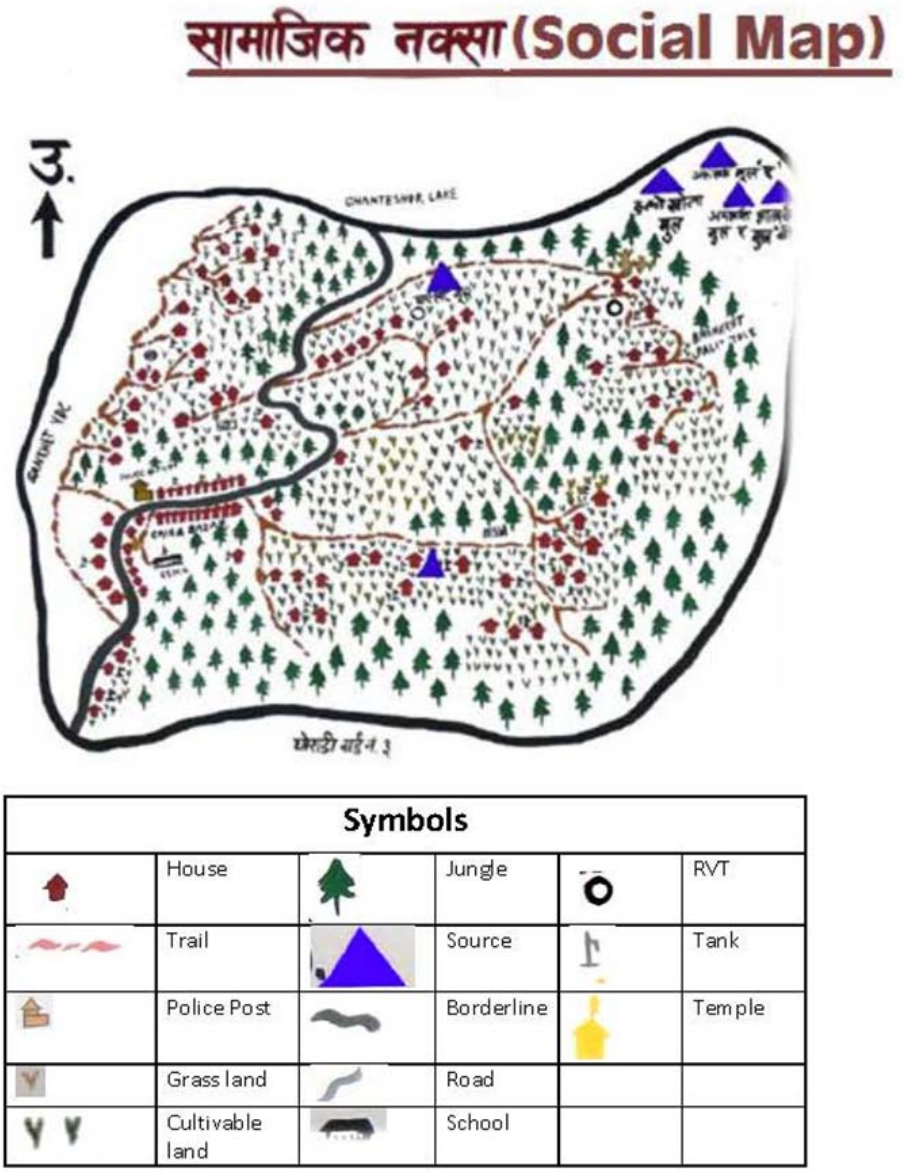


Figure 20: Example of resource map (source: MetaMeta)

calendar is developed is provided in Annex 5.The socio-economic data needs to be filed in the other formats found in Annex 5.

8.4. Another important aspect of this step is mapping both the existing 3R measures used and the future 3R potential, both those for the enhancement of the larger water buffer within a landscape as well as those directly linked to water-related development activities. One has to keep in mind that holistic buffer management must be derived from a thorough understanding of the local livelihoods and the needs, priorities, and potential of the people living in the area, i.e. from access to drinking water to the scope for economic development. Based on the resource map prepared in step 8.1, a 3R exploration needs to be developed together with key representatives of the local community. If the resource map is already too full and it is not clear enough, a new blank map can be developed

based on the resources map such that the community members can depict the 3R aspects. The 3R exploration map needs to show the (main) existing sources of water, the main sources of concentrated runoff (roads, gullies, and seasonal streams), and the direction taken by water when flowing through the area. Another important aspect is indicating specific moisture stressed areas. An example is provided below.

This exploration map can be taken a step further with the help of an innovative interactive water harvesting discussion tool called "Happy Strategies". This tool can provide an interesting and quick overview of potential measures and their possibilities within the target landscape.

The tool was developed for the Nile Basin Development Challenge (www.nilebdc.org) as a way to involve various stakeholders in identifying and matching 'best bet' Water Management Strategy

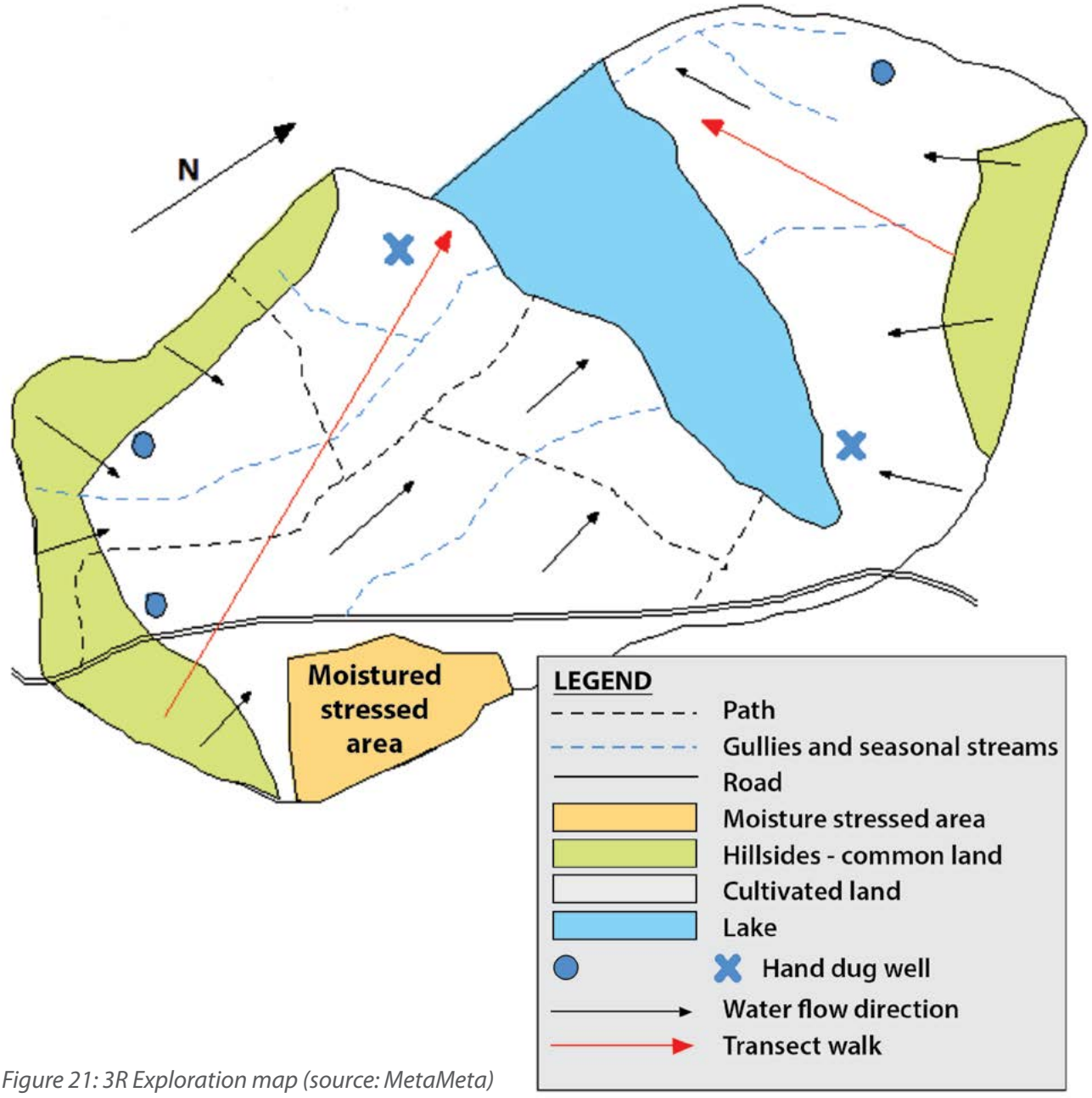


Figure 21: 3R Exploration map (source: MetaMeta)

practices and interventions at different scales. Further details on how to use the tool can be found in Annex 9. The 3R/water management techniques that can be used for the game are provided in Annex 1.

Step 9: Technical assessment

Another important step of the WUMP + 3R preparation is the technical assessment. Preferably, the technical assessment is carried out during both the dry season (approximately from April to May) and the wet season. If there are budget and/or time constraints, then at least one assessment needs to be undertaken during the dry season. The technical assessment in each ward is preceded by the social assessment described above. The WUMP + 3R facilitator of technical background uses the social data and social/resource map to conduct the technical assessment. The facilitators and the representative of the villages conduct the technical assessment of the ward and then move to another ward for the same sequence of work. During the technical assessment, the social facilitator accompanies the technical facilitator. The-sub steps of the technical assessment are:

Step 9: Technical assessment				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
9.1 Secondary data review	Data analysis/desk study/validation/ triangulation of data with community	WUMP + 3R facilitator	Service provider with support of ward citizen forum	Month 3-4 (6 weeks)
9.2 Water resources inventory and discharge measurement	Field mapping and measurements	Key informants from community, WUMP + 3R facilitator		
9.3 Inventory of water infrastructures	Field mapping and measurements	Key informants from community, WUMP + 3R facilitator		
9.4 Verification of 3R opportunity map using transect walks and participatory mapping	Participatory rural appraisal tool – transect walk	Key informants from community and WUMP + 3R facilitator		
9.5 Pre-feasibility assessment of potential schemes	Field observations and measurements	Key informants from community and WUMP + 3R facilitator		

9.1. The first sub step of the technical assessment is to review available secondary data. These secondary data include hydro-metrological data, technical data related to water resources, water infrastructure, and related plans.

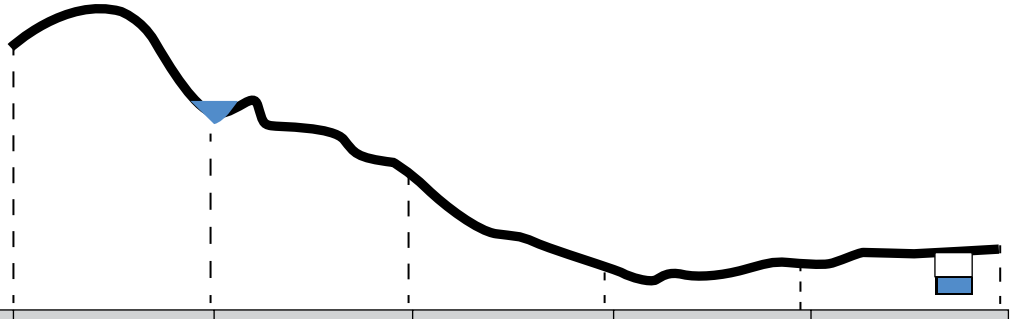
9.2. Inventory of water sources and discharge measurement is carried out for the water sources available in the VDC and transboundary water sources that have the potential for use in the VDC. For this, refer to the Source Inventory Form (TA 0 2) in Annex 10 – Technical formats.

9.3. To assess the existing situation of water and sanitation, irrigation, energy coverage, and status of existing water infrastructure, an inventory of all water schemes is recorded. The

functionality of existing schemes and repair and maintenance status are also recorded. The data on the WASH profile of each cluster of wards are collected to analyze the drinking water service level. For this, refer to the Scheme Inventory Form (TA 03, 04, 05,06) and WASH profile forms (TA 01) in Annex 10.

9.4. The 3R opportunities mapped during the social assessment are verified in the field during the technical assessment. The verification is done by the technical WUMP + 3R facilitator together with local key informants through one or more transect walks. An example is provided in table 4.

It is more convenient and time saving if the transect walk is carried out with the water source measurement or pre-feasibility study of water schemes. Please note that in addition to 3R measures directly linked with potential water schemes, 3R measures that will positively affect the larger water buffer in the landscape need to be identified. Refer to Annex 10 for the inventory form (TA 07).



	Section 1	Section 2	Section 3	Section 4	Section 5
LAND-USE	Grazing, few trees	Grazing-shrubs	Agriculture	Agriculture	Agriculture
CROPS	-	-	Khat-Maize	Sorghum-	Sorghum
SLOPE	> 50%	> 20%	> 20%	< 10%	< 10%
Concentrated runoff	Gullies, road	Gullies, road	Seasonal stream	Seasonal stream road	Seasonal stream
Soil moisture	Green for few months	Green for few months	Green for 4 months	Green for 6 months	Green for 6 months
Already existing 3R measures	Stone faced soil bunds	WH pond	none	none	soil bunds
Existing water sources	None	one pond	none	water fron dry riverbed	hand dug well
Challenges	Bush encroaching	low grass production, erosion	no water	Crop failure	drying up well
OTHERS	Big herd of cows	Abandoned quarry	Many tukuls	waterlogged after rain	most productive

Table 4: Transect sketch

The parameters guiding 3R opportunities are:

- Terrain slope
- Terrain aspect
- Land cover/land use
- Soil moisture presence
- Areas with concentrated runoff

(more details found in Annex 11)

These transect walks need to be undertaken in both the wet and dry seasons in order to obtain a proper overview of the water movements and 3R possibilities throughout the year. It is also important to specifically assess the 3R measures in place in the area in order to build on what is already in place on the ground. In addition, potential future 3R measures should be listed based on their feasibility with regard to the list above (terrain slope, aspect, land cover/land use, soil moisture, and runoff). An example of such an exploration is depicted here:

3R measure	Aim	Where
Soil Bunds	To increase moisture retention	On gently sloping cultivated fields
Sand dam and/or subsurface dam	To improve water storage in dry riverbed	On ABC stream close to village xy, where women traditionally fetch water
Gully plugs	To avoid excessive drainage and increase recharge	On all gullies, starting uphill and moving down
Cutoff drain and waterways	To protect farmland from erosion and deviate runoff to reservoir and recharge pond	Above all farming land at the foothills
Hillside pond	To provide water for community multiple use	At foothills where clay soil is found, near the water stressed area
Recharge pond	To recharge the groundwater table close to hand dug wells	In old quarry at the foothill. Where possible to receive runoff from slopes and drains
Roof water harvesting	To provide drinking water	On laminated roofs of schools and health clinics
Agroforestry	To reduce ET and increase wood and fodder production. To increase soil fertility and soil moisture storage capacity.	On cropland. Can be applied as windbreaks on farm boundaries or scattered in the fields
Mulching and composting	To increase fertility, reduce ET, and augment soil moisture retention	To be applied on cropland. Mulch from crop residues. Composting from kitchen and crop residues. Composting pits close to households and source of water.

After having developed an exhaustive overview of existing and potential 3R measures, the community needs and constraints for each specific measure should be explored in detail.

The next step in the process entails undertaking a further investigation of the more specific potential benefits of each of the WUMP + 3R measures (in terms of concrete benefits, beneficiaries, benefits for women and disadvantaged people, and gender equality and equity aspects) in order to prioritize for implementation. An example of this can be found in Annex 5.

To enhance the sustainability of 3R opportunities, the 3R assessment should also include exploring potential income generating c.q. business opportunities. By facilitating these business ideas, it might be possible to make 3R interventions self-standing and the communities more independent from external help. This idea needs to be tested with willing and open-minded community members and/or community based organizations such as self-help groups, cooperatives, local financial institutions, and women, farmers, and youth associations (Sambalino et al. 2013). An example is provided at the end of Annex 5 (Social Assessment formats).

9.5. Pre-feasibility of potential water schemes (categorized according to four legs) is carried out, and each scheme is listed in the participatory needs identification. A proper analysis should be conducted for appropriate water sources and types of technology, the possibility for multiple use schemes, environment and ecology related interventions, etc. For this, refer to Annex 10, Proposal Form (TA 08, 09, 10, 11,12, 13) .

The process diagram for technical assessment is described in the table below.

1	Obtain social map and other social assessment data		
2	Inform community to organize about 4 to 5 persons who have good knowledge of village, source, location etc.		
3	Arrange tools (ansi, kodalo, bucket etc), required numbers of technical forms and technical equipment: GPS, altimeter, pedometer, tape, stop watch, plastic sheet, camera		
4	Measure water sourse and fill the source survey form (TA/02) and follow as below:		
5	If the source is used for drinking water	yes →	Complete drinking water and sanitation profile form (TA/01)
6	If there is any existing improved water system	yes →	Complete relevant inventory form TA/03, 04, 05 and 06
7	If the source is used for improved water scheme and the scheme is proposed for repair or rehabilitation	yes →	Complete proposal form (TA/07, 08, 09, 10, 11 and 12) and tick "repair or maintenance schemes"
8	If the source is not in use and a new scheme is proposed	yes →	Complete proposal form (TA/07, 08, 09, 10, 11, 12 or 13) for relevant scheme and tick "new scheme"
9	Explore possibilities of multiple use schemes; compare with alternative options, if any		
10	Explore 3R opportunities (source improvement and conservation, plantation works etc.) linked with water scheme and stand alone		
11	Follow the alignment of existing or new proposed scheme and record necessary data		
12	Verify and acess feasibility of 3R opportunities identified during social assessment. Conduct transect walk along 2 - 3 directions for remaining area to verify/identify 3R opportunities		
13	If 3R opportunities identified and feasible (special attention should be given for water hardship areas)	yes →	Fill the proposal form (TA/07, 08, 09, 10, 11, 12 or 13) for relevant scheme
14	Compile the information of TA/15 from Household Survey form and Water Sanitation Profile form		
15	Take relevant photograps of the surveyed area, sources, settlements, special area, meetings etc.		

2.4 Planning phase

Phase objectives:

To plan water resources development activities based on participatory and inclusive principles.

By the end of this phase the following achievements are expected:

- Planning workshops at different levels are organized
- A consolidated WUMP + 3R is compiled and approved by VDC authorities
- Full ownership by all local stakeholders is fostered

Step 10: Ward level planning workshop

Step 10 : Ward level planning				
Sub-step	**Methodology**	**Participants**	**Responsibility**	**Month 4-5 (2 weeks)**
10.1 Prioritization at ward level	Ward citizen forum with support from service provider	Ward citizen forum, household representatives	Ward citizen forum with support from service provider	
10.2 VDC level meeting	Service provider	VDC, V-WASH-CC, selected ward citizen forum members	Consultative meeting	

10.1. A one-day workshop will be conducted with the ward citizen forum, including the communities, to share and verify the findings of the social and technical assessments. During the workshop the participants will prioritize the water related schemes for all sectors according to the four legs of the WARM + 3R chair. Participation from each household is important in planning, as this is the key step for WUMP + 3R preparation. Similarly, participation of women and disadvantaged groups will be ensured in this exercise. It is important to note that the WUMP + 3R facilitators need to act as facilitators and not as decision makers. Facilitation needs to be based on the needs of local people giving high priority to water hardship areas, gender, and inclusion perspectives. The prioritization at ward level is carried out for all wards following the same process.

10.2. An exit meeting with the V-WASH-CC members and selected ward citizen forum members is carried out to inform them of the completion of the fieldwork and to make a further action plan. The major findings of the technical and social assessments and the ward level planning are shared in the meeting. One of the major tasks of this meeting is to share information on planned schemes covering more than one ward, the water that is situated in the ward and planned for a water scheme in another ward, and potential transboundary water sources. This discussion helps in further negotiation and consensus finding for the different uses of water sources. Any issues and remaining data collection are also shared in the meeting. In case further discussions and negotiation are needed, responsibility is given to a particular V-WASH-CC member and the VDC.

The schedule for ward level planning and forms is presented in Annex 12.

Step 11: Preparation of preliminary report

Step 11: Preparation of preliminary report				Month 5 (3 weeks)
Sub-step	**Methodology**	**Participants**	**Responsibility**	
11.1 Preparation of preliminary report for VDC level prioritization	Desk work	WUMP + 3R facilitator	Service provider	

11.1. Based on the findings of the social and technical assessments and the prioritization exercise at ward level, all available data is compiled to prepare a preliminary WUMP + 3R report. This report can be used in the later steps of the approach.

A standard table of contents of the report is presented in Annex 13.

Step 12: VDC level planning workshop

Step 12: VDC level planning workshop			
Sub-step	**Methodology**	**Participants**	**Responsibility**
12.1 Prioritization at VDC level	Workshop	VDC, V–WASH-CC (representative of ward citizens forum) and water-related stakeholders	VDC with support from service provider

12.1. At this stage, a 3-day workshop is conducted with the V-WASH-CC members, representatives of ward citizen fora, and advisory panel members (political party representative in the VDC). If possible, a representative from the DDC and other resource organizations, including women, children, and Dalit networks/organizations should also be invited. It is emphasized that representatives of adjacent VDCs may also be brought on board during planning if they are sharing the same catchment.
The objectives of the planning workshop are to share and verify the findings of the social and technical assessments and to prepare immediate and long-term action plans by prioritizing the activities. The overall catchment perspective is an important element considered for the planning. During the workshop, the participants will exercise sub-sector specific prioritization of water related schemes. The major tasks of the workshop are to:

- Disseminate social and technical assessment findings and verify them in the workshop
- Prioritize both the water and 3R schemes for implementation to prepare a five year and long term plan as per the four legs of the WARM + 3R Chair
- Identify potential resource organizations and possible business opportunities connected to the schemes identified
- Develop financial resource forecast and budget estimates
- List support activities like training, observation tours, skills training, etc.
- Prepare monitoring and follow-up action plan
- Prepare commitment letters from the participants of the workshop: VDC, V-WASH-CC members, political leaders, etc.

The detailed schedule of planning workshop is provided in Annex 14 and the format of the planning is presented in Annex 12.

Step 13: Final WUMP + 3R report preparation

Step 13: Final WUMP + 3R report preparation			
Sub-step	**Methodology**	**Participants**	**Responsibility**
13.1 Development of plan	Desk work	WUMP + 3R facilitator	Service provider

13.1. The master plan report is prepared based upon the outcomes of all the previous steps. The report shall be produced as follows:

1. Volume 1: Main report (Nepali version)
2. Volume 2: Appendices (English only)
3. Database: E-copy (Nepali and English version)

Step 14: Approval by VDC council

Step 12: Approval by VDC council			
Sub-step	**Methodology**	**Participants**	**Responsibility**
14.1 Approval by VDC council	Council Meeting	VDC council members	VDC

Month 6 (1 week)

14.1. The real owner of the WUMP + 3R is the concerned VDC. As per the Local Self Governance Act 1999, the VDC council has the authority to approve various plans and strategies of the VDC. To make a WUMP + 3R more authentic and binding, the council of the respective VDC must endorse it. The VDC takes responsibility for the endorsement of the plan by their council. The endorsement could take a longer time, as there is usually a fixed date for the council meeting. The implementation of the schemes can begin before endorsement if it takes a long time to get approval from the VDC council.

Step 15: Dissemination at district level

The master plan of the VDC needs to be shared with the respective DDC. The DDC supports the VDC to network with potential resource organizations for implementation of water related schemes. The VDC is expected to work together with such organizations.

Step 15: Dissemination at district level			
Sub-step	**Methodology**	**Participants**	**Responsibility**
15.1 Dissemination of the plan at district level	Workshop meeting	VDC, DDC, line agencies, other water stakeholders, women, children, Dalit networks, and organizations	VDC secretary
15.2 Recognition of the plan and its endorsement by the DDC	Meeting	DDC	DDC, VDC

Month 6 (1 week)

15.1. After preparing the WUMP + 3R report, the VDC will organize a meeting with the district authorities to inform them and disseminate the completed WUMP + 3R. Relevant line agencies and representatives of political parties will also be invited to the meeting. The meeting will emphasize developing co-operative mechanisms of the VDC with other potential resource organizations for the long-term realization of the various identified water related schemes.

15.2. After the dissemination meeting, the DDC recognizes the WUMP + 3R plan and endorses it. The DDC commits that it will instruct the organizations working in the water sector to follow the plan while implementing schemes.

2.5 Implementation phase

Phase objectives:

- To implement the master plan for improved livelihoods and adaptation to climate change
- By the end of this phase the following achievements are expected:
- The WUMP + 3R is marketed amongst different stakeholders and resource organizations
- The WUMP + 3R is periodically updated

Step 16: Marketing and implementation

After preparation of the master plan, the implementation of the schemes will begin. The real implementation of the WUMP + 3R depends upon the capacity of the VDC to approach resource organizations and their marketing approach for the WUMP + 3R.

Step 16: Marketing and implementation				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
16.1 Dissemination and marketing of plan with line agencies and donors	Meeting/workshops, regular community events	VDC, line agencies, resource organizations	VDC	Continuous
16.2 Implementation of prioritized schemes by VDC and other resource organizations	Investment planning in the VDC annual plan	VDC, line agencies, resource organizations		

16.1. The VDC continuously approaches relevant line agencies and donors for the dissemination and marketing of the WUMP + 3R and seeks their commitments for financial assistance.

It is important to note that significant amounts of buffer management can be achieved with more considerate planning and with the use of relatively low-cost techniques. Many techniques have very short repayment periods and some can be operated by local or community initiatives. Given the impact of climate change in the long-term, there is a high end to 3R as well, which makes implementation of 3R applications financially viable.

A WUMP + 3R financing strategy cannot be limited to targeting a single sector—government, the private sector, or individual initiative. Rather, a broad range of sectors needs to be considered as does who benefits most and who is best positioned to manage and operate the 3R facility. A holistic implementation and financing strategy systematically looks at the functions served by buffer management, identifies the interests associated with these functions, and helps determine whom to involve in the different components.

A number of principles should be considered in WUMP + 3R financing:

- Mobilizing action and investment – have the knowledge and incentives ready for individual families, firms, and local communities to invest in water resources development in combination with recharge, retention, and/or reuse measures. These incentives may come from direct benefits.
- Create matches with other investments – add buffer management to road planning, urban planning, and land development programmes so as to achieve high cost efficiency.
- Make use of special investment opportunities - for instance, climate change adaptation funds, to leverage investment by others.
- Acknowledge and make use of the large interest involved in water and land development - In the case of sand and gravel extraction, for instance, considerable money is involved in mining concessions that can be used to invest in rainwater harvesting, buffer management, and water retention.

16.2. The prioritized schemes will be implemented based on the WUMP + 3R. The potential resource organizations will support the VDC to implement the schemes as per their commitments. In addition to implementation support from resource organizations, the VDC can also implement schemes from their own resources.

Step 17: WUMP + 3R follow up

Follow-up monitoring is necessary for the effective implementation of the WUMP + 3R. The following sub-steps will be conducted for WUMP + 3R follow up:

Step 17: WUMP + 3R follow up				
Sub-step	**Methodology**	**Participants**	**Responsibility**	
17.1 Monitoring and review of plan	Meeting	VDC, V-WASH-CC, other relevant committees	VDC	Continuous
17.2 Plan update	Workshop	VDC, V-WASH-CC, other relevant committees		

17.1. The effectiveness of the WUMP + 3R will be assessed via periodic follow-up studies after its preparation. The VDC will organize WUMP+3R review meeting once a year among V-WASH-CC members and other stakeholders working in the VDC. The meeting will review the achievement of the plan, efforts of the VDC/V-WASH-CC to market the WUMP+3R, and the number of documented contacts with the resource organizations for implementing the schemes.

17.2. The master plan includes a five-year plan, which needs to be updated after a certain time period. It is expected that the VDC will update the WUMP+3R every five years.

Module 3: A WUMP + 3R example from Nepal

Area Base (settlement based) Analysis (Paduka VDC)

Potential water hardship locality is predicted based on an analysis of the watershed sub basin within the VDC and the settlement pattern considering terrain slope, land cover, terrain aspect, and hydrological network of the VDC. The VDC constitutes three distinct watershed sub basins as shown in figure 22 and 23.

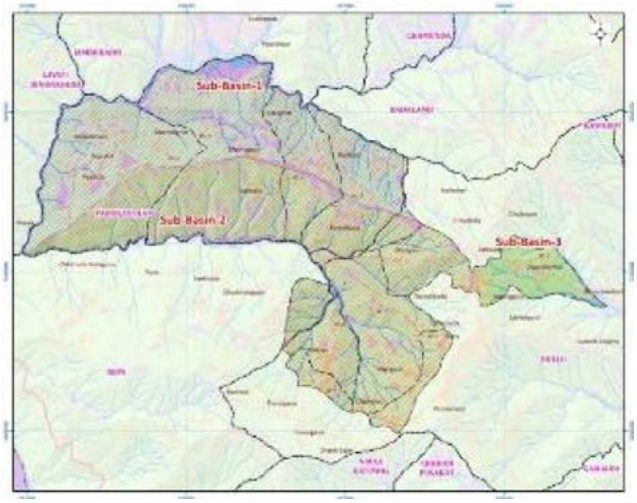


Figure 22: Watershed sub-basin

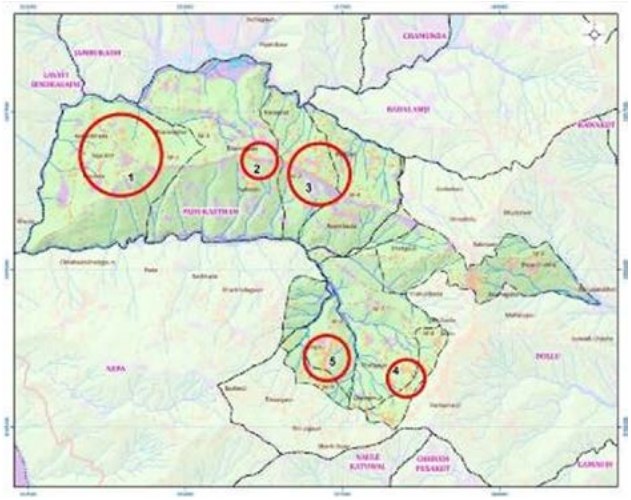


Figure 23: Potential Water hardship areas in slope map

Table 5: Potential water hardship locality with proposed 3R measures, Paduka VDC

Area Code	Locality Name	Slope	Aspect	Land Cover	Proposed 3R Measures
1	Saja Aot	Dominant > 20 % with large cluster of 6 - 20 %	North-East, West	Cultivation	• Rooftop rainwater harvesting • Recharge pond in the flat slope area with provision of water diversion from road • Tied ridges in the cultivation area
2	Dhamigaun	Dominant > 20 % with large cluster of 6 - 20 % and significant area in 3 - 6 %	North, South-West	Cultivation	• Rooftop rainwater harvesting • Retention ponds of eyebrows nature in the area of 6 - 20 % slope with provision of diversion of road drain to the pond • Contour bund in the cultivation area

Area Code	Locality Name	Slope	Aspect	Land Cover	Proposed 3R Measures
3	Badipati	Dominant > 20 % with large cluster of 6 - 20 % and significant area in 3 - 6 %	North, North-East	Cultivation	• Rooftop rainwater harvesting • Retention pond in the area of 6 - 20 % or 3 - 6 % slope with provision of diversion from road drain to the pond, preferably on northern aspect • Contour bund in the cultivation area
4	Khetgaun	Dominant > 20 % with significant area in 6 - 20 %	North-West	Cultivation	• Rooftop rainwater harvesting • Retention pond in the area of 3 - 6 % slope having provision of diversion of road drain to the pond • Trapezoidal bunds in the cultivation area
5	Tallipau	Dominant > 20 % with significant area in 6 - 20 %	North, North-East	Cultivation	• Rooftop rainwater harvesting • Retention pond in the area of 6 - 20 % slope • Trapezoidal bunds in the cultivation area

Water source base analysis

The GPS coordinates of the water sources collected during the field inventory stage are plotted against the satellite images of the area as well as against slope, aspect, and land cover map. Based on the location of these water sources in slope, aspect, and land cover, different source improvement/protection technology related to the 3R technique is recommended. This is important from the water source sustainability and reliability perspective.

Also, during trans walk survey during the wet season it was observed that the yield/discharge of the source has increased by more than 100 times compared to the dry season. This also highlights the opportunity of the 3R principle, which calls for the retention of excess wet season discharge from the source to recharge water sources in the dry season via reuse management.

Table 6 shows the source properties with respect to 3R parameters and its recommended technology (**Paduka VDC**).

Table 6: Example of table with water source properties and proposed 3R structures

Slope	Aspect	Land Cover	Land Use	Proposed 3R Structure
6 - 20 %	East	Forest	Valley Cultivation	Small water harvesting ponds
6 - 20 %	North-West	Sand	Valley Cultivation	Sand dams
> 20 %	North	Cultivation	Coniferous Forestry	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Coniferous Forestry	Cutoff drain and waterways
> 20 %	South-West	Cultivation	Coniferous Forestry	Demi lunes
> 20 %	North-West	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-West	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-West	Forest	Coniferous Forestry	Recharge Pond
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	North-East	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-West	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-East	Forest	Coniferous Forestry	Recharge Pond
> 20 %	West	Forest	Coniferous Forestry	Eyebrows
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	East	Forest	Coniferous Forestry	Recharge Pond
> 20 %	South	Forest	Coniferous Forestry	Eyebrows
> 20 %	East	Forest	Coniferous Forestry	Recharge Pond
6 - 20 %	South-West	Forest	Coniferous Forestry	Small storage hill dams
> 20 %	South	Forest	Coniferous Forestry	Eyebrows
6 - 20 %	East	Forest	Coniferous Forestry	Small water harvesting ponds
> 20 %	East	Forest	Coniferous Forestry	Recharge Pond
3 - 6 %	South-West	Cultivation	Hill Slope Cultivation	Small Storage hill dams
6 - 20 %	North-West	Cultivation	Hill Slope Cultivation	Small water harvesting ponds
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways

Slope	Aspect	Land Cover	Land Use	Proposed 3R Structure
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-West	Forest	Hill Slope Cultivation	Recharge Pond

Slope	Aspect	Land Cover	Land Use	Proposed 3R Structure
6 - 20 %	North-West	Forest	Hill Slope Cultivation	small water harvesting ponds
> 20 %	West	Forest	Hill Slope Cultivation	Eyebrows
> 20 %	East	Forest	Hill Slope Cultivation	Recharge Pond
> 20 %	North	Sand	Hill Slope Cultivation	Sand dams
6 - 20 %	South-East	Sand	Hill Slope Cultivation	Percolation Ponds
3 - 6 %	East	Sand	Hill Slope Cultivation	Subsurface dams
< 3 %	East	Sand	Hill Slope Cultivation	Percolation Ponds
6 - 20 %	North	Sand	Hill Slope Cultivation	Sand dams
6 - 20 %	North	Sand	Hill Slope Cultivation	Sand dams
6 - 20 %	North-East	Sand	Hill Slope Cultivation	Sand dams
6 - 20 %	South-West	Cultivation	Valley Cultivation	Contour Trenches
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-West	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-East	Forest	Coniferous Forestry	Recharge Pond
> 20 %	West	Forest	Coniferous Forestry	Eyebrows
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
6 - 20 %	North	Sand	Coniferous Forestry	Sand dams
> 20 %	North-West	Bush	Hill Slope Cultivation	Recharge Pond
> 20 %	North-West	Cultivation	Grazing Grazing	Cutoff drain and waterways
> 20 %	South-West	Forest	Grazing Grazing	Eyebrows
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	South	Bush	Coniferous Forestry	Eyebrows
> 20 %	South	Cultivation	Coniferous Forestry	Demi lunes
6 - 20 %	South	Cultivation	Coniferous Forestry	Contour Trenches
> 20 %	South	Forest	Coniferous Forestry	Eyebrows

Slope	Aspect	Land Cover	Land Use	Proposed 3R Structure
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
6 - 20 %	South	Forest	Coniferous Forestry	Small Storage hill dams
> 20 %	West	Bush	Hill Slope Cultivation	Eyebrows
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	West	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	North-East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
6 - 20 %	North-East	Cultivation	Hill Slope Cultivation	small water harvesting ponds
6 - 20 %	West	Cultivation	Hill Slope Cultivation	Contour Trenches
6 - 20 %	West	Cultivation	Hill Slope Cultivation	Contour Trenches
6 - 20 %	South-West	Cultivation	Hill Slope Cultivation	Contour Trenches
> 20 %	North-East	Forest	Coniferous Forestry	Recharge Pond
6 - 20 %	East	Forest	Coniferous Forestry	small water harvesting ponds
> 20 %	North	Forest	Coniferous Forestry	Recharge Pond
> 20 %	North-East	Forest	Coniferous Forestry	Recharge Pond
> 20 %	West	Forest	Coniferous Forestry	Eyebrows
6 - 20 %	West	Forest	Coniferous Forestry	Small Storage hill dams
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	West	Forest	Coniferous Forestry	Eyebrows
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	West	Forest	Coniferous Forestry	Eyebrows
> 20 %	South-West	Forest	Coniferous Forestry	Eyebrows
> 20 %	South	Forest	Coniferous Forestry	Eyebrows
> 20 %	West	Cultivation	Grazing Grazing	Demi lunes
6 - 20 %	East	Bush	Grazing Grazing	Small water harvesting ponds
> 20 %	North	Cultivation	Grazing Grazing	Cutoff drain and waterways
> 20 %	East	Forest	Grazing Grazing	Recharge Pond
> 20 %	North-East	Bush	Hill Slope Cultivation	Recharge Pond

Slope	Aspect	Land Cover	Land Use	Proposed 3R Structure
> 20 %	South-East	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	South-East	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	South-East	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	South-East	Cultivation	Hill Slope Cultivation	Demi lunes
> 20 %	North-West	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
> 20 %	East	Cultivation	Hill Slope Cultivation	Cutoff drain and waterways
6 - 20 %	North-West			
6 - 20 %	North-West			
6 - 20 %	South-West			
< 3 %	Flat			Percolation Ponds
< 3 %	Flat			Percolation Ponds
< 3 %	Flat			Percolation Ponds
< 3 %	Flat			Percolation Ponds

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ANNEX 1

3R WATER MANAGEMENT TECHNIQUES HAPPY STRATEGIES IWMI

Level Bunds (graded or level)

Hydrological purpose:	Soil and water conservation
Bio-physical purpose:	Erosion reduction
Socio-economic purpose	Increased crop yield
Suited to altitude?	Midland
Suited to slope?	3-35% on cultivated land (level) 3-15% (graded), up to 5% for grassland
Suited to rainfall conditions?	< 1400 mm (level) > 1400mm (graded)
Suited to soil conditions?	not sandy, not stony, not shallow, moderately-well drained
Suited to degraded land?	Yes
Land needs	Medium
Required level of labor input?	High
Required level of capital investment?	Low
Generates additional fodder?	No
Requires access to markets?	Low
Required level of cooperation	High

Level Fanya Juu (graded or level)

Hydrological purpose:	Soil and water conservation
Bio-physical purpose:	Erosion reduction
Socio-economic purpose	Increased crop yield
Suited to altitude?	Midland
Suited to slope?	3-15%, up to 5% for grassland
Suited to rainfall conditions?	900- 1400 mm >1400 if altitude 500 - 1000m <900mm if altitude >1500 (level) > 1400mm (graded)
Suited to soil conditions?	deep well drained soil not sandy not stony soils
Suited to degraded land?	no
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	if combined with vegetation strip
Requires access to markets?	low
Required level of cooperation	high

Bench Terracing

Hydrological purpose:	soil and water conservation
Bio-physical purpose:	erosion reduction
Socio-economic purpose	Increase crop productivity

Suited to altitude?	midland, highland
Suited to slope?	15-50%
Suited to rainfall conditions?	all
Suited to soil conditions?	deep well drained soil not sandy not stony soils
Suited to degraded land?	yes
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	low
Requires access to markets?	low
Required level of cooperation	high

Conservation Tillage

Hydrological purpose:	soil and water conservation
Bio-physical purpose:	Erosion reduction
Socio-economic purpose	Increase crop productivity

Suited to altitude?	midland, highland
Suited to slope?	all
Suited to rainfall conditions?	all
Suited to soil conditions?	deep soil
Suited to degraded land?	no
Land needs	no
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	low
Requires access to markets?	low
Required level of cooperation	low

Hillside Terraces (with or without trenches)

Hydrological purpose:	soil and water conservation
Bio-physical purpose:	erosion reduction
Socio-economic purpose	increased yield

Suited to altitude?	highland
Suited to slope?	15-50%
Suited to rainfall conditions?	<900mm
Suited to soil conditions?	not vertisol, not sandy, medium-well drained
Suited to degraded land?	yes
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	if combined with vegetation strip
Requires access to markets?	
Required level of cooperation	high

Cut off drains/Waterways

Hydrological purpose:	drainage
Bio-physical purpose:	conserve soil, reduce soil erosion
Socio-economic purpose	increased yield

Suited to altitude?	midland highland
Suited to slope?	< 50 %
Suited to rainfall conditions?	all
Suited to soil conditions?	not on vertisol
Suited to degraded land?	yes
Land needs	low
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	if combined with vegetation strip
Requires access to markets?	low
Required level of cooperation	high

Hand-dug wells

Hydrological purpose:	water storage
Bio-physical purpose:	-
Socio-economic purpose	Cash crop in the dry season

Suited to altitude?	lowland
Suited to slope?	< 35%
Suited to rainfall conditions?	all but access to groundwater
Suited to soil conditions?	not stony, not shallow, not sandy
Suited to degraded land?	no
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	medium

Treadle pump

Hydrological purpose:	water lifting
Bio-physical purpose:	-
Socio-economic purpose	Cash crop in the dry season

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	all but access to water storage
Suited to soil conditions?	-
Suited to degraded land?	No
Land needs	No
Required level of labor input?	High
Required level of capital investment?	Medium
Generates additional fodder?	No
Requires access to markets?	High
Required level of cooperation	Low

Diesel pumps

Hydrological purpose:	water lifting
Bio-physical purpose:	-
Socio-economic purpose	Cash crop in the dry season

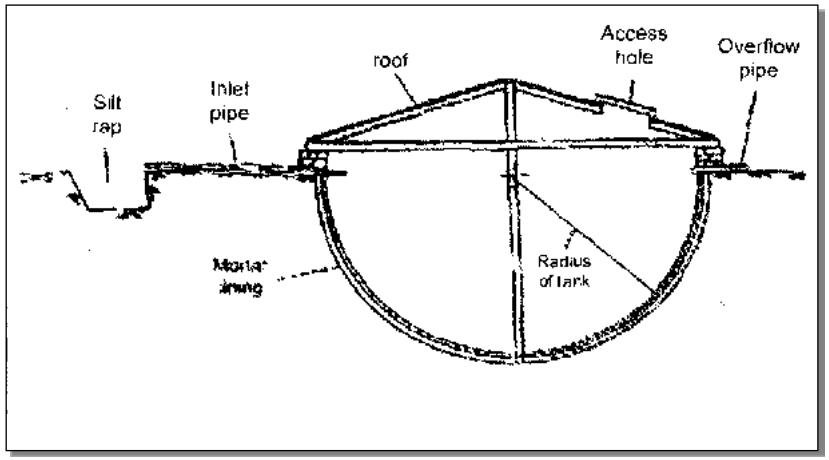
Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	all but access to water storage
Suited to soil conditions?	-
Suited to degraded land?	no
Land needs	no
Required level of labor input?	low
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	low

Wind mill

Hydrological purpose:	water lifting
Bio-physical purpose:	-
Socio-economic purpose	Cash crop in the dry season

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	All but access to water storage and wind
Suited to soil conditions?	-
Suited to degraded land?	no
Land needs	Medium
Required level of labor input?	High
Required level of capital investment?	Medium
Generates additional fodder?	No
Requires access to markets?	High
Required level of cooperation	Low

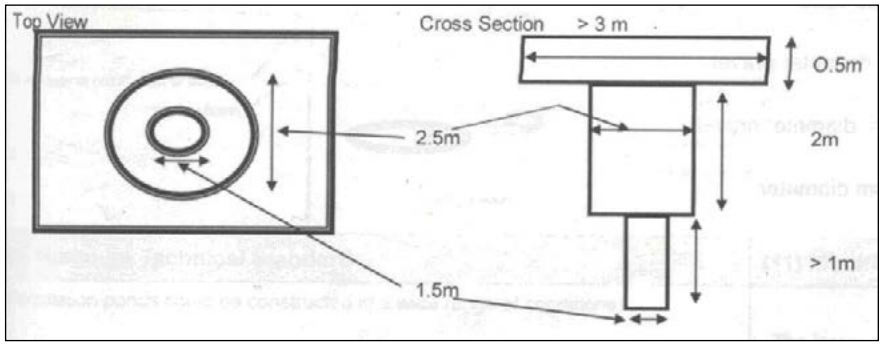
Underground cisterns



Hydrological purpose:	water storage
Bio-physical purpose:	-
Socio-economic purpose	supplementary irrigation

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	-
Suited to soil conditions?	deep, not vertisol
Suited to degraded land?	Yes
Land needs	fertility
Required level of labor input?	-
Required level of capital investment?	-
Generates additional fodder?	-
Requires access to markets?	-
Required level of cooperation	low

Percolation pond/ percolation pit



Hydrological purpose:	water storage
Bio-physical purpose:	
Socio-economic purpose	Increased crop yield

Suited to altitude?	midland-highland
Suited to slope?	< 50%
Suited to rainfall conditions?	All
Suited to soil conditions?	not vertisol, not sandy, moderately-well drained
Suited to degraded land?	Yes
Land needs	High
Required level of labor input?	Medium
Required level of capital investment?	Low
Generates additional fodder?	No
Requires access to markets?	No
Required level of cooperation	low

Pond

Hydrological purpose:	water storage
Bio-physical purpose:	minimize rainfall failure
Socio-economic purpose	supplementary irrigation for cash crop

Suited to altitude?	midland-highland
Suited to slope?	< 50%
Suited to rainfall conditions?	-
Suited to soil conditions?	not vertisol, not sandy, moderately-well drained
Suited to degraded land?	No
Land needs	Yes
Required level of labor input?	High
Required level of capital investment?	Medium
Generates additional fodder?	-
Requires access to markets?	High
Required level of cooperation	Low

Family drip irrigation

Hydrological purpose:	water lifting
Bio-physical purpose:	-
Socio-economic purpose	Improved yield

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	< 900 mm, access to water
Suited to soil conditions?	not on sandy, moderately-well drained
Suited to degraded land?	No
Land needs	No
Required level of labor input?	Low
Required level of capital investment?	High
Generates additional fodder?	No
Requires access to markets?	High
Required level of cooperation	Low

Roof water harvesting

Hydrological purpose:	water storage
Bio-physical purpose:	
Socio-economic purpose	supplementary irrigation for cash crop

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	all
Suited to soil conditions?	-
Suited to degraded land?	yes
Land needs	low
Required level of labor input?	low
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	medium
Required level of cooperation	low

Micro dam construction

Hydrological purpose:	water storage
Bio-physical purpose:	-
Socio-economic purpose	supplementary irrigation for cash crop

Suited to altitude?	midland-lowland
Suited to slope?	< 50%
Suited to rainfall conditions?	-
Suited to soil conditions?	-
Suited to degraded land?	yes
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	medium

Flood diversion (spate irrigation)

Hydrological purpose:	water storage
Bio-physical purpose:	accumulate sediments
Socio-economic purpose	improved yield

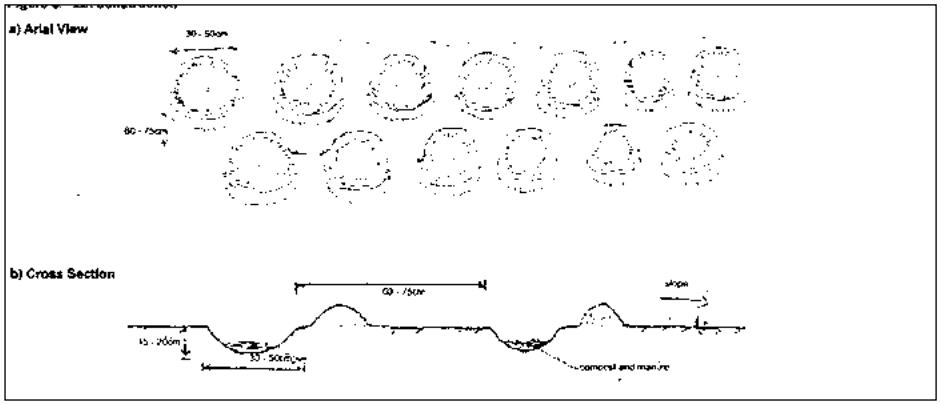
Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	< 900 mm
Suited to soil conditions?	-
Suited to degraded land?	yes
Land needs	low
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	no
Requires access to markets?	low
Required level of cooperation	high

Tied ridge

Hydrological purpose:	in-situ water storage
Bio-physical purpose:	restore degraded land
Socio-economic purpose	cultivation on degraded land

Suited to altitude?	-
Suited to slope?	
Suited to rainfall conditions?	< 900 mm <1400 mm if altitude <2300m
Suited to soil conditions?	moderately -deep , not sandy, medium-well drained
Suited to degraded land?	no
Land needs	yes
Required level of labor input?	medium
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	low
Required level of cooperation	low

Zai & Planting Pit system



Hydrological purpose:	in-situ water storage
Bio-physical purpose:	restore degraded land
Socio-economic purpose	cultivation on degraded land

Suited to altitude?	-
Suited to slope?	< 5%
Suited to rainfall conditions?	< 900 mm
Suited to soil conditions?	moderately -deep , not sandy, medium-well drained
Suited to degraded land?	yes
Land needs	no
Required level of labor input?	medium
Required level of capital investment?	low
Generates additional fodder?	yes
Requires access to markets?	low
Required level of cooperation	low

Large Half Moons

Hydrological purpose:	insitu water storage
Bio-physical purpose:	erosion reduction
Socio-economic purpose	Crop cultivation in low rainfall area

Suited to altitude?	-
Suited to slope?	< 5%
Suited to rainfall conditions?	< 900 mm if altitude < 1500 m
Suited to soil conditions?	moderately-deep
Suited to degraded land?	yes
Land needs	medium
Required level of labor input?	medium
Required level of capital investment?	low
Generates additional fodder?	no
Requires access to markets?	low
Required level of cooperation	low

Diversion Weir

Hydrological purpose:	use of river
Bio-physical purpose:	-
Socio-economic purpose	supplementary irrigation for cash crop

Suited to altitude?	lowland
Suited to slope?	-
Suited to rainfall conditions?	all but proximity to river
Suited to soil conditions?	not sandy soils
Suited to degraded land?	yes
Land needs	medium
Required level of labor input?	high
Required level of capital investment?	medium-high
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	high

Sand dam

Hydrological purpose:	use of river
Bio-physical purpose:	-
Socio-economic purpose	supplementary irrigation for cash crop

Suited to altitude?	lowland
Suited to slope?	-
Suited to rainfall conditions?	all proximity to the river
Suited to soil conditions?	sandy soils
Suited to degraded land?	no
Land needs	low
Required level of labor input?	high
Required level of capital investment?	high
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	high

Checkdams

Hydrological purpose:	soil and water conservation
Bio-physical purpose:	soil fertility
Socio-economic purpose	-

Suited to altitude?	midland
Suited to slope?	1-35%
Suited to rainfall conditions?	all
Suited to soil conditions?	all
Suited to degraded land?	all
Land needs	yes
Required level of labor input?	low
Required level of capital investment?	high
Generates additional fodder?	if vegetative check dam
Requires access to markets?	low
Required level of cooperation	medium

Grass strips along contour

Hydrological purpose:	soil and water conservation
Bio-physical purpose:	soil fertility
Socio-economic purpose	forage for livestock

Suited to altitude?	midland
Suited to slope?	< 15%
Suited to rainfall conditions?	> 900 mm
Suited to soil conditions?	-
Suited to degraded land?	yes
Land needs	high
Required level of labor input?	medium
Required level of capital investment?	low
Generates additional fodder?	yes
Requires access to markets?	low
Required level of cooperation	low

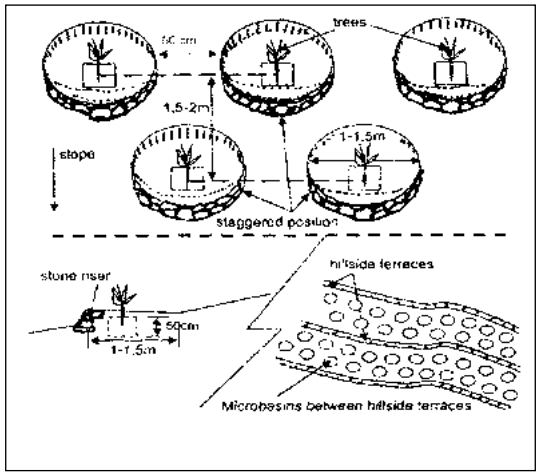
Biological fertility management

(Legume, intercroping, crop rotation)

Hydrological purpose:	water recharge
Bio-physical purpose:	soil fertility
Socio-economic purpose	Fodder for livestock

Suited to altitude?	-
Suited to slope?	< 50%
Suited to rainfall conditions?	-
Suited to soil conditions?	-
Suited to degraded land?	no
Land needs	no
Required level of labor input?	medium
Required level of capital investment?	low
Generates additional fodder?	yes
Requires access to markets?	low
Required level of cooperation	low

Microbasins



Hydrological purpose:	in situ water storage for trees
Bio-physical purpose:	improve degraded land
Socio-economic purpose	Fodder for livestock

Suited to altitude?	midland
Suited to slope?	< 15%
Suited to rainfall conditions?	>900 mm and if altitude >1500 m
Suited to soil conditions?	moderately-deep , not vertisol medium-well drained
Suited to degraded land?	yes on degraded land only
Land needs	no
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	yes
Requires access to markets?	low
Required level of cooperation	low

Eyebrow basins

Hydrological purpose:	in situ water storage for trees
Bio-physical purpose:	erosion control
Socio-economic purpose	-

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	< 1400mm 1400 if altitude <1500mm
Suited to soil conditions?	moderately-deep, not vertisol medium-well drained
Suited to degraded land?	yes on degraded land only
Land needs	no
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	Yes if multipurpose tree
Requires access to markets?	low
Required level of cooperation	low

Herringbones

Hydrological purpose:	I n situ water storage for trees
Bio-physical purpose:	improve degraded land
Socio-economic purpose	Increased biomass

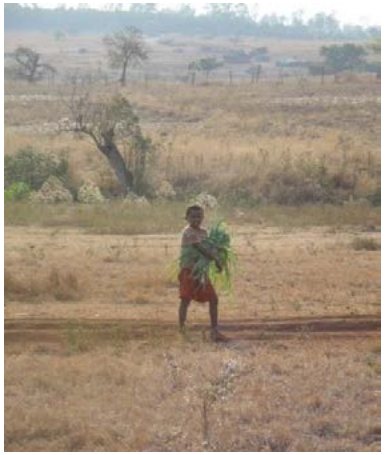
Suited to altitude?	-
Suited to slope?	< 5%
Suited to rainfall conditions?	< 900 mm
Suited to soil conditions?	moderately deep and shallow soils, medium texture soils, stony soil
Suited to degraded land?	yes on degraded land only
Land needs	no
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	Yes if multipurpose tree
Requires access to markets?	low
Required level of cooperation	low

Micro-trenches/ trenches/improved pits

Hydrological purpose:	in situ water storage for trees
Bio-physical purpose:	improve degraded land
Socio-economic purpose	exploit productivity of different parts of hillside

Suited to altitude?	-
Suited to slope?	< 35%
Suited to rainfall conditions?	< 900 mm
Suited to soil conditions?	not on shallow and poorly drained soils
Suited to degraded land?	yes on degraded land only
Land needs	no
Required level of labor input?	high
Required level of capital investment?	low
Generates additional fodder?	yes if multipurpose tree
Requires access to markets?	low
Required level of cooperation	low

Limiting animal movement



Hydrological purpose:	increased water infiltration
Bio-physical purpose:	grazing land improvement
Socio-economic purpose	-

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	-
Suited to soil conditions?	
Suited to degraded land?	yes
Land needs	low
Required level of labor input?	low
Required level of capital investment?	low
Generates additional fodder?	-
Requires access to markets?	low
Required level of cooperation	high

Woodlots

Hydrological purpose:	ground water recharge
Bio-physical purpose:	erosion reduction
Socio-economic purpose	timber, fruit and fodder

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	depend on tree type
Suited to soil conditions?	depend on tree type
Suited to degraded land?	yes
Land needs	yes
Required level of labor input?	medium
Required level of capital investment?	medium
Generates additional fodder?	yes if multipurpose tree
Requires access to markets?	low
Required level of cooperation	low

Orchards (fruit)

Hydrological purpose:	ground water recharge
Bio-physical purpose:	erosion reduction
Socio-economic purpose	timber, fruit and fodder

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	depends on the fruit
Suited to soil conditions?	deep soil
Suited to degraded land?	yes
Land needs	high
Required level of labor input?	medium
Required level of capital investment?	medium
Generates additional fodder?	no
Requires access to markets?	high
Required level of cooperation	low

Contour hedgerow/ boundary planting

Hydrological purpose:	ground water recharge
Bio-physical purpose:	erosion reduction
Socio-economic purpose	timber, fruit and fodder

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	depend on tree type
Suited to soil conditions?	depend on tree type
Suited to degraded land?	yes
Land needs	low
Required level of labor input?	low
Required level of capital investment?	low
Generates additional fodder?	yes if multipurpose tree
Requires access to markets?	low
Required level of cooperation	low

Grazing land management– over sawing

Hydrological purpose:	-
Bio-physical purpose:	grazing land productivity
Socio-economic purpose	increased fodder

Suited to altitude?	-
Suited to slope?	-
Suited to rainfall conditions?	-
Suited to soil conditions?	-
Suited to degraded land?	yes on pasture land
Land needs	No
Required level of labor input?	low
Required level of capital investment?	low
Generates additional fodder?	Yes
Requires access to markets?	Medium
Required level of cooperation	Medium

Which are the practices that you did not want to pair with? Why?

Which are the practices that you wanted to be part of your strategy but could not pair with? Why did you want to pair up with those practices?

What were the trade-off that you faced?

The final strategy you are part of :
(landscape name and name of the other cards)

Which are the practices that you did not want to pair with? Why?

Which are the practices that you wanted to be part of your strategy but could not pair with? Why did you want to pair up with those practices?

What were the trade-off that you faced?

The final strategy you are part of :
(landscape name and name of the other cards)

ANNEX 2

TEMPLATE FOR MEMORANDUM OF UNDERSTANDING BETWEEN VDC, NGO AND SUPPORT AGENCY

Sample of Memorandum of Understanding between DDC and VDC

Memorandum of Understanding for WUMP + 3R Preparation between District Development Committee,....., Village Development Committee,..... and support organization…….

Background

International Conference for Water and Energy (ICWE-1992) has focused on the need for conservation of locally available water resources and their watersheds, effective and rational distribution of water resources and formation of national policy on stakeholders' consensus for their use. Different laws and acts in Nepal has also formulated on same line. Water Resources Act (1993), Environment Protection Act (1997), Environment Protection Regulation (1998), Local Self Governance Act (1999), Water Resources Strategy (2002), National Water Plan (2005), Rural Water Supply and Sanitation Policy 2004, Urban Water Supply and Sanitation Policy (2009), National Sanitation and Hygiene Master Plan (2011) are some of the examples of national legislature. Local Self Governance Action (1999) has accepted the self-governance of Village Development Committee (VDC) and Municipality and spelled out the work, right and duty of those agencies in water resources development and protection, survey of water schemes, construction and operation and maintenance of schemes through User Committees. It has provided right to collect operation and maintenance fund of the schemes. The act has visualized the formulation of master plan of all sectors. Considering the need of planned development, protection and rational distribution of water resources..... VDC of.....district has decided to formulate Water Use Master Plan with focus on Recharge, Retention and Reuse (WUMP + 3R).

..... Village Development Committee (hereinafter referred as "VDC"), ... District Development Committee (hereinafter referred as "DDC") and …… (hereinafter referred as Support Organization) have agreed to formulate WUMP + 3R ensuring active participation of women and men, poor and marginalized groups with the objectives of enhancing water resources development activities perusing following conditions.

Objectives

The overall objective of this MoU is to agree on formulation WUMP + 3R and delineate role and responsibilities of VDC, DDC and support organization. The specific objectives are:

- Prepare WUMP + 3R for sustainable development of water resources ensuring inclusion of all stakeholders especially women and marginalized, at local level
- Develop a mechanism to implement the water schemes according to the master plan by all stakeholders

Duration

Duration of this MoU is fixed till completion of WUMP + 3R formulation process. The process shall be completed by..... However there is no time limitation for the implementation of WUMP + 3R.

Role and Responsibilities

VDC is the executing agency and owner of the WUMP + 3R, so the WUMP + 3R shall be VDC's property. Prioritization of activities, searching funding sources, implementation, monitoring

and evaluation of planned activities shall be VDCs responsibility. The Support Organization shall play role of facilitator in the process and DDC shall make effort for the coordination and linkage with other resources organization for the implementation of WUMP + 3R. Summary of roles and responsibilities are presented below.

Roles and Responsibilities of Key Stakeholders

1. Roles and Responsibilities of VDC

As VDC is the main key stakeholder of WUMP + 3R, the VDC will be main responsible for the preparation of Water Use Master Plan and its main roles and responsibilities are as follows: Reshuffling/Formation of Ward Citizen Forum (WCF)/ Water Resources Management Sub Committee: Ward Citizen Forum will be formed/ reformed in every ward for the preparation of WUMP + 3R. The ward citizen forum will actively participate in assessment and planning process at ward level, create awareness for community participation during WUMP + 3R formulation, conduct sanitation triggering activities etc.

1.1. Reshuffling/Formation of VDC level Water Sanitation and Hygiene Committee (V-WASH-CC)/ Water Resources Management Main Committee: VDC level Water Sanitation and Hygiene Committee (V-WASH-CC) will be formed/ reformed in the chairmanship of VDC Secretary for the preparation of WUMP + 3R of VDC. There should be representative of 1 male and 1 female from the each ward. The main roles and responsibilities are: lead and coordinate WUMP preparation process, support WUMP + 3R facilitation team for social and technical assessment, participate planning workshop and prioritize the identified activities, market of WUMP + 3R and its implementation, annual review of WUMP + 3R action plan.

1.2. Selection of Service Provider: Local NGOs as a Service Provider will be selected for facilitation of the process and conduct social mobilization and technical assessment for the preparation of WUMP + 3R.

1.3. Financial support for the preparation of WUMP + 3R: The VDC shall finance the whole or part of the cost for WUMP + 3R preparation (Ref).

1.4. Coordination support in social technical assessment, need identification and planning: VDC will play vital role in social and technical data collection and assessment, need identification and planning for the preparation of WUMP + 3R .

1.5. Monitoring: Regular monitoring and evaluation of Service Provider (facilitator) will be done by VDC during the preparation of WUMP + 3R.

1.6. Endorsement of WUMP + 3R: After the preparation of WUMP + 3R, the VDC will approve it from VDC Council and submit to DDC for endorsement.

1.7. Implementation of Water Use Master Plan (WUMP): VDC will play vital role in coordinating and Search resources for WUMP implementation proposing to different agencies.

2. Roles and responsibilities of District Development Committee (DDC)

2.1. Play vital roles in monitoring of WUMP + 3R preparation and provide advice and suggestions to VDC and respective agencies.

2.2. Assist VDC for WUMP + 3R mobilization and marketing.

2.3. Endorse WUMP + 3R from district authority.

2.4. Play Coordination role with different support organization for the implementation of WUMP + 3R activities.

3. Roles and responsibilities of Support Organization

3.1. Prepare guideline on WUMP + 3R preparation.

3.2. Support for capacity building of WUMP + 3R facilitator, VDC and V-WASH-CC.

3.3. Support to VDC for the monitoring and evaluation of working of Service Provider.
3.4. Support in preparation of final WUMP + 3R report.
3.5. Support in implementation of few schemes prioritized in WUMP + 3R according to resources availability.
3.6. Support VDC for coordination and linkage with different agencies for WUMP + 3R implementation.

Financial Management
Total cost of WUMP preparation in ..... VDC is estimated NPR ..... . Contribution from different stakeholders shall be as follows.

S.N.	Description	Total Cost	Contribution			Remarks
			DDC	VDC	Support Organization	
Total						

Disagreements
The terms and conditions of the MoU might be reviewed with mutual agreement. If any kind of disputes arose during its implementation, all the disputes shall be solved through mutual discussions.

Signature
A copy of MoU will be available to all signing parties.

On behalf of VDC On behalf of DDC behalf of the Support Organization

Signature:…….. Signature:…… Signature:……..
Name: Name: Name:
VDC Secretary Local Development Officer ……..

Date: Date: Date:

Office Stamps:

Witness:

VDC level representatives of active political parties
1…….
2…….
3…….

ANNEX 3

TERMS OF REFERENCE FOR WUMP + 3R FACILITATORS

Position	Main Roles and Responsibilities	Time input	Qualification and Working Experiences
WUMP Facilitator (Technical)	Social and technical facilitators work in a team. Start with objectives and use PRA to map out the resources, codify them and take GPS reading and discharge of each source identified during PRA. Facilitate local community members for PRA mapping, data collection, use of data for need identification and dialogue at ward level priority in planning and design. Record all the data and field proceedings. Support report writers in clarifying field data for first draft report used as a base for VDC level planning workshop. Assist and facilitate local communities and report writers during VDC level planning and provide support for capacity building training Report	2 months - field work 1 month -table/office work	Sub Engineer with minimum 1 year of work experience or Sr. Assistant Sub-engineer with minimum 3 years work experiences in water supply, water management or irrigation
WUMP facilitator (Social)	Facilitate capacity building training, conduct participatory need identification, social assessment, facilitate planning workshop at ward and VDC level, support to prepare WUMP + 3R report	2.5 month field work, 0.5 month office work	Bachelor with 1 year experience of work experience or Intermediate with minimum 3 years work experience in community development or social mobilization
Planner (WUMP + 3R report writer)	Orientation to the Field team, Support for capacity building training, Facilitation in VDC Level Planning workshop and preparation of WUMP + 3R Report	Field- 0.5 month Office- 1.5 month	Civil Engineer or agronomist with minimum 3 years work experiences and knowledge on natural resource management or Sr. Sub engineer with minimum 7 years work experiences in Water supply, management or irrigation etc.

ANNEX 4

PROPOSED SCHEDULE FOR WUMP + 3R FACILITATOR TRAINING

Day	Session I	Session II	Session III	Session IV
1	Registration, Introduction of participants, Objective of the training	**Module 1**: The Basics - Water cycle, Global water distribution, Blue, green and brown water	**Module 1:** Introduction to the water management landscape - Introduction to IWRM, the local IWRM context and justification of the local unit of management (including watershed concept)	**Module 1:** Introduction of 3R concept and its relevancy, climate change adaptation and WARM + 3R Chair
2	**Module 1:** Introduction to 3R technologies + looking at the landscape with 3R glasses	**Module 2:** WUMP + 3R process different phases and steps	**Module 2:** Preparatory and capacity building phase	**Module 2:** Assessment phase: Socio-economic assessment and need identification sub steps and relevant instructions
3	**Module 2:** Overview of socio-economic assessment and need identification formats and check list	**Module 2:** Exercise on social/ resource mapping by using PRA tools	**Module 2:** Assessment phase: technical assessment sub steps and relevant standards	**Module 2:** Assessment phase: Technical assessment formats and checklist (source measurement, ward profile, scheme inventory); Water movement mapping using transect walks
4	**Module 2:** Assessment phase: Field exercise on source measurement, inventory of existing water schemes, ward profile and water movement mapping, developing a 3R opportunity map using transect walks	**Module 2:** Assessment phase: Technical formats (proposal formats, 3R opportunity verification formats)	**Module 2:** Assessment phase: Group exercise on proposal format filling	**Module 2:** Planning phase: Ward level planning instructions and formats, table of content for report
5	Module 2: Planning phase: VDC level planning instruction and format	Module 3: WUMP and 3R examples	Action plan preparation	Eveluation of training and closing

ANNEX 5

SOCIO-ECONOMIC AND NEED IDENTIFICATION FORMATS FOR WUMP + 3R PREPARATION

District:	
VDC:	
Ward/Sub-Committee No:	
WUMP facilitator (social) Name: Contact No:	

S.N.	Format title	Format code	Remarks
0	PRA tools and process for WUMP + 3R	SA/00	
1	House Hold Survey	SA/01	
2	Cluster Inventory	SA/02	
3	Source Inventory	SA/03	
4	Inventory of Existing Water Supply Scheme	SA/04	
5	Inventory of Existing Irrigation Scheme	SA/05	
6	Inventory of Existing Water Energy Scheme	SA/06	
7	Inventory of Existing 3R Schemes	SA/07	
8	Inventory of Existing Environment and Ecology Related Scheme	SA/08	
9	Information on Disaster Risk and Impact on Environment	SA/09	
10	Institutional WASH Situation	SA/10	
11	Environmental Sanitation	SA/11	
12	Geographical and Natural Information	SA/12	
13	Socio-economic Information	SA/13	
14	Stakeholders Working in the VDC	SA/14	
15	Ward wise Need Identification for water Resources Development	SA/15	
16	Sample Social Map	SA/16	

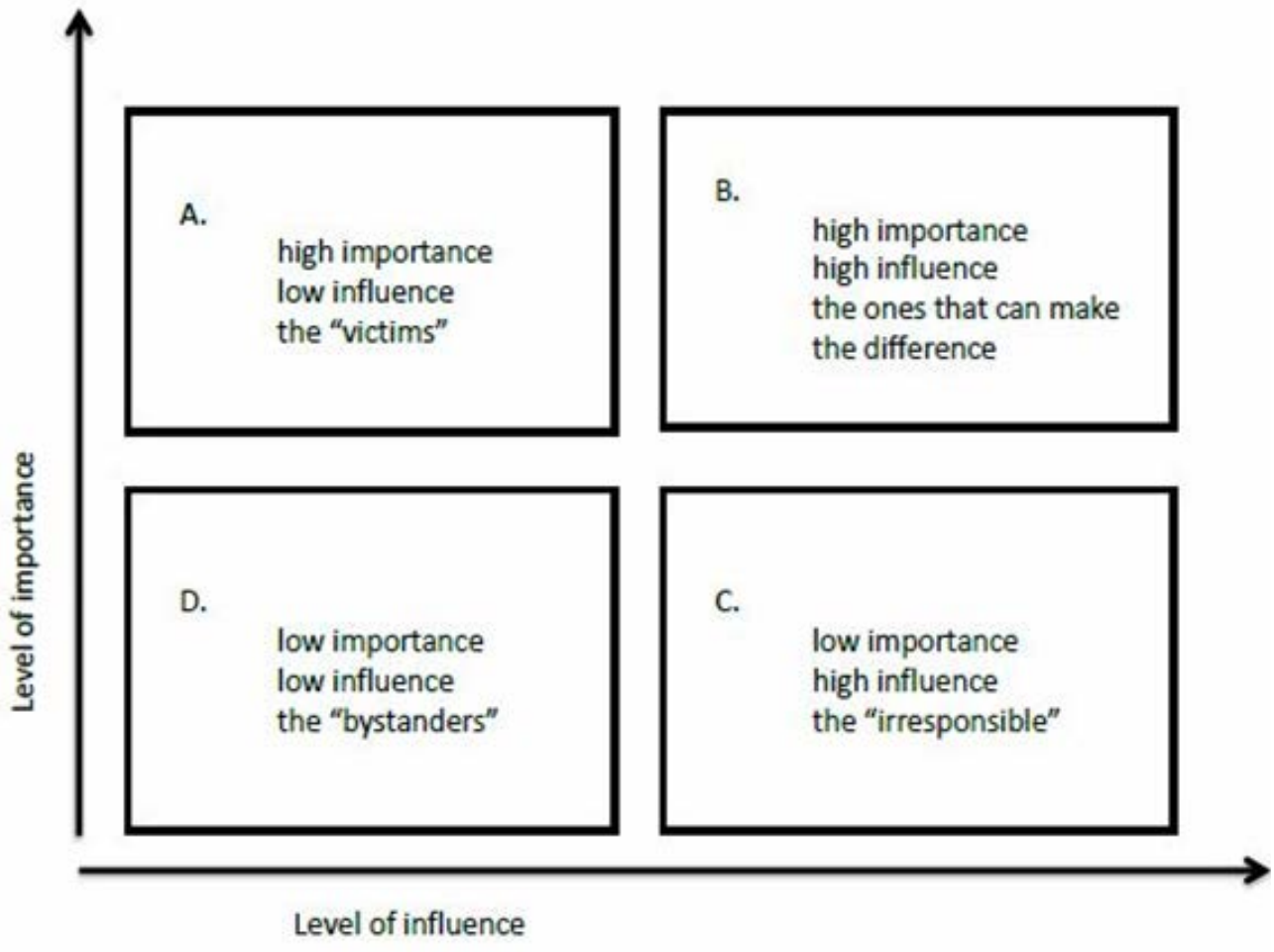
Stakeholder Analysis Tools

Why is it necessary to undertake a stakeholder analysis?

A Stakeholder Analysis is helpful in the design, planning and implementation of WUMP + 3R plans in order to identify[1]:

- The interests of all stakeholders who may affect or be affected by the WUMP + 3R;
- Potential conflicts and risks that could affect the WUMP + 3R planning and implementation;
- The people or groups that should be encouraged to participate in different stages of the WUMP + 3R process;
- Ways to improve the WUMP + 3R process or counter negative impacts on vulnerable and disadvantaged groups.

Various types of stakeholder analysis tools:



1 *DFID Tools for Development, 2002*

a) Influence and importance matrix:

Relevant questions:

- Which problems, affecting which stakeholders, does the project seek to address or alleviate?
- For which stakeholders does the project place a priority on meeting their needs, interests and expectations?
- Which stakeholder interests converge most closely with policy and project objectives?

Implications for your projects:

A. stakeholders in A require special initiatives if their interests are to be protected
B. your project needs to construct good working relationships with these stakeholders, to ensure effective coalition of support
C. these stakeholders may be a source of significant risk, and they will need careful monitoring and management
D. these stakeholders are unlikely to be the subject of project activities or management

Deciding on strategy:

Decide on strategy for working with stakeholders in light of the outcome of the analysis.

Other stakeholder analysis tools that are also useful:

b) Venn diagram

A Venn diagram (named after the man who created it) shows the key institutions and individuals in a community and their relationships and importance for decision-making.

- Identify key groups, institutions and individuals who are responsible for decisions that are made in the project that you visited: who has some role to play in terms of making decisions in the case. Write a list of these stakeholders. Then group them.
- Identify degree of contact between the actors in terms of decision making and arrange the circles accordingly. The closer, the more frequent / the better the contact (in terms of passing on information, co-operation, decision making).
- Identify the problem areas (especially those with high importance in de the decision making system but with poor links/communication to the others).

(adapted from Theis and Grady, 1991)

c) Actor analysis checklist

Design a matrix using different colour cards for each column:

Column 1: brainstorm stakeholders. Group stakeholders: place similar groups in one row and write the name of the stakeholder group on a separate card.

Column 2: primary activities carried out by each actor?

Column 3: position in the decision making system. To what extent do the different actors have a mandate, policies, knowledge or other 'power' in relation to other actors in the project. Rank actors in order of importance (1=low position/importance; highest score = total number of actors).

Column 4: impact on the project. Indicate to what extent the actors contribute towards the successful outcome of the project. Rank actors in order of importance (1=low impact on the project; highest score = total number of actors).

(Adapted from Engel, 1997)

d) Participation analysis matrix

Design a matrix using different color cards for each column:

Column 1: brainstorm stakeholders. Group / cluster stakeholders: place similar stakeholders in one row and write the name of the stakeholder group on a separate card.

Column 2: characteristics, which describe the agency or group. (E.g. size; degree of influence in the area; how it is organised; scale or scope (national, regional, provincial); rural/urban; membership etc.).

Column 3: interests in the project. What is it they can / hope to get out of the project?

Column 4: resources that they (can) provide to the project. What is it that they contribute towards the project? (E.g. data or information; human resources (personnel, expertise); a network; financial resources; material, facilities and/or equipment that might be used in the project; mandate, policies.)?

Column 5: challenges faced (by stakeholders) and that hinder the successful outcome of the project. (E.g. lack of involvement in planning; lack of funds or material; lack of information or orientation to the project etc.).

Column 6: required actions. How to work with these stakeholders (e.g. build capacity or strengthen interest)?

(adapted from Hamilton & Gaertner, 1992) - GOPP)

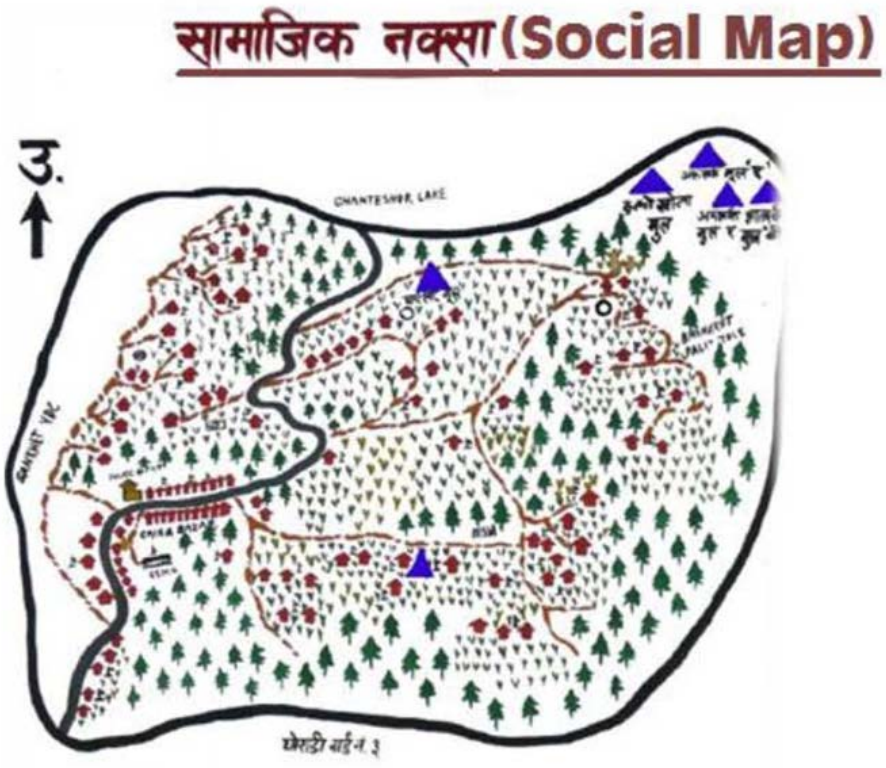
e) Social/Resource Map

Social/resource mapping is carried out to gain a better understanding of social features and available natural resources. The social features include social objects in the community (household, road, path, tap stands, temple, school, health post etc), population (Male, female, different ethnic group, poor, literate, illiterate etc). Natural resources include available resources (water resources, forests, land etc.), existing and potential use of those resources, access of the marginalized people to those resources etc.

Social/Resource Mapping Process:

- Request the ward citizen forum and other key persons to fix the time, place and date for the meeting convenient to men and women. Encourage proportionate representation of women, poor and marginalized groups
- In the meeting, introduce yourselves, describe purpose and scope of the mapping exercise; explain that the map will show the village from above (from a bird's eye view)
- Invite the group to select key informants 2 - 4 (including female) knowledgeable of the village
- Let the community people start mapping by drawing the border of the community first. Indicate north in the top of the map (white cement or ash could be used for the boarder)
- After drawing the boarder, ask to draw trail and road (brown colour dust or red soil could be used)

- By using stick or chalk ask to draw area of different clusters/toles. Write name of the cluster in a piece of paper and keep it inside the area and press by small stone. The name of clusters should be noted in the format **Cluster Inventory (SA/02)**
- All households of the community are shown in a social map and each household should be given a chronological number. At the same time, write the name of each household head in a piece of paper and press it by small. The name of household head is noted in the **House Hold Survey Format (SA/01)**
- School, temple, community building, health post etc are located in the map (Yellow colour could be used with symbol)
- To show agricultural land and Kharbari (land for grass) use piece of peddy straw and other straw respectively
- Locate jungle by using green leaves
- Ask name of available different water sources (spring, well, stream). Locate these water sources in the map by using blue colour and different shape (e.g. Triangular shape for



Symbols					
	House		Jungle		RVT
	Trail		Source		Tank
	Police Post		Borderline		Temple
	Grass land		Road		
	Cultivable land		School		

spring source, circle for well and line diagram for stream. Write name of each water sources with serial number in the format **Source Inventory (SA/03)** and collect other information such as location, existing use, potential use of water source etc. according to format.

- Ask direction (east, west, north and south) in the map and write name of adjoining wards or VDC
- Copy the map prepared on brown paper
- The map on brown paper shall be presented to community people. Verify the map and add missing information. The following is an example of a resource map:

After preparation of map following information are collected on the same day or next day. It is important to note here, that this information should also be collected by key community members themselves, guided by the community facilitator. After the information is collected and depicted in the resource maps as much as possible, the community facilitator should fill in the formats listed below and provided further on in this Annex.

Format title	Format code	Methodology
Remaining information of House Hold Survey	SA/01	Interview with key persons or House Hold lead
Remaining information Cluster Inventory	SA/02	Key Informant Interview
Remaining information of Source Inventory	SA/03	Key Informant Interview
Inventory of Existing Water Supply Scheme	SA/04	Key Informant Interview
Inventory of Existing Irrigation Scheme	SA/05	Key Informant Interview
Inventory of Existing Water Energy Scheme	SA/06	Key Informant Interview
Inventory of Existing Environment and Ecology related Scheme	SA/07	Key Informant Interview
Information on Disaster Risk and Impact on Environment	SA/08	Key Informant Interview
Institutional WASH Situation	SA/09	Key Informant Interview
Environmental Sanitation	SA/10	Key Informant Interview
Geographical and Natural Information	SA/11	Key Informant Interview
Socio-economic Information	SA/12	Key Informant Interview
Stakeholders Working in the VDC	SA/13	Key Informant Interview

f) Need Identification

Participatory need assessment is a way of understanding the water related needs of the local community such as drinking water and sanitation, irrigation etc. It is carried out in presence household representative form each cluster of the ward. As far as possible participation from each households is encouraged. During need identification, the discussion with community member is carried out to know: which cluster needs what, which water source is available, how

many house holds are benefitted etc. It should be kept in mind that the use of water sources is efficient, equitable and sustainable.

Need identification process:

- Ask ward citizen forum to organize community meeting
- Display the social map in front of the community member
- Ask community people: which cluster need water supply and sanitation scheme and the potential water source. Use social map for the discussion, verification and easy understanding. Identify the needs according to first, second, third etc. priorities of the community
- Similarly ask community member: which cluster need irrigation schemes and potential water source. Also discuss in the map about the land to be irrigated
- Similarly discussion is carried out for energy related schemes and environment and ecology related schemes according to four legs of the WARM chair.
- Discuss about potential 3R opportunities

ll the information are collected in the format **Need Identification for Water Resources Development (SA/14)**.

h) Seasonal Calendar

A seasonal calendar shows distribution of the main activities, opportunities and problems over the time period in a visual form. It helps identify the months of greatest busy/difficulty for women and men in terms of workload. It also reveals the daily chores and responsibilities of women and men.

A seasonal calendar tool in WUMP + 3R plots the very busy period of women and men to understand when the community will not be able to participate in the development activities.

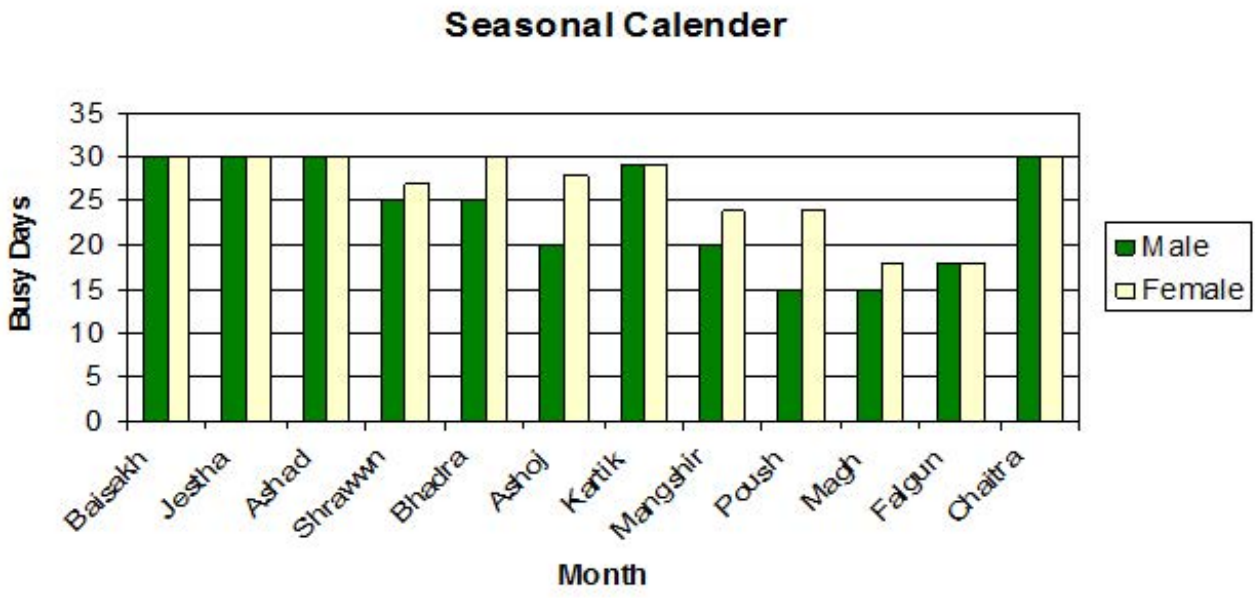


Figure 1: Sample seasonal calender

Seasonal Calendar Mapping Process:

- Organize meeting with group of the people (10-15 members, about 50 % women)
- Discuss busy period of men and women for each month. Start from Baisakh, the first month of Nepali year and ask most busy time in weeks. The number of busy weeks for each month for men and women are noted in the format: **Socio-economic Information (SA/12)** under section 11
- Same process is continued for all other months and finally a bar diagram could be prepared.

1 HOUSE HOLD SURVEY

Form-SA/01

District IC:..... VDC ID:..... Ward ID:.....

HH ID	Full name HH	Family member Total		Cluster		Ethnicity			Main occupation						If agriculture is main occupation, food sufficiency			Involvement in occupation other than agriculture				Educational Information		Recent drinking water fetching pond				
																		No of members involved in occupation other than agriculture		Monthly income in rupees		Illiterate						
		F	M	Name	Cluster ID	Dalit	Janjati	Others	Agriculture	Business	Service	Labor work	Abroad	Others	Up to 3 months	Up to 6 months	More than 6 months	F*	M**	F	M	F	M	Managed Pipe Water	Unmanaged Pipe	Well/kuwa	Stream/canal/pipe	Protected spring/Dhunge Dhara

HH ID																	
Drinking water service level	Water quality (Good, Moderate, Poor Very poor																
	Availability of water Quantity (litres/day)																
	Fetching time (minute)																
	Continuity (hrs/day)																
	Source Reliability (months/ year)																
Daily consumption of water	No of trip to fetch water (trip/day by)	F															
		M															
	Volume of pot (litres)																
Household Cleanliness	Toilet	No															
		Yes															
		Improved															
		Unimproved/ Temporarily															
		Bio gas connected															
		Toilet in use															
		Toilet not in use															
	Drying rack (chang)	No															
		Yes															
	Garbage pit	No															
		Yes															
	Improved farm yard (IFY)	Livestock (Yes)															
		IFY (Yes)															
		IFY (No)															
HH using renewable energy	Solar																
	Bio gas																
	Electricity																
	Improved cooking stoves																
Remarks																	

Local, national and international organizations working in the VDC

Please use one or more of the stakeholder analysis tools presented in earlier on in this Annex to collect the necessary information. Subsequently, fill in the table below:

S.N.	Name of organization	Contact person	CBO	NGO	INGO	Development and other activities (work done by organization	Supporting organization name

Sub watershed information based on watershed of the VDC

S.N.	Name of sub watershed (Based on water flow of river, bared land)	Connecting wards/Major villages
1		
2		
3		

Please draw a sketch of the VDC showing the sub watersheds (for explanation on the delineation of watersheds, please revisit section 1.3 of the main manual).

2 CLUSTER INVENTORY — Form-SA/02

District ID:..... VDC ID:..... Ward ID:.....

Cluster ID[2]	Name of cluster*	HH No.	Population	Name of water source used	GPS Reading (optional)			
					X	Y	Accuracy	SN (WP)

** Clusters name in WUMP shall be according to the shared water supply systems in the VDC*

2 *Code for cluster area with shared water supply systems: District ID - VDC ID - Ward ID -* **Cluster ID (01)**

3 SOURCE INVENTORY — Form-SA/03

3.1 Participatory water sources assessment

Engage with members of the community and address the following:

1. Investigate the main sources of water of the VDC
2. Map the findings including:
   a. Streams (Seasonal-Perennial)
   b. Water sources
   c. Sanitation facilities
   d. Point pollution sources
   e. Dispersed pollution sources

The output of the above exercise should contain:

1. A sketch of the settlement areas and water and sanitation points (see picture below)

2. A table including details of each water source encountered, as follows:

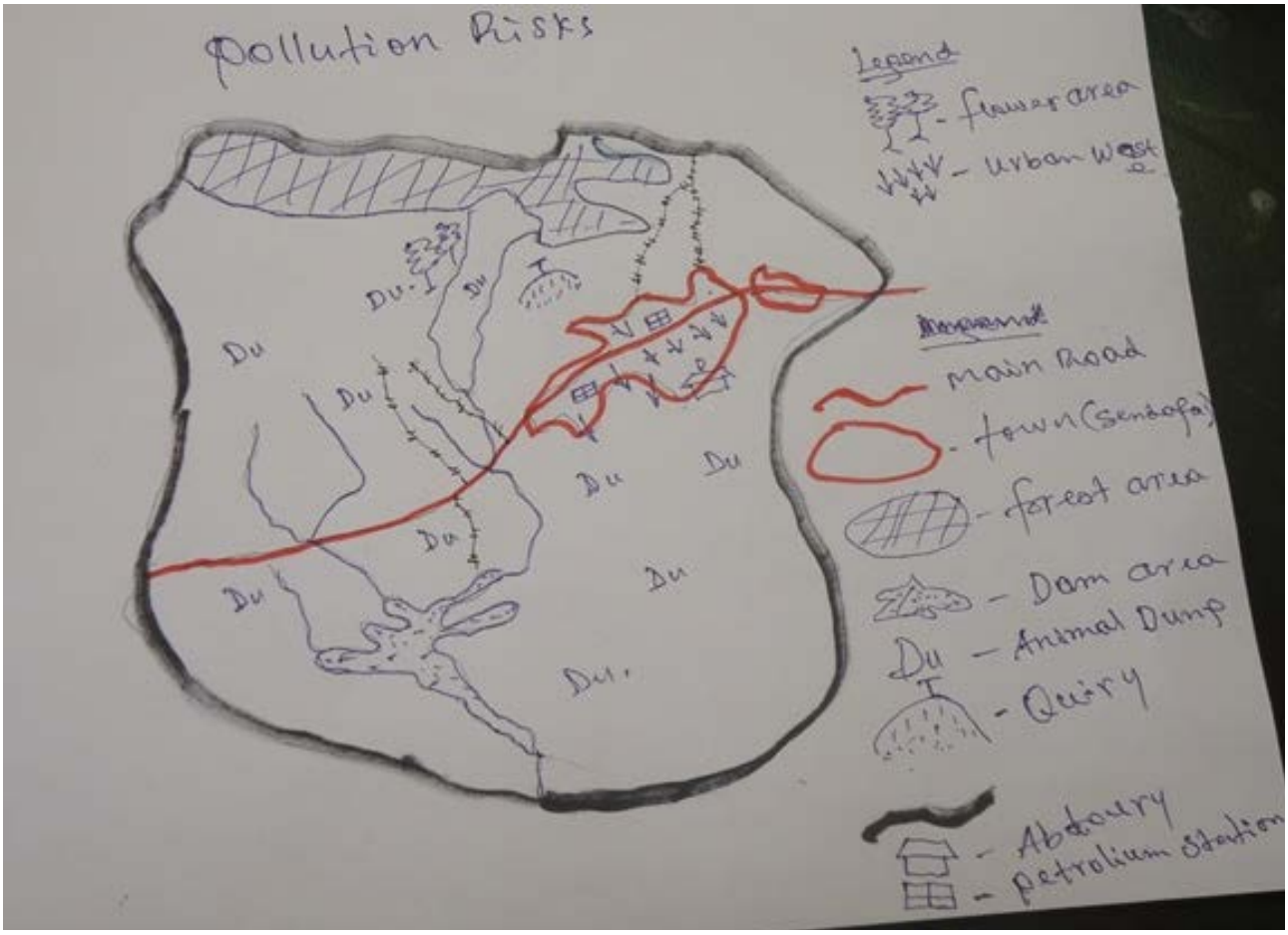
Type of system: …….	Description
Details	(give an overview of main components e.g. drilled well, depth xx meter; equipped with handpump (depth xx m)
Technical quality of system	Description of quality and type of maintenance
Water quantity	What is the quantity of water people usually collect per family (on average) per day in dry and wet season and what do they use it for. Especially important here is to get an indication of the change in water quantity over the last 20 - 30 years (more, less or the same and if possible quantify)
Water quality	Any physical observations (color etc.); what is the result of the sanitary survey; what do the people think about the quality
Continuity	What is the continuity of the system (during the day, week, and in dry and wet season)
Cost	What is the cost for the consumers and does anyone restrict water use because of cost
Management	Who is managing the system
Operation	Who is operating and maintaining the system
Main technical problems	What are the main technical problems that need urgent attention
Main management problems	What are the main management problems that need urgent attention

3. A water pollution risk map (see figure on the next page)

4. Pictures of each of the water sources and sanitation facilities

5. Some further information on cleanliness/situation of:
   a. VDC in general
   b. Roads and paths
   c. Houses and surrounding areas
   d. Schools
   e. Springs/taps
   f. Waste water management
   g. Solid waste (organic) management
   h. Non degradable (plastic) waste management
   i. Overall personal hygiene status

After having collected the above listed information, the community facilitator can go on to fill the formats below. It is again very important to note here, that the facilitator should not fill in the tables below without having guided key community members to undertake the assessments as described above in a participatory manner.


Pollution Risks
Legend
- flower area
- Urban W
Main Road
- forest area
- Dam area
- Animal Dump
- Quary
- Abattoury
- petrolium station
Du

3 SOURCE INVENTORY — Form-SA/03

District ID:..... VDC ID:..... Ward ID:.....

Source ID[3]	Source name	Source location			Present use of source				Use of the source (public/ private)
		District	VDC	Ward No.	Use with scheme constructed		Use without scheme	Not in use	
					Scheme type	Scheme ID			

3 *Code for water sources: District ID - VDC ID - Ward ID - Water sources ID (WS01)*

3.2 Participatory mapping of existing projects

This process consists of several steps in order to obtain an overview of (water related) projects that have been or are currently being undertaken in the area.

The first step is to form several Focus Groups and let participants map the following (the best would be to do this on the resource map already developed.

A. Existing water supply projects
B. Existing irrigation projects
C. Existing water energy projects
D. Existing environment related projects
E. Existing 3R and/or Soil and Water Conservation (SWC) projects

After having collected the above listed information, the community facilitator can go on to fill the formats below. It is again very important to note here, that the facilitator should not fill in the tables below without having guided key community members to undertake the assessments as described above in a participatory manner.

4 INVENTORY OF EXISTING WATER SUPPLY SCHEME

Form-SA/04

District ID..... VDC ID:..... Ward ID:.....

Scheme ID[4]	Scheme name	Scheme type	Source		Beneficiary clusters		Benefited HH	DWS Users Committee		Operation and maintenance fund		Village maintenance worker		Completed year	Functioning (fully, partially, closed down)	Supporting organization
			Name	Type	Name	Cluster ID		Y/N	Active/Passive	Y/N	Regularly collected/Not	Y/N	Regularly paid/ Not			

4 *Existing water supply scheme code: District ID - VDC ID - existing water supply scheme ID (EW01)*

5 INVENTORY OF EXISTING IRRIGATION SCHEME

Form-SA/05

District ID..... VDC ID:..... Ward ID:.....

Scheme ID[5]	Scheme name	Scheme type	Source		Irrigation area			Benefited HH	Users committee		Operation and maintenance fund		Village maintenance worker		Completed year	Functioning (fully, partially, closed down)	Supporting organization
			Name	ID	Places	Ward no	Are (Hectare/ m^2/Ropa ni)		Y/N	Active/Passive	Y/N	Regularly collected/Not	Y/N	Regularly paid/ Not			

5 Existing irrigation scheme code: District ID - VDC ID - existing irrigation scheme ID (EI01)

6 INVENTORY OF EXISTING WATER ENERGY SCHEME (MICRO HYDRO, WATER MILL) Form-SA/06

District ID..... VDC ID:..... Ward ID:.....

Scheme ID[6]	Scheme name	Scheme type	Source		Beneficiary clusters		Benefited HH	Capacity (kW)	Users Committee		Operation and maintenance fund		Village maintenance worker		Completed year	Functioning (fully, partially, closed down)	Supporting organization
			Name	Type	Name	Cluster ID			Y/N	Active/Passive	Y/N	Regularly collected/Not	Y/N	Regularly paid/ Not			

6 *Existing Water Energy code: District ID - VDC ID - existing water energy scheme ID (EH01)*

7 INVENTORY OF EXISTING 3R SCHEMES

Form-SA/07

Using the resource map prepared earlier on which already existing 3R measures where depicted, please fill in further details of each 3R technology in the tables below:

Specific technology	Aim	Where/which areas is it found	Potential for improvement and scaling up	Needs and constraints	Beneficiaries and benefits (especially women)	Any other remarks

8 INVENTORY OF EXISTING ENVIRONMENT AND ECOLOGY RELATED SCHEME

Form-SA/08

District ID..... VDC ID:..... Ward ID:.....

Scheme ID[7]	Scheme name	Scheme type	Source		Beneficiary clusters		Benefited HH	Users Committee		Operation and maintenance fund		Village maintenance worker		Completed year	Functioning (fully, partially, closed down)	Supporting organization
			Name	Type	Name	Cluster ID		Y/N	Active/Passive	Y/N	Regularly collected/Not	Y/N	Regularly paid/ Not			

7 *Existing environment related scheme code: District ID - VDC ID - existing environment related Scheme ID (EO01)*

9 INFORMATION ON DISASTER RISK AND IMPACT ON ENVIRONMENT

Form-SA/09

Disaster risk ID[8]	Main disaster risk	Impact of disaster	Location		Remarks
			Ward No.	Name of place	

8 *Existing disaster risk related code: District ID - VDC ID - existing disaster risk related ID (ED01)*

10 INSTITUTIONAL WASH SITUATION

Form-SA/10

Institution ID	Name of institution	No of employee	Average no of visitors	If school		Water supply			Toilet						Hand washing facility (Yes/No)	Proper waste managment (Yes/No)	Remarks
									If Yes, no of toilet cabin for				Toilet status* (1, 2, 3, 4, 5)	No			
				Girls	Boys	Regular	Intermittent	No facility	Common	Women	Men	Urinal					

** 1: Good (clean toilet); 2: Moderate (less clean); 3: Poor (dirty and feces everywhere); 4: Not in use due to poor sanitation; 5: clean but locked (not in use)*

11 ENVIRONMENTAL SANITATION — Form-SA/11

(1) Cleanliness of Village

- Roads
- House and surrounding area
- Schools
- Spring, Taps
- Waste water management
- Solid waste (organic) management
- Non degradable (plastic) waste management
- Overall personal hygiene status

12 ENVIRONMENTAL SANITATION — Form-SA/12

Using the social resources map that was prepared (and is explained in the beginning of this Annex) please facilitate the community members to indicate the following on the map clearly:

(1) Border*: North..... South .....
East..... West .....

(2) Near Motorable Road:

(3) Main rivers and rivulets:

(4) Main Crops:

(5) Use of Crops:

(6) Main Livestocks:

(7) Information about riverbank erosion, gully cutting:

(8) Main market area:

(9) Information about landslides, floods:

(10) Existing 3R interventions, and also indicate the dry areas and wet areas (for the dry season):

* *shall be copied from social map*

13 SOCIO-ECONOMIC INFORMATION — Form-SA/13

1. Main Language:.....

2. Main Religious community:.....

3. Main Festivals:

S.N.	Festivals	Month	Availability of local people on the festival day for community work (Yes/No)

4. Available services:

Services	Numbers	If not available, nearest places and time required to go to services	Services	Numbers	If not available, nearest places and time required to go to services
Primary school			Resource centre		
Lower secondary school			Bank		
Secondary school			Cooperative organization		
Higher secondary school			Post office		
Sub health post			Telephone		
Animal service centre			Electricity office		
Agriculture service centre			If any others:		
Range post					
Police office					

5. Skilled human power information:

Information	Daily labor cost	Skilled labor					
		Dalit		Ethnic group		Others	
		F	M	F	M	F	M
Mason skilled labor							
Plumber							
Local toilet builder							
Carpenter							
Electrician							
Rainwater harvesting tank builder							
Female community health volunteers							
Community health volunteers							
Drinking water supply technician							
Agriculture technician							
Livestock technician							
Social mobilizer							
Other, specify:							

6. Information about migration (recent one year):

S.N.	Where	No. of person (tentative)	Why	No of months
1	India (temporary)			
2	Terai Region of Nepal (temporary)			
3	Lower Hilly Region of Nepal (temporary)			
4	Permanently within Nepal			n/a
5	Other countries (excluding India)			

7. Information about agriculture:

7.1 What are the main crops?

Household use:.....

Commercial purpose:.....

Income generated:.....

7.2 If there is vegetable farming:

Household purpose:.....

Commercial purpose:.....

Income generated:.....

7.3 If there is fruit farming:

Household purpose:.....

Commercial purpose:.....

Income generated:.....

7.4 Is there market potential for vegetable and fruits?

7.5 Which animal is preferred for livestock?

7.6 Which types of non-timber forest products/herbs (NTFP) are available and produced?

7.7 Where is the nearest market for selling the NTFP?

7.8 Others:.....

8. Other sources of income (excluding agriculture and services)

- Export materials?
- Cottage industry,
- How many shops, stores?
- How many hotels and restaurants? Trade fair

- Temporary local market? .....times in a month
- Trade fair (Mela)? .....times in a year
- Where do people take loan? (Bank, cooperative, person)
- Average interest for loan:
  Bank: ..... Cooperative: ..... Person: .....

9. Nearest big market name and distance:.....

10. Availability of local materials in VDC

Materials	Within VDC or Outside VDC	Where (name of place)	Adequate or less	Average time to transport (hours)
Stone				
Sand				
Wood				
Bamboo				
Slate used for house roof				
Others, specify				

11. Busy time of local people: seasonal calender (write in week)

Nepal month	Busy time		Nepal month	Busy time	
	Female	Male		Female	Male
Baishak			Kartik		
Jestha			Mangsir		
Asadh			Poush		
Shrawan			Magh		
Bhadra			Falgun		
Ashwin			Chaitra		

14 STAKEHOLDERS WORKING IN THE VDC

Form-SA/14

S.N.	Name of organization	Contact person	CBO	NGO	INGO/ project	Major intervention areas	Supporting organization (if NGO)

15 NEEDS IDENTIFICATION FOR WATER RESOURCES DEVELOPMENT

Form-SA/15

S.N.	Scheme name	Source name	Source location	Source ID	DWS	Irrigation	Environment	Water energy and others	Climate change/DRR	Benefited clusters	Benefited HHs				Benefited population	Remarks
											Total	Dalit	Janjati	Others		

Community needs and constrains table regarding specific 3R measures (example)

Needs and constrains	
Soil bunds	Need to be planned in order to allow easy plowing of the fields
Composting	Crop residues are usually fed to the livestock. Composting not possible if the fodder production in the area in not increased.
Bund and terraces	Need to create short term benefit before any kind of terraces or bunds are spontaneously
Lined ponds	Where already introduced by government, but people disliked it because some kids fell in it. Important to promote live fencing with trees that can also provide valuable products.

Potential benefits coming from the implementation of 3R measures (the first 2 rows are examples)

3R measures	Benefits	Beneficiaries (number of people/hhs)	How women will benefit	Gender equality measures
Soil bunds	Increased grass production, trees production	Farmers (500)	Easy to access fire wood	Choose trees that are multipurpose and can provide fire wood
Water from roads	Water in ponds, allows production of cash crops	Households (50)	Less time spent in looking for water; women improved garden	Provide training on sanitation and provide chlorine tablets

Potential business opportunities couples with 3R measures

Business opportunites
• Production and storage of fodder to be used during the drier part of the year. To be coupled with soil improvement 3R measures; • Production of honey to be coupled with tree planting; • Stall fed dairy production thanks to the increased availability of fodder; • Brick making coupled with water harvesting pond; • Reuse of water from household activities for vegetable cultivation for sale at local markets

ANNEX 6

WUMP + 3R ORIENTATION SCHEDULE

Participants:
V-WASH-CC members (e.g. VDC secretary, representative from health facilities, non-governmental organizations, community based organizations, development partners, users committees, local development organizations, female community health volunteer, headmasters/principals, child clubs, women groups) and other key persons of the VDC.

Duration:
Half day.

Objectives:

- Inform all stakeholders about preparation of WUMP + 3R and seek their support
- Orient on WUMP + 3R and its preparation process
- Prepare action plan

Contents:

S. No.	Descriptions	Methodology
1	Registration	Attendance in the register
2	Welcome, Introduction	Introductory speech by VDC Secretary
3	Objective of the orientation	Write in the Newsprint paper by NGO Facilitator
4	Introduction on WUMP + 3R	Explanatory (What, Why needed, What should be done to prepare WUMP-3R); poster of WUMP + 3R chair is used; Possibly the water cycle model is used (*https://www.youtube.com/watch?v=og9cQKxlFnE*)
5	WUMP + 3R preparation steps	Describe by showing the big posters and handouts distribution
6	Roles and responsibilities of different stakeholders: VDC, ward citizen forum, V-WASH-CC, service providers etc.	Explanation of the exercise and stakeholders mapping using Focus Group Discussion or PRA tools such as Stakeholder Analysis Matrix (Refer to Annex 5)
7	Action Plan preparation: • Planning for Ward level meeting and orientation	Discussion
8	Closing and commitments	

ANNEX 7

WARD LEVEL ORIENTATION SCHEDULE

Participants:
Ward citizen forum, representatives of CBOs, FCHV, teachers, ward level political party members and members of each household

Duration:
Half Day

Objectives:

- Inform all stakeholders about preparation of WUMP + 3R and ensure community participation
- Orient on WUMP + 3R and its preparation process
- Reshuffle ward citizen forum

Contents:

S. No.	Descriptions	Methodology
1	Registration	Attendance in the register
2	Welcome and Objective of the orientation	Write in the Newsprint paper by NGO Facilitator
3	Introduction on WUMP + 3R	Explanatory (What, Why needed, What should be done to prepare WUMP); poster of WUMP + 3R chair is used
4	WUMP + 3R preparation steps	• Describe by showing the big posters • Handouts distribution • Use the water cycle demonstration ((*https://www.youtube.com/watch?v=og9cQKxlFnE*)
5	Roles and responsibilities of different stakeholders: VDC, ward citizen forum, V-WASH-CC, service providers etc.	Explanation and stakeholder mapping exercise
6	Reshuffling of ward citizen forum and selection of two (one male and one female) representative for V-WASH-CC member	Discussion
7	Closing	

ANNEX 8

SCHEDULE FOR THE CAPACITY BUILDING TRAINING TO THE V-WASH-CC AND VDC MEMBERS

S. N.	1st Session	2nd Session	3rd Session	4th Session
1	• Participant Registration • Welcome, Introduction • Rules and regulation of training • Expectation collection • Brief Introduction of Support Organization (eg HELVETAS)	• Concept of Integrated Water Resources Management • 3R (Retention, Recharge and Reuse) concept • Climate change, its effects and adaptive measures	• Water Resource Management Chair • What is WUMP + 3R? Why, How? WUMP + 3R Preparation Steps (use a 3-legged chair to demonstrate its instability – ask participants to sit on it, this way people will remember it more vividly) • Roles and responsibilities V-WASH-CC	• Brief Introduction of Group and CBOs • Leaders and Leadership • Communication • Process of Meeting
2	• Recap of 1st day • Brief Introduction of Local Self Governance Act • What is Decentralization	• Water Resources Act • Sanitation, Total sanitation and Hygiene • National Sanitation and Hygiene Master Plan 2068 B.S.	PRA tools • Well-being ranking • Seasonal Calendar • Social Mapping • Transect Walk • Participatory mapping	• Practice for preparation of Social Mapping
3	• Recap of 2nd day • VDC Level Planning Process • Participatory need identification and Planning process • Gender Equality and Social Inclusion	• Methods of Water measurement • Water Hardship criteria • Conflict and management	• Reading the landscape with 3R mindset • ODF Campaign	• Action Planning Preparation • Evaluation • Closing

ANNEX 9

THE 'HAPPY STRATEGIES' GAME: MATCHING LAND AND WATER INTERVENTIONS WITH COMMUNITY AND LANDSCAPE NEEDS

CGIAR Challenge Program on
WATER & FOOD
Nile

RESEARCH
PROGRAM ON
Water, Land and
Ecosystems
CGIAR

The 'happy strategies' game: Matching land and water interventions with community and landscape needs

Nile BDC Technical Report–4

The ‘happy strategies’ game: Matching land and water interventions with community and landscape needs

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Contents

Introduction

Integrated water management is a relatively new concept that seeks to overcome the differentiation between rain-fed and irrigated land (Rockström et al., 2010). It looks at a whole range of water management practices related to crop, livestock and trees, and seeks to understand how these practices can be bundled within a watershed, also referred to as rainwater management strategies (RMS) at landscape scale.

Defining landscape specific RMS that improves livelihoods of smallholders by optimizing water retention or water productivity has thus become a multi-dimensional, unstructured and complex environmental problem (Bose and Bose, 1995) . Indeed, for each landscape there are many possible objectives, and as many possible rainwater management practices that can be combined into a strategy.

Stakeholder participation is often seen as a viable – and essential - approach to make decisions in these unstructured problems that must adapt to changing circumstances and embrace divers knowledge and values (Reed, 2008). Nonetheless, there are only a few methods to involve stakeholders into unstructured complex problem solving as part of a participatory process (Kolkman et al., 2005). New ways of involving stakeholders that capture the complexity of the problems to address are needed.

This paper presents the 'happy strategies' game that was developed for the Nile Basin Development Challenge (www.nilebdc.org) as a way to involve various stakeholders in identifying and matching 'best bet' RMS practices and interventions at different scales.

The main objective if the game[1] is to provide a tool for researchers and practitioners to start a dialogue on the complex issues of rainwater management. It uses cards that describe a broad range of rainwater management practices. These are traded allowing a team to form a strategy (bundle of practices) that fits a particular landscape. Optionally, teams can add 'interventions' (extension for example) necessary to deliver their strategy. The game has different elements that can be combined in different ways, depending on the type of participants and the specific objective of the exercise. Game materials are online at http://happystrategies.wikispaces.com

The game can be played with experts where the objective is to validate and improve the rainwater management practices knowledge base. It has proved to be particularly useful in stimulating discussion and debate among multi-disciplinary game players. It can also be played with communities and stakeholder platforms to start a dialogue about rainwater management in a particular landscape; it could be played with modelers or students to learn about decision-making problems on the ground.

[1] The game was inspired by the 'happy families' child's game in which individuals or teams have to collect set of similar cards related to one another.

Background

The happy strategies game was developed as part of the Nile Basin Development Challenge funded by the CGIAR Challenge Program on Water and Food. Initial versions of the game make heavy use of the landscapes, issues and concepts found in the Ethiopian Highlands.

Rainwater management strategies at landscape scale

In the Nile Basin Development Challenge, a rainwater management practice, hereafter referred to as a practice, is defined as anything done by a farmer or a rural community to increase water retention or water productivity within a watershed. This definition assumes that a farmer, her family, or a group of farmers decide to do something on their farm or land. As such it includes a broad range of practices such as water harvesting, soil and water conservation, livestock production, small scale irrigation, reforestation, agro-forestry or grassland management.

When implemented, many of these practices might increase the amount of water available within the watershed, enabling farmers and communities downstream to adopt new practices. Implementation may also lead to other unexpected changes, positive or negative. To take trade-offs and synergies within a watershed into account, single practices need to be combined and bundled into rainwater management strategies that maximize water retention or water productivity at a specific landscape scale.

In ecology, the landscape is a scale. In the context of water management, the landscape scale can be understood as a watershed, that comprises a top slope (upland), a middle slope (mid-land) and the bottom valley (lowland), as shown in Figure 1. From this perspective a landscape approach to rainwater management suggests that synergies occurred by combing practices within a watershed are assumed constant. Impact on downstream watersheds can be assessed by hydrological models.

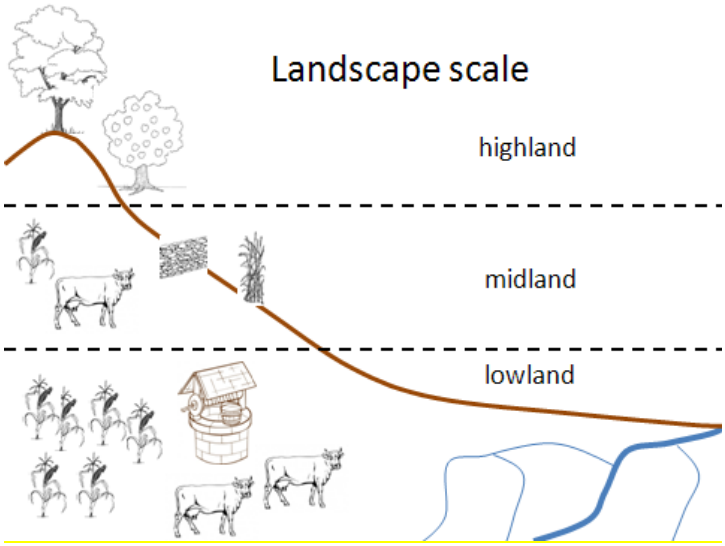


Figure 1: Conceptual landscape with three zones

We define a rainwater management strategy at landscape scale as bundles of practices that cover the whole gradient of the landscape (upland, mid-land, lowland) and maximize water retention or water productivity within the landscape (micro-watershed or sub-basin). To maximize water productivity and water retention within the landscape, a RMS needs to fulfill deferent objectives at different locations in the landscape. Table 1 illustrates the major objectives of a suitable RMS at a given location in the landscape.

Table 1: Objectives of practices in the different zones and land use

	Main objective (examples)		
Zone	Cropland	Grassland	Degraded land
Upland	Increase infiltration (all forms of forestry, percolation pits)	Increase the quantity and quality of fodder for livestock (over-sowing, enclosed grazing)	Rehabilitated degraded land (half moon, forestry)
Mid-land	Increase soil and water conservation (bunds, terraces, in situ water harvesting)		
Lowland	More efficient use of surface or shallow water (wells, rivers)		
Independent	Increase water availability in the dry season (Ex-situ water harvesting)		

In the uplands, the objective could be to increase water infiltration, mid-elevation land practices could aim to increase in-situ soil and water conservation. In the lowlands, the objective of a practice could be more efficient use of surface and shallow water. Ex-situ water harvesting techniques can be applied everywhere across the landscape where water can be collected and used for supplementary irrigation or for livestock.

Besides the practices that are closely related to farmers' decision making, interventions are defined in the game as anything done by a government, NGO or other actor to initiate or support a practice change. Note that these definitions differ from the ones used in environmental sciences where the word *intervention* refers to any practice that intervenes on the landscape structure.

Rainwater management practices

The game was designed to validate and build upon an initial database of existing and potential RMS practices in the Blue Nile Basin. Developed through literature review and expert knowledge acquired through stakeholder participation, for each practice the database provides information about the purposes of the practice as well as any bio-physical, socio-economic and institutional condition of success. For this database, RMS practices were defined very broadly to include traditional water-crop related practices, agroforestry and livestock oriented practices.

Bio-physical suitability conditions are relatively well defined in the literature (Desta et al., 2005). Socio-economic suitability is less well understood and sometimes contradictory (Amha, 2006; Deininger and Jin, 2006; Deressa et al., 2009; Hagos, 2010; Petros, 2010). These conditions have been validated in several expert meeting. When contradictory conditions were found, the one suggested by the experts was retained.

From this database, half the practices were used to develop the game. The selection of these practices was based on the potential impact, as well as their relevance in current policy and NGO work.

Basic elements of the game

The main task of the game is to bundle different practices into a strategy that fits the characteristics of a given landscape. The game consists of several support materials, and is implemented with several support persons. The game has several steps that are always the same. However the detailed rules of the game can be changed depending on the objective of the game and the prior knowledge of the players.

Support material

Conceptual landscape

The conceptual landscape description describes the conceptual approach presented above. It is presented to the participants as an introduction to water management, and aims to clarify the vocabulary used in the game.

Landscape descriptions

These describe the landscape for which a rainwater management strategy needs to be fitted. This description needs to cover the bio-physical characteristics, socio-economic and possibly the institutional context. Bio-physical characteristics can be presented with maps and the socio-economic context can be retrieved from national statistics. This information can be printed on paper and distributed to the participants. The description can be completed with stories from different point of view or from different stakeholders that are active in the landscape.

Practice cards

Practice cards, an example is shown in Figure 2, describe each selected practice from the database. Each illustrates the practice with a picture and as well as the hydrological, environmental and socio-economic purpose and the bio-physical, socio-economic and institutional context.

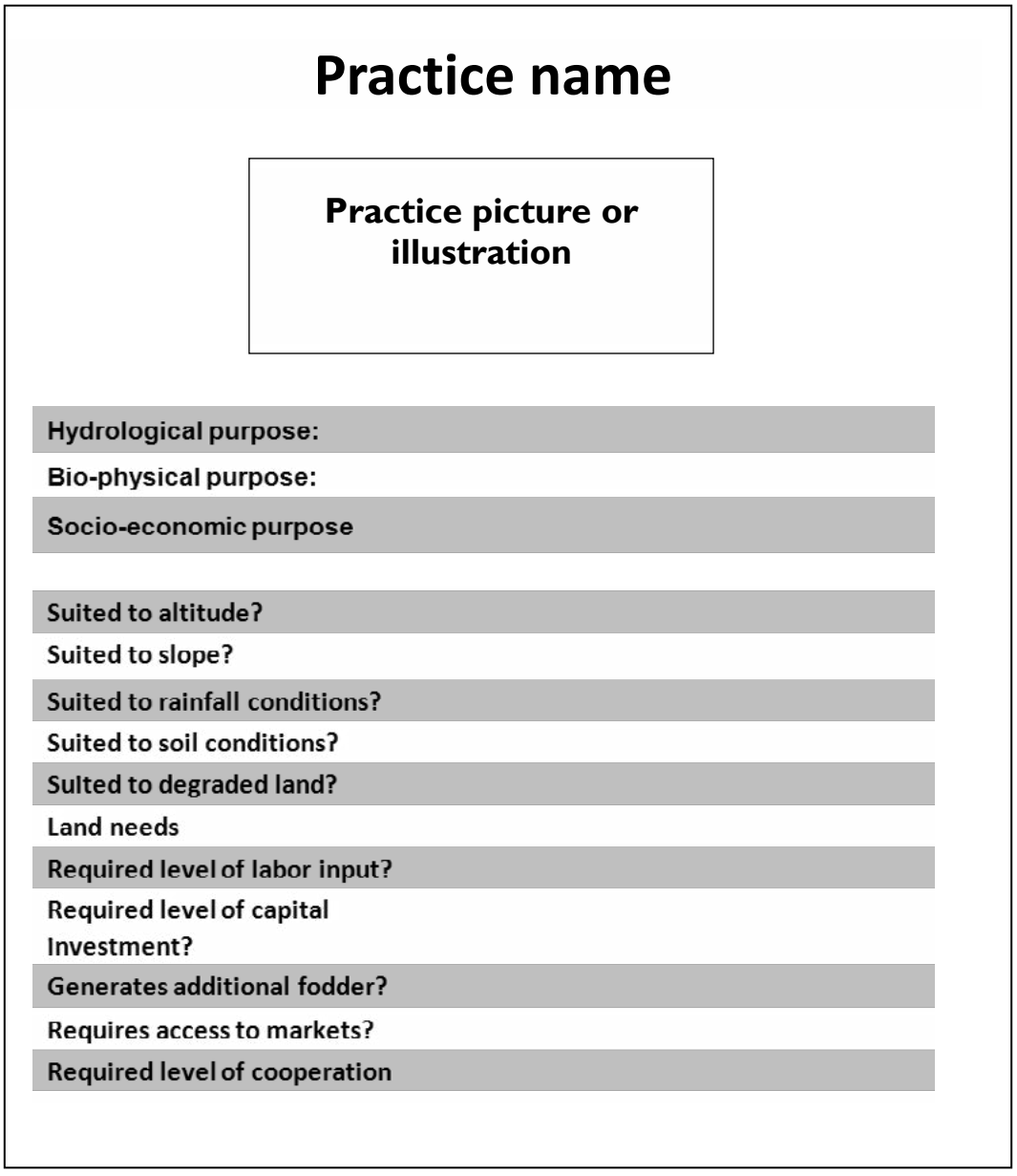


Figure 2: Standard practice card used to describe each practice

In the game, water management practices were classified into different categories, each with its own color. Soil and water conservation is yellow, agro-forestry is green, in-situ water harvesting is brown, ex-situ water harvesting is blue, water lifting is pink, livestock and grassland related practices are black and fertility management is turquoise.

Innovation cards

Innovation cards are blank practice cards that can be filled out by players as needed. It allows them to add new practices that are not yet part of the game.

Intervention cards

Interventions cards are blank forms that players can use to suggest interventions necessary to make their strategy successful, and why. Examples of interventions are improved extension services, better access to credit or supply chain development.

Support persons

- To play the game, several supporting person are needed.
- A facilitator introduces the game, its objectives and the rules and he or she makes sure that the landscapes are well presented and described.
- A landscape manager facilitates discussions for a group of players forming a team whose task is to formulate a strategy. The landscape manager:
    - Manages time and process
    - Reminds people of the instructions.
    - Helps people to reorganizing practice into strategies by suggesting to locate in each practice into the different landscape zones.
    - Facilitates the negotiation process.
    - Hands out intervention cards when necessary.
    - When the group agree on the strategy, guides the discussion towards interventions (what can other actors do to enable the strategy)

There should be between 7–12 people in each group facilitated by landscape manager.

A help desk is a sort of information center where players can ask for more information about each practice card. The help desk also holds all cards that are not yet used in the game. Depending on the specific rules, the help desk can exchange practice cards or give out new practice cards. The help desk also support players to fill innovation cards correctly.

Documenting the game

To learn from the game, different steps need to be documented.

Two main forms are used for this: The landscape manager form and the help desk form. As well as supporting the group work, landscape managers write down the initial set of practices at the beginning of the game, and the final set of practices - which represents the strategy. They also keep track of all innovation and intervention cards that are used, they track exchanges of practices with other landscapes, as well with the help desk and they keep track of synergies and trade off that emerge in the discussion. Typically, the end result is photographed and any presentations of the game results can be captured on video or text.

The help desk form is used to track the exchanges the help desk has been authorizing as well as the innovation cards that were filled out.

Flip charts are useful tools for the landscape manager to involve the players. It can for example be used to design the landscape and its 3 zones, and to locate or position practices within the landscape. The visual result of the game is often a useful discussion point.

At the end of the game, each group (or landscape) presents its final strategy and defends it. They have to explain the chosen objective for the landscape and how this objective is addressed by their strategy. The process of getting to the strategy, and trade-offs and assumptions made, are often important elements of the presentation – they also need to be documented.

Two fundamental variants of the game: the role of the participants

So far, the game has two fundamentally different variants, assigning different roles to the participants.

Variant 1 'players as practices': In this variant, each participant identifies with a practice of his or her own choice at the beginning of the game, and the player needs to find a landscape that 'adopts' him or her. In this variant, each landscape has as many practices as there are people in the team. In this process, the practice needs to fit the landscape characteristics as well as the practices represented by other players in the group. When this variant is played, the participants can decide to change landscape (when several landscapes are available) or try to trade cards (identities) at the help desk. Trading rules can be developed.

Variant 2 'teams as strategies': In this variant, each participant is part of a community or group that gets a set of random starting practices. As a team, they need to use their practices and any other resources to improve the livelihoods of the allocated landscape. Collectively, they decide which practices need to be exchanged, and for which new ones. In this variant, the number of practices for each landscape is independent of the number of participants in a team.

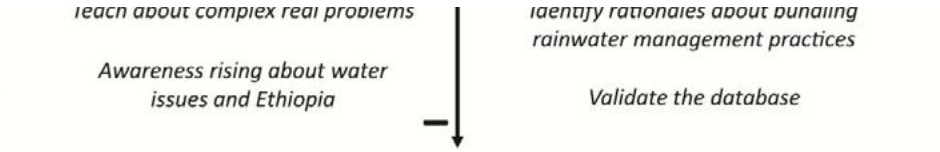
In our experience, variant 1 leads to a more dynamic game especially if there are many participants (more than 50 persons). It allows participants to identify with a practice, t take on the 'identity' of the practice. This allows some breaking down of hierarchical relationships that might influence relations among participants and helps to gives everyone an equal voice. Variant 2 is preferred when there are fewer participants (20-30); it ensures that enough cards are in circulation. Variant 1 is much more about trade-offs and individuals advocating for specific practices while variant 2 is more about collective behavior.

Nonetheless, the steps of the game remain similar and are the following.

	What	Who
1	Introduce the game, the objective and the general rule	Facilitator
2	Describe the landscape	Facilitator
3	Describe the specific rule	Facilitator
4	Introduce the " help desk" and the "landscape managers"	Facilitator
5	Send people to the "help desk" (variant 1) to select ones personal practice card or to the "landscape managers" (variant 2) that hand out the set of practice card for the group.	Facilitator
6	Ask people to amend or improve the card (depending on the objective of the game	Facilitator
7	Start discussing	Landscape manager
8	Hand out innovation and intervention cards when needed	Landscape manager
9	Perform exchange with other landscapes and help desk given the rules	Participant, help desk
10	Ends the discussions and proceeds toward reporting	Facilitator
11	Feedback from the different groups	Participants, landscape manager
112	Scoring	Depends on the rule

Adapting the game to the objectives and target groups

Different participants and different objectives



e objectives and on

Figure 3 shows the different objectives of the game depending on the prior knowledge of the participants. The two major axes are the knowledge about the specific local context and about specific landscapes as well as the knowledge about rainwater management.

When players have a high prior knowledge of the local landscape, the game allows them to make use of their knowledge to validate the database (in which case it is up to the facilitator to make sure there is space to amend the practice cards) and to develop context-specific strategies and identify the necessary interventions to enable the practice adoption. When the participants have less knowledge about integrated water management, the game can also be used to raise awareness about synergies between some practices at landscape scale. This understanding may lead to discussions of benefit-sharing mechanisms that can be taken up into a community discussion.

When participants have prior knowledge about integrated water management the game also allows the organizers to collect expert knowledge on synergies between different practices, both at farm and at landscape scale.

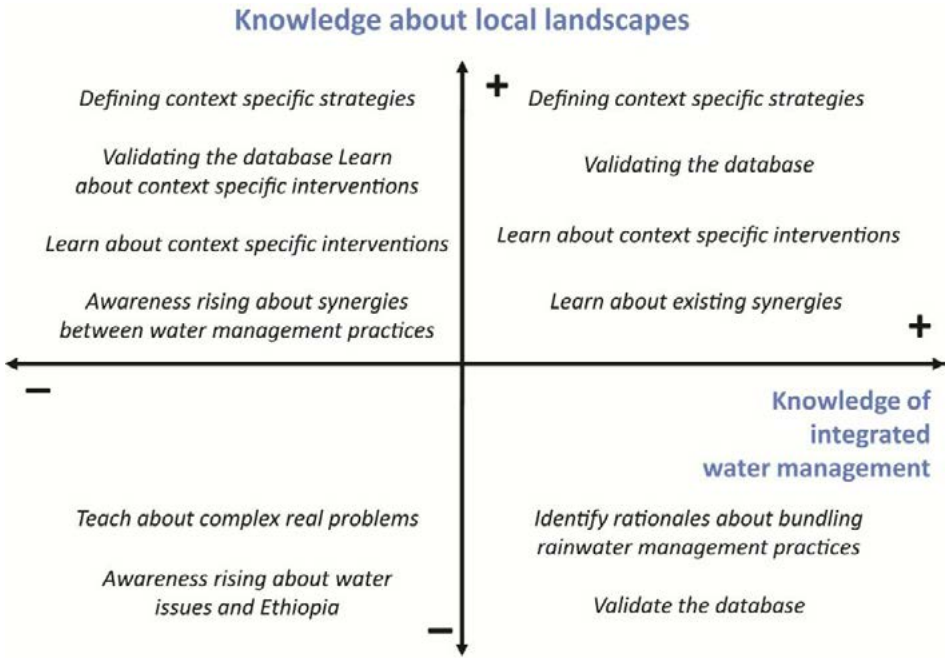


Figure 3: Different objectives given the prior knowledge of the participants

When participants have little knowledge about the local context and its landscapes, the game has different objectives. If the players have prior knowledge of integrated water management, then it allows the exercise to collect more theoretical knowledge to validate the database and to identify rationales about how to bundle rainwater management practices based on theoretical knowledge about synergies between practices.

If the participants do not have prior knowledge of integrated rainwater management strategies, the game is a teaching tool that allow participant to learn about a real complex problem, and raise awareness about water issues in the local context.

Different landscapes

The landscape descriptions can be based on real cases but can also be a 'virtual construct' combining features from different existing landscape. When participants have little knowledge about the local context, the 'constructed' landscape may work best. The landscape bio-physical characteristic can also be inspired by a real landscape, and the socio-economic characteristics can be stereotyped for any local area. In this way it makes it easier for participants to understand a simplified local context. If this version of the game is played, different strategies will be developed for the same landscapes, and can be compared among each other.

If participant however come from a specific area, or have a good prior knowledge of the area, the real landscape can be described with their real socio-economic and institutional context. When this option is chosen it makes sense to use the specific landscapes where the participants come from or know of. When this variant is chosen, different strategies for different landscapes are developed and can hardly be compared with each other. If the number of participants allows, two groups can be used for each landscape definition.

Differences in practice card selection

The currently available practice cards contain the most important practices that the NBDC has identified in the Blue Nile region of Ethiopia and covers about 45 practices. This list can easily be extended with other practices that are already in the database, or by adding practices suggested in previous games - from the innovation cards. This list should be a living document that should grow each time the game is played.

Nonetheless, it is important to select the initial set of cards. If participants have prior knowledge of the local context and the different practices, the proposed set of practice can be relatively large and include cards that might not fit the bio-physical context of any of the landscapes. This approach allows players to validate the database and stretch the discussions.

When participants have little knowledge about the local context and the different practices, it is better to reduce the initial set of practices and select only feasible ones.

When variant 2 of the game is chosen, each landscape team receives 10 cards. It is important that these are all different and cover all the categories (colours of the cards). In addition the set should contain at least two innovation cards and 5 intervention cards. In variant 1, the innovation and intervention cards are held by the landscape manager; he or she hands them out as requested.

Different trading rules

Trading rules can also be adapted. For example, players can be allowed to freely trade a card within the same category (color) at the help desk. Exchanging a card with a practice from a different color group may be made less easy, to maintain some dynamics in the game. Exchanging two cards for one new one is an option when there are many participants in each group (> 10 participant). Otherwise, a practice needs to be refused by at least 2 other landscapes before having the right to trade it in at the help desk.

To allow for a creative process, innovation and intervention cards should be unlimited for each group.

Differential emphasis on interventions

When the objective is to identify context-specific strategies, the landscape managers should be careful and emphasize the need to identify constraints of the strategy and define suitable interventions. When the objective of the game is to identify how to bundle strategies or to teach, interventions are less important as a focus.

Feedback and scoring choices

Each group needs to present its strategy to the rest of the teams. Sufficient time should be allocated to ensure that discussion between the different groups can take place. This is of particular importance when the objective of the game is to identify context specific landscape with specific stakeholders or a community. In this case, ranking the strategies is not important except as a way to introduce 'buzz' to the plenary discussions.

When the game is played as a teaching aid or to argue the rationales for different bundles of practices, then the feedback session can also use scoring to rank the different practices. If only one landscape definition has been used in the game, it is relatively easy, and the following criteria might be used: fitting the bio-physical characteristics, fitting the socio-economic characteristics, fitting the defined objectives, innovation, synergies and the suitability of interventions. A panel of experts could, for example, rank the different strategies. The various groups can also rank each other.

How we played the games

In the NBDC, the game has been played several times: first at the NBDC stakeholder workshop in October 2011 (see Figure 5), second, at the CPWF International Forum on Water and Food (IFWF) in November 2011; third it has been played with rural communities, and fourth it formed part of a training event for water practitioners

Figure 4 shows the various games we have played in relation to the objectives of the various games.

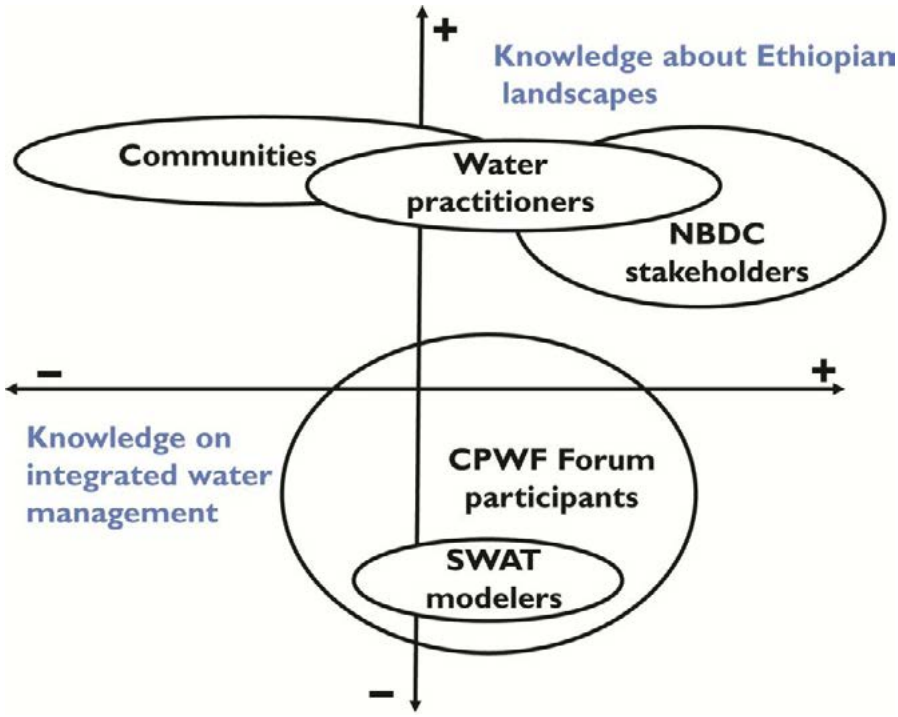


Figure 4. Matching participants and objectives in the NBDC context

The first game used variant 1. The players knew the local landscapes and the concept of integrated water management. The workshop involved close to 70 people and the objective was to validate and enlarge the database of practices and identify which practices might form synergies with others at landscape scale. It was also the first test of the game. In this game, we used 'real' data from the project sites.

The three project study sites were used as 3 different landscapes; we had two groups per landscape. Participants were asked to choose their practice and to correct and improve 'their' cards. They then joined the landscape of their choice, taking care there were enough people in each landscape.

The trading rules allowed a new practice to be obtained from the help desk in exchange for two existing ones – or to swap with any other landscape group. Two innovation cards and an unlimited amount of interventions cards were given to the landscape managers. We found the 'two for one' trading rule to be very limited for the smaller groups; so we used this for the larger groups only. In some cases, two innovation cards were not sufficient and the trading rule two for one was even more restraining.

We learned several lessons in this game. It allowed people to talk easily about multi-objective and multi-criteria problems. Participants could learn from each other. Some cards could be validated and improved for application in specific landscapes. We found that the quality of facilitation in the landscape teams strongly influenced the quality of the discussions and the subsequent strategy development. The concept of interventions was not always understood; consequently some innovation cards were used for interventions. Finally, one and a half hours was simply too short to also include reporting back from a large groups.

Figure 5: Participants discussing a 'happy strategy' at the October 2011 NBDC stakeholder workshop

The game at the IFWF brought together a broader range of scientists and stakeholders that work on water management from six river basins. Some participants came from the Nile, but most were from different areas and had very little knowledge of the local Ethiopian context. The objective was to present our database and the Ethiopian context to people from other regions. An additional objective was to learn from other regions about possible new practices. In this game, we used composite data from the three Ethiopian sites, creating a fictitious 'Jegerida' landscape.

In this game, variant 2 was played with a virtual landscape. In this form, the game was perceived much more as a discussion tool. In this version, innovation and intervention cards were hardly used, whereas the discussions clearly discussed these issues. Nonetheless, this version seems to work well with people that did not know the sites or the different rainwater management practices.

The game has also been played with and adapted for rural communities. Here, the objective of the game was to identify an optimal rainwater management strategy from the perspective of the farmers.

Significant adjustments for the rural community included: First, male and female farmers were separated in different groups and no exchange between the groups was foreseen. This was to overcome situations in which women will not express their opinions in the presence of men nor will have sufficient negotiation power to trade cards.

Second, instead of a landscape description, the group went through a participatory mapping exercise, aiming to produce a common understanding of locations within the watershed. The resulting map was subsequently used to place the practice cards were players thought they would be most needed.

Third, before playing the game, participants were asked about the practices they know of. Only cards corresponding to these practices were used in the game.

Fourth, variant 1 of the game was played with men who are used to making decisions for their fields; variant 2 was played with women, who have more difficulties in making choices. Finally, there was no help desk. Per discussion round, each farmer got one card. The game was played until all the cards that the farmers wanted to discuss were placed on the map.

The lessons learned from the communities were that these communities often have a good vision of what an optimal rainwater management strategy is for their watershed. They often know very well what would improve their livelihoods. Most of the time, there are rational explanations for non-adoption of rainwater management practices, such as lack of market access, lack of access to credit or lack of technical support. In addition, very unexpected practices came up, such as poultry farming.

Finally, the game played with water practitioners was similar to the NBDC stakeholder one, except that two virtual landscapes were developed: a dry landscape and a humid landscape inspired by existing watersheds. Rules were implemented very strictly in the beginning of the game, but facilitators and help desk adjusted the rules as they felt it would make the game more dynamic.

The lesson learned from this game was that it can be used as a tool to teach people about rainwater management. The setting of the game makes optimal use of the prior knowledge that participants have. The flexible game rules allowed the help desk manager to become an NGO that gave away practices he knew about, but which other participants ignored – reflecting the reality in which organizations ‘promote’ their preferred practices.

Conclusions

The happy strategies game allows groups of people of different backgrounds to start discussing multi-dimensional unstructured and complex environmental problems. It allows participants to learn and negotiate with each other and at the same time provide relevant information to scientists working on integrated rainwater management.

We found that the happy strategies game is very flexible and can be adjusted to many different situations with different participants. It has two fundamental variants, but almost every part of the game can be modified and adjusted to the particular objective and participants. From both rounds played, participants enjoyed playing the game and were very positive about it.

More information

A 'happy strategies tool box' is available at http://happystrategies.wikispaces.com. It contains:

1. Full set of cards, including innovation and intervention cards
2. Tracking forms
3. Landscape descriptions
   a. 3 NBDC study site description poster and a conceptual landscape
   b. Virtual landscape poster and PowerPoint description
4. Additional material
   a. Report from the game played at the NBDC workshop
   b. Report from the game played at CPWF forum

Related links:

Blog post CPWF forum http://nilebdc.org/tag/game/

http://nilebdc.org/2012/07/03/multi-scale-participatory-mapping/

http://nilebdc.org/2012/05/01/nile-3-partner-meeting-finally-touching-the-ground/

http://nilebdc.org/2011/11/24/jegerida/

http://blip.tv/ilrivideo/rainwater-management-interventions-the-happy-strategies-game-5761296

http://nilebdc.org/2011/11/20/happy-strategies-where-strategic-land-and-water-management-is-as-simple-as-playing-a-game/

http://www.slideshare.net/ILRI/the-happy-strategies-game-matching-land-and-water-interventions-with-landscape-needs

http://www.flickr.com/search/?s=rec&mt=all&adv=1&w=56797490%40N03&q=%22happy+strategies%22

http://nilebdc.wikispaces.com/happy+strategy+game

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Nile Basin Development Challenge (NBDC) partners

Ambo University	http://www.ambou.edu.et
Amhara Regional Agricultural Research Institute	
Bahir Dar University	http://www.bdu.edu.et
Catholic Relief Services – Ethiopia	http://crs.org/ethiopia
Ethiopian Economic Policy Research Institute	http://eeaecon.org
International Livestock Research Institute	http://ilri.org
International Water Management Institute	http://www.iwmi.cgiar.org
Ministry of Agriculture	http://www.eap.gov.et
Ministry of Water and Energy	http://www.mowr.gov.et
Nile Basin Initiative	http://nilebasin.org
Oromia Agricultural Research Institute	
Overseas Development Institute	http://odi.org.uk
Stockholm Environment Institute	http://sei-international.org
Wollega University	http://www.wuni.edu.et
World Agroforestry Centre	http://worldagroforestrycentre.org

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ANNEX 10

TECHNICAL FORMATS FOR WUMP + 3R PREPARATION

District:	
VDC:	
Ward/Sub-Committee No:	
WUMP facilitator (technical) Name: Contact No:	

S.N.	Format title	Format code	Remarks
0	Technical Assessment Process and General information	TA/00	
1	Drinking Water Supply and Sanitation Profile	TA/01	
2	Source Survey	TA/02	
3	Inventory- Existing Water Supply Scheme	TA/03	
4	Inventory- Existing Irrigation Scheme	TA/04	
5	Inventory- Existing Hydropower Scheme	TA/05	
6	Inventory- Existing Miscellaneous Scheme	TA/06	
7	Inventory- 3R Opportunities	TA/07	
8	Proposal for Water Supply Scheme (gravity)	TA/08	
9	Proposal for Alternative Water Supply Scheme	TA/09	
10	Proposal for Irrigation Scheme (Conventional)	TA/10	
11	Proposal for irrigation Scheme (non-conventional)	TA/11	
12	Proposal for Environment & Related Scheme	TA/12	
13	Proposal for Water energy Scheme	TA/13	
14	Proposal 3R schemes	TA/14	
15	Other Information Required on Water Use	TA/15	

0 TECHNICAL ASSESSMENT PROCESS

1	Obtain social map and other social assessment data		
2	Inform community to manage about 4 to 5 persons who have good knowledge of village, source, location etc.		
3	Arrange tools (ansi, kodalo, bucket etc), required numbers of technical forms and technical equipment: GPS, altimeter, pedometer, tape, stop watch, plastic sheet, camera		
4	Measure water source and fill the source survey form (TA/02) and follow as below:		
	↓		
5	If the source is used for drinking water	yes →	Fill drinking water and sanitation profile form (TA/01)
	↓		
6	If there is any existing improved water system	yes →	Fill relevant inventory form TA/03, 04, 05, 06 and 07
	↓		
7	If the source is used for improved water scheme and the scheme is proposed for repair or rehabilitation	yes →	Fill proposal form (TA/08, 09, 10, 11, 12, 13 or 14), and tick repair or maintenance schemes
8	If the source is not in use and proposed for new scheme	yes →	Fill the proposal form (TA/08, 09, 10, 11, 12, 13 or 14) for relevant scheme and tick new scheme
9	Explore possibilities of multiple use schemes; compare with alternative options, if any		
10	Explore 3R opportunities (source improvement and conservation, plantation works etc.) linked with water scheme and stand alone		
11	Follow the alignment of existing or new proposed scheme and record necessary data		
12	Verify and access feasibility of 3R opportunities identified during social assessment. Conduct transect walk along 2 - 3 directions for remaining area to verify/identify 3R opportunities		
13	If 3R opportunities identified and feasible (special attention should be given for water hardship areas)	yes →	Fill the proposal form (TA/08, 09, 10, 11, 12, 13 or 14) for relevant scheme
14	Compile the information of TA/15 from Household Survey form and Water Sanitation Profile form		
15	Take relevant photographs of the surveyed area, sources, settlements, special area, meetings etc.		

GENERAL INFORMATION SHEET FOR TECHNICAL ASSESSMENT

District name:		District ID:	
VDC name:		VDC ID:	
Ward no:		Sub-committee/Ward ID:	

Ward Details:

Ward boundary	
• East	
• West	
• North	
• South	
No of tole/cluster*	
Cluster Details	
Cluster name	Cluster ID Serial no. start from separate ward**

* Cluster based on Water sharing

** District ID - VDC ID - Ward ID - **Cluster ID (C01)** (Refer cluster ID in "Tole/cluster information")

1 DRINKING WATER SUPPLY AND SANITATION PROFILE — Form-TA/01

A. General Information

District ID:		VDC ID:		Ward/Sub-committee ID:	
Total HHs:		Population:		Number of Clusters	

B. Existing Water Supply Condition

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9
Cluster name[1]									
Cluster ID[2]									
Ward no.									
HHs									
Population									
i) Dry season source									
Water fetching point									
Source Name									

1 *Cluster of households with shared water supply systems* ***(Refer clusters in SA 5F "Cha. Tole/cluster information")***
2 *Cluster code: District ID - VDC ID - Ward ID -* ***Cluster ID (01)*** *(Refer cluster ID in "Cha. Tole/cluster information")*

Source ID									
Type of source									
Source yield (lps)									
If improved scheme: a) Tapped yield (lps)									
b) Quantity available at cluster (lps)									
Quantity available at cluster (Lpcd)									
Fetching time (round trip)									
Continuity (hrs/day)									
Reliability (month/year)									
Water quality									

1 DRINKING WATER SUPPLY AND SANITATION PROFILE	Form-TA/01

District ID:			VDC ID:			Sub-committee ID:	

C. Alternative/Wet Season Water Supply Condition (Contd..)

Cluster name[3]	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9
Cluster ID[4]									
Ward no.									
HHs									
Population									
ii) Alternate/Wet season source									
Water fetching point									
Source Name									
Source ID									
Type of source									
Source yield (lps)									

3 *Cluster of households with shared water supply systems* ***(Refer clusters in SA 5F "Cha. Tole/cluster information")***

4 *Cluster code: District ID - VDC ID - Ward ID -* ***Cluster ID (01)*** *(Refer cluster ID in "Cha. Tole/cluster information")*

If improved scheme: a) Tapped yield (lps)									
b) Quantity available at cluster (lps)									
Quantity available at cluster (Lpcd)									
Fetching time (round trip)									
Continuity (hrs/day)									
Reliability (month/year)									
Water quality									
Service Level									
Quantity									
Quality									
Fetching time									
Continuity									
Reliability									
Overall Service Level									

1 DRINKING WATER SUPPLY AND SANITATION PROFILE	Form-TA/01

District ID:		VDC ID:		Sub-committee ID:	

D. Existing Sanitation Condition (HH format) verify

Cluster name[5]									
Cluster ID[6]									
Ward no.									
HHs									
Population									
HH latrine total									
a) with water seal									
b) without water seal									
c) temporary pit latrine									
Use status of HH latrine									
Institutional toilet									
Public toilet									
Use status									

5 Cluster of households with shared water supply systems (cluster name same as DWS for sanitation information)

6 Cluster code: District ID - VDC ID - Ward ID - Cluster ID (C01) (Refer cluster ID in SA 5f "Cha. Tole/cluster information")

1 DRINKING WATER SUPPLY AND SANITATION PROFILE	Form-TA/01

District ID:		VDC ID:		Sub-committee ID:	

E. Existing Sanitation Condition (HH format) verify

Cluster name[7]									
Cluster ID[8]									
Ward no.									
Implementation supported by (Organization and Number of Latrine)									
General cleanliness of surrounding area									
Nos. of Chang (drying rack)									
Nos. of garbage pit									
Nos. of improved cooking stoves									

7 Cluster of households with shared water supply systems (cluster name same as DWS for sanitation information)

8 Cluster code: District ID - VDC ID - Ward ID - Cluster ID (C01) (Refer cluster ID in SA 5f "Cha. Tole/cluster information")

1 DRINKING WATER SUPPLY AND SANITATION PROFILE	Form-TA/01

District ID:		VDC ID:		Sub-committee ID:	

F. Other aspects of Environmental Sanitation

Defecation Area

Defecation area ID[9]	Defecation area	District	VDC	Ward No.	GPS Reading			
					X	Y	Accuracy	S.N.

Carcass/Solid Waste Area

Carcass/ solid waste area ID[10]	Carcass/Solid waste disposal Area	District	VDC	Ward No.	GPS Reading			
					X	Y	Accuracy	S.N.

Cremation Area

Cremation area code[11]	Cremation area	District	VDC	Ward No.	GPS Reading			
					X	Y	Accuracy	S.N.

9 District ID - VDC ID - Ward ID - Defecation area ID (DEF01)
10 District ID - VDC ID - Ward ID - Solid waste/carcass disposal area ID (SOL01)
11 District ID - VDC ID - Ward ID - Cremation area ID (CRE01)

2 SOURCE SURVEY[12] Form-TA/02

A. General information

Source ID[13]: .....

Name of source: .....

Type of source: .....

Spring Spring-fed stream Stream Water Bodies Runoff (Road drain)

Location: District name: VDC Name: Ward No:

Location (name of place): Owner of source:

Elevation and GPS reading:

X	Y	Elevation	Accuracy	S.N.

Source yield:

Measured yield (lps):

Safe yield:

Flow measurement Method:

Date measured:

Water quality:

(by observation & interview)

Source disputes, if any:

.....

Layout and environment around the source area:

12 *Source survey should include survey of spring, springfed stream, stream and water bodies flow measurement at potential project sites, Significant change in discharge, junction of major streams, Outlet pour point (lowest point of VDC) etc.*

13 *Refer List of existing water sources*
Code for water sources: District ID – VDC ID – ward ID - watersources ID

B. Present use of this source

Sector	Ward	Settlement using the source	Use of source in a managed project	Use of source by the people not developed as a project	Code of the source

C. Potential use of source

First priority			Second priority		
Sector	Ward	Settlement to be covered	Sector	Ward	Settlement to be covered

D. Need for further improvement; Is the source at risk from any hazards?

Hazards type	Intervention type	Remarks

3 INVENTORY - EXISTING WATER SUPPLY SCHEME — Form-TA/03

Name of scheme				Code			Type	
Source I	Name		Discharge (lps)		Tapped discharge		Total tapped discharge	
	Code							
Source II	Name		Discharge (lps)		Tapped discharge			
	Code							
Supported by			Operation started year		Maintenance done in year (if any)			

Beneficiary and Service Area										
VDC	**Ward No.**	**Beneficiary HHs (Built up/Design)**				**Beneficiary HHs Functional (present year)**				**Remarks**
		Total	**Dalit**	**Janjati**	**Other**	**Total**	**Dalit**	**Janjati**	**Other**	

Operational & Management Aspect							
Functional Status	Good (no repair required		Need minor repair		Need major repair		Need reconstruction	
	Need Rehab.		Not fit for re-operation				If closed, closed down year	
Operation and Maintenance	Users committee (yes)			User Committee			Other group managing system	
Users committee detail	Registration	Yes		No				
	Active	Yes		No		No. of meeting last year		
	Members	Total		Male			Female	

Operator/ VMW	Trained	Yes		No	Appointed	Yes		No
	Active	Yes		No	Paid	Yes		No
	Operator Monthly Salary	Cash Nrs			Kind (Mention)			
O & M fund/ Water tariff	O & M fund at present		Last 3 year expenses		Water Tariff rate/Month			

Structure Details												
Strt. ID	**Generatic name**	**Structural status**	**Hydraulic/ Leakage Status**	*** Service provided to**			**GPS Reading**				
				Built up/ Design HH	**Present/ Funct. HH**	**Cluster Name**	**X**	**Y**	**Z**	**Acc**	**S.N.**
1	Intake										
2	RVT										
3	BPT/IC										
4	Tapstand 1										
	Tapstand 2										
	Tapstand 3										
	Tapstand 4										
	Tapstand 5										
	Tapstand 6										
	Tapstand 7										
	Tapstand 8										
	Tapstand 9										
	Tapstand 10										
			Total HH			No of HH = Present functional coverage of DWS					
* Structural status: as per set indicator			* Hydraulic status as per set indicator			Overall status (as per set indicator)					

Structure details....continue of tapstand

Structure Details											
Strt. ID	Generatic name	Structural status	Hydraulic/ Leakage Status	* Service provided to			GPS Reading				
				Built up/ Design HH	Present/ Funct. HH	Cluster Name	X	Y	Z	Acc	S.N.
	Tapstand 11										
	Tapstand 12										
	Tapstand 13										
	Tapstand 14										
	Tapstand 15										
	Tapstand 16										
	Tapstand 17										
	Tapstand 18										
	Tapstand 19										
	Tapstand 20										
	Tapstand 21										
	Tapstand 22										
	Tapstand 23										
	Tapstand 24										
	Tapstand 25										
	Tapstand 26										
	Tapstand 27										
	Tapstand 28										
	Tapstand 29										
	Tapstand 30										
			Total HH			No of HH = Present functional coverage of DWS					
* Structural status: as per set indicator			* Hydraulic status as per set indicator			Overall status (as per set indicator)					

4 INVENTORY - EXISTING IRRIGATION SCHEME — Form-TA/04

Name of scheme				Code			Type	
Source I	Name		Discharge (lps)		Tapped discharge		Total tapped discharge	
	Code							
Source II	Name		Discharge (lps)		Tapped discharge			
	Code							
Supported by			Operation started year		Maintenance done in year (if any)			

Beneficiary and Service Area												
VDC	Ward No.	Beneficiary HHs (Built up/Design)				Beneficiary HHs Functional (present year)				Remarks	Command area (Ropani)	
		Total	Dalit	Janjati	Other	Total	Dalit	Janjati	Other		Summer	Winter

Operational & Management Aspect									
Functional Status	Good		Partial		Closed down		If Closed down year		
Operation and Maintenance	Users committee (Yes)			User Committee (No)			Other agencies		
Users committee detail	Registration	Yes		No					
	Active	Yes		No		No. of meeting last year			
	Members	Total		Male			Female		
	Management capacity	Good		Satisfactory			Poor		
Operator/ VMW	Trained	Yes		No		Appointed	Yes		No
	Active	Yes		No		Paid	Yes		No
	Operator Monthly Salary	Cash Nrs				Kind (Mention)			
O & M fund/ Water tariff	O & M fund at present		Last 3 year expenses			Water Tariff rate/Month			

Structure Details											
Strt. ID	**Generatic name**	**Structural status**	**Hydraulic/ Leakage Status**	**Service provided to**			**GPS Reading**				
				Built up/ Design HH	**Present/ Funct. HH**	**Cluster**	**X**	**Y**	**Z**	**Acc**	**S.N.**
1											
2											
3											
4											
5											
6											
7											
			Total HH			No of HH = Present functional coverage of irrigation					
* Structural status			* Hydraulic status			Overall status (good, moderate, poor, very poor & failure)					

5 INVENTORY - EXISTING IRRIGATION SCHEME — Form-TA/05

Name of scheme				Code			Type	
Source I	Name		Discharge (lps)		Tapped discharge		Total tapped discharge	
	Code							
Source II	Name		Discharge (lps)		Tapped discharge			
	Code							
Supported by			Operation started year		Maintenance done in year (if any)			

Beneficiary and Service Area												
VDC	Ward No.	Beneficiary HHs (Built up/Design)				Beneficiary HHs Functional (present year)				Remarks	Ownership	
		Total	Dalit	Janjati	Other	Total	Dalit	Janjati	Other		Private	Community

Operational & Management Aspect							
Functional Status	Good		Partial		Closed down		If Closed down year	
Operation and Maintenance	Users committee (Yes)			User Committee (No)			Other agencies	
Users committee detail	Registration	Yes		No				
	Active	Yes		No		No. of meeting last year		
	Members	Total		Male			Female	
	Management capacity	Good		Satisfactory			Poor	

Operator/ VMW	Trained	Yes		No	Appointed	Yes		No
	Active	Yes		No	Paid	Yes		No
	Operator Monthly Salary	Cash Nrs			Kind (Mention)			
O & M fund/ Water tariff	O & M fund at present		Last 3 year expenses		Water Tariff rate/Month			

Structure Details												
Strt. ID	**Generatic name**	**Structural status**	**Hydraulic/ Leakage Status**	**Service provided to**			**GPS Reading**				
				Built up Design HH	**Present HH**	**Cluster Name**	**X**	**Y**	**Z**	**Acc**	**S.N.**
1											
2											
3											
4											
5											
6											
7											
			Total HH			No of HH = Present functional coverage of Micro hydro					
* Structural status			* Hydraulic status			Overall status (good, moderate, poor, very poor & failure)					

6	INVENTORY - EXISTING ENVIRONMENTAL RELATED SCHEME	Form-TA/06

1. Scheme Description
Scheme name: .....
Type of system: .....
Scheme code: .....
Supported by: .....
Operation started (year): .....

2. Source Description
(*Source no. from form TA/02)*
Source code:
Source name:

Beneficiary and Service Area

VDC	Ward No.	Cluster names	Beneficiary HHs (Built up/Design)				Beneficiary HHs Functional (present year)				Remarks
			Total	Dalit	Janjati	Other	Total	Dalit	Janjati	Other	

Structure Details											
Strt. ID	Generatic name	Structural status	Hydraulic/ Leakage Status	Service provided to			GPS Reading				
				Built up HH	Present year HH	Cluster Name	X	Y	Z	Acc	S.N.
1											
2											
3											
4											
5											
6											
7											
			Total HH			No of HH = Present functional coverage					
* Structural status			* Hydraulic status			Overall status (good, moderate, poor, very poor & failure)					

7 INVENTORY - 3R EXISTING MEASURES | Form-TA/07

In addition to the water supply, irrigation and micro-hydro inventories, an overview of existing 3R related interventions needs to be made. After undertaking the initial 3R exploration as explained in step 8 of WUMP + 3R, further details can be filled in, in the tables below. Please re-visit the social formats Annex to fill in the benefits, gender aspects and business opportunities for each existing 3R measure.

1. Description
Technology name:
Type of system:
Code:
Supported by:
Operation started (year):

Beneficiary and Service Area

VDC	Ward No.	Cluster names	Beneficiary HHs (Built up/Design)				Beneficiary HHs Functional (present year)				Remarks
			Total	Dalit	Janjati	Other	Total	Dalit	Janjati	Other	

No	3R technology type	Reason for construction	Overall status	Maintenance aspects	Year of construction	Improvement needed	Remarks

In the table below are some examples of 3R measures:

3R measure	Aim	Where
Soil bunds	To increase moisture retention	On gently sloping cultivated fields
Sand dam and/or subsurface dam	To improve water storage in dry riverbed	On ABC stream close to village xy, where women traditionally fetch water
Gully plugs	To avoid excessive drainage and increase recharge	On all gullies, starting from uphill and then moving down
Cutoff drain and waterways	To protect farmland from erosion and deviate runoff to reservoir and recharge pond	Above all farming land at the foothills
Hillside pond	To provide water for community multiple use	At foothill where clay soil is found, near to the water stressed area
Recharge pond	To recharge the groundwater table close to hand dug wells	In old quarry at the foothill. Where possible to receive runoff from slopes and drains
Roof water harvesting	To provide drinking water	On laminated roofs of schools and health clinic
Agroforestry	To reduce ET and increase wood and fodder production. To increase soil fertility and soil moisture storage capacity.	On cropland. Can be applied as windbreaks on farm boundaries or scattered in the fields
Mulching and composting	To increase fertility, reduce ET and augment soil moisture retention	To be applied on cropland. Mulch from crop residues. Composting from kitchen and crop residues. Composting pits close to households and source of water.

8 INVENTORY - 3R EXISTING MEASURES — Form-TA/08

(New/Repair/Maintenance)

WS Scheme Proposal ID[14]:..... No. of Sub-schemes:.....

VDC:..... Sub-committee/WN:..... Scheme Name:.....

1. General information		
No. of HH:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....
Present population		.....
Schemed population		.....

2.1. Source Description (form TA/02)			
	Source 1	Source 2	Source 3
Source code			
Source name			
Source Discharge (Q) (lps)			
Elevation of source (m)			
Elevation of RVT (m)			
Elevation of difference (m)			

2.2. Design Data

Schemed Demand for DWS (lpd):

Required flow to be tapped (lps):

(X) Proposed flow to be tapped (lps):

Possibility for Multi use (MUS) if discharge (Q) is greater than proposed flow (X) for DWS:

Required minimum flow
((HHs X 125)/86400) .....lps (Y)

Sum discharge required for MUS = (X) + (Y) = ...lps

Check sum discharge = or > Measured discharge
No Yes

If Yes, fill the table 4.4 for Multi use

14 *Water Supply Scheme proposal code: District ID – VDC ID – Proposed wss scheme ID (PW01)*

District	VDC	Cluster code	Cluster	Beneficiary HHs	Population	Sub-schemes*

* If more than one sub-schemes, indicate scheme no.

8 PROPOSAL FOR WATER SUPPLY SCHEME (GRAVITY) Form-TA/08

(New/Repair/Maintenance)

WS Scheme Proposal ID:..... No. of Sub-schemes:.....

VDC:..... Sub-committee/WN:..... Scheme Name:.....

4. Details of sub-schemes (note in separate page if more than 2 sub-schemes)

Name of sub-scheme 1:.....

4.1. General information

Present population:.....

Design population.....

No. of HH:
Total:.....
Dalit:.....
Janjati:.....
Others:.....

Name of sub-scheme 2:.....

4.2. General information

Present population:.....

Design population.....

No. of HH:
Total:.....
Dalit:.....
Janjati:.....
Others:.....

4.3. Technical components and cost:

Stru ID	Proposed structures	Total Quantity	Quantity sub-scheme 1	Quantity sub-scheme 2	Unit	Estimated cost/unit	Total cost (NRs)
	Intake						
	Collection chamber						
	Reservoir						
	Distribution chamber						
	BPT/IC						
	Tapstand						
	Transmission pipe line						
	GI						
	HDPE						
	Distribution pipe line						
	GI						
	HDPE						
	Others: SC/ protection etc.						

4.4. Technical components an costs for mus scheme (irrigation part)

Stru ID[16]	Proposed structures	Total Quantity	Quantity sub-scheme 1	Quantity sub-scheme 2	Unit	Estimated cost/unit	Total cost (NRs)
	Intake						
	Collection chamber						
	Reservoir						
	Distribution chamber						
	BPT/IC						
	Tapstand						
	Transmission pipe line						
	GI						
	HDPE						
	Distribution pipe line						
	GI						
	HDPE						
	Others: SC/ protection etc.						

8 PROPOSAL FOR WATER SUPPLY SCHEME (GRAVITY) Form-TA/08

(New/Repair/Maintenance)

WS Scheme Proposal ID:..... No. of Sub-schemes:.....

VDC:..... Sub-committee..... WN:..... Scheme Name:.....

Details of each sub-scheme

Name of sub-scheme:.....
WS sub-scheme Proposal ID:.....

5. Layout plan of the Scheme
(Please indicate the location of source & proposed structures with elevation, settlement of HHs with respect to tapstand, pipe length.)
If available: Layout shall be prepared on the topomap background with contours and tentative location of taps/outlets.

6. Remarks:

9 PROPOSAL FOR ALTERNATIVE WATER SUPPLY SCHEME — Form-TA/09

WS Scheme Proposal ID[15]:.....

VDC:..... Sub-committee..... WN:..... Scheme Name:.....

Type of water supply (rainwater/fogwater/lift):.....

New/repair/maintenance:.....

1. General information		
Present population		.....
Design population		.....
No. of HH:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....

2 Source Description (form TA/02) in case of lift, fill source detail	
Source code	
Source name	
Sources discharge (lps)	
Elevation of source (m)	
Safe yield (lps)	
Elevation of source (m)	
Elevation of RVT (m)	
Elevation of difference (m)	
Other technical description if any	

3. Proposed Area

Cluster code	Cluster	Beneficiary HHs	Population

Cluster code	Cluster	Beneficiary HHs	Population

15 *Water Supply Scheme proposal code: District ID – VDC ID – Proposed water supply scheme ID (PW01)*

4. Technical components and cost

S.N.	Proposed structures	Total Quantity	Unit	Estimated cost/unit	Total cost (NRs)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
	Grand Total				

9 PROPOSAL FOR ALTERNATIVE WATER SUPPLY SCHEME — Form-TA/09

WS Scheme Proposal ID:.....
VDC:..... Sub-committee..... WN:..... Scheme Name:.....

5. Layout plan of the Scheme
(Please indicate the source & proposed structures, settlement of HHs etc)

6. Remarks:

10 PROPOSAL FOR IRRIGATION SCHEME — Form-TA/10

(New/Repair/Maintenance)

Irrigation Scheme Proposal ID[16]:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

1. General information		
Type of system:		.....
No. of HH:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....
Length of main canal/ pipe (m)		.....
Available head (m)		.....
Major crops grown:		.....
Informant's name and age:		.....

2. Source Description (form TA/02)		
	Source 1	Source 2
Sources code		
Sources name		
Sources Discharge (lps)		
Safe yield (lps)		
Elevation of source (m)		
Elevation of 1st outlet of command area (m)		

2.1. Design Data

Required demand for Irrigation (lps):.....

Available discharge for this scheme (lps):.....

(*source discharge - shared discharge by other schemes)*

If any, specify:

2.2. Possibility for Multi use (MUS)

Possible extra use: NO YES

If yes, indicate type & fill the table 4 for MUSA

1. Irrigation + Ghatta alternate/inline
2. Irrigation + Fish pond alternate/inline
3. Irrigation + MH alternate/inline
4. Irrigation + other (specify)

16 *Irrigation Scheme proposal code: District ID - VDC ID - subcommittee ID - proposed irrigation scheme ID (PI01)*

3. Service area

VDC	Ward No.	Command area (Ropani)		Beneficiary HHs
		Summer	Winter	

VDC	Ward No.	Command area (Ropani)		Beneficiary HHs
		Summer	Winter	

4. Technical components and costs

S.N.	Proposed structures	Total Quantity	Unit	Estimated cost/unit	Total cost (NRs)
1	Intake/Headwork				
2	Settling basin				
3	Main canal • Lined • Earthen • Piped				
4	Distr. Canal • Lined • Earthen • Piped				
6	Cross-drainage work				
7	Spill way				
8	Other structures • Outlet • Drops • Retaining Wall				

a. Technical components and cost for MUS part

Stru ID	Proposed structures	Total Quantity	Unit	Estimated cost/unit	Total cost (NRs)

5. Layout plan of the Scheme

(Please indicate the location of proposed sources, command area, canal alignment, location of pond with measurement etc. If available approximate layout should be prepared on the top of map background with contours and tentative location of taps/outlets.

6. Remarks:

11 PROPOSAL FOR IRRIGATION SCHEME (NON-CONVENTIONAL) Form-TA/11

(Non-Conventional: Modified irrigation technology)

Irrigation Scheme Proposal ID[17]:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

1. Scheme features		
Type of system:		.....
No. of HH benefited:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....
Length of main canal/ pipe (m)		.....
Available head (m)		.....
Major crops grown:		.....

2. Source Description (form TA/02)		
	Source 1	Source 2
Sources code:		
Sources name:		
Sources discharge (lps):		
Safe yield (lps):		
Elevation of source (m):		
Elevation of 1st pond/outlet (m):		
Elevation difference (m)		

2.1. Design Data

Required demand for Irrigation (lps):....

Available discharge for this scheme (lps):.....

(*source discharge - shared discharge by other schemes)*

If any, specify:

2.2. Possibility for Multi use (MUS)

Possible extra use: NO/YES

If yes, indicate type & fill the table for MUSA

1. Irrigation + DWS
2. Irrigation + Fish pond
3. Irrigation + Picco Hydro
4. Irrigation + other (specify)

17 *Irrigation Scheme proposal code: District ID - VDC ID - subcommittee ID - proposed irrigation scheme ID (PI01)*

3. Service area

VDC/ Ward	Cluster ID	Command area (Ropani)		Benefi-ciary HHs
		Summer	Winter	

VDC/ Ward	Cluster ID	Command area (Ropani)		Benefi-ciary HHs
		Summer	Winter	

4. Technical components and costs

S.N.	Work proposed	Quantity	Unit	Remarks
1				
2				
3				

11 PROPOSAL FOR IRRIGATION SCHEME (NON-CONVENTIONAL) Form-TA/11

Irrigation Scheme Proposal ID:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

5. Technical components and cost for MUS part:

Stru	Proposed structure/PL	Quantity Total	Quantity Sub scheme 1	Quantity Sub scheme 2	Unit	Approximate cost per unit	Total cost (NRs)

5. Layout plan of the Scheme

Please indicate the location and elevation of proposed sources command area, canal alignment, location of pond with measurement etc. If available approximate layout should be prepared on the topo map background with contours and tentative location of taps/outlets.

6. Remarks:

12 PROPOSAL FOR ENVIRONMENT & RELATED SCHEMES — Form-TA/12

(Environment conservation, source conservation, river training, land protection, plantation, any other relevant interventions towards climate change including 3R)

Miscellaneous Scheme Proposal ID[18]:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

1. Scheme features		
Type of system:		.....
No. of HH:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....
Level of feasibility		.....

2. Basic description (form TA/02)	
(form TA/02) in case of lift, fill source details	
Sources code:	
Sources name:	
Sources discharge (if applicable) (lps):	
Safe yield (lps):	
Elevation of source (m):	
Elevation of specific str or point (m):	
Earth movement necessary (m^3):	
Other technical description if any:	

3. Service area

District	VDC	Cluster code	Cluster	Beneficiary HHs	Population

18 *Miscellaneous other Scheme proposal code: District ID - VDC ID - subcommittee ID - proposed other scheme ID (PO01)*

4. Technical components and costs

S.N.	Work proposed	Quantity (no, length, area etc.)	Unit	Remarks
1				
2				
3				
4				
5				
6				

12 PROPOSAL FOR ENVIRONMENT & RELATED SCHEMES — Form-TA/12

(Environment conservation, source conservation, river training, land protection, plantation, any other relevant interventions towards climate change including 3R)

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

5. Layout Plan of the Scheme

(Please indicate the location and elevation of proposed structures, elevation of command area with main canal/pipe length, etc.)

6. Remarks

13 PROPOSAL WATER ENERGY SCHEME — Form-TA/13

Hydropower Scheme Proposal ID[19]:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

1. Scheme description		
HH benefited:	Total	.....
	Dalit	.....
	Janjati	.....
	Other	.....
Demands for lightning & other applications (watts)		.....
Pumping for water supply/ irrigation (kWh/year)		.....
Total Capacity of hydropower plant required (kW)		.....

2. Source description (form TA/02)		
	Source 1	Source 2
Sources code:		
Sources name:		
Measured discharge (lps):		
Design yield (lps):		
Elevation of at source point (m):		
Elevation of Forebay (m):		
Elevation at proposed powerhouse (m):		
if any:		

2.1. Design data

Required flow to be tapped for irrigation (lps):.....

(X) Proposed flow for irrigation (lps).....

2.2. Possibility for Multi use (MUSA)

YES NO

If yes, type
1. MH + Irrigation: fill the table 4
2. MH + fishpond
3. MH + other

If yes fill the table 4, for MUSA

19 *Hydropower Scheme proposal code: District ID - VDC ID - subcommittee ID - proposed hydropower scheme ID (PH01)*

3. Coverage by electric facilities

VDC	Ward	Cluster	Beneficiary HHs	Command Area (Ropani) only for irrigation*	
				Winter	Summer

* If MUS Scheme

Ownership (private/community/other agencies):	
Design power output (kW):	Gross Head (m):
Available flow in the river during dry season (lps):	Design flow (lps):
Turbine type:	
Length of headrace (m):	Length of transmission main (m):
Length of distribution line (m):	Level of feasibility:

4. Technical components and cost for MUS part: irrigation

Stru	Proposed structure	Quantity Total	Unit	Approximate cost per unit	Total cost (NRs)

5. Layout Plan of the Scheme: irrigation
(Please indicate the location and elevation of proposed structures, length of headrace canal, length of penstock pipe, etc.)

13 PROPOSAL WATER ENERGY SCHEME — Form-TA/13

(New/Repair/Maintenance)

Hydropower Scheme Proposal ID:.....

VDC:..... Sub-committee:..... WN:..... Scheme Name:.....

b. Headrace canal (pipe) including crossing and drop structures, if any:

c. Forebay tank including rack:

d. Penstock (-----dia. HDPE pipe) including support and anchor blocks:

e. Power House and electro-mechanical equipment in powerhouse:

f. Tailrace canal:

g. Transmission line including poles and cables:

h. Protection and safety systems:

i. Miscellaneous:

13 PROPOSAL WATER ENERGY SCHEME — Form-TA/13

(New/Repair/Maintenance)

Hydropower Scheme Proposal ID:..... Scheme Name:.....

5. Layout Plan of the Scheme

(Please indicate the location and elevation of proposed structures, length of headrace canal, length of penstock pipe, etc.)

6. Remarks:

14 PROPOSAL FOR 3R SCHEMES — Form-TA/14

(General conservation, source conservation, terracing, soil bunds, mulching, gully plugging, land protection, plantation, etc.)

3R Scheme Proposal ID:..... Scheme name:.....

VDC:..... Sub-committee:..... WN:.....

1. General information

Scheme features		
Scheme name:		
No of HH:	Total:	
	Dalit:	
	Janjati:	
	Other:	
Level of feasibility:		

Type of 3R measure(s):

Linked with water scheme/source:

Stand alone:

If linked with water source:

Name of the water source:..... Source ID:..... (from TA/02)

If proposed for any water scheme:

Name of water scheme:

2. Service area

District	VDC	Cluster code	Cluster	Beneficiary HHs	Population

3. Technical components and costs

S.N.	3R component	Quantity (no. length, area, etc.)	Unit	Unit rate	Estimated cost	Remarks
1						
2						
3						
4						

14 PROPOSAL FOR 3R SCHEMES — Form-TA/14

(General conservation, source conservation, terracing, soil bunds, mulching, gully plugging, land protection, plantation, etc.)

VDC:..... Sub-committee:..... WN:.....

Scheme name:.....

4. Layout Plan of the Scheme

(Please indicate the location and elevation of the proposed structures, the estimated size and elevation of the impacted area, any other important aspects, etc.)

6. Remarks

Please revisit the social formats in Annex 5 and facilitate the community to formulate for each 3R measures: benefits, gender aspects, business opportunities, etc.

15 OTHER INFORMATION REQUIRED ON WATER USE — Form-TA/15

This information is compiled based upon household information or cluster wise information

District ID:..... VDC ID:..... Sub Committee ID:.....

1. Existing water supply condition

S.N.	Cluster name		HHs	Existing water facility (HH)						Remarks
	Name	Code		Managed Piped water	Unmanaged Piped water	Kuwa/Nauto	Pandhero/ dungedhara	Stream/kulo	Rain water	

15 OTHER INFORMATION REQUIRED ON WATER USE — Form-TA/15

District ID:..... VDC ID:.....

This information is based on analysis of data from water sanitation profile (TA/01)

2. Existing water supply condition

Sub-committee wise (WARD)	Total HH	Existing water supply service level (SL) (no. of household				Remarks
		SL 1	SL 2	SL 3	SL 4	
Total						
%						

ANNEX 11

SOME KEY PARAMETERS FOR IDENTIFYING 3R OPPORTUNITIES

11.1 TERRAIN SLOPE

Terrain slope (or slope gradient) is defined as the rate of change of elevation or in other words, the steepness of a slope. It is generally represented in percentage or in degree. The terrain slope can be extracted from a map, a digital elevation model of can be measured in the field with a line level. The slope value of represents the maximum rate of change in elevation.

Slope is a key aspect because it determines the stability of the soil, but it is also one of the determining factors of runoff generation. Accordingly, when working on slopes it is important to look at this aspect. The degree of recharge of groundwater table is dependent on the slope of the terrain (Amharref et al., 2001). Effective recharge of the groundwater table is very weak or zero where the slope of the terrain is very steep. Conversely recharge of the groundwater table is very strong where the slope of the terrain is flat. Surface runoff responds with increasing terrain slope. In steep terrain surface runoff is high, while it is significantly lower in flat terrain resulting in the accumulation of runoff water on the land surface. Although terrain slope is one of the dominating parameters that determine recharge or retention of runoff, its critical threshold is very hard to determine as it interferes with other factors such as land cover, soil properties and catchment characteristics. Critical threshold values adopted by Amharref et al. (2001) are followed with its classification scheme of slope for the terrain. This classification of terrain slope is presented in Table 1.

Table 1: Terrain slope classification (adapted from: Amharref et al., 2001)

Slope	Recharge	Runoff diversion and retention potential (downstream)
> 20 per cent	Very weak	Very strong
6 - 20 per cent	Weak	Strong
3 - 6 per cent	Strong	Weak
< 3 per cent	Very strong	Very weak

All 3R measures have been tested in various situations and based on these experiences a range of suitable slope gradient is usually given for the technologies. As mentioned above, one way to determine the terrain slope is to use a digital elevation model. However, often this kind of tool is not available and one has to rely on field work. The slope can be easily measured by using a line level that is already available in many VDCs or wards, or it can be purchased in most of the construction material shops around Nepal. To measure the slope with a line level, a few steps need to be followed. These steps are explained in the section below.

Measuring the slope with a line level

Material required:

- A thin 10 meter long rope;
- 2 wooden poles (2 m long) with demarcations every 10 cm;
- A line level (also called spirit level);

Procedure:

1. Put the line in tension between the wooden poles (see figure below). Since the area is sloping the bubble of the line level will result not centered.
2. Let the person in the higher position slide the line from the top mark of its pole downward until the bubble will be centered.
3. Measure the difference in height between the marks where the line is attached to the poles. By dividing the difference between pole marks by 1000 (10 m = 1000 cm) you can identify the slope (in per cent). If the difference is 10 cm the area has a slope of 1 per cent. For easy reading consult the table provided below.

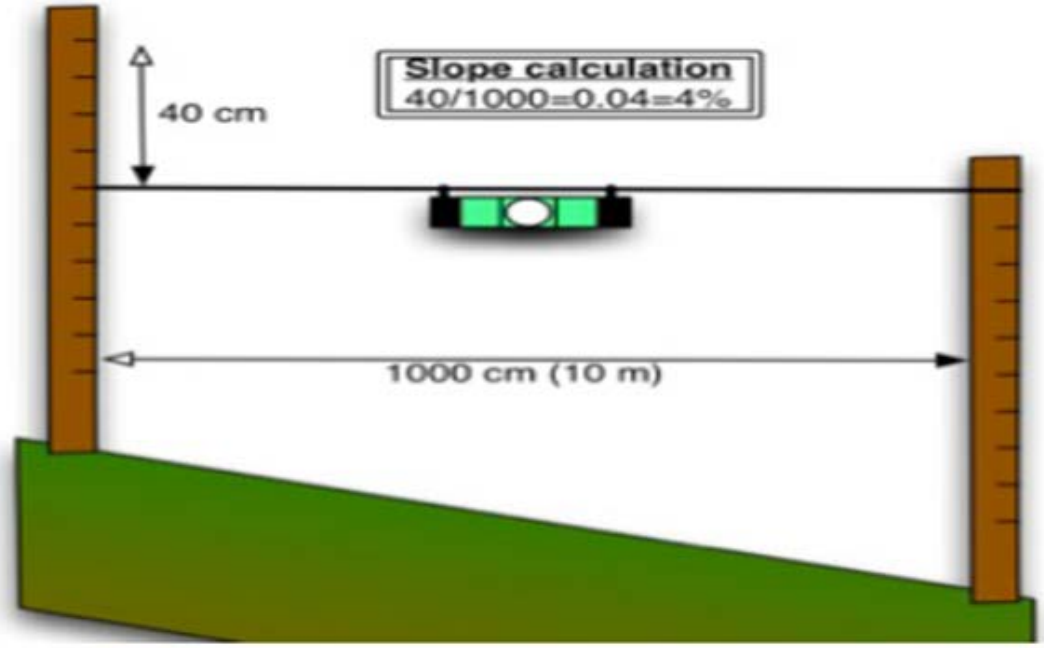

Figure 1: Slope measurement with a line level

Table 2: Conversion table for slope measurement with a line level

Difference between pole marks (cm)	Slope (per cent)
5	0.5
10	1
15	1.5
20	2
30	3
40	4
50	5
100	10
150	15
200	20

11.2 TERRAIN ASPECT

Terrain aspect refers to the horizontal direction to which a slope faces. Terrain aspect can also be extracted from a map or a digital elevation model. The value of aspect represents the compass direction that the surface faces at that location. It is measured clockwise in degrees from 0 (due North) to 360 (again due North), coming full circle. Flat areas having no downslope direction are given a value of -1.

Aspect has a strong influence on water body, temperature and on its local climate. This is because aspect affects the angle of the sun rays when they come in contact with the ground and therefore affects the concentration of the sun's rays hitting the earth.

In the context of Nepal, a Northern hemisphere country, a south-facing slope is more open to sunlight and warm winds and is therefore generally warmer and dryer due to higher levels of evapotranspiration than a North-facing slope. As a result South facing slopes have much more extensive farming as well as densely forested areas than cold, dry and much more heavily glaciated North facing slopes.

Terrain aspect also has a vital role as a parameter for the 3R technology. The water sources on a Northern slope often have more of a perennial nature than the Southern slopes. Besides, the selection of a 3R technology such as gully plugging and surface ponding will be more reliable on Northern slopes as there will be less water loss due to evaporation than on Southern slopes.

11.3 SOIL MOISTURE PRESENCE

Soil moisture – the green water – is vital for crop and animal production. In rainfed agricultural systems it is the only source of water available to plants. 3R – given a reasonable minimum amount of rainfall – can help in improving soil moisture content and retention. A soil moisture scan should be undertaken together with the community. The first areas that show signs of water stress and which areas are greener for longer during the dry season must be identified and mapped. Furthermore the local slopes can be used to convey extra water to crops, trees and pastureland in a practice that is often referred as in-field rainwater harvesting (or runoff agriculture). When the most moisture stressed areas are known is possible to think of possible solutions to increase green water storage and therefore augment crops and livestock production.

11.4 AREAS WITH CONCENTRATED RUNOFF

Runoff tends to concentrate in depressions or when it finds softer soils. When this happens the flowing runoff starts carving its way downstream through the soil by forming gullies. This way a preferential way for runoff flow is created. Gullies in comparison to seasonal streams have unstable and often steep banks. They have an erratic behavior and their flow transport a great

amount of sediments. Additionally the head (i.e. it's starting point) of the gully is usually abrupt and moves upstream as the runoff tend to carve the soil around it (Morgan, 2005). Runoff water eventually reaches more stable seasonal and perennial streams where is collected and brought downstream. Runoff can also concentrate inside in-field drains and road drains. Gullies pose a threat to many rural communities and its treatment is one of the corner stones of watershed management. Concentrated runoff can be stopped using barriers within the gully that favor recharge of the surrounding banks or make up for a small seasonal water reservoir. Alternatively, the water can be diverted from gullies to reservoirs, recharge areas or for direct productive use (cropland, grazing land).

As depicted in the figure below, concentrated runoff can be productively used to create a stronger water buffer.

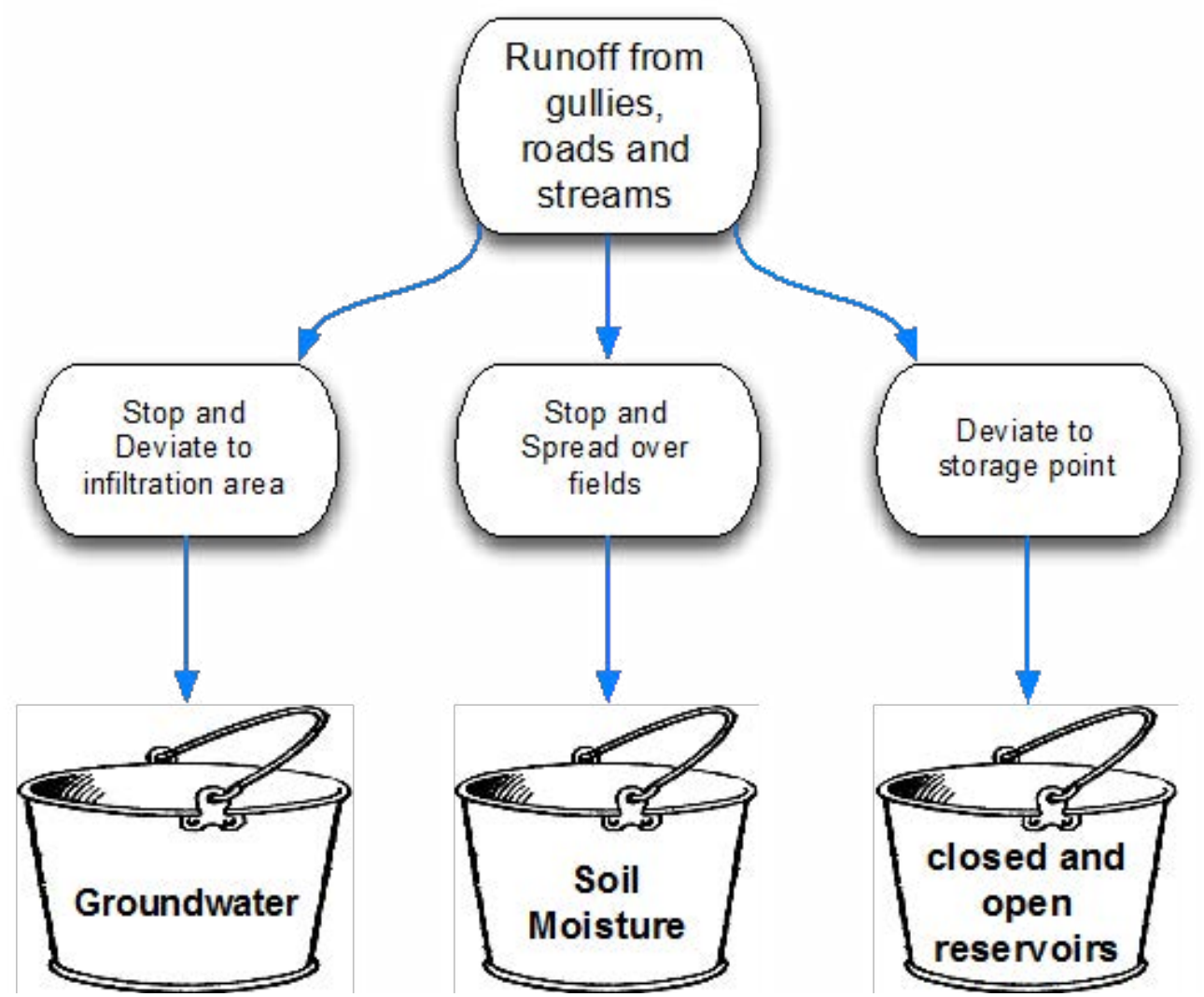

Figure 2: Different ways to properly manage concentrated runoff in order to enrich the water buffer

ANNEX 12

PLANNING FORMATS FOR WUMP + 3R PREPARATION

District:	
VDC:	
Ward/Sub-Committee No:	

S.N.	Format title	Format code	Remarks
1	Ward Level Planning	PL/01	
2	VDC Level Planning: Water, Sanitation and Hygiene Planning	PL/02	3 pages
3	VDC Level Planning: Irrigation and Drainage	PL/03	
4	VDC Level Planning: Environment and Ecology	PL/04	3 pages
5	VDC Level Planning: Water Energy	PL/05	
6	VDC Level Planning: WUMP Monitoring Plan	PL/06	
7	VDC Level Planning: List of Possible Supporting Organization	PL/07	
8	VDC Level Planning: Commitment Letter	PL/08	
9	VDC Level Planning: Name List of V-WASH-CC	PL/09	

1	WARD LEVEL PLANNING FORMAT	PL/01

SUB SECTOR*

Priority no.								
Scheme code								
Scheme name								
Ward no.								
Scheme type (new, repair, rehab)								
Water source name	Name							
	Safe yield (lps)							
Benefited clusters								
Benefited HH	Total							
	Dalit							
	Janjati							
	Other							
Total Population								
Command Area (HA)								
Estimated cost								
Integration of MUS/3R								
Remarks								

** Sub sector: Water Supply Sanitation and Hygiene or Irrigation and Drainage, Water Energy, Environment and Ecology*

2	VDC LEVEL PLANNING FORMAT: WATER SANITATION AND HYGIENE PLANNING	PL/02

VDC Level 5 Year and Long Term Plan

2.1 Water Supply (Gravity, Pumping, Rainwater, Source Improvement/Protection etc.)

Priority no.								
Scheme code								
Scheme name								
Ward no.								
Scheme type (new, repair, rehab)								
Water source name	Name							
	Safe yield (lps)							
Benefited clusters								
Benefited HH	Total							
	Dalit							
	Janjati							
	Other							
Total Population								
Command Area, if MUS, Irrigation (Ha)								
Estimated cost								
Integration of MUS/3R								
Implementation year								
Remarks								

Signature of participants:

2	VDC LEVEL PLANNING FORMAT: WATER SANITATION AND HYGIENE PLANNING	PL/02

VDC Level 5 Year and Long Term Plan

2.2 HH Toilet construction/ODF/Post ODF Planning

Priority no.								
Scheme code								
Scheme name								
Ward no.								
Scheme type (toilet construction, ODF, Post ODF)								
Benefited clusters								
Benefited HH: Total								
Benefited HH: Dalit								
Benefited HH: Janjati								
Benefited HH: Other								
Total Population								
Estimated cost								
Integration of MUS/3R								
Implementation year								
Potential Collaborator								

Signature of participants:

2	VDC LEVEL PLANNING FORMAT: WATER SANITATION AND HYGIENE PLANNING	PL/02

VDC Level 5 Year and Long Term Plan

2.3 School, Public and Institutional Toilet Construction

S.N.	Name of School/ Institution/Public places	Ward no.	No. of Students, Teachers and Visitors				Type of Toilet*	No. of Cabin	Hand Washing Basin	Implementation year	Estimated costs	Remarks
			Boys	Girls	Teachers	Visitors						

** With urinals, without urinals, etc.*

Signature of participants:

3	VDC LEVEL PLANNING FORMAT: IRRIGATION AND DRAINAGE	PL/03

VDC Level 5 Year and Long Term Plan

3.1 Irrigation and Drainage (Conventional and Non-conventional Irrigation Scheme

Priority no.								
Scheme code								
Scheme name								
Ward no.								
Scheme type (new, repair, rehab)								
Water Source name	Name							
	Safe yield (lps)							
Benefited clusters								
Benefited HH	Total							
	Dalit							
	Janjati							
	Other							
Total Population								
Command Area, if MUS, irrigation (Ha)								
Estimated cost								
Integration of MUS/3R								
Implementation year								
Potential Collaborator								

Signature of participants:

4	VDC LEVEL PLANNING FORMAT: ENVIRONMENT AND ECOLOGY	PL/04

VDC Level 5 Year and Long Term Plan

4.1 Source Improvement, water harvesting pond (fish pond, cattle feeding pond, recharge pond and religious pond etc.)

Priority no.									
Scheme code									
Scheme name									
Ward no.									
Scheme type (new, repair, rehab)									
Water Source name	Name								
	Safe yield (lps)								
Benefited clusters									
Benefited HH	Total								
	Dalit								
	Janjati								
	Other								
Total Population									
Command Area, if MUS, irrigation (Ha)									
Estimated cost									
Integration of MUS/3R									
Implementation year									
Potential Collaborator									

Signature of participants:

VDC Level 5 Year and Long Term Plan

4.2 Watershed Improvement/Source conservation: afforestation, forest management, gully treatment, recharge pit, river training, flood and landslide control etc.

Priority no.	Scheme code	Scheme name	Ward no.	Type of activities*	Benefited clusters	Benefited HH: Total	Benefited HH: Dalit	Benefited HH: Janjati	Benefited HH: Other	Total Population	Command Area, if MUS, irrigation (Ha)	Estimated cost	Integration of MUS/3R	Implementation year	Potential Collaborator

** Afforestation, forest management, gully treatment, recharge pit, river training, flood and landslide control etc.*

Signature of participants:

4	VDC LEVEL PLANNING FORMAT: ENVIRONMENT AND ECOLOGY	PL/04

VDC Level 5 Year and Long Term Plan

4.3 Climate Change Adaptation Planning

Priority No.	Main disaster risk due to climate change	Disaster and its effect	Livelihood measures of people in risk	Priority No.	Adaptation Intervention	Ward No.	Benefited clusters	Benefited HHs	Implementation Year	Collaborator	Remarks
	Drought										
	Changes in temperature										
	Changes in precipitation pattern and amount										

Signature of participants:

5 VDC LEVEL PLANNING FORMAT: WATER ENERGY	PL/05

VDC Level 5 Year and Long Term Plan

5.1 Water Energy: Mico hydro, Improved Water Mill etc

Priority no.									
Scheme code									
Scheme name									
Ward no.									
Scheme type (new, repair, rehab)									
Water Source name	Name								
	Safe yield (lps)								
Benefited clusters									
Benefited HH	Total								
	Dalit								
	Janjati								
	Other								
Total Population									
Command Area, if MUS, irrigation (Ha)									
Estimated cost									
Integration of MUS/3R									
Implementation year									
Potential Collaborator									

Signature of participants:

6 WUMP MONITORING PLAN | PL/06

S.N.	Main activities	Quantity	When	Responsible organization	
				Main	Support

7 LIST OF POSSIBLE SUPPORTING ORGANIZATIONS PL/07

S.N.	Name of organization	Working area	Address	Contact number

8 COMMITMENT LETTER PL/08

We the people of ……..Village development committee (VDC) of……. district, in presence of the VDC council/V-WASH-CC members, local representatives of different political parties have been involved in the water planning process and conducted the planning of water use master plan on the date (day/month/year) to (day/month/year). We have thoroughly discussed among our peers and agreed on the different priorities of water use we have indicated in this plan. We commit we will look into the Village development committee yearly budget and discuss the plan in the yearly VDC council meeting, and search fund from other government and non-government institutions to realize the priorities of this water use master plan.

9 NAME LIST OF V-WASH-CC

PL/09

S.N.	Name	Post	Ward No.	Contact number

ANNEX 13

STANDARD TABLE OF CONTENTS OF THE WUMP + 3R REPORT

TABLE OF CONTENTS

ANNEX 14

DETAILED SCHEDULE FOR VDC PLANNING WORKSHOP

S.N.	Activity
Day 1	
1	Welcome to participants
2	Introduction of participants
3	Workshop Objectives
4	Review of WUMP + 3R preparation process and steps
5	Planning development strategy (IWRM, 3R, MUS, relevant priorities of the country according five year plan and sectoral targets)
6	Discussion on prioritization criteria
Day 2	
1	Review of previous day
2	Presentation of Social Assessment findings
3	Presentation of Technical Assessment findings
4	Discussion on Planned projects at ward level
5	Identification of potential collaborators
Day 3	
1	Review on day 2
2	Five Year Plan: water, sanitation and hygiene
3	Five Year Plan: Irrigation and drainage
4	Five year plan: Energy
5	Five year plan: Environment and Ecology including stand alone 3R
6	Follow Up Action Plan
7	Closing

ANNEX 15

AVAILABLE LAWS, PLANS AND STRATEGIES

Available laws, plans and strategies (documents on training reference CD or USB):

- **Water Resources Act, 1992 and Water Resources Rules, 1993**
  - Sets priority of water use in allocation: first priority drinking water, second priority irrigation, third priority livestock and fishery, fourth priority hydropower
  - However, does not provide an integrated and comprehensive water resources policy
- **Local Self Governance Act, 1999**
  - Delegates authorities to local government institutions for formulating plans, implementation, and monitoring
  - Provision for periodic planning in local governments
  - Foresee the participation of citizens in the planning process at ward and VDC level
- **Water Resource Strategy, 2002**
  - The strategy emphasizes the role of local communities and stakeholders at basin level to manage watersheds effectively with participatory mechanism.
  - However, there are no mechanisms by which local institutions are established at basin level.
- **National Water Plan, 2005 based on Water Resource Strategy, 2002**
  - Efficient delivery of water services through decentralized management (local government unit or locally constituted institutions) to avoid unnecessary overlaps
  - Empowerment and capacity building of local institutions are the keys to decentralization.
  - Emphasizes improvements in governance due to lack of transparency and accountability
  - Makes it mandatory to involve popular participation in all its decision-making processes
  - Highlights security aspects from water induced disasters
  - Highlights use aspects (drinking, irrigation, hydropower, industries, and tourism)
  - Mechanisms: to develop a water related information system, regional cooperation frameworks, legal frameworks, and institutional mechanisms
- **Under Institutional Mechanism National Water Plan, 2005 Highlights**
  - Absence of an institutional framework for coordinated and integrated development
  - Jurisdictional overlaps and challenges of maintaining coordination between public and local bodies
  - Recommends creating new organizations, re-defining the functions of some of the existing organizations
- **Irrigation Policy, 2003**
  - Provides mechanisms for maintaining coordination between agriculture and irrigation at various levels
- **National Water Supply Sector Policy, 1998**
  - Visualizes a shift from the traditional role of a service provider; overall management of drinking water supply will eventually be handed over to users' committees or private sector, or both.
- **The Hydropower Policy, 2001**
  - Encourages private sector involvement following the economic liberalization policy of the government

- Foresee river basins of specific rivers as the basis of development and management of water resources
- However, under institutional provisions it fails to identify which local institutions are established at basin level under the regulatory body, the Electricity Tariff Fixation Commission, which is envisioned to promote public and the private sector producers

- **National Sanitation and Hygiene Master Plan, 2011**
  - Promotes declaration of open defecation free areas at district and village development committee level
  - Encourages total sanitation and hygiene promotion to meet the national goal and the Millennium Development Goals
- **National Adaptation Programme of Action (NAPA) to climate change, 2011**
  - Highlights, security aspects from water induced disasters, environment and ecology

ANNEX 16

ANSWERS SELF-EVALUATING QUESTIONS, MODULE 1, CHAPTER 3

Answers to self-evaluation questions

Q1: Answer B
Evaporation and transpiration make up evapotranspiration (green water flow). They are the processes by which the environment returns water to the atmosphere.

Q2: Answer B and C
When thinking of water, we automatically think of blue water—water that flows in rivers, that is found in wells, or that is captured in livestock pans and can be easily collected in a jerry can. Blue water can be easily extracted and it flows in the groundwater table in streams and as overland flow. This water moves from one point to another as a visible flow. Ocean, river, and lake water are all examples of blue water.

Q3: Answer B
Green water is the water stored in the soil profile. It cannot be fetched with a bucket, jerry can, or pump. The only pump able to use this water is the plants' root system and direct radiation from the sun that makes it evaporate.

Q4: Answer A
A watershed — also called a catchment – consists of all areas in which runoff is collected and drained to a same, common point. A watershed is defined by the watershed divide: an imaginary line that defines the direction in which the rainfall will flow. On one side it will flow to a watershed; on the other side it will flow to another, adjacent watershed.

Q5: Answer A and B
Big reservoirs are not part of the 3R approach for various reasons. The main constrains are their costs, the need for complex management bodies, and the problems of reaching rural communities dispersed all over the landscape. Piped systems can be part of a 3R system helping to access the water present in the water buffer, but are not the base of it. Many options and alternatives exist to abstract and deliver water retained in the buffer to the end users.

Q6: Answer B
Ponds are a sub-category of open reservoir storage. Big open reservoirs are not part of the 3R measures for the reasons explained in question 5.

Q7: Answer B
Recharge, retain, and reuse.

Q8: Answer B
Climate change is a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature.

Q9: Answer A