CRS
CATHOLIC RELIEF SERVICES

Watershed Restoration Guide

"We are faced not with two separate crises, one environmental and the other social, but rather one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature."

- Pope Francis. Laudato Si' No. 139

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Cover Photo: Women and men in a rural community of Lesotho built rock bunds on contours to protect and restore land in their watershed by capturing rainfall and improving vegetative production. This work was carried out over several years, supported in part by a CRS-led Food-for-Work project.

Cover photo by Geoff Heinrich.

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Members of the watershed management committee (WMC) work to clear debris from a water canal in Lingoni, Machinga district, Malawi.
[Photo by Dooshima Shee / CRS]

Introduction and Purpose of Guidebook

The Watershed Restoration Guidebook is part of a series of guides related to CRS Strategic Change Platform 3, Transforming Livelihoods and Landscapes. The series provides guidance to CRS staff and partners in the design and implementation of land restoration projects.

The Watershed Restoration Guidebook is written for the following readers:

- Program Managers who design, lead, and support projects related to watershed restoration
- CRS and partner field staff implementing watershed restoration activities
- MEAL staff responsible for monitoring and learning processes in watershed restoration
- Technical Advisors and consultants that support project design
- Business Development staff who support proposal development activities

Material in this guidebook is drawn from CRS field experience across many regions as well as lessons and recommendations from other sources with expertise in watershed restoration.

Purpose of the Guidebook: This guidebook is written for CRS staff and partners who are designing and implementing projects related to watershed restoration. The goal of the guidebook is to create shared understanding of concepts, tools, and best practices for watershed restoration. The guidebook is short and succinct, designed to provide a foundation for the design of proposals and project design. The guidebook points to various resources for readers who want to go deeper into specific themes.

What the Guidebook is not: This guidebook is not a comprehensive implementation manual, but it will point readers to existing manuals, which they can use for implementation. The guidebook should not be considered as a set of standards nor checklist that country programs are obligated to follow.

Key Point: Watershed restoration is complex, contextual, and dynamic and requires people with specialized skills and experience at every stage of planning and implementation. As such, we encourage readers that design proposals and projects related to watershed restoration to work with staff, technical specialists, and partners with relevant expertise.

Structure of the Guidebook

The guide is divided into two parts:

- Part 1 focuses on key concepts, definitions, and principles.
- Part 2 provides an 8-step model for watershed restoration with references to tools and manuals.

Part 1: Key concepts, approaches, and principles

What readers will learn from Part 1: Part 1 of the guidebook presents key concepts, approaches, and principles for watershed restoration. Readers of Part 1 will learn the following: how watershed restoration relates to international development objectives; watershed restoration in relation to Catholic Social Teaching and CRS' global strategy; key terms related to watershed restoration; the approaches that have proven effective in various contexts where CRS and our partners work; and the principles that guide effective watershed restoration strategies. Part 2 of the guide provides guidance on tools and resources for carrying out watershed restoration and case examples of CRS current and recent watershed restoration programs.

Part 1 Sections:

Part 1 includes the following sections:

- Section 1.1: Watershed restoration in context of international development
- Section 1.2: Catholic Social Teaching and CRS Vision 2030, related to watershed restoration
- Section 1.3: Defining watershed restoration and related concepts
- Section 1.4: Introduction to 8 steps of watershed restoration
- Section 1.5: Principles for watershed restoration

The city is a catch basin where the great Mindanao River Basin, (the largest river system in Mindanao empties into Ilana bay.) Thirteen barangays (local-level administrative district) are permanently flooded, and residents are confronted with the impact of climate change on a daily basis.. [Photo by Benny Manser / CRS]

Section 1.1: Watershed restoration in the context of international development

Watershed restoration is not a new concept, but it has become more critical and urgent in recent years given the degradation of land and water resources coupled with the acceleration of climate change. Protecting and restoring land and water resources has become a priority theme for achieving global development objectives.[1] Below we highlight where and how watershed restoration emerged again as a priority for international development:

- **Land degradation**: Land degradation is occurring on nearly a third of the global land area, and more than half of agricultural lands across the global are considered moderately or severely degraded.[2] This has direct and long-term impact on human well-being, as at least 1.3 billion people live on marginal lands that are prone to degradation.[3] The majority of these people are vulnerable farm families who depend on the land for their food and income. Unsustainable farming and grazing practices (such as chronic overgrazing and the cultivation of crops on steep slopes); deforestation and the removal of natural vegetation, and the expansion of farmland into forest and other natural areas drive a cycle of degradation and resource scarcity that keeps families locked in poverty and declining agricultural potential. Over time, nutrient depletion and loss of organic matter have resulted in reductions in soil moisture, reduced water infiltration, diminished crop productivity, reduced forage for livestock, lower nutrients in food produced, and loss of other vital ecosystem services. Unaddressed, land degradation threatens the world's food and water supplies and the loss of agriculture as a viable livelihood for future generations. Watershed restoration activities can break this cycle of poverty by restoring the health of soil, water, and other resources, thus leading to greater resilience and agricultural opportunities for future generations.

1 Mark W. Rosegrant et al, From Scarcity to Security: Managing Water for a Nutritious Food Future (Chicago: The Chicago Council on Global Affairs, 2019).

2 Economics of Land Degradation and Improvement — A Global Assessment for Sustainable Development. Ephraim Nkonya et al., eds (Washington, DC: IFPRI; Bonn: University of Bonn, 2016).

3 Millenium Ecosystem Assessment (M.E.A. 2005) defined land degradation as a long-term loss of ecosystem services. This definition is used widely by academics and research institutions. https://www.millenniumassessment.org/en/index.html

- **Climate Change**: Climate change is accelerating, further exacerbating the effects of land degradation, and threatening human wellbeing and livelihoods in virtually all places CRS operates. Climate change fundamentally affects the flow of water through the atmosphere, land, oceans, streams, and lakes. In the context of land degradation and agriculture, when soils are degraded, they can hold much less water. This means that when it rains, the soil saturates more quickly, and much more water runs off the soil surface – thus increasing the frequency of floods and intensity (volume) of flooding. And following a rain, because the soil holds much less water, the plants growing on that soil run out of water much more quickly (for example, crops might survive for a week after a rainfall on degraded soils, whereas they might be able to survive for two to three weeks on healthy soils). This gives the appearance of more frequent "droughts". And for these reasons, land degradation and soil degradation greatly increase rural people's vulnerability to climate variations (more intense rainfall and/or more frequent (or longer) dry spells. For these reasons, many global and national climate strategies that aim to reduce human vulnerability to climate change include watershed restoration activities.
- **The Sustainable Development Goals** have set the agenda for international development from 2015 to 2030. Several of the SDGs directly refer to the need for watershed restoration, notably SDG #2 (End Hunger, Achieve Food Security, and Promote Sustainable Agriculture), SDG #6 (Ensure availability and sustainable management of water and sanitation for all), and SDG #15 (Protect, restore, and promote sustainable use of terrestrial ecosystems).
- **COP-15 for Biodiversity 30x30**. The Convention on Biological Diversity, representing 190 countries, agreed on targets to ensure that 30% of the planet's land and sea area is under protection by 2030. One of the five targets is to "Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and coastal and marine ecosystems are under effective restoration…"
- **UN Decade of Ecosystem Restoration**: The United Nations declared a Decade of Ecosystem Restoration[4] starting in 2021, coinciding with the SDGs, in recognition of how environmental degradation exacerbates the threats of climate change and undermine the efforts to achieve SDGs.
- **USAID launched its first-ever Global Water Strategy for 2022-2027**: The strategy is designed to guide U.S. government efforts to advance health, prosperity, stability, and resilience through ***improved water resources management*** and increased access to safe drinking water, sanitation, and hygiene.[5] One of the four objectives of the strategy is to: "Improve ***climate-resilient conservation and management of freshwater resources*** and associated ecosystems."
- **Nature-based Solutions (NbS)**. Over the past decade, 'Nature-based Solutions' (NbS) has emerged to restore degraded lands through practical and proven methods. NbS is described as leveraging nature and the power of healthy ecosystems to protect people, optimize infrastructure and safeguard a stable and biodiverse future.[6] NbS is also defined as, "cost-effective interventions that can enhance resilience in agriculture and food production, while mitigating climate change and enhancing the environment".[7] NbS is increasingly referenced in the context of watershed restoration, including CRS' Strategic Change Platform on Transforming Livelihoods and Landscapes (see below).

4 United Nations (UN) Decade on Ecosystem Restoration, "Preventing, Halting and Reversing Loss of Nature," accessed September 30, 2023.

5 GlobalWaters of USAID, "2022 U.S. Global Water Strategy," USAID, 2022.

6 International Union for Conservation of Nature and Natural Resources (IUCN). "Nature-based Solutions," IUCN, accessed October 3, 2023.

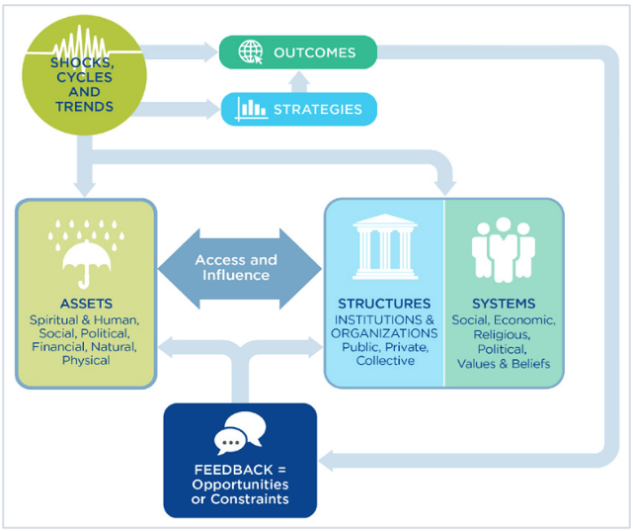
7 T. Iseman and F. Miralles-Wilhelm, "Nature-based solutions in agriculture: The case and pathway for adoption," FAO and The Nature Conservancy, 2021.

Section 1.2: Catholic Social Teaching and CRS Vision 2030

Catholic Social Teaching – Laudato Sí

Catholic Social Teaching (CST) is the formal social doctrine of the Catholic Church, grounded on the cornerstones of human dignity, solidarity, subsidiarity and the common good.[8] CST aims to "encourage governments, institutions, and private organizations to shape a future consonant with the dignity of every person."[9] CST is the foundation of CRS' mission, guiding what we work for and how we work.[10] In 2015, Pope Francis published Laudato Si,[11] explaining how CST requires a moral and religious commitment to protect and restore the environment, referring to the planet as "Our Common Home".

Figure 1. CRS Integral Human Development Framework



Integral Human Development and the need to restore natural resources

Integral Human Development (IHD) is the goal of CST and serves as a framework for CRS development programming. (See the CRS IHD Guide and the Peacebuilding Fundamentals guide for useful introductions to IHD).[12] The CRS IHD framework provides tools for analyzing problems related to poverty and injustice and gives guidance for considering development strategies to improve livelihoods in a holistic sense. (See figure 1).

Explicit in the IHD framework is the need to address underlying systems and structures that perpetuate inequality, conflict, and poverty. The IHD framework is useful for analyzing problems and identifying development solutions at scale. Especially relevant for this Guidebook, "natural assets" refer to the natural resources (water, plants, soil, trees, air, etc.) that people depend on for their livelihoods. When natural assets are degraded, this contributes to poverty and undermines people's ability to thrive and attain their full potential.

8 "The common good is 'the sum of those conditions of social life which allow social groups and their individual members relatively thorough and ready access to their own fulfilment.'" Francis, Laudato si' (Vatican City: Vatican Press, 2015), sec.156.

9 Paul II, Ecclesia America (Apostolic Exhortation). (Vatican City: Vatican Press, 1999) sec. 55.

10 Catholic Relief Services, Peacebuilding Fundamentals: Participant's Manual. (Catholic Relief Services, 2021) 5-9,

11 Francis, Laudato si'.

12 CRS, Peacebuilding Fundamentals: Participant's Manual, p. 9-13.

CRS Vision 2030 and Strategic Change Platforms

Vision 2030 is CRS' long-term global strategy that guides our programming to pursue IHD. Watershed restoration directly and indirectly contributes to all five goals of Vision 2030, and most directly to Goal Area 3:

"All people achieve dignified and resilient livelihoods in flourishing landscapes."

Strategic Change Platform 3: Transforming Livelihoods and Landscapes

CRS established several strategic change platforms (SCPs) to guide and monitor progress toward its 2030 goals of transformational change at scale. SCP3 is the "Transforming Livelihoods and Landscapes" platform, through which CRS, together with partners, seeks to scale land restoration to unlock the current cycle of poverty, reduce risks and pave a sustainable path to prosperity. Nature-based Solutions (NbS, described above) are at the heart of this work, including watershed restoration, to restore vital ecosystem services that keep rural livelihoods productive for current and future generations. CRS' strategy is that by 2030 these efforts will lead to 1 million farming households adopting restoration practices putting 1.6 million hectares under restoration.

As part of SCP3, watershed restoration is at the nexus of two of CRS' program areas, the Agriculture Livelihoods Program and the CRS Water Security Framework.

- **Agriculture and Livelihoods Program.**
  CRS helps agricultural communities recover from natural disasters, rebuild productive assets, engage with markets on equitable terms along with strengthening social cohesion, gender equality, and social inclusion. This progression is described and characterized in our Pathway to Prosperity approach and its accompanying theory of change with the ultimate goal that rural families achieve a living income, are resilient, food and nutrition secure, and prosper in sustainable landscapes. Watershed restoration factors prominently in CRS' agriculture and livelihoods approach to achieving these goals and guides CRS' support to smallholder farm families, their communities and governments to restore and protect land, soils and water and enhance governance for viable livelihoods and future generations.
- **CRS Water Security Framework.**
  The CRS Water Security Strategy "adopts and applies integrated, improved and gender-responsive land and water resource management approaches for more resilient and equitable agriculture systems and improved water security". CRS water security programs work at the nexus of 1) sustainable agriculture, 2) watershed management, and 3) water supply to support governments, partners, communities, and all stakeholders. CRS promotes and applies water- and climate-smart agriculture practices to maximize water efficiency and productivity at both farm and landscape scales. CRS implements water in sustainable landscapes by supporting investments in NbS and the protection of water sources (often referred to as "source water protection").[13]

13 Source water refers to sources of water (such as rivers, streams, lakes, reservoirs, springs, and groundwater) that provide water to public drinking water supplies and private wells." US Environmental Protection Agency (EPA), "Basic Information About Source Water Protection," US EPA, 2023, accessed October 3, 2023.

Section 1.3: Defining watershed restoration and related terms and concepts

Purpose of this section: This section explains the reasons for working at the watershed scale, it provides practical definitions for "watershed" and "watershed restoration" as they pertain to CRS programming. This section also introduces several other terms and concepts related to watershed restoration.

Why do we do watershed restoration?

Land and water resources around the globe are severely degraded, and the well-being and continued livelihoods of more than a billion vulnerable people urgently depend on watershed restoration. Rural people, especially, are finding it increasingly difficult to maintain their food and water security given the many negative impacts of land and water degradation. Primary impacts include soil erosion, sedimentation of water courses, reservoirs, and coasts, increased runoff and flash flooding, reduced infiltration to groundwater, and water quality deterioration.[14] Secondary impacts include reduced agricultural potential, water scarcity, increased workload, and constraints to economic activity. Watershed degradation is exacerbated by the impacts of climate change, including recurrent droughts and frequent severe storms. The reverse is also true: land and water degradation make communities more vulnerable to the impacts of climate change. Based on CRS' experience, we know that good watershed management is an effective way for communities to increase their resilience and adapt to the impacts of climate change and to contribute to climate change mitigation through sequestration of carbon.

Unsustainable farming - including crops, livestock, and forestry - is one of the major causes of watershed degradation around the world.[15] "Most pressures on the world's land, soil and water resources derive from agriculture itself."[16] Given CRS' strategic emphasis on agricultural livelihoods, there are opportunities to converge our work on agriculture and watershed restoration.

Problems encountered in watersheds – land degradation or water scarcity – can rarely be resolved by working at only farm or community levels. The problems – and therefore the solutions – occur at a larger scale. **Working at a watershed scale requires us to analyze and plan at scale, right from the beginning.**

14 Salah Darghouth et al, Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up, Water Sector Board discussion paper series no. 11 (Washington, DC: World Bank, May 2008) 5.

15 Brian D. Richter, Water Share: Using water markets and impact investment to drive sustainability, (Washington, DC: The Nature Conservancy (TNC), 2016).

16 FAO, State of the World's Land and Water Resources for Food and Agriculture, (Rome, Italy: SOLAW, 2021), xi.

Terraced slopes help reduce runoff, retain water, and open more land to farmers, who, along with CRS, are rehabilitating soil and improving yields and incomes. [Photo by Will Garde / CRS]

Managing at the watershed scale is more effective than working at only the farm level. Managing rainfall at a farm or plot level is not as effective because there will almost always be water moving onto the farm from up-slope areas, and there will be water exiting the farm down-slope. Excess rainfall that is moved off one farm safely will need to flow somewhere else. And if it is not managed safely all the way to the common water body in the watershed, it is very likely to cause problems for the next farm further down the slope.

Watershed restoration programs are designed for various reasons – and most often for several different and complementary goals. For CRS programming, the goals almost always relate to food security, water security, and building household and community resilience in line with our global vision and goals. CRS has defined a set of basic indicators for watershed management, which will be discussed in Part 2 of the Guidebook. Below are examples of program goals relevant to watershed restoration:

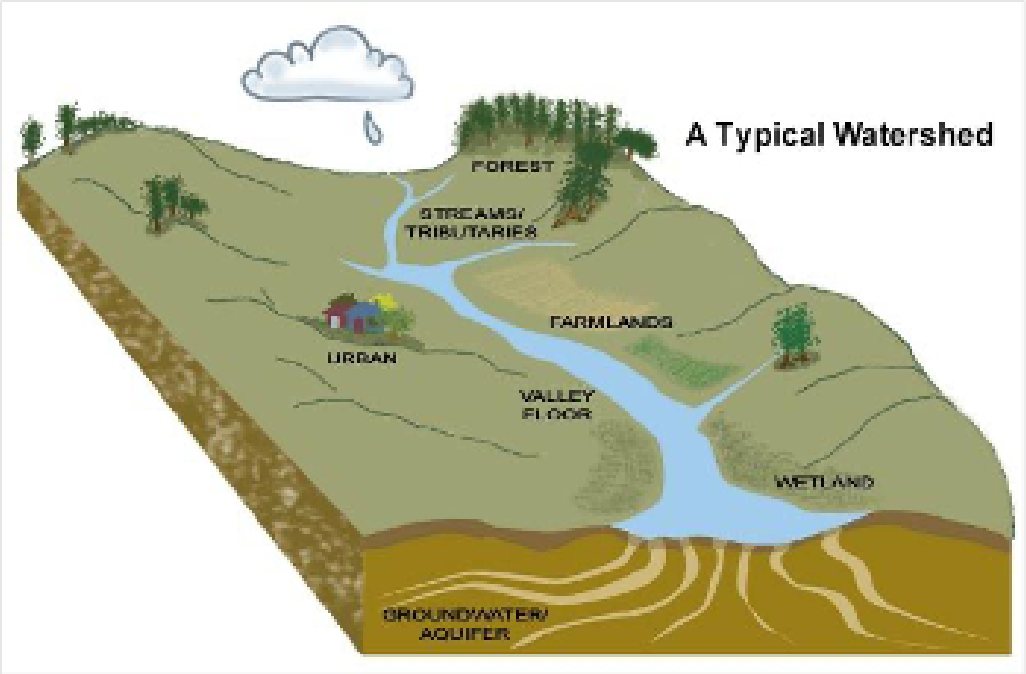
- Protect water sources for people living within and beyond the watershed whose access to safe and abundant water is threatened
- Improve agricultural production for rainfed farmers who suffer from low crop productivity
- Expand access to irrigation for farmers to increase incomes and resilience to drought
- Improve rangeland and forage management for livestock
- Ensure access to water for livestock
- Improve water quality (surface or groundwater) by mitigating activities that pollute water
- Adapt and build resilience to the impact of climate change

What is a watershed?

Watershed (basic definition):

A basic definition of a watershed is that it is an area of land from which all rainfall drains into the same body of water (e.g., a stream or lake).

Figure 2. Simple graphic of a typical watershed (Source: miwaterstewardship.org).



Another way of describing a watershed is that it is the land area that "sheds" water into a body of water. The image on this page provides an example of a physical watershed. See this one minute video for a very basic explanation.[17]

All land on earth is part of a watershed because all water is driven by gravity toward some outlet, such as a pond, lake, stream, river, sea, or ocean. A watershed is a topographically delimited area because it is bounded by hills or mountains which causes water to flow toward a single drainage area.

Watersheds are also referred to as "catchments" or "basins", where terms vary according to regional and linguistical preferences, but the basic concepts are the same. Watersheds (or catchments or basins) may be sub-divided into "sub-watersheds" or "micro-watersheds", depending on size. A watershed is almost always composed of two or more sub-watersheds, which are themselves composed of several micro-watersheds. Each country or region differs on what scale they use for these sub-divisions, but typically a micro-watershed will measure in the range of tens to hundreds of hectares, sub-watersheds are typically hundreds to a few thousand hectares, and watersheds are typically thousands to millions of hectares. Basins often refer to these very large watersheds and are often transboundary in nature. In most cases, CRS watershed restoration projects work at sub-watershed and micro-watershed scales.

17 For more information, see: Battle River Watershed, "What is a watershed?" YouTube video, 1 minute, 2014.

CRS in Lesotho is working with 'herd boys' under a project called REAL, or Restoring Ecosystems and Livelihoods, funded by CRS private funds. Lesotho is a mountainous country - having one of the highest elevations in the world - thus less than 10 percent of land is suitable for crop farming.
[Photo by Will Garde / CRS]

"Watershed" is a useful concept because it helps us appreciate how landscape management is connected by the gravity driven flow of water. **By looking at a watershed as an interconnected unit of land with upper areas and lower areas, we can see how upland activities and conditions might impact downhill water conditions, land use capacity, and risks associated with water and land management.**

Three major determinants of physical characteristics and functions of a watershed are precipitation, topography, and land use.

- **Topography**: The steepness of slopes and the shape of a watershed influence the way gravity moves water across the watershed. Water tends to move slowly through flat watersheds and moves relatively quickly through steep watersheds.
- **Precipitation**: The amount of precipitation (rain or snow) that falls on a watershed each year and the temporal distribution of precipitation define much about a watershed. There are arid watersheds that may only receive a few hundred millimeters of rain that occurs in a few monsoon storms; likewise, tropical watersheds may receive thousands of millimeters of rainfall per year, with rain occurring virtually every month of the year.
- **Land use**: Land use refers to how land is used by people, specifically "land cover" and potential land uses based on soil types, slopes, and the geology underlying soils. Of these three characteristics, humans have the greatest impact on land use, and we can have the greatest impact in restoring watershed functions.

Watershed (expanded definition):

A broader understanding of watershed provides a framework for describing and analyzing everything within a watershed, such as the natural resources (e.g., forests and fauna), human settlements and communities (towns and cities), physical resources (e.g., roads and dams), as well as all activities that take place within a watershed (e.g., farming, factories, mining, football). Often this broader definition of a watershed is considered when employing a "**watershed approach**".[18]

This expanded definition recognizes that a watershed has social, economic, and political dimensions, which are related to the natural characteristics of each watershed. Successful watershed restoration initiatives will need to consider and engage with each of those dimensions. Naturally, people interact with the natural resources within a watershed and depend on these resources for their **livelihoods**.[19]

> *"When we speak of the "environment", what we really mean is a relationship between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or a mere setting in which we live. We are part of nature, included in it, and thus in constant interaction with it."*
>
> **—~LAUDATO SI, NO. 139**

Families across Afghanistan are suffering from unprecedented levels of food insecurity, primarily due to the worst drought in living memory combined with a financial crisis following the Taliban takeover in August 2021. A view of one such village severely affected by drought.
[Photo by Stefanie Glinski / CRS]

18 The following publication is an excellent introduction to a more complex understanding of watersheds: Cuyahoga River Community Planning Organization, The Watershed Book: A citizen's guide to healthy streams and clean water (Cleveland, OH: Cuyahoga River Community Planning Organization, 2009).

19 "Livelihood" refers to the means of securing people's basic needs, such as food, water, shelter and clothing.

Watershed stakeholders are all those who use, access, and manage the natural resources in the watershed, and who affect or are affected by the activities taking place there. This may include people who live within the watershed, as well as those who live outside but use or impact its resources and functions. Knowing the area and limits of a watershed helps us to critically assess which stakeholders are relevant to that watershed, what livelihood activities and natural resource use occur within the watershed, the stakeholders' interests, and relationships, and how these stakeholders and activities might affect, or be affected by, watershed functions.

A high degree of biophysical and social interconnectivity is a crucial feature of watershed management. Upstream/downstream and rural/urban linkages are critical, particularly in areas of rapid urbanization and where land and water resources are increasingly stressed.[20] Poverty, land degradation and erosion in upstream areas can lead to downstream floods and poor water quality and/or limited water availability (e.g., sedimentation of dams, depletion of groundwater resources, etc.).

Women have a special role as stakeholders in watersheds and watershed restoration processes. Especially in rural communities, women tend to bear most of the burden of collecting and managing water and other natural resources like fuel wood for their households, which often means several additional hours of work each day. Despite this special role, women are often excluded from the processes of watershed restoration. It is incumbent on CRS and its partners to explicitly create opportunities for women to participate in analysis, planning, decision-making, management of the watershed and the utilization of water resources.

CRS definition of watershed restoration

For the purposes of CRS programming, we define watershed restoration as:

> ***A process to improve management of land and water resources at a watershed scale to restore key ecosystem services, contribute to resilient livelihoods, and strengthen local governance in ways that lead to integral human development.***

Below are specific explanations of key terms that have not been discussed previously in this Guidebook.

- **Restoration**. Where watersheds are degraded beyond a point that they can be simply conserved or protected, they require deliberate interventions to restore natural resources and the ecosystem services they provide.[21]
- **Ecosystem Services.** Ecosystem services are the benefits that humans obtain directly or indirectly through their interaction with nature.[22] We are concerned with preserving and restoring ecosystem services that watersheds provide — e.g., clean water, topsoil, agricultural crops, forestry products, biodiversity, carbon sequestration, etc...
- **Resilient livelihoods**. Resilience is the ability to bounce back from and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth.[23] CRS works primarily with smallholder farmers in its watershed programs, so resilient livelihoods most often refers to activities related to diversifying income, buffering against climate shocks, and introducing improved farming methods.

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20 Robert Lenton and Mike Muller, Integrated Water Resource Management in Practice: Better Water Management for Development, 1st edition. (London: Global Water Partnership and Routledge, 2009), Chapter 2.

21 R. J. Hobbs and J. A. Harris, "Restoration Ecology: Repairing the Earth's Ecosystems in the New Millennium," Restoration Ecology 9, no. 2 (June 2001): 239-246.

22 Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Synthesis (Washington DC: Island Press, 2005), 239-246.

23 CRS, "Resilience," Our Work Overseas (CRS, 2023).

Esther Kolli is a 55-year-old single mother of three. She is a trader of small goods. Esther is happy with the construction of a water supply in her Bensville community, in Kakata city of Liberia's Margibi county. [Photo by Nde Ndifonka / CRS]

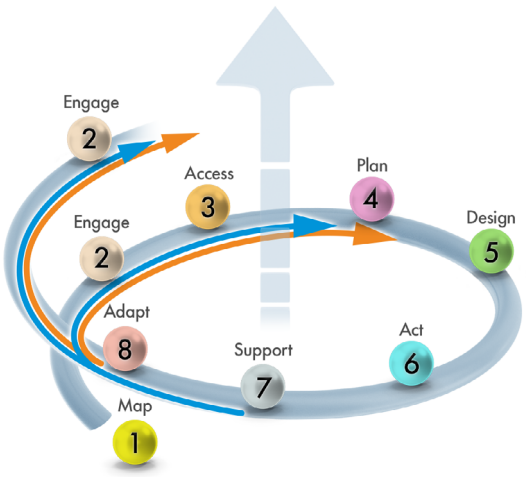
Section 1.4: 8 Steps of Watershed Restoration

Purpose of this section: This section describes the flow and logic of watershed restoration processes, and briefly describes each step. Part 2 of the Guidebook provides tools for the implementation of each step of the watershed restoration process.

Watershed restoration should be a flexible and adaptive process, nevertheless, there is a logic and flow, which can be structured as steps. Note that the basic steps we have defined for watershed restoration are similar and consistent with many rural development approaches, including several CRS project guidance tools.[24] Several of these approaches will be shared in Part 2 of this Guidebook. CRS project staff should feel comfortable using different frameworks, depending on preferences of donors, governments, or partners. What is important is the general flow and phases, which emphasize empowering local stakeholders.

The table below introduces CRS' 8 Steps for Watershed Restoration, followed by diagrams to show how these steps are cyclical, creating a virtual process of learning and progress over time.

8 STEPS OF WATERSHED RESTORATION	
1	Scope: Preliminary watershed characterization
2	Engage: Stakeholder identification and consultation
3	Map: Participatory mapping and data gathering
4	Plan: Collaborative visioning and planning
5	Design: Designing watershed restoration interventions
6	Act: Carrying out field activities
7	Support: Building sustainable institutions and financing for the long-term
8	Adapt: Monitoring, reflection, and planning



Watershed restoration as a cyclical process

Each of the 8 Steps will be described in detail in Part 2 of the Water Restoration Guidebook.

24 Valerie Stetson, ProPack I and ProPack II guidebooks (CRS, 2004/2015 and 2007).

Section 1.5: CRS Principles for watershed restoration

Below, we present ten principles that CRS programs should consider when designing and implementing watershed restoration programs. These principles are grounded in Catholic Social Teaching, CRS' global strategy, CRS field experience, and recommendations from watershed restoration experts from around the world. These principles are not meant to be comprehensive or prescriptive, they are intended to ***highlight principles that are especially important for CRS' special approach to watershed restoration***. We have included extensive references in this section to guide readers who want to go into more depth.

- Principles 1 to 7 relate to the processes of social and political processes for watershed restoration.
- Principles 8 to 10 are specific to agricultural approaches for watershed restoration.

CRS PRINCIPLES FOR WATERSHED RESTORATION	
1	Act in the short-term, manage for the long-term
2	"Do No Harm", apply technical best practices and careful monitoring
3	Start with local stakeholders, and work at multiple levels
4	Create opportunities for women's leadership
5	Adapt approaches to specific contexts
6	Watershed restoration should contribute to peace and social cohesion
7	Foster enabling policies and institutions
8	Catch rainfall where it falls, and slow it down
9	Apply sustainable agriculture as a strategy for watershed restoration
10	Develop market systems that support land and water restoration

1. Act in the short-term, manage for the long-term

Watershed restoration is part of a long-term process that requires the combination of short-term interventions as well as long-term management to sustain improvements beyond the life of any single project. Projects should be designed with both of those timeframes – short-term and long-term in mind. A long-term watershed restoration process may involve multiple projects that overlap in time.

It is important that initial activities are planned and implemented in ways that build confidence and trust of stakeholders to motivate their buy-in for follow-on activities and projects.[25] Watershed restoration projects are generally more effective when they deliver tangible results to stakeholders over the short-term, and then work in an iterative manner to design interventions to solve larger, more complex problems in the long term.[26] This is especially true with watershed restoration requires stakeholders to change their farming practices or livelihood activities.

Ideally, projects are designed to deliver tangible improvements in the short-term, such as improved crop productivity, improved access to water, or mitigation flood risk. Based on CRS' experience over the past several years in various countries, the types of results we should be able to see over the short term (one to three years), include: increases in soil moisture, reduction in water runoff and erosion, soil stabilization on slopes, gully restoration, increases in soil organic matter.

Importantly, results achieved over the short-term can also be quickly reversed if people revert to unsustainable land management practices, so success in the short-term does not always lead to desired results in the long-term. For this reason, ***it is critical to build the foundations for longer-term planning, management, and monitoring, even when designing short-term projects***.

Ideally short-term projects (such as food security or WASH projects) will be designed to contribute to long-term watershed restoration goals. For example, a food security project designed to improve crop productivity with a group of farmers within a watershed can be designed and implemented in a relatively short period of time (two to five years) with specific goals to improve water resources over the medium- and long-term. In some watersheds, it may be possible to see improvements in spring flows water levels in shallow wells, or water quality. In other contexts, changes in stream flow, groundwater recharge, and water quality may take much longer, particularly in large and complex watersheds.

To ensure the connection between short-term projects and long-term watershed management, it is critical that short-term projects help local stakeholders establish long-term governance structures and sustainable funding strategies to ensure that stakeholders can carry forward plans and activities.

25 Jeff Sayer, Louise Buck, and Sara Scherr, "The Lally Principles," Learning from Landscapes, Chapter 4. Arborvitae special (Geneva, Switzerland: International Union for the Conservation of Nature Programme - IUCN, 2008).

26 Peter Penning (of ALO Advisors). "What are the Challenges in Implementing Nature-based Solutions?" Keynote address at World Water Week (Stockholm, Sweden, 2022).

2. "Do No Harm": Watershed restoration interventions need to be planned and implemented based on technical best practices and careful monitoring

Watersheds are complex and dynamic. NGOs and governments around the world have often oversimplified watershed restoration programming, sometimes creating more harm than good. There are many examples around the world where watershed restoration projects have caused severe damage, for example where terracing hillsides caused landslides, where diverting water for irrigation deprived downstream water users from drinking water, or where a road designed to improve access to agricultural markets permanently changed the hydrology of a stream. Obviously, serious changes in the biophysical conditions of a watershed will also have serious social, economic, and political repercussions.

We need to learn from the mistakes of the past. Specifically, watershed restoration projects need to avoid prescribing standardized activities, especially those with potentially negative consequences. For example, digging infiltration ditches or terraces may be effective in some contexts, but when these are poorly designed or built, they can cause more soil erosion or landslides. Too often, local stakeholders are left with the damage long after development organizations have finished their projects and moved on.

The risk of causing more harm than good should be considered at every stage of project design and implementation. Watershed restoration activities should be evaluated using cost/benefit analysis, and risk mitigation strategies.[27] (See Part 2 of the Guidebook).

It is important to have a diverse set of technical experts to support the design and monitoring of project activities (engineers, agronomists, and social scientists) as each one will analyze opportunities and challenges from a specific angle. Generally, watershed functions are well understood by technical specialists, including water engineers, hydrologists, agronomists, and other related professions. There are watershed modelling systems that work well in analyzing and predicting changes in watershed dynamics based on restoration activities. (See Part 2 of the Guidebook for details on modelling tools).

3. Start with local stakeholders, and work at multiple levels

Subsidiarity is a principle at the heart of Catholic Social Teaching and fundamental for effective watershed restoration processes. Subsidiarity says that *a higher level of government—or organization—should not perform any function or duty that can be handled more effectively at a lower level by people who are closer to the problem and have a better understanding of the issue*.[28] The principle of subsidiarity is intertwined with the principles of solidarity and the common good, "it grants freedom to develop the capabilities of society, while also demanding a greater sense of responsibility for the common good from those who wield greater power.[29]

27 The "Do No Harm" framework is a useful point of reference when considering watershed restoration activities. Collaborative for Development Action, Inc. (CDA) Collaborative Learning Projects, The "Do No Harm" Framework for Analyzing the Impact of Assistance on Conflict: A Handbook (CDA, 2004).

28 CRS, Peacebuilding Fundamentals Participants Manual (CRS, 2019), 8.

29 Pope Francis, Laudato Si', #196.

In practice, this means that CRS watershed restoration projects need to engage local stakeholders right from the start. It is the actions of local people that will determine a) quality of watershed restoration interventions, b) whether the structures put in place to manage the watershed will be maintained (contour trenches, stone bunds, forest restoration/protection areas, zero grazing areas, etc.), and (c) the durability and equity of the institutions and organizations responsible for watershed governance.[30] Watershed restoration activities will more likely succeed if they arise in response to a recognized problem, and are grounded in existing institutions, including government agencies and legal frameworks, as well local community organizations.[31]

> *"The local population should have a special place at the table; they are concerned about their own future and that of their children and can consider goals transcending immediate economic interest."*
>
> **—POPE FRANCIS, LAUDATO SI #183**

If local people, that represents diverse members of the community, are part of the planning and implementation process it is more likely that they will "own" the process and take responsibility for carrying out the work and managing it over the long-term. Local stakeholders should always participate in the analysis and monitoring of activities and be fully aware of the risks and trade-offs of specific interventions and how they may affect different stakeholder groups. This principle is clearly articulated throughout CRS' guides and manuals, including the ProPack series and many others.[32]

Below is a quote from Dr. Marcella D'Souza from the training manual for the WALA program in Malawi:

> *"A successful watershed development effort and management is only possible when the people living in that area understand the relationship between the environment and their own social and economic well-being, decide to come together and labour together to conserve, regenerate and manage their environment appropriately in order to realize their plans and hopes, i.e., they must "participate" in the fullest sense of the word."*[33]

30 Mike McGahuey, Heinfrich, Geoff and Lori Pearson. Wellness for Agriculture and Life Advancement Activity (WALA): A retrospective of three studies on the impact of watershed restoration. (CRS, 2021), 14.

31 Robert Lenton and Mike Muller, Integrated Water Resources Management. Global Water Partnership CRS, 2009, 13.

32 Valerie Stetson et al, ProPack II. (CRS, 2015), 25-30.

33 D'Souza, Gender and Watershed Development, 15.

4. Create opportunities for women leadership in watershed restoration

Women need to be engaged early and often in the watershed restoration process. Women share a disproportionate burden in managing food, water and other basic needs that rely on natural resources for their households. They also rely heavily on natural resources for income generating activities. There is extensive evidence that women are substantially negatively affected by degraded natural resources. Women stand to gain the most (or lose the most) with watershed restoration projects.

For women to engage actively and have voice within the household, in the community and various committees, it is important to understand the gender context. Gender refers to the two sexes, male and female, within the context of society. Factors such as ethnicity, class, race, age, and religion can affect gender roles. Gender roles may vary widely within and between cultures, and often evolve over time.

> *"Gender planning is based on… the rationale that because men and women play different roles in society, they often have different needs. Therefore… it is important to disaggregate households and families within communities on the basis of gender."*[34]

Very often, women are excluded or underrepresented in leadership and decision-making.[35] Structural gender inequality is very often inherent in environmental restoration development goals, where community and social dynamics are ignored or overlooked in an attempt to oversimplify restoration activities, which often perpetuate inequality in processes, institutions, and in outcomes.

> *"Unequal power relations between the state and local communities, within communities, and within households shape how restoration priorities are set, whose knowledge counts, and how rights to resources and benefits are perceived and distributed."*[36]

Part 2 of this Guide will provide reference resources tools that can be applied for gender analysis and gender-sensitive planning.

34 Caroline O.N. Moser. "Gender Planning in the Third World: Meeting practical and strategic gender needs," World Development 17, no. 11 (November 1989): 1800

35 Moser, "Gender Planning," World Development (November 1989): 1799-1825.

36 Marlène Elias et al. "Restoration for Whom, by Whom? A Feminist Political Ecology of Restoration," Ecological Restoration 39, nos. 1&2 (March/June 2021): 3-15.

5. Adapt approaches to specific contexts

Watershed restoration needs to be adaptive and context specific, based on an ***adaptive management*** approach.[37] Watersheds are complex, adaptive systems that constantly change,[38] where human beings, natural phenomena, and economic factors constantly affect social and ecological conditions. While it is important to adhere to core principles and steps, there should be no rigid blueprint to watershed restoration.[39] A resilient and robust watershed restoration strategy is one that has multiple ways of achieving goals.[40] Conditions will often change so the interventions should be able to adapt to these changes.[41]

Project staff and local stakeholders need to determine the approaches and activities most suited to their own context.[42] It is important to understand the logic of watershed restoration approach and activities, without fixating on the specific steps or timeframe defined, especially when those are defined by an NGO or donor.[43]

6. Watershed restoration should contribute to peace and social cohesion

Effective watershed restoration requires a focus on social and political processes, with a goal to strengthen relationships and institutions in ways that foster social cohesion. CRS defines social cohesion as:

> *"The capacity of a society to sustainably ensure the wellbeing of all its members, namely equitable access to available resources, respect of dignity in diversity, personal and collective empowerment, and responsible participation."*[44]

Social cohesion is a prerequisite for (sustainable) watershed restoration while watershed restoration may, in turn, also become an entry point for strengthening social cohesion. Social cohesion was highlighted as a key reason for success in the WALA program in Malawi.[45] Watershed restoration projects need to foster broad stakeholder participation, fully recognizing that participation is not a neutral concept because it involves shifts in decision-making power between stakeholders.[46]

37 B.K. Williams, R. C. Szaro, and C. D. Shapiro, Adaptive Management: The U.S. Department of the Interior Technical Guide. (Washington, DC: U.S. Department of the Interior, 2009).

38 Rebecka Malinga, Ecosystem services in agricultural landscapes: A study on farming and farmers in South Africa and Sweden (Stockholm: Stockholm University, 2016), 1, 3, 8.

39 Pope Francis, Laudato Si', #180.

40 Patrick Moriarty et al. The EMPOWERS Approach to Water Governance: Guidelines, Methods, and Tools (Amman, Jordan: INWRDAM, 2007).

41 Dargouth, Salah, et al, Watershed Management Approaches, Policies and Approaches: Lessons for Scaling Up, (Washington, DC: IBRD of the World Bank, 2008).

42 Lenton and Muller, Integrated Water Resource Management, 8.

43 The CRS CASCADE initiative makes a similar conclusion from an analysis of projects that have succeeded at impacting at scale. For more information, see: "Mindset Shift from Business as Usual to Scale, One Pager," CRS internal report, June 2022.

44 Jean-Baptiste Talla, The Ties that Bind: Building Social Cohesion in Divided Communities (CRS, 2017).

45 See WALA review by University of Notre Dame Keough School of Global Affairs doc, p.18

46 Dargouth et al, Watershed Management Approaches, 38.

Social cohesion can be considered as relationships along horizontal and vertical planes. Horizontally, we talk about social cohesion as trust, reciprocity, and the links between and among people and groups. Vertically, social cohesion refers to the social contract between citizens and the state on multiple levels (e.g., local, intermediary, and national).[47]

Watershed restoration processes require conflict sensitivity tools for managing and resolving conflicts.[48] The CRS Peacebuilding Fundamentals guide provides a good starting point for tools. CRS has also developed specific guidance on conflict management and peacebuilding for water related programming.[49] (Specific tools will be presented in Part 2 of the Guidebook).

Often, relationships between and amongst stakeholders are contentious because watershed resources are shared resources, which are fundamental to diverse groups for human wellbeing and economic activity (farming, industry, etc.).[50] As competition for resources intensifies, it becomes more and more difficult to find simple technical solutions to resource-related problems; increasingly solutions involve trade-offs between benefits and costs for different groups. For example, providing more domestic water for the poor may mean there is less water for irrigated agriculture, or water retained for hydropower may limit farmers' access to water for irrigation.[51] These conflicts often stem from underlying inequalities, including discrimination against women and other groups.

Conversely, when key resources increase (such as water resources and/or grazing resources) this can help to reduce tensions and promote harmony within communities. Thus, decreased conflict and increased social cohesion may be an outcome of good watershed management.

Co-management: **Co-management of watersheds refers to the shared responsibility among users and authorities in managing watershed resources**. Experience shows that management is usually more sustainable when there is a high degree of connectivity amongst actors at the local level (horizontal relationships) and between various levels (vertical relationships).[52] Project facilitators should coordinate communication to assure that what happens at any given level (local, intermediate, national) is relevant to, and informed by, what takes place at other levels.[53]

This Guidebook deliberately focuses on positive solutions; however, it is important not to be pollyannaish about the threats to people's water resources and the risks involved in protecting those resources, especially when there are major imbalances in power between stakeholders. A key example is extractive mining, especially metallic mining, which often pits relatively powerless communities against extremely powerful actors, which CRS has documented previously.[54] Historically, for many reasons, CRS programs rarely engage in programs that require confrontations of this sort. Nevertheless, increasingly we will need to develop our capacities to support local people and our partners to work in contentious and potentially violent situations.

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47 CRS, The Ties That Bind: Building Social Cohesion in Divided Communities (CRS, 2017), 5-6.

48 Jacob Hileman et al, "An alternative framework for analysing and managing conflicts in integrated water resources management (IWRM): linking theory and practice," International Journal of Water Resources Development 32, no. 5 (September 2017): 675-691.

49 Jason Gehrig and Mark M. Rogers, Water and Conflict: Incorporating Peacebuilding into Water Development (CRS, 2009).

50 Gehrig and Rogers, Water and Conflict.

51 Moriarty et al, The EMPOWERS Approach to Water Governance.

52 Elinor Ostrom, "A General Framework for Analyzing Sustainability of Social Ecological Systems," Science 325, no. 5939 (July 2009): 419-422.

53 Nelson Cuéllar and Susan Kandel, The Landscape: The right scale for rainfed agriculture. Lessons learned and opportunities in Central America (San Salvador, El Salvador: Global Water Initiative and CRS, 2015).

54 Tom Bamat, Aaron Chassy, and Rees Warne, eds. Extractives and Equity: An introductory overview and case studies from Peru, Angola and Nigeria (CRS, 2011).

7. Watershed restoration requires enabling policies and institutions

Most CRS watershed restoration activities will take place at the local level, including micro-watershed and sub-watershed levels. Nevertheless, long-term success of watershed restoration needs to be aligned with national government policies and institutions, as enabling policies and institutions can support or derail activities at the watershed level in the medium- and long-term. "Watershed management works best when there is a supportive policy and legal framework, particularly (a) policies that facilitate decentralized and participatory development, (b) institutional arrangements that allow and encourage public agencies at all levels to work together, and (c) an approach to access to natural resources that reflects local legislation and tenure practices and problems."[55]

CRS' 2030 strategy urges CRS programs to consider the systems and structures that influence change at scale, while we also design and implement projects to solve problems in the short-term.

> *"To catalyze transformational change at scale requires breaking out of traditional paradigms. This will require changing both internal and external ways of working, partnerships, and mobilization of financing and support to move the needle on big challenges."*
>
> **—CRS VISION 2030**

> *Society, through non-governmental organizations and intermediate groups, must put pressure on governments to develop more rigorous regulation, procedures, and controls.*
>
> **—LAUDATO SI #179.**

For scale and sustainability, CRS should always consider interventions for watershed restoration programming that improve policies, institutions, and systems. In line with Principle 4, it is critical to apply a gender lens to any analysis and planning on policies and institutions.

55 Dargouth, Watershed Management Approaches, 51.

Small coffee producers who are members of COMICOVEL seen at the oxidation lagoons of San Isidro Dry Coffee Mill in San Isidro Municipality, Honduras. [Photo by Oscar Leiva, Silverlight / CRS]

3 Principles related to agriculture interventions for watershed restoration

8. Catch rainfall where it falls, and slow it down

Water is a powerful, erosive force when it has gained speed on a slope, so a fundamental goal in watershed restoration is to slow down the movement of water through the watershed. One reason that climate change is so worrisome is precisely because rainfall patterns are changing rapidly and becoming more variable, creating disaster risks within a watershed, and downstream.

With this in mind, one critical principle for watershed restoration is to **catch rainfall where it falls and slow it down**.[56] Rainfall may come in the right amount, or be little or too much. The farmers (and communities) that capture rainfall on their farms and landscapes can improve farm production while preventing problems of flooding, landslides, and erosion in areas below them. In some cases, this can also improve water recharge in watersheds.

Ridge to Valley: A best practice for watershed interventions is to always start at the top of the slope then continue to the bottom. If measures are built at the bottom first, rain may fall on the slope, pick up speed, and then destroy the measures by eroding their base or, in the case of trenches, filling them with eroded soil. Avoid this scenario by always starting measures at the top of the slopes. A popular manta for watershed restoration specialists is, “Ridge to valley”.

56 Gaye Burpee et al, Preparing Smallholder Farm Families to Adapt to Climate Change: Pocket Guide 3: Managing Water Resources (CRS, 2015), 25.

Watershed restoration interventions designed to capture and slow down water include cover crops, rock walls, live barriers, terraces, mounded earth, infiltration pits or trenches. Generally, vegetative solutions (e.g., cover crops and live barriers) are more cost effective than built structures, and in many cases these vegetative solutions will be sufficient to reduce runoff and erosion that built structures are not necessary.[57] Whenever possible, it is best to avoid disturbing soil or building structures when vegetative solutions are sufficient.

Vegetative stips and contour planting el salvador 2023. [Photo by CRS staff]

9. Apply sustainable agriculture as a strategy for watershed restoration.[58]

Usually, agriculture is described as a major cause of watershed degradation, however increasingly farming should be considered as part of the solution for watershed restoration. In fact, most watersheds where CRS works are impacted by agricultural practices, so in many places promoting sustainable agriculture is fundamental part of any watershed restoration strategy.[59] In many projects and countries, CRS has demonstrated that promoting sustainable agriculture is often an effective and cost-efficient part of an integrated strategy for watershed restoration.[60] (In this context, we define agriculture broadly, including rainfed crops, irrigated crops, horticulture, fruit production, livestock, and grazing). Importantly, a watershed approach requires us to go beyond individual farms and work across and between farms, as the watershed is more than only the sum of the farms located in the watershed. (See Part 2 of this Guidebook for case examples).

57 Paul Hicks et al, "The Vital Few: The few agricultural practices that make the biggest difference in improving water recharge and reducing soil erosion in watersheds," Presentation, Water for Food Conference (Lincoln, Nebraska: CRS, 2023).

58 By "sustainable agriculture" we refer generally to improved agricultural practices deliberately designed to restore and protect natural resources.

59 Heather Luedke, "Fact Sheet: Nature as Resilient Infrastructure – An Overview of Nature-based Solutions," Environmental and Energy Study Institute (EESI) website, October 16, 2019.

60 McGahuey et al., Wellness for Agriculture, 13-15.

Co-benefits: One reason that sustainable agriculture is cost effective is because of all the associated "co-benefits" achieved when farmers improve their agricultural practices. Beyond improving watershed functions (such as improving water flows and water quality), water-smart agriculture practices also increase farm productivity, increase income for farm families, and reduce risks to disasters.[61]

CRS SMART Skills Competency Model and Training Manuals. CRS' SMART Skills Competency Model defines a set of natural resource management skills) for resilient farming systems and landscapes that are necessary for effective watershed restoration.[62] (See Guidebook Part 2 for details). In particular, the SMART Skills training manual, "Understanding Natural Resources" provides farmers and project staff with foundational knowledge to support improved understanding of natural systems.[63]

Water Smart Agriculture: CRS has developed several agricultural approaches that contribute to watershed restoration, including Water Smart Agriculture,[64] agroforestry, and Farmer Led Natural Regeneration. A key concept underpinning these approaches is, "**Manage soils to manage water**".[65] CRS Blue Harvest projects are specifically designed to promote water-smart agricultural practices to improve and protect water sources.[66]

CRS' Strategic Change Platform 3 defined 8 Land Restoration Principles. *CRS defined eight land restoration principles (or practices) as part of SCP3.[67] These will be reviewed in detail in Part 2 of this Guidebook.*

Other Approaches: Other approaches share this emphasis on water and soil management as key for restoration, including agroecology,[68] agroforestry, regenerative agriculture,[69] farmer-led natural regeneration, green infrastructure, and Nature-based Solutions (NbS).[70]

61 Robert Abell et al., Beyond the Source: The Environmental, Economic and Community Benefits of Source Water Protection (Arlington, VA: The Nature Conservancy, 2017).

62 CRS, SMART Skills Competency Model: A theory of action for capacity building in agriculture and livelihoods programming (CRS, 2021), 14-19.

63 CRS, Managing natural resources: A SMART Skills Manual (CRS, 2022).

64 Kristen Rosenow, Water-Smart Agriculture: What It Is and Why It Matters (Baltimore, MD: Catholic Relief Services, 2018).

65 Jennie Barron, "Soil as a Water Resource: Some thoughts on managing soils for productive landscapes meeting development challenges," Agro Environment. (Stockholm, Sweden: Stockholm Environment Institute, 2012), 2.

66 CRS Blue Harvest, www.blueharvest.org

67 CRS, *SCP3 Land Restoration Impact Indicators in Ethiopia's RFSA Watersheds* (CRS, 2023), Annex 1: Land Restoration Principles.

68 Miguel A. Altieri. *The Science of Sustainable Agriculture*, 2nd Edition. (Boca Raton: CRC Press, 1996).

69 CRS, "About Regenerative Agriculture," Our Work Overseas Program, CRS, accessed October 4, 2023. https://www.crs.org/our-work-overseas/program-areas/regenerative-agriculture

70 T. Iseman and F. Miralles-Wilhelm, *Nature Based Solutions in Agriculture, The Case and Pathway for Adoption* (Virginia: FAO and The Nature Conservancy, 2021).

10. Develop market systems that support sustainable land and water management activities

CRS' approach to value chains and market systems has continuously evolved over the past twenty years.[71] Our current model promotes a holistic and integrated approach to markets that can be adapted for watershed restoration (See Part 2 of the Guidebook for details). Under the MSD approach, a market system refers to the economic interactions related to specific products and/or services. Market systems development (MSD) influences how market systems work so that they grow and better include and benefit people who are living in poverty at scale.[72] Engaging in markets for the sustainably managed products of the watershed can further incentivize farmers to protect and restore their watersheds.

The CRS approach to MSD explicitly:

- Focuses on local people and communities, including the most disadvantaged.
- Informs strategies and activities across the Humanitarian-Development-Peace (HDP) nexus with a shared systems perspective and vision.
- Strengthens market systems so that they increase resilience, improve environmental stewardship, and promote social cohesion.

A few ongoing programs demonstrate how CRS has applied an MSD approach to strengthen rural livelihoods, build sustainable marketing systems, and protect natural resources:

- ***Blue Harvest***: The Blue Harvest watershed program recognized that coffee production and processing often impact water resources. Coffee is an important source of livelihood for small-holder farmers, but also a leading source of surface water contamination in coffee-growing watersheds as farmers misused chemical fertilizer. CRS approached input suppliers to adjust their fertilizer formula based on soil analyses in the area. The result was higher coffee productivity with reduced excess fertilizer runoff.
- ***SPICES project***: SPICES looks at multiple value chains to support reforestation activities and to improve forest-friendly land use beyond forest borders. The project assists farmers to produce high-quality products (spices – such as vanilla, cloves, ginger, and cardamom - fruits, and vegetables) that can generate income and improve food security. The project works with cooperatives and exporters to improve farmers' access to inputs and outlet markets to produce higher quality products and obtain premium prices.

71 CRS's approach to value chains and market development systems originally started from the Territorial Development Approach to Agroenterprise Development (TA-AD), which was developed by researchers at the International Center for Tropical Agriculture (CIAT), then adopted and adapted by CRS as part of the Learning Alliance for Agroenterprise Development, a collaboration between CRS and CIAT. TA-AD was originally designed to complement CIAT's watershed work recognizing that economic opportunities and livelihood security are critical for supporting sustainable land and water management activities.

72 CRS, The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion. Authors: Harald Bekkers, Alexandra Miehlbradt. 2023.

- Savings and Loan Communities: SILC and Village Savings and Loans (VSL), and other community-based savings and loan groups have enabled people to undertake investments in watershed restoration and build organizational skills to engage in watershed planning and management. This approach has been especially effective for empowering women's participating in watershed restoration. As an example, in WALA watershed project in Malawi, reviewers observed that VSL activities "led to participant and community feelings of empowerment, confidence and enhanced planning and problem-solving ability."[73]

"Before the program our yields were very low. We were producing 1500 kg – 2000 kilograms per 1.72 acres and now we are producing 2500 – 3000 and its going up," shares Elmer Flores. Elmer is associated with COMICOVEL a Cooperative created with the support of Blue Harvest that has over 200 small coffee producers associates. [Photo by Oscar Leiva, Slverlight / CRS]

73 David Soroko et al., Assessment of the "Wellness and Agriculture for Life Advancement (WALA) Activity" project in southern Malawi (Vienna, VA: International Business & Technical Consultants, Inc. for USAID, 2018), 11-12.

CATHOLIC RELIEF SERVICES

Photo by Dooshima Tsee.

Watershed Restoration Guide Part 2:

TOOLS AND RESOURCES FOR IMPLEMENTING WATERSHED RESTORATION

Use this guide from start to finish, or select the parts that best meet the needs of your work.

2.1 Key Resources and Guides
2.2 Guidance for Facilitators
2.3 8 Steps for Watershed Restoration
Step 1: SCOPE
Step 2: ENGAGE
Step 3: MAP
Step 4: PLAN
Step 5: DESIGN
Step 6: ACT
Step 7: SUPPORT
Step 8: ADAPT
2.4 Recommend-ations

Introduction

Part 2 of the Watershed Restoration Guidebook provides tools, resources, and cases studies for guiding teams in the implementation of watershed restoration. Part 2 builds on Part 1, which focused on concepts, definitions, and principles.

Note that this Guidebook is meant to serve as a reference for project managers and technical staff who are designing projects, writing proposals, and facilitating watershed restoration projects. The tools, resources, and case studies presented in this document draw from a mix of CRS' relevant guidebooks plus external resources.

How this Guidebook is organized

- This Guidebook provides a stepwise approach to watershed restoration. However, it is not a comprehensive implementation manual. Rather, we point readers to tools and manuals that are practical and useful for each step of the Watershed Restoration process. Wherever possible, we point readers to CRS guidelines and manuals, but we draw from external sources as well.
- Choose the tools that fit your context and purpose: We expect that readers will analyze the various resources presented and take the initiative to decide for themselves which resources and tools fit for specific contexts and goals. For example, some resources focus on agricultural development in watersheds, others on protecting drinking water sources, and others on market development in a watershed context.
- Choose a methodology but be willing to adapt when necessary: Experience tells us that the most efficient and effective way to achieve results is to move in a stepwise manner with a clear methodology. Many projects fail because project teams either fail to use a clear methodology and/or do not clearly communicate to stakeholders the methodology they are applying. We strongly recommend that once a team decides on a method and set of tools, that they stick with these and only make changes in consultation with stakeholders, and clearly communicate the rationale for making changes.

Part 2 is organized into three major sections plus several Annexes.

- 2.1 Key Resources and Guides
- 2.2 Guidance for facilitating watershed restoration
- 2.3 8 Steps for Watershed Restoration
- 2.4 Recommendations for agriculture and NbS for watershed restoration
- Annexes, including references to tools, guides, manuals, and studies

A mangrove forest in El Salvador. [Photo by CRS Staff]

Section 2.1: Key Resources and Guides

Part 2 of this Guidebook is based on (a) CRS field experience in watershed restoration, (b) CRS rural development resources, and (c) resources and recommendations from external watershed restoration programs. Key resources are listed in each section (step) of this documented and included in the annexes. Below are a few resources that most influenced this Guidebook:

- CRS Understanding/Managing Natural Resources, SMART Skills Manuals
- CRS Malawi WALA Program (project documents and evaluation reports)
- CRS Guide to Facilitating Community-led Disaster Risk Management
- CRS Source Water Protection Guide
- EPA Handbook for Developing Watershed Plans to Protect our Waters
- Water Funds Toolbox by The Nature Conservancy
- EMPOWERS Approach for Water Governance

2.1 Key Resources and Guides
2.2 Guidance for Facilitators
2.3 8 Steps for Watershed Restoration
Step 1: SCOPE
Step 2: ENGAGE
Step 3: MAP
Step 4: PLAN
Step 5: DESIGN
Step 6: ACT
Step 7: SUPPORT
Step 8: ADAPT
2.4 Recommend-ations

Section 2.2: Guidance for facilitators

Part 1 of this Guidebook highlighted the importance of empowering watershed stakeholders at every step of the watershed restoration process. Building from the 10 Principles from Part 1, CRS and its partners should see themselves as facilitators of stakeholder-led activities, rather than the primary actors who are responsible for watershed restoration.[1]

Effective facilitators must be willing and able to adapt processes and approaches to each context, depending on the relative capacity of stakeholders, and/or the complexity of the watershed restoration project, and/or the level of conflict amongst stakeholders. Stakeholders with very little experience may require considerable support from the project facilitator team, while other stakeholders may be very experienced and require a lighter touch, where the facilitation team serves only as a guide.

Facilitation is a team effort: Facilitating watershed restoration processes requires a team approach, where CRS staff and partners contribute expertise across a wide range of skillsets: social, technical, administrative, etc. The role of the facilitator team is to build stakeholder capacity, to foster social cohesion, and assist stakeholders to resolve problems that they are not capable of resolving on their own. The role of the facilitation team is to help stakeholders keep on track. If this works well, the facilitation team will come to be trusted and become knowledgeable about the issues, problems, and dynamics amongst stakeholders. As far as possible, facilitation teams should work constructively with government representatives and institutions to ensure that the watershed restoration work is aligned with policies, programs, and budgets.

The facilitation role will likely change over the course of the watershed restoration program, usually reducing the number of field staff required. There are costs to consider, such as salaries, logistics, travel, office space, and communications. Ideally, costs are kept lean to maximize funds dedicated to field activities and mitigate the risk of stakeholders over-relying on the facilitation team.

Look for and cultivate leaders at every stage: Some leaders will emerge right at the start of the watershed restoration process, while others may start out with lots of energy then fade back as they realize how much work it requires. Other leaders may only emerge over time, as they build trust and belief in the process. Some of the quieter or more cautious leaders may need encouragement; very often there are women and young people who have leadership potential but have not been encouraged to be leaders and may face some barriers or resistance from traditional leaders.

1 See the definition of **facilitation** from: The Springfield Centre, The Operational Guide for Making Markets Work for the Poor (M4P) Approach, 2nd edition (Chicago, IL: The Springfield Centre, 2015) 3.

Your exit strategy should be clear from the start: As facilitators, CRS and its partners need to be clear about their exit strategy even at the start-up of the program.[2] The goal is for stakeholders to assume leadership of the watershed restoration process, and that should start as early as possible. It is important to set milestones for leadership transition, making clear to the facilitation team and to stakeholders how roles will transition over time, setting clear expectations indicators with dates.

We recommend the following resources for understanding the role of facilitators:

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS Guide to Facilitating Community-Led Disaster Risk Management	This guide is designed to help facilitators. While this guide is designed for disaster risk management, many of the tools and instructions can be adapted to watershed restoration processes.	• See "Principles", p. 6-11. • See guidance on facilitating project start-up, p. 14-17. • Resource B provides guidance on recruiting facilitators, p. 75-76. • Resource C provides guidance from experienced facilitators on good practices, p. 77-78. • Resource F is a checklist for facilitators, p. 81-82.
EMPOWERS: Role of Facilitators	The entire EMPOWERS approach is based on facilitating processes with stakeholders.	• Description of the role of facilitators, p. 17-19 • A description on building capacity of facilitators, p. 118-123

2 The Springfield Centre, Operational Guide for Markets M4P Approach, 26.

Section 2.3: 8 Steps for Watershed Restoration

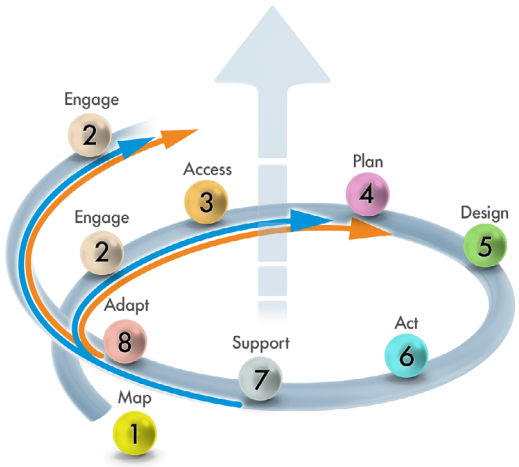
This section provides guidance, tools, and examples for the 8 Steps of Watershed Restoration.

8 STEPS OF WATERSHED RESTORATION	
1	Scope: Preliminary watershed characterization
2	Engage: Stakeholder identification and engagement
3	Map: Participatory mapping and data gathering
4	Plan: Collaborative visioning and strategic planning
5	Design: Design of watershed restoration interventions
6	Act: Carry out field activities
7	Support: Building sustainable institutions and funding for the long-term
8	Adapt: Monitor, reflect, and adjust activities

Watershed restoration as a virtuous cycle

The watershed restoration process is cyclical and iterative, with learning and reflection giving continuous feedback to stakeholders and project facilitators who adjust activities accordingly. Similarly, experience and collective reflection build social capital and institutional capacity for long-term sustainability. To reflect this virtuous cycle, the diagram at the right shows how the "Support" and "Adapt" steps from one project cycle can be carried forward into new projects, thereby leading to higher level outcomes of the watershed restoration process over the long-term.

Figure 1.CRS 8 Steps for Watershed Restoration



2.1 Key Resources and Guides
2.2 Guidance for Facilitators
2.3 8 Steps for Watershed Restoration
Step 1: SCOPE
Step 2: ENGAGE
Step 3: MAP
Step 4: PLAN
Step 5: DESIGN
Step 6: ACT
Step 7: SUPPORT
Step 8: ADAPT
2.4 Recommend-ations

Note that CRS' 8 Steps for Watershed Restoration are similar and consistent with many development frameworks and approaches, including CRS Guide to Facilitating Community-led Disaster Risk Management (10 processes); the CRS Source Water Protection Guide (6 steps),[3] TNC's Water Fund Toolbox,[4] the EMPOWER Approach Water Governance Management (6 Steps),[5] USAID's Water Security Improvement Process (5 steps), the Ethiopia Community-based Watershed Management Guidelines (6 steps),[6] CRS SMART Skills – Managing Natural Resources (7 steps), CRS Approach to Market Systems Development, and CRS Value Chain Toolkit (7 methods).[7]

CRS project staff should be familiar with these various frameworks and methodologies, depending on donor requirements, governments, or partners. What is important is to understand the logical flow and phases common to these frameworks, which are designed to empower stakeholders – starting from project conception to implementation, monitoring, and post-project management.

As mentioned above, we strongly recommend that project facilitators (a) review and analyze the resources and tools recommended for each Step in this Guidebook, (b) define for themselves the methodology and tools that fit their context and purpose, then (c) follow that methodology. We caution readers that too much improvisation may lead to confusion and frustration on the part of project staff and stakeholders, which could undermine the goal to empower stakeholders as leaders and decision-makers. On the other hand, too much rigidity may also frustrate stakeholders when activities do not seem to be relevant or necessary. When a clear method is used, project facilitators can work with stakeholders to adjust the watershed restoration process, but these changes should be clearly communicated and agreed upon by key stakeholders.

A healthy cattle farm on hillsides in Colombia. Note the dispersed trees and fencing. [Photo by CRS Staff]

3 "CRS Source Water Protection Toolbox & Repository," CRS, accessed October 4, 2023.

4 "TNC Water Funds Toolbox," TNC, accessed September 30, 2023.

5 Patrick Moriarty, et al. The EMPOWERS Approach to Water Governance: Guidelines, Methods, and Tools (Amman, Jordan: Inter-Islamic network on Water Resources Development and Management (INWRDAM), 2007), 11.

6 Lakew Desta et al., eds. Community Based Participatory Watershed Development: A Guideline. Ministry of Agriculture and Rural Development (Addis Ababa, Ethiopia: Ministry of Agriculture and Rural Development, 2005) 22-58.

7 Jefferson Shriver, Shaun Ferris, and Dan Barthmaier, Value Chain Toolkit: Harnessing the power of markets to drive change (CRS, 2019).

Step 1: Scope: Preliminary watershed characterization

Preliminary characterization is often carried out prior to project design or implementation. In some cases, where project teams have sufficient time and resources to develop detailed project proposals, preliminary information may be gathered in the proposal development phase. This preliminary work will help frame the scope of potential projects and help identify challenges and opportunities that exist. To gather this information, project staff and other professionals will carry out literature reviews, geospatial analysis, and expert consultations to characterize the watershed, such as size, geology, water resources, soils, land use, population, and other information. This information will be helpful and necessary when engaging stakeholders in subsequent steps.

Scale matters. Preliminary characterization are important activities for estimating the scope and scale of watershed restoration projects. In Part 1, we explained that CRS usually works at sub-watershed and micro-watershed levels. The scale of work is directly related to costs and timeframe, which is important for developing concept notes and proposals that match the scale, timeframe, and budgets of specific funding opportunities.

The scale of the watershed and the scale of a potential watershed restoration project determine the scope of the preliminary watershed mapping exercise.

- For relatively small and short-term projects, it may be enough to gather basic information and validate it quickly with partners and local organizations. This is the kind of information that might go into the background analysis for a concept note or proposal.
- For relatively large or long-term projects, the preliminary mapping exercise can be a small project, taking many weeks or even months, with significant documentation.

Some core questions are helpful in Step 1:

- Why are we working in this watershed? Usually, there is a clear reason why CRS is working in a specific watershed, such as issues around food insecurity, water insecurity, drought, or other issues. In other situations, we may choose to use the watershed framework to help organize project planning, even if a project is not explicitly described for watershed restoration.
- Who else is working in the watershed? In almost all cases, there will be other development actors or government agencies working within the watershed, or that have worked within the watershed in the recent past. It is important to include these actors in this first step, whenever possible.
- What is already known? Often NGOs or government agencies will have carried out watershed mapping exercises and documented information through proposals, plans, or reports. Honor the stakeholders in the watershed by researching and reading whatever is available before organizing meetings and workshops to generate information that has already been collected and analyzed. They will appreciate you for doing your homework before meeting with them.

OUTPUTS EXPECTED FOR STEP 1:	
1	A description of why the watershed or territory and why it is a focus of the proposal/project
2	A map with basic biophysical and demographic information (see list below)
3	A list of sources (reports, publications, maps, data) relevant to the watershed

Below is a list of basic watershed characteristics that are typically collected during Step 1:

- Size and location of watershed (delineate the watershed)
- Land-use (e.g., forests, cities, water bodies, farmland, pastures, etc.). Ideally this will include a map and approximate area (hectares) of different land uses.
- History of land use changes over the past 10 to 50 years
- Soil types, topography, geology of the area
- Precipitation (annual, monthly) – ideally graphs showing rainfall patterns.
- Evaporation and transpiration estimates (referred to as potential evapotranspiration, or EVP)
- Population within the watershed; cities, towns, urban population. Data should be disaggregated by sex, age, and other demographic characteristics.
- Population that depends on ecosystem services (for example water supply), which may include populations outside of the watershed (for example a city that depends on water)
- Key problems related to the watershed – why is a restoration project required in this area? Are there problems related to access to safe water? Is untreated wastewater affecting downstream communities? Is drought a problem? Is food security an issue? It is important to explicitly include gender and youth lenses in this analysis.

List of characteristics that are helpful to have but may not be available or easy to acquire during Step 1:[8]

- Water balance (simple)
- Water infiltration potential across the watershed
- Water quality (groundwater and surface water)
- Water flow data, especially in dry seasons
- Area of land under irrigation, or potentially under irrigation
- Groundwater information, mapping of existing wells
- Map of water access points and water systems, general characterization of water security
- Areas of conflict or disagreements over water, such as potential risks of gender-based violence or issues of discrimination in access to water.

A stream waterfall in El Salvador. [Photo by CRS staff]

8 This list draws from a CRS discussion paper, "CRS Watershed Minimum Standards and Metrics," (CRS internal document).

Below are resources and tools relevant to Step 1. See Annex 2 for additional technical resources relevant to this step.

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS Source Water Protection Toolbox Component 2: Characterize	Component 2 of the SWP toolbox is "Characterize and Assess the Water Source",[9] including (a) delineation, (b) analysis of water quality and quantity, (c) inventory or land uses and threats, (d) climate risk assessment, and (e) institutional analysis.	This tool is especially useful for watershed restoration projects designed to protect water sources.
Water Funds Toolbox – TNC How to Carry out a Situation Analysis Report	This resource provides guidance on how to evaluate the feasibility of developing a Water Fund, including details on water resources and a thorough water security situational analysis, accompanied by supporting maps and an initial stakeholder inventory.	This is an interactive, online guide can be adapted for analyzing a complex watershed.
EPA Watershed Handbook Chapter 4 – Define Scope	This Handbook for Developing Watershed Plans to Protect our Waters provides comprehensive,[10] step-by-step guidance for how and why to gather data and define the project scope.	The total guide is 400 pages (with annexes, etc.). It is the ultimate guide for those willing and able to use. It.
CRS Guide to Facilitating Community-led Disaster Risk Management	Process 5 of this guide describes how to carry out participatory community mapping.	• See section on participatory community mapping. (p. 37 – 42)
CRS Value Chain Toolkit (2018) Method #1, Territorial Analysis	"Method 1" of the Value Chain Toolkit is "Territorial Analysis" which gives clear guidance on defining a project zone and creating a visual inventory of partners, assets, and market relationships.	• See Chapter 2, p.20-22 • Annex 2.1 provides guidance on organizing workshops for territorial market analysis.

9 "Phase 1: Feasibility," CRS Water Funds Toolbox (The Nature Conservancy, 2023).

10 Handbook for Developing Watershed Plans to Restore and Protect our Waters, United States Environmental Protection Agency, March 2008. https://www.epa.gov/sites/default/files/2015-09/documents/2008_04_18_nps_watershed_handbook_handbook-2.pdf

Step 2: Engage: Stakeholder identification and engagement

Step 2 of the Watershed Restoration process is stakeholder identification and engagement. The goal is to be as inclusive and broad as possible and not exclude any stakeholder group (major or minor) in the consultation process and subsequent planning activities. Facilitators will work with community leaders e.g., local government, agriculture cooperatives, water boards, religious groups (churches, mosques, temples), women groups, youth groups, and organizations that support people with disabilities to identify watershed stakeholders.

Whose project is it? A Project Committee should be formed at the start of Step 2. Ideally, the committee will be formed as part of an organizational body, such as a Watershed Committee, a community planning organization, or similar bodies. It is important that the Project Committee represents the various interests and perspectives amongst stakeholders and decision-makers that will be involved in planning and implementing watershed restoration activities. In communities or territories where there is a lot of tension, it may be necessary to organize a "preliminary project committee", then form a more permanent committee at the end of Step 2 or in Step 3. Similarly, in situations when the Project Facilitation Team does not feel there is sufficient cohesion or inclusion within the existing organizational bodies, it may make more sense for the facilitation team to assume a more prominent role in Steps 2 and 3, with the goal of creating conditions to form a more inclusive and representative Project Committee during the process.

CRS' Resilience Food Security Activity (RFSA), entitled Ifaa (Afaan Oromo for "light"), will brighten the future for poor communities in Oromia by reducing intractable poverty, vulnerability, and food insecurity. A program participant showcases her produce. [Photo by Melikte Tadesse/ CRS]

Watershed stakeholders are all those who use, access, and manage the natural resources in the watershed, and who affect or are affected by the activities taking place there. This may include people who live within the watershed, as well as those who live outside but who depend on or impact its resources and functions. Knowing the area and limits of a watershed helps us to critically assess which stakeholders are relevant to that watershed, what livelihood activities and natural resource use occur within the watershed, the stakeholders' interests, and relationships, and how these stakeholders and activities might affect, or be affected by, watershed functions.

Step 2 involves building a thorough understanding of different stakeholders, their rights, and their responsibilities. Who has access to resources, who controls resources, who makes decisions over resources? What risks do different groups of people face in use of or changes in natural resources? What divisions exist related to wealth, gender, ethnicity, or other reasons? In Step 2, it is important for facilitators to work with women, youth, people with disabilities and any groups that may be marginalized from development processes.

Gender Assessments. Gender-based analysis should be applied during each step of the watershed restoration process, beginning with Step 2. Our suggestion is to use the CRS gender conceptual framework, which analyses gender dynamics across six domains: access and control of resources; power dynamics and decision-making; roles, responsibilities, workload and time-use; , leadership and participation; cultural norms and legal environment The framework applies a Socio-Ecological Model (SEM) to understand how an individual's gender-related behavior is influenced by factors at the individual, relationship, community and society level.[11]

OUTPUTS EXPECTED FOR STEP 2:	
1	A Project Committee is formed, that is inclusive and representative of various stakeholders
2	Stakeholder mapping that identifies all stakeholders that will impact or be impacted by watershed restoration efforts.
3	Preliminary description of stakeholder interests, and whether they are in line with basic goals of watershed restoration (include gender-sensitive lens)
4	Identification of the primary stakeholders to be directly engaged in the watershed restoration process. Assess groups that may be excluded or discriminated or marginalized, e.g., women, youth, people with disabilities, etc.
5	Identification of potential conflicts, at the watershed scale, between or within communities, and between and within groups or families.
6	Identification of supporting and external actors who can support or hinder watershed restoration.

Below are references to several guides and tools that may be useful for Step 2: Engage.

11 See description of Socio-Ecological Model in CRS, Global Gender Strategy 2020-2030: Summary (CRS, 2020), 2.

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS SMART Skills – Managing Natural Resources Lessons 1 and 3 Identifying and Engaging Stakeholders	Lesson 1 provides practical guidance and tools on "Engaging the Community" and Lesson 3 is "Identifying and Engaging Stakeholders".	See Lesson 1 p.3-12 See Lesson 3 p.35-41 • Exercise 3 Stakeholder Analysis p.40-41
CRS: Guide to Facilitating Community-led Disaster Risk Management Stage 1: Engage	Stage 1 ("Engage") includes Process 1 (Inclusive Foundations) and Process 2 (Reach-out for Buy-in). The guidance is for disaster risk management, but it can be adapted and applied for watershed restoration.	See pages 13-25 for steps, tools, and examples on the initial steps for community engagement.
CRS Source Water Protection Toolbox Component 1: Vision	Component 1 of the SWP Toolbox is "**Cultivate a shared vision**", working with stakeholders and identify motivators for pursuing SWP.	This tool is especially helpful for watershed restoration projects focused on protecting water sources.
TNC: Stakeholder Mapping Methodology[12]	This guide was designed by TNC and AFD for Stakeholder Mapping. It is part of the Watershed Investment Program and the Financing Nature for Water Partnership.	The full guide is less than 10 pages, very clear and concise.
IFPRI: Net-Map Toolbox: Influence Mapping of Social Networks[13]	This 20-page guide provides a clear and interesting interview-based process for mapping stakeholder influence in decision-making.	This is a great example of using participatory tools for improving inclusion in stakeholder assessments.
WFP: Gender and Stakeholder Analysis	This 6-page guide from the World Food Program provides basic steps and checklists related to gender and inclusivity.	This is a simple guide, especially useful for an introduction to gender analysis.
Reading Material – Training for WALA Malawi on Micro-watershed Development	This manual was developed for the WALA project in Malawi by the Watershed Organization Trust (WOTR) of India. This is a comprehensive step-by-step manual for watershed management and planning. The structure and format of this manual are dated, but the content is very good.	The sections on Gender and Watershed Development. (p. 11 and p.15-33) are especially useful.
The EMPOWERS Approach to Water Governance	The EMPOWERS guide offers guidance and tools for stakeholder engagement and analysis.	• Guidance on carrying out semi-structured interviews: p. 69-70. • Guidance on stakeholder identification, p. 99-101. • Tools to map and visualize stakeholder relationships, p. 104-110.

12 The Nature Conservancy (TNC), Stakeholder Mapping: Deep Dive (TNC, 2023).

13 Eva Shiffer, "Net-map toolbox: Influence Mapping of Social Networks," Conference paper, presented at the Documentation of Research 20/2007, Integrating Governance & Modeling Project (CPFW). Colombo, Sri Lanka: Challenge Program on Water and Food (CGIAR), 2007).

Step 3: Map: Participatory watershed mapping and data gathering

Participatory mapping and data gathering involve the combination of (a) gathering and analyzing information from specialists, government agencies, and other "external" actors and (b) sharing and gathering information with watershed stakeholders, primarily community representatives. Information includes physical data (soils, land use, water sources, water quality, etc.) as well as social, political, and economic information. Issues around water security can be key drivers for watershed dynamics that will come out during this process.

Fundamental to Step 3 is that it is participatory, it is about stakeholders learning and sharing to increase their own knowledge about their context and building social cohesion through meetings and workshops. It should never be an "extractive" exercise, where field staff (and other external actors) collect data solely for project purposes.

This step will build on the preliminary mapping and characterization that was conducted in Step 1.

Typically, information is gathered in workshops or focused-group-discussions over a few weeks or months, but project staff should also recognize that this process is continuous and iterative; information can always be added, corrected, and updated.

As mentioned in Step 1, the amount of data and analysis will depend on the scale and scope of a watershed restoration project. Short-term or small-scale projects will generally need less information than large-scale and long-term projects.

Vila Cachoeira locals working on the Map activity. In Brazil, the municipalities of Ilheus and Dario Meira in Bahia State are areas affected by frequent, cyclical crises—such as flooding, deforestation, landslides and mining—that lead to emergency setbacks in the lives and livelihoods of families and communities. [Photo by Felippe Thomaz/ CRS]

Who else is working in the watershed? In almost all cases, there will be other development actors or government agencies working within the watershed, or that have worked within the watershed in the recent past. It is important to include these actors in this first phase.

What is already known? Often NGOs or government agencies will have carried out watershed assessments and published information through proposals, plans, or reports. Honor the stakeholders in the watershed by researching and reading whatever is available before organizing meetings and workshops to duplicating efforts that have already been collected and analyzed. They will appreciate you for doing your homework before meeting with them. In many cases, outside researchers don't share with the communities the results of their studies, so this could be a good opportunity for the CRS-led team to share existing information back to communities, which they can validate, correct, or augment.

GUIDING QUESTIONS FOR ANALYZING GOVERNANCE IN THE WATERSHED:[14]	
1	Which institutions, regulatory framework, rights, informal agreements have influence on the management of the watershed? What local cultural norms may affect watershed restoration?
2	Are there interests or management mandates that are in conflict to the general goals of watershed restoration?
3	Are there other programs, projects, NGOs, companies, or other actors that influence the management of the watershed?
4	What is the relative power of local stakeholders, civil society, government, and private sector in the watershed?
5	Are the practices used by targeted stakeholders in line with policies and institutional mandates? Are there practices that contradict policies and mandates?
6	Are there mechanisms for stakeholders of diverse groups to be involved in decision-making, are there mechanisms for resolving conflicts, and are they being effectively applied?
7	Are there underlying land tenure issues or structural social and economic inequalities that prevent genuine participatory engagement in analyzing and planning activities in the watershed?

14 Adapted from: Ruth E. Mathews et al, Implementing the source-to-sea approach: A guide for practitioners (Stockholm: SIWI, 2019), 33.

OUTPUTS EXPECTED FOR STEP 3: MAP	
1	An information base (database) is created to support stakeholder dialogue and contribute to strategizing, planning, and monitoring project interventions. The information base must be accessible to stakeholders and user-friendly.
2	A GIS-based mapping tool that is linked to the information base. Ideally information is also shared using Mapeo-A-Mano so stakeholders without computer competency can participate. See Annex 2 for details on Mapeo-A-Mano.
3	An analysis of how the watershed has changed over the years, the drivers of those changes and how the changes have affected different populations within the watershed
4	An identification of problems and analysis of causes of those problems
5	Identification of gender and age-based dynamics, barriers and opportunities that contribute to recommendations for ensuring equitable watershed restoration
6	A description of ongoing and recent development initiatives, and their outcomes
7	An analysis of existing institutions (local, regional, national) that impact on the watershed, including historic community, customary, or tribal management history of natural resources?

Mapping and spatial analysis. It will often be helpful in Step 3 to carry out more detailed mapping exercises, like those described in Step 1, but this time stakeholders will be more engaged in carrying out the activities and analyzing the results. See Annex for additional tools and resources related to mapping and spatial analysis.

A note on watershed modeling tools: In large-scale and sophisticated watershed restoration projects, it is often necessary (and required) to use modeling tools for assessment and data analysis. There are many tools designed specifically for gathering and analyzing information at the watershed scale. The choice of which tool to use will depend on the overall goals and scope of the watershed restoration program and the availability of data required for modeling. See Annex 2 for descriptions and recommendations for specific modeling tools and their applications.

The table below provides recommendations for tools and guides related to Step 3:

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS SMART Guide – Managing Natural Resources • Lesson 2: Understanding Community Context • Lesson 4: Mapping Problems and Opportunities	Lesson 2 provides clear and practical guidance on "Understanding the Community Context", including several community-based exercises. Lesson 4 provides guidance and community based-exercises related to mapping and analyzing problems, and identifying hotspots on farms and watersheds.	See Lesson 2 p.13-34 + exercises: • 2A Vulnerability Analysis p.22-23 • 2B Mapping Resources p.24-25 • 2C Seasonal Calendar p.26-27 • 2D Transect Walk, p.28-30 • Issues Analysis, p.33-34 See Lesson 4 p.43-50 • General guidance p.43-48 • 4A Social Resource Map p.52-54 • 4B Gender Roles p.55-56 • Google Earth Map p.57-58 • 4C Identify Hotspots p.59 • 4D Problem Tree p.60-62
CRS Guide to Facilitating Community-Led Disaster Risk Management	Stage 2 (Assess Risk) of this Guide provides clear guidance on organizing meetings and workshops for participatory assessments, which can be adapted and applied to watershed restoration.	• Process 3, analyzing cycles and trend, p. 29-32) • Process 4 "Past, Present, and Future" p. 33-36 • Process 5 community mapping and other tools p.37–42 • Resource K, livelihoods issues and solutions p.92-93 • Resource L, WASH issues and solutions p. 94-96 • Resource N, NRM issues and solutions p. 98-99
Water Funds Toolbox - Stakeholder Assessment and Mapping Guideline[15] The Nature Conservancy	This 7-page guide provides a very clear description on how to carry out stakeholder assessments and mapping with examples of forms used to record and report this information.	• The tool is a short Word document, practical and useful for identifying and characterizing stakeholders and their relationships.
EPA Watershed Handbook Chapter 5 – Gather Data	This Handbook for Developing Watershed Plans to Protect our Waters provides comprehensive, step-by-step guidance for how and why to gather data with stakeholders.	• Chapter 5 is 45 pages. The total guide is 400 pages (with annexes, etc.). It is the ultimate guide for those willing and able to use. It.
EMPOWERS: Analysis	This section of the EMPOWERS guide provides simple tools for community-based problem analysis.	Relevant tools: • Problem Tree Analysis p. 66-68 • SWOT Analysis p.71-72 • Water Balance p.87-89
M4P Operational Guide for Market Systems Development Step 2: Diagnosis	**The M4P Guide Step 2**, "Diagnosis", provides excellent guidance and steps, framed around the question, "Have you understood the root of the problem?"	See M4P Step 2, Diagnosis, p. 13-20.

15 Latin American Water Funds Toolbox (LAWFP),"Stakeholder Assessment and Mapping Guideline," (The Nature Conservancy, 2023).

El Salvador 2023 monitoring climate and water balance on farm. [Photo by CRS staff]

Step 4: Plan: Collaborative visioning and strategic planning

Step 4 is where the goals and objectives of projects are defined. This is a multistakeholder process, led by the Project Facilitation Team, involving local stakeholders in concert with government agencies, NGOs, staff, and other actors.

In many cases, this is the most complex and sensitive stage in the watershed restoration process. If there are conflicts amongst stakeholders, those will often surface in the visioning and planning process. During this stage, project facilitators must apply conflict sensitivity approaches and be proactive in giving voice to a diverse set of actors, especially women, youth, and marginalized groups who are often ignored or excluded from planning processes.

Whose project is it? Facilitators need to ensure that the project is designed to support stakeholders to implement their own plan, rather than treating stakeholders as the implementers of a plan created by external actors. (See the principles described in Part 1 of this Guidebook).

Visioning and planning processes can be carried out over a short period in small watersheds and short-term projects, or where there are only a few stakeholders. In larger and more complex watersheds, this process can take many months, especially in highly contested watersheds where divergent and contradictory goals can prevent stakeholders from arriving at a common vision.

GUIDING QUESTIONS FOR VISIONING AND PLANNING:[16]	
1	What is the long-term impact that the project is aiming for?
2	What social, environmental and/or economic benefits will be reaped by the primary stakeholders? (Disaggregate this by gender, age, ability, other key groups). To what extent will resilience be increased as a result of the project?
3	What practices are to be used by the targeted stakeholders to achieve the long-term impact of the project? How do these practices consider stakeholders gender, age, ability , health, etc.?
4	To what degree are enabling conditions present for the desired changes in practices to occur and sustain over time?
5	What gender, age and ability tailored activities and intervention strategies will change the practices of the targeted stakeholders and establish the necessary enabling conditions?
6	A description of ongoing and recent development initiatives, and their outcomes

Visioning: Visioning is a stepwise reflection process that helps communities agree on what they see for their collective future. The vision should be long-term and comprehensive, often beyond the timeframe or scope of a single project. It is critical not to rush or force the visioning process, as a shared vision is the foundation of all follow-up planning and project interventions. It is often helpful to organize field trips to successful watershed restoration projects to broaden people's imagination of what might be possible for their watersheds. In many cases, the visioning process should be guided by skilled facilitators who use inclusive processes. Based on local context, processes that support women, youth and other marginalized groups to engage in the visioning process is needed.

Scenario building: Scenario building is an intermediate stage between visioning and planning. It provides an opportunity for stakeholders to brainstorm potential and probable future scenarios, based on their experience, knowledge, and learning from diverse community members within their group. Scenario building is especially helpful when stakeholders may have divergent visions for the future, or where stakeholders' visions for the future are either too pessimistic or overly optimistic. A scenario building exercise may help identify a middle pathway that is both possible and desirable.

Goal Setting: Goals are specific impacts or outcomes that the project team and stakeholders define. The goals are derived from visioning and scenario building. The goals should provide clarity on what people hope to achieve in a reasonable timeframe to restore their watershed. The more specific goals are, the better. Goals can be long-term and short-term. It is important that the goals are defined and prioritized by diverse sets of stakeholders, especially women, youth, and other groups.

16 Adapted from Ruth E. Mathews et al, Implementing the Source-to-Sea Approach: A guide for practitioners. (Stockholm: SIWI, 2019), 41.

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2.4 Recommend-ations

Below are examples of program goals relevant to watershed restoration:

- Protect water sources for people living within and beyond the watershed whose access to safe and abundant water is threatened
- Improve agricultural production for rainfed farmers who suffer from low crop productivity
- Expand access to irrigation for farmers to increase incomes and resilience to drought
- Improve rangeland and forage management for livestock
- Ensure access to water for livestock
- Improve water quality (surface or groundwater) by mitigating activities that pollute water
- Adapt and build resilience to the impact of climate change

Building a Theory of Change: It may be helpful to develop a theory of change so that project teams and stakeholders clearly explain how their activities will lead to the solutions they desire. The process of developing of theory of change requires planners to question their assumptions and can help refine the interventions. (See the table below for guidance on developing a theory of change).

Planning: The project planning process involves identifying the priority interventions for watershed restoration. The planning process defines the scope of a project (large or small) depending on the time and resources constraints of specific projects. A plan is a coherent set of steps to allocate resources to carry out work within a defined timeframe and budget. A plan defines methods, tools, roles and responsibilities, schedules, and budget estimates. There will probably be many plans to achieve different parts of the watershed restoration strategy. Effective planning uses a variety of tools that match the complexity, size, duration, and cost of activities. The plan should include the sources of funding for each of the activities in the plan. Planning tools must include gender-aware approach, building from the assessment stage. Watershed restoration plans should explicitly reflect the priorities of women, young people, and other groups often excluded in decision-making.[17]

OUTPUTS EXPECTED FOR STEP 4: VISIONING AND PLANNING	
1	A vision is defined by diverse stakeholders, with various scenarios for achieving the vision.
2	Problem(s) to solve are prioritized by stakeholders.
3	Potential solutions identified, short-term and long-term, ideally with various scenarios evaluated.
4	Goals are defined and prioritized, both long and short-term.
5	Strategy defined for solving problems, with a results framework, and a theory of change.
6	General strategic plan defined, with summary of interventions, including gender interventions, roles and responsibilities, and timeframe/calendar.
7	Sources of funding identified for each set of interventions.

17 Celine Salcedo-La Viña, Ayushi Trivedi, and Keegan Grace, Enabling Women as Key Actors in Nature-based Solutions, Working Paper (World Resources Institute, 2023), 15.

The resources and tools below are relevant to Step 4: Visioning and Planning:

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS Guide to Facilitating Community-Led Disaster Risk Management	This guide provides guidance on planning and prioritizing solutions. Processes 6-9 of the Guide focus on planning and visioning activities.	• Process 6: Prioritize Community Challenges p.43-48. • Process 7: Deepen understanding of challenges p.53-56. • Process 8: Agree on Solutions p.57-58. • Process 9: Develop Action Plan p.60-63.
CRS Source Water Protection Toolbox Phase 3: Formulate	Phase 3 of the SWP Toolbox is "**Formulate** SWP Goals and Objectives" looking at 3 dimensions (1) temporal, (2) horizontal (scaling across an area), and (3) vertical (linking goals to other programs).	The tools for Component 3 include a checklist table, helpful for ensuring that goals are well formulated.
CRS Guide on Developing Logical and Results Frameworks (2007)[18]	This guide (30 pages) provides clear steps for creating logical frameworks and results frameworks.	Note: this guide is designed for project professionals NOT local stakeholders.
CRS ProPack 1 **The CRS Project Package**	The CRS ProPack 1 is a very thorough step-by-step manual for designing projects, mainly at the proposal stage.	• Gender integration checklist, p.12-14 • Chapter 5: Designing Results Frameworks and ProFrames, p.57-74 • Chapter 7: ProFrame Design, p.87-96
CRS Practical Guide on Developing a Theory of Change[19]	This guide (16 pages) provides clear guidance on developing a theory of change.	Note: this guide is designed for project professionals NOT local stakeholders.
CRS SCP3 Land Restoration Theories of Change	See the one-page Theory of Change (Land Restoration) and one page, Theory of Change (Scaling)	These each are one-page documents that may help frame similar Theories of Change for projects.
TNC Water Funds Toolbox: Goal Setting[20]	This is a brief online guide with text and video explaining how to define water-related goals.	This is very clear and user-friendly. A good guide for understanding how to set and define goals.
EPA Watershed Handbook **Chapters 9-11**	Chapter 9 focuses on Setting Goals, Chapter 10 on Identifying Management Solutions, and Chapter 11 on Evaluating and Selecting Management Strategies.	These chapters are very detailed and technical, useful and recommended especially for large programs.
EMPOWERS: Scenario Planning and Visioning	The EMPOWERS guidance on scenario building and visioning is clear and practical.	• Description on scenario planning p.21-22 • Facilitating a workshop on Scenario Building p.53-56 • Visioning process p.23-27 • Facilitating a workshop on Visioning p.52

18 Carlisle J. Levine, Catholic Relief Services' (CRS) Guidance for Developing Logical and Results Frameworks. (Baltimore, MD: CRS, 2007).

19 CRS, Practical Guide on Developing a Theory of Change (CRS, 2020).

20 "Goal-Setting," CRS Water Funds Toolbox (The Nature Conservancy, 2023).

Step 5: Design: Create watershed restoration action plans

Building from the vision and planning step, Step 5 (Design) is more "nuts and bolts", often more technical and detailed than Step 4. The process of defining the action plan and interventions is as critical as the action plan itself. In Step 5 (Design) and Step 6 (Act) are where planning turns to action, so this is when and how stakeholder participation gets translated into commitments, co-investment and stakeholder accountability.

Whose project is it? Facilitators need to ensure that the action plan is designed to support stakeholders to carry out their own plan, as opposed to treating stakeholders as the implementers of a plan created by external actors. Facilitators should guide, coach, encourage and motivate stakeholders throughout the design process to contribute ideas, time, resources, and political capital. Stakeholder investment in designing and implementing the action plan will determine the outcome of project activities and the long-term durability and impact of project investments.

Technical assistance in Design Step: Ideally, technical assistance should be sourced as locally as possible. Our aim is to build technical expertise locally, so stakeholders have the expertise to carry forward the watershed restoration plan beyond the life of the project. When qualified experts exist locally (or within the country), we should avoid the cost of inviting in external experts during the Design Step. However, it is often necessary and worthwhile to bring in external experts in the design process, especially when watershed challenges are very complex. Whenever possible, terms of reference for external experts should focus on building local expertise.

Activities defined in the Design step will vary greatly depending on the problems, solutions, and the strategy defined during Step 4. Because activities will vary so much from project to project, this section describes only the general process of designing interventions. Specific guidance on project interventions will be provided in Section 2.4 and Annexes.

OUTPUTS EXPECTED FOR STEP 5: DESIGN	
1	Communication strategy for informing all stakeholders on priority activities
2	Detailed action plans and budgets for specific activities
3	Defined roles and responsibilities for each activity
4	Working groups or committees created for each activity (or set of related activities)

Below is an example of simple project start-up plan, using a GANTT chart format.

Year 1 (Y1) Start-up Activities			Months - March to August					
General	**Specific**	**Responsible**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
PROGRAM startup up activiites	Define a detailed implementation plan for each Program Area for Y1	PM, with team	x					
	Define project milestones	PM with team					x	x
	Recruit and train key staff	PM	x	x				
	Organize field trips and exchange visits	PM		x	x			
	Baseline surveys and reports	MEAI Officer			x	x	x	
	Procurement of equipment and materials	Procurement Officer	x	x				
	Start FFS at start of agriculture season	Field PM	x	x	x			
	Produce cover crops for seeds for late season and Y2	Field PM			x	x	x	x
	Design Gender Analysis plan	Gender advisor and PM				x	x	x
	Design SIGA work, budgets and partners	MEAI Officer				x	x	x
	Soil Sampling and SIGA tool applications	Field PM		x	x	x		
	Co-planning and preparation of farmer field schools	Field PM	x			x	x	x
	Design and launch of online tools for reporting, sharing, and communications	MEAI Officer					x	x
	Submit revised budget for Y2-Y4 with detailed workplans	PM						x

Below are tips to consider for Step 5, Design:

- Activities should be designed with those people that will be involved in implementation and will benefit from project interventions (this is the principle of subsidiarity explained in Part 1 of this Guidebook).
- Each activity should have its own design workshop, ideally in or near the community where the intervention will take place. Representatives of those who are to implement the activity should be included as active participants.
- Create an implementation plan with defined roles and responsibilities, budget, and timeframe for each intervention. (Budget for gender-related capacity strengthening, activities and monitoring and evaluation).
- Technical experts should work with stakeholders to ensure projects are designed, planned, and budgeted with technical rigor.
- A monitoring and evaluation process should be designed for each activity/ intervention, where local people participate defining specific indicators and participate in monitoring and evaluation processes. The process should be gender and age sensitive (See Step 8).

Recommendations for gender-responsive activities:

In addition to defining gender specific objective and outcomes, gender-responsive watershed restoration activities must be developed with male and female stakeholders and be responsive the findings of the gender analysis carried out in Step 3. Below are general recommendations drawn from CRS guidance on gender-sensitive rural development projects.[21]

- Include gender-specific interventions into watershed activities to address key gender analysis findings that impacts the implementation of watershed activities
- Adequately budget for gender-related capacity strengthening, activities and monitoring and evaluation.
- Consider strengthen linkages with other programs working on gender issues.
- Ensure restoration projects do not cause gender-based harm and consider how its design can mitigate gender-based violence associated with watershed restoration activities.
- Strengthen women's leadership capacity at the community level as well as at senior levels of planning and management. Create an enabling environment for women leaders to be accepted and respected

A hand drawn map of producer Carmenza Aráuz Hernández's farm is seen inside of her home Finca La Bendición. CRS and partner organization ADDAC have been helping farmers in the El Tuma - La Dalia region through the Cosecha Azul project, which provides technical training in coffee farming, restores and protects water resources, as well as provides training to ensure that water flowing from coffee-based watersheds are clean for communities downstream. [Photo by Morgan Arnold/CRS]

21 Adapted from: CRS, A Sample Gender Analysis, Abridged Version. (CRS, 2013).

Project Prioritization:

We recommend considering the following criteria when deciding on start-up activities:

A. Start with the problem stakeholders want to solve. CRS and its partners need to ensure that interventions solve the problems that stakeholders defined and prioritized in Step 4. If there is confusion or lack of consensus, go back to Step 4 and make sure that stakeholders are clear on priority interventions. Too often NGOs start projects having already decided what actions they will carry out. Sometimes, these actions have been pre-defined in project proposals. This often leads to mistakes, because (a) this disempowers stakeholders from making decisions and (b) NGOs may carry out the wrong activities because they do not respond to the needs and priorities of stakeholders.

B. Choose interventions that can deliver Early Recognizable Results: Below are the recommendations from the CRS Malawi WALA program on using short-term activities that provide stakeholders (especially farmers) incentives to engage in the broader watershed restoration process.[22]

RESOURCE / NAME	DESCRIPTION
Align incentives with immediate needs	Create incentives for low-income households that allow them to prioritize the preservation of natural resources over their immediate needs.
Highlight economic benefits along project life cycle	Create incentives for project sustainability by pairing short-term economic activities with benefits from long-term natural resource management.
Link markets to incentives	Create incentives for farmers to continue successful watershed management by creating market linkages that allow them to take advantage of improved yields.

C. Choose interventions that can be completed in a reasonable timeframe. If possible, try breaking up larger interventions into shorter-term activities, to give planners and stakeholders confidence in progress. This can be in the form of clearly measurable milestones. The idea is to avoid start-up activities that are overly ambitious, requiring unreasonable amount of time to get started and complete, which can undermine enthusiasm and buy-in of stakeholders.

D. Include training and technical assistance in project plans and budgets. Experience shows that training and technical support are critical for the successful design and implementation of project interventions. In many cases, CRS and its partners can have the greatest impact by delivering high-quality training and technical support versus providing material inputs. Evaluators of the WALA project described how the quality of technical support was a determining factor for the success of interventions and the lack of technical support was cited as a reason why some project activities did not succeed.[23]

- When budgeting technical support, some donors consider training and technical support as a "field activity" rather than "staffing", so in the design process, project facilitators should encourage stakeholders to include technical support and training in project activities and budgets.

22 University of Notre Dame Keough School of Global Affairs and CRS, WALA and Natural Resources Management in Malawi: Synthesis report, 25, Table 6: "Key Considerations for Short-term Incentives."

23 KSGA and CRS, "Barriers to Successful Watershed Management," WALA and Natural Resources Malawi, p. 20.

- In addition to watershed specific high-quality training and support, plan, and budget for gender training. CRS gender team is developing budget templates for many of the gender-specific interventions to ease staff budgeting adequately for them.

Below are recommended tools and guides for Step 5: Design.

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS SMART Skills Guide – Managing Natural Resources Lesson 5, Making NRM Management Plan	Lesson 5 provides a simple and practical guide on action planning and choosing NRM solutions.	See Lesson 5 p.63-75 • General guidance p.63-66 • Action Planning p.6768 • Budgeting p.68 • 5A Choosing Solutions p.71-73 • 5B Developing NRM Plan p.74-75
CRS ProPack 2: Chapter 3: Detailed Implementation Plans	CRS ProPack 2, Chapter 3 on Detailed Implementation Planning (DIP) is a very thorough guide on creating project plans. It builds on a ProFrame and presumes this has already been completed. (Refer to Step 4).	See: Activity scheduling and roles: p.74-82
CRS Source Water Protection Toolbox Phase 4: Action Plan	Phase 4 of the SWP Toolbox is "**Develop** SWP Action Plan" with stakeholder participation that lays out a "road map" to achieve SWP goals.	This tool is especially useful for projects designed to protect water sources.
CRS Guide to Facilitating Community-Led Disaster Risk Management	Process 6 of the Guide is "**Prioritize community challenges**."	See Process 6: Prioritize community challenges: p.43-47
EPA Watershed Handbook Chapters 12	Chapter 12 of the EPA Watershed Handbook is "Design Implementation Program and Assemble Watershed Plan"	This is comprehensive and useful, especially for larger programs.
EMPOWERS Approach to Water Governance: Strategy Development and Planning	Phase 3 of the EMPOWERS approach focuses on strategizing. "The aim is for stakeholders to decide on a range of practical actions to achieve their vision."	• Phase 3: Strategizing p.34-37. • Facilitating a workshop on strategic planning p.57-59 • Facilitating a workshop on planning: p.60-62 • Prioritization and ranking, p.73 • Cost-benefit analysis, p.96

Step 6: Act: Carry out field activities

Watershed restoration will involve many different activities across different parts of the watershed (e.g., upstream, downstream), involving various stakeholders.

Whose project is it? It bears repeating that in Step 6, the role of CRS and partners - as facilitators – is to support stakeholders in implementing activities they have prioritized and designed. We need to avoid treating stakeholders as "implementers" of a project designed by CRS or partners. This is a good moment to review and confirm project priorities with stakeholders. Are the activities in line with the vision, goal, and strategies defined in previous sections? Are these activities priorities for the people involved in and responsible for the projects? Ensure that project activities support the priorities of women, youth, and other groups who are typically marginalized.

Key points to consider in carrying out project activities:

- **Project calendars**: It is critical that stakeholders participate in defining the planning calendar, rather than having the facilitation team define this for stakeholders. Activities will need to be planned based on seasonal calendars that make sense for stakeholders, for example agricultural interventions need to be planned based on the agricultural cycle. Contributions by stakeholders need to consider current workloads and how workloads need to shift to accommodate watershed restoration activities. The project should be adjusted to what makes sense for stakeholders rather than having stakeholders adapt to calendars imposed by project timeframes.
- **Technical assistance and training**: The facilitation team should ensure that the people carrying out activities have the skills required and understand the purpose of project activities. Learning-by-doing on the part of stakeholders is as important as the quality of the activities performed. For gender-specific activities layered onto watershed restoration projects, experience has shown that these activities are best delivered by facilitators with gender expertise and those with gender-equitable attitudes.
- **Safeguarding**: It is during project intervention where project facilitators and local leaders create the environment, rules, and tools to protect participants from any kind of discrimination, harassment, or exclusion – especially women, youth, the elderly and people with disabilities. In addition to CRS Safeguarding policy[24] and principles,[25] the project leadership team should define its own set of safeguarding rules and reporting mechanisms, which are clearly communicated to all participants.
- **Participatory monitoring and reporting on activities**: Each activity, no matter how small, should include participatory monitoring and evaluation process. This helps builds transparency and accountability for the overall project, and it also helps stakeholders at every level build capacity in planning, monitoring, and reports (refer to Step 8).

24 CRS, "Catholic Relief Services (CRS) Policy on Safeguarding," CRS, accessed September 29, 2023.
25 "Catholic Relief Services tools on Safeguarding," Resource & Support Hub, 2020-2023.

OUTPUTS EXPECTED FOR STEP 6: ACT	
1	Each project/activity has a clearly defined purpose and plan, with budgets, and timeframe
2	Clear agreements on roles and responsibilities for carrying out activities and post-project maintenance and management
3	Projects are carried to a high quality based on agreed plans and within budget
4	Safeguarding plans and reporting mechanisms are set up and shared to all participants
5	Clear and simple monitoring and reporting tools defined and shared with stakeholders

Below are resources we recommend for Step 6: Act:

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS SMART Guide – Managing Natural Resources Lesson 6, Managing NRM Projects	Lesson 6 of this guide provides guidance on organizing and managing NRM action plans, for project facilitators. There are details on farm-based action plans.	See Lesson 6 p.77-84 • Training farmers p.77-79 • Work quality and Adaptive Management p.80-82 • Exercise 6 Adaptive Management and Most Significant Change p.84
CRS Source Water Protection Toolbox	Component 5 of the SWP Toolbox is "**Implement**: Action Plan Implementation" based on (a) comprehensive plan, (b) adaptive management approach, and (c) adherence to timeline and budget.	This tool is especially helpful for watershed restoration projects designed to protect water sources.
CRS ProPack II Detailed Implementation Planning	Chapter 3 of CRS ProPack provides steps and tools for activity planning and scheduling.	See Section 3, Activity Scheduling, p.74-82
EPA Watershed Handbook Chapters 13, Sections 13-1 to 13-4	Chapter 13 is "Implement Watershed and Measure Progress". Sections 13-1 to 13-4 focus on implementation.	This guide is detailed and technical, useful and recommended especially for large programs.
EMPOWERS Approach to Water Governance Project plans and budgets	Appendix 1 to the EMPOWERS guide provides simple and practical examples of project plans.	See Appendix 1, p. 141-143

Step 7: Support - Build sustainable institutions and co-investment strategies

Watershed restoration is a long-term and continuous process. Donor-funded projects can be helpful and necessary to start and scale-up watershed restoration processes, but for results and outcomes to be sustainable over the long-term, it is critical that the facilitation team and local leaders design work on long-term policy and co-investment strategies.

A. **Fostering an enabling policy environment**: Fostering an enabling policy environment requires project facilitators and local leaders to analyze how the watershed restoration priorities align with public policies, laws, plans, and programs. It is important to recognize that watershed management is part of larger government processes, where decisions are often made at district, regional, or national levels. How do existing laws or policies contribute to the goals of the watershed restoration plan, or how might laws or policies inhibit these plans? It is usually helpful to bring in external experts who know the laws and policies and can help local stakeholders and watershed managers understand and interface with institutions and policies. The Project Facilitation Team can play an important role in identifying good consultants or advisors.

   Existing policies and program: Often, national laws, policies, and programs can empower local decision-making. What changes might be required in the watershed restoration plan(s) to align better with existing policies or laws?

   Policy influence: Where laws or policies are not enabling, e.g., they are contradictory to the priorities and plans developed by local stakeholders, it may be necessary to advocate for policies, policy decisions, or ordinances that enable stakeholders to act. (This Guidebook does not offer specific advice on formal policy advocacy, but some resources below may be helpful).

B. **Co-investment and resource mobilization**: Very often, a single project will not have sufficient funds (resources) to support all the activities that stakeholders want to carry out in their watershed restoration plans. During the execution of the project, it is critical to identify potential partners that can co-invest in the watershed restoration plans. These may include government-supported projects, other donor-supported projects, or NGOs-supported projects.

   Co-investment: A key concept here is “co-investment” – how to attract municipal or district government, national level government programs, donors, NGOs, and other to invest with community organizations to carry out watershed restoration activities? Implicit in “co-investment” is the ability to demonstrate how local actors are investing their own resources (time, money, land, etc.) into the watershed restoration process.

   Resource mobilization: Another key concept is “resource mobilization”, which is broader and more strategic than just raising funds. In many cases, funding opportunities exist, but they need to be unlocked, or mobilized, through creative partnerships and engagement.

C. **Collaboration and partnership**: As highlighted in early steps and in Part 1 of this Guidebook, watershed restoration always needs to be a collaborative process, where partnerships are developed at every step.

Key Points to Consider for Step 7:

- ***From Project Committee to Watershed Committee***: In Step 2 of the Watershed Restoration project, we recommended that a Project Committee be formed and supported for planning, design, and implementation of watershed restoration activities. Throughout this process, we expect that the Project Committee, and other stakeholders, will have developed organizational skills, strengthened relationships, and developed capacity for problem-solving and conflict management. These experiences and skills will enable a Watershed Committee (or similar structure) to carry forward watershed restoration strategies and projects for the long-term. The Project Facilitation Team will have identified and trained leaders who may not been part of the Project Committee, but who could be effective for the Watershed Committee.
- ***From Project Planning to Watershed Planning***: The experience of planning, designing, and implementing watershed restoration activities will enable members in the Watershed Planning committee to apply the same skills and tools to develop longer term plans to carry forward what was started with the project.
- ***Role of Project Facilitation Team***: The role of the Project Facilitation Team in Step 7 is to continue supporting local leaders (including the Project Committee, Watershed Committee, or other organization) to create plans and strategies to carry forward what the project has started. Step 7 is an important process for handing over (the exit strategy), and empowering local leaders to lead processes. In Step 7, the Project Facilitation Team takes on more of a coaching and support role.

OUTPUTS EXPECTED FOR STEP 7: SUPPORT	
1	A Watershed Committee is formed and/or supported to develop a long-term plan
2	The Vision and Goals are reviewed, updated, and validated by a Watershed Committee
3	A Watershed Restoration and Management Plan is revised based on updated priorities, including alignment with public policies and programs supported by governments, donors, and NGOs.
4	Long-term funding strategy defined by Watershed Committee

Recommended resources for Step 7: Support

RESOURCE / NAME	DESCRIPTION	COMMENTS
Engaging Government: A CRS Guide for Working for Social Change[26]	The Engaging Government Guide (EGG) provides step-by-step guidance, multiple resources, and tools for influencing public policy, optimizing government institutional performance and increasing civic participation.	See: Key concepts, p. 1-8 See: Understanding context, p.9-22 See: Types of policy influence, p.24 See: Chapter 4, Optimal Institutional Performance, p.49-64
Financing Nature for Water Security: A How-to guide to Develop Watershed Investment Programs The Nature Conservancy, Water Funds Toolbox	The How-to Guide (HTG) for Watershed Investment Programs is a 78-page resource for those seeking to improve their water security via Nature-based Solutions (NbS) in a programmatic manner	The whole guide is an excellent resource for methodical approach to mobilizing resources for watershed restoration. It is designed for practitioners, but it is advanced.
CRS and TNC: Western Area Peninsula Water Fund: Assessing the Return on Investment for NbS	This is a comprehensive analysis of the financial feasibility to fund NbS in a watershed that provides water for Freetown, Sierra Leone	
CRS Value Chain Toolkit	Chapter 4 of the toolkit, Finance, focuses on financing strategies to support farmers and value chains.	• Identify financial needs, p.59 • Financing value chains, p.62 • Sources of value chain financing, p.63-70 • Triangular investments, p.71 • Social investing, p.73-74
CRS Value Chain Toolkit	Chapter 7 of the toolkit, Private Sector Engagement, emphasizes (a) the need for farmers to co-invest and pay for necessary services and (b) engaging with private sector service providers.	• The whole of Chapter 7, p.105-115, is a helpful introduction to public sector engagement for value chains.
USAID: Funding Water Security Activities –Water Security Improvement Step #4[27] Winrock Water Security Partnership	This 26-page guide provides explanations of types of funding for water security and watershed restoration projects.	A good general reference guide on different types of funding.

26 CRS, Engaging Government: A CRS Guide for Working for Social Change (CRS. 2018).
27 Water Security Partnership, Funding Water Security (USAID and Winrock, 2018).

Step 8: Adapt: Monitor, reflect, and adjust activities

The purpose of monitoring and evaluation systems (M&E), including CRS' MEAL framework, is to (a) keep the project on track, (b) provide continuous feedback to project implementers and stakeholders on project performance, (c) enable actors to adjust based on challenges and lessons, and (d) provide clear reports to stakeholders, donors, governments, and other actors.

Building on CRS' extensive experience and guidance on MEAL, the monitoring and learning process should be continuous (i.e., throughout all 8 Steps of the Watershed Restoration Process), and after the project has been completed. It is fundamental that stakeholders engage in defining goals, objectives, and indicators. This helps build transparency and accountability and helps build local capacity for planning and implementation.

OUTPUTS EXPECTED FOR STEP 8: ADAPT	
1	A ProFrame, or similar project framework is designed, using CRS guidance.
2	Indicators are defined through participatory process involving project staff, local leaders, and marginalized groups (women, youth, and others).
3	Milestones are defined for outputs and intermediate results, including targets and dates, which will serve as check-in and evaluation points for project facilitators and project committee.
4	A monitoring and evaluation framework and plan is created and shared amongst leaders and participants.
5	Project plans are adjusted over time, and this is documented for local stakeholders, project facilitators, and donor (if necessary).

Two levels of monitoring systems. It may be necessary to create two separate but parallel and complementary monitoring and evaluation systems, one for the Project Facilitation Team (CRS and partner organizations) to report to donors, and a second for the Project Committee that is developed with and for stakeholders.

The M&E system should use the same logic/levels for CRS ProFrame and SMILER tools, including Goals, Strategic Objectives, Intermediate Results, and Outputs. Keep in mind that short-term or small-scale project interventions may only report and monitor at activities and outputs, while multiple small projects can contribute to Intermediate Results and Strategic Objectives. For small projects or where stakeholder groups have very limited project planning experience, it may be sufficient to only track Activities, Outputs and Strategic Objectives, and excluding Intermediate Results as these can be tricky to design and comprehend.

Intermediate Results: Below, we highlight the critical level of ***Intermediate Results*** (IRs) for two reasons: First, IRs can be complicated to define. Second, IRs can also be the most important to monitor during the implementation of the watershed restoration programs. When IRs are well-designed, they can be very useful for creating the feedback that enables project teams to ***adapt***. The IRs should be designed to provide feedback during the execution of watershed restoration activities on how successful these activities are in reaching objectives and goals. When IRs are well designed, they show how stakeholder behavior and practices change as a result of project activities. If we see no real change, for example in the uptake of better agricultural practices, then this indicates a problem in our analysis, design, and/or the quality of intervention of activities. If, on the other hand, we see enthusiastic uptake of improved agricultural practices within a watershed, this is a good indicator that the project will achieve its objectives and goals.

CRS ProFrame – Levels and Definitions

LEVEL	DEFINITION
Goals	Goals are how stakeholders hope their watershed will change as a result of the watershed restoration strategy. Goals were designed in Step 4: Strategy and Plan.
Strategic Objectives	Strategic Objectives or Outcomes are what stakeholders expect to achieve in the timeframe of the project. They were designied in Step 4: Strategy and Plan
Intermediate Results	*Intermediate Results are observable changes that point to progress toward the SO, that the outputs are having the intended results, that will contribute to the SO. The IRs will be defined as the last step of the M&E design process. (Often this requires a lot of technical support and guidance from the facilitation team).* *Example: An example of an IR is that farmers will put in to practice new techniques they learned for conservation agriculture.*
Outputs	Outputs are the short-term changes we can measure due to activities. The outputs are deliverables. For example, when farmers are trained in Water-Smart Agriculture, we should be able to explain the new practices they learned. Example: Examples of outputs include number of farmers with improved skills in using cover crops or number of farmers who received improved seeds.
Activity	Activities are the things that the project staff and stakeholders will do; activities require staff time and other resources (funds). All activities should be budgeted. Example: Examples of activities include training farmers or giving farmers inputs (e.g., improved seeds or fertilizer)

Choosing indicators:

Annex X of this Guidebook provides comprehensive guidance on selecting and measuring indicators. Below are several tips to consider when choosing and defining indicators:

- Choose indicators carefully. Choose indicators wisely because these will define how the project team and stakeholders will measure progress and success. (Good indicators are essential for good implementation). Even if indicators have defined in the proposal development stage (and defined by a donor), there is usually scope for reviewing and adjusting indicators at the project design stage.
- Start with stakeholders' perspectives. To formulate indicators, start by asking stakeholders what they would expect to see if the project activities are successful. What would they consider evidence for success?
- Less is better. Based on experience, we suggest keeping indicators to only as many as needed, but no more than that. You do not need to measure every activity and every change you expect to see in a watershed. Choose the indicators that give you a good sense of your performance and progress. You can always add indicators later, if needed.
- Keep it simple. When designing indicators, the mantra is to "keep it simple". Keep the language and concepts very clear, avoid technical jargon if possible, and make sure the Project Facilitation Team (CRS and partners) and the Project Committee (local stakeholders) understand each indicator.

- Project indicators versus research data. Do not confuse the design of project indicators with research questions and data. We want indicators to indicate how things are going – they usually do not need to be as rigorous as academic research data. (Research questions and rigorous analysis can be added on to a project, but not confused with the project indicators and MEAL process).

CRS has selected a few key indicators to track for its Strategic Change Platform, Transforming Landscapes and Livelihoods.

SCP3 Key Indicators

INDICATOR	TOOL/TECHNOLOGY	FREQUENCY
Tree Cover	GPS coordinates and ERDAS software	2-3 years
Carbon Stock – above ground (tons/ha)	Biomass data using vegetation indices (perennial grasses, shrubs and trees)	3-years
Water quality (piped water sources)	Total Dissolved Solids (TDS) Total Suspended Solids (TSS)	Quarterly
Stream flow	Flow measured in fixed location	Quarterly
Ground water level	Water level measured in boreholes	Quarterly

Other common indicators in agricultural activities in watersheds:

RESOURCE / NAME	DESCRIPTION	COMMENTS
CRS SMART Guide – Managing Natural Resources Lesson 7, Monitoring Progress	Lesson 7 of this manual provides guidance on monitoring NRM projects and defining indicators.	See Lesson 7 p.85-96 • Indicators p.85-86 • Maps for monitoring p.87-88 • Gender indicators .88-89 • 7A Monitoring Plan p.91-92 • 7B Gender Matrix p.93-94 • 7C Cost-Benefit Analysis p.95-96
CRS ProPack SMILER (2010)[28]	CRS SMILER is an approach to turn a project's ProFrame into an M&E System. Note, it is designed for project staff, not local stakeholders.	The SMILER manual is about 70 pages, clearly organized for creating an M&E system.
CRS indicators for SCP3 Performance Indicator Reference Sheet PIRS Guide[29]	(To be published in August 2023)	
CRS Source Water Protection Toolbox Step 6: Evaluate	Step 6 of the SWP toolbox is "**Evaluate**: Continuous learning and improvement".	This tool is especially relevant for projects focused on protecting drinking water supplies.
Water and Development Indicator Handbook[30] USAID Global Waters 2021	This handbook (68 pages) provides explanations, guidance, and examples on standard USAID indicators related to water supply, sanitation, water resources, and other water related activities. Annex 3 (PIRS) provides a full definition of each indicator.	• Drinking Water Indicators (HL.8.1), p.5 • Sanitation and Hygiene Indicators (HL.8.2), p.13 • Policy and Governance Indicators (HL.8.3), p.21 • Financing for WASH Indicators (HL.8.4), p.25 • Water Resources Productivity Indicators (HL8.5), p.28 • Custom Indicators, p.33
The Road to Restoration: A guide to identify priorities and indicators for monitoring forest and landscape restoration Water Resources Institute and Food and Agriculture Organization	This 78-page guide[31] provides a very clear and technical methodology for evaluating and choosing indicators for land and forest restoration, which can be adapted for watershed restoration.	This guidebook is very useful for choosing a small set of strategic indicators for the various goals for a restoration program.
EPA Watershed Handbook **Chapters 13, Pages 13-6 to 13-12**	Chapter 13 is "Implement Watershed and Measure Progress". Pages 13-6 to 13-12 focus on tracking progress, evaluating, and adjusting when necessary.	• This guide is detailed and technical, useful, and recommended especially for large programs.

28 CRS. Susan Hahn and Guy Sharrock, ProPack III: The CRS Project Package, A Guide to Creating a SMILER M&E System. (Baltimore, MD: CRS, 2010).

29 PIRS Guide here.

30 Global Waters, Water and Development Indicator Handbook, (USAID, 2021).

31 Water Resources Institute and Food and Agriculture Organization, The Road to Restoration: A guide to identify priorities and indicators for monitoring forest and landscape restoration. October 2019.

Section 2.4: Recommendations for agriculture and nature-based solutions for watershed restoration

This section provides specific guidance to facilitators and project teams on technical interventions for watershed restoration, including promoting sustainable (regenerative) agriculture and nature-based solutions (NbS). The tools and recommendations in this section are based on CRS' field experience and recommendations from organizations and experts in the fields of watershed restoration, water resources management, and sustainable agriculture.

Section 2.4.1 SCP3 – Land Restoration Principles

CRS developed a list of Eight Land Restoration Principles and Practices to guide the design, implementation and reporting of land restoration programming. These 8 Principles reflect the best practices from CRS agriculture programming around the world and serve as the starting point for all associated recommendations.

Per SCP3 guidance, land is considered "under restoration" when principles 1 is met, or when at least two principles of 2 through 8 are met.

SCP3 8 Land Restoration Principles

#	PRINCIPLE	DESCRIPTION
1	Maintain permanent soil cover	Keeping the soil permanently covered with mulch, crop residues or other materials; Establishment and management of cover crops/ green manure cover crops; no burning of crop residues.
2	Minimize soil disturbance	Land preparation methods and weeding options that minimize soil disturbance Direct planting/seeding techniques
3	Ensure soil and crop nutrition	Integrated soil fertility management (ISFM).4 Rs (right product, right dose, right time, right place), based on soil analysis and crop needs
4	Capture and infiltrate rainwater where it falls	Infiltration holes/pits, half/moons/demi/lunes, box ridges, shallow pits, bunds, rock lines, swales
5	Ensure that water moves slowly off the slopes	Contour trenches along the slope with vegetative cover, live barriers or other materials, stone bunds, check dams for gully rehabilitation and reclamation
6	Diversify farming system	Crop rotation systems, implementation of intercropping practices, incorporation of crops with different and complementary functions in the production system (nitrogen fixing, biomass production, soil erosion control)
7	Incorporate trees and/ or permanent crops in farm system	Establishes trees and/or permanent crops in production systems for multiple uses (food, fiber, fodder, fertilizer, and fuel)
8	Managed natural regeneration	Farmer managed natural regeneration (FMNR) Assisted natural regeneration (ANR)

Locals take boats out on the lakes in-between rice paddies to collect morning glory in Binh Dao commune, Quang Nam province, Vietnam. [Photo by Lynzy Billing/ CRS]

Section 2.4.2 – Start with training field technicians and field promoters

Prioritize investments in training and technical assistance

A determining factor of success in promoting sustainable agriculture and restoration practices is effective training, technical support, and extension services.[32] One of the most effective and efficient project investments is hiring and training high quality agricultural trainers and investing time and resources in training farmer leaders (field promoters). Too often, projects are designed to distribute farm inputs and other incentives right from the start, which causes two types of problems. First, farm inputs are often procured before field staff have sufficient time to work with farmers and understand their needs, so the inputs purchased may not be the most strategic or helpful. Second, this focus on inputs quickly distracts technical field staff from dedicating time to farmer training.

Formation of Field Promoters and Farmer-Field-Schools

This CRS Water Smart Agriculture (WSA) Program and the Agricultural Landscape Restoration Initiative (ALRI/RAICES) in Central America developed a simple approach for training and formation of farmers, promoters, and technical field staff.[33] The strategy is focused on a "farmer-first" approach through farmer-field-schools, where training takes place on farmers' lands. As an example, in the first phase of the ALRI program (two full years), the team focused primarily on training a critical mass of Field Promoters (lead farmers) in order for these farmers to train other farmers through a farmer-field-school model. This strategy enabled ALRI to quickly scale from hundreds of farmers in Phase 1 to thousands in Phase 2 of the program. This scaling strategy included (a) focusing on only a few core practices and (b) promoting and supporting farmer-field-schools.

Inclusive extension services: Extension services—public, private, or NGO-run—often bias towards adult men as farmers and tailor their method, content, and engagement strategy accordingly. It important to assess extension staff and farm promoters for social inclusion equality attitudes and support them in strengthening their inclusive approaches to all farmers in the community. CRS' draft gender-responsive agriculture extension and advisory services guidance document is a useful resource for this purpose.

32 See "Conclusions and Recommendations," Final Evaluation of CRS Malawi WALA Program: Volume 1 – Main Report (USAID, 2014), 57.

33 CRS ALRI (RAICES Program), Trainer of Promoters Approach (CRS, 2020). See https://www.raices.sv/recursos

Structure in Afghanistan watershed capturing water and snow. [Photo by David Ghandi / CRS]

Section 2.4.3 – General recommendations for introducing water restoration activities

Below are recommendations for introducing improved agricultural practices and NbS, based on CRS field experience.

Keep it Simple – start with a core set of key practices:

Building on successful scaling of WSA practices at a landscape scale, the ALRI program in El Salvador defined a "core set of practices" that serve as fundamental first steps for WSA. These core practices include:[34]

1. Permanent soil coverage, using crop residue and cover crops (SCP3 Principle 1)
2. Introduction of cover crops as "green manure" for soil health and restoration (SCP3 Principle 1)
3. Apply the 4R methodology for promoting Integrated Soil Fertility Management (SCP3 Principle 3)

Experience shows that once these core practices are adopted, soil health improves surprising rapidly, which leads to increased crop productivity and improves resilience to climate shocks (storms and droughts). These practices also reduce crop production costs considerably by reducing the amount of fertilizer applied to crops and reducing (or eliminating) the cost of herbicide. Once these core practices are adopted it becomes easier to add additional practices, including those from the SCP3 list. Conversely, if the core practices are not adopted, it becomes harder and less efficient to adopt other WSA practices.

34 Paul Hicks (CRS) and Derek Shlea (LimnoTech), "The Vital Few," Presentation (Lincoln, NB: Water for Food Conference, May, 2023).

Introduce only a few new practices to farmers as a first step:

Our experience with large scale agricultural projects shows that if we can focus on only a few changes to farming systems, farmers are more likely to experiment and adopt these practices. Farming is complex and risky enough, that it is bad practice for development actors to attempt to impose or coerce farmers to adopt entirely many new practices at once or to suddenly overhaul their farming systems. By starting with the few core practices described above, farmers can take the time to learn and understand how the practices change their land, and then choose to adapt and apply the practices that work best for their land and context.

Prioritize practices that produce "early recognizable results":

In most places CRS carries out watershed restoration projects, crop yields tend to be far below potential. A few basic agronomic improvements (soil health, fertilizer management, seed quality, tree pruning, etc.) can have clear and rapid improvements to crop yield and quality. Those early, recognizable results can quickly build farmer confidence in adopting other new farm practices and technologies and participating in other watershed restoration activities.

Whenever possible, start with agronomic solutions before introducing built structures:

The introduction of vegetative solutions can contribute significant short-term results for slowing down water, capturing rainfall, reducing erosion, and restoring soil health. Vegetative solutions include the introduction of cover crops and green manure, conservation tillage, vegetative strips, vegetative contour barriers, and planting shrubs or trees on fence lines. All these practices cover and protect soil from rain, wind, and sun erosion, cool soils, and add organic matter to the soil. (These may be referred to as NbS, when they are also intentionally introduced to promote environmental benefits). In many cases, these vegetative solutions (or NbS) can solve problems related to erosion or runoff without having to invest in more expensive and complicated built structures, such as terraces, pits, ditches, etc.

An evaluation of impacts of soil and water conservation in watershed projects in Ethiopia concluded the following:

> *"The review and synthesis showed that most physical soil and water conservation practices such as soil bunds and stone bunds were very effective in reducing run-off, soil erosion and nutrient depletion. Despite these positive impacts on these services, the impact of physical soil and water conservation practices on crop yield was negative mainly due to the reduction of effective cultivable area by soil/stone bunds. In contrast, most agronomic soil and water conservation practices increase crop yield and reduce run-off and soil losses. This implies that integrating physical soil and water conservation practices with agronomic soil and water conservation practices are essential to increase both provisioning and regulating ecosystem services. Additionally, effective use of unutilized land (the area occupied by bunds) by planting multipurpose grasses and trees on the bunds may offset the yield lost due to a reduction in planting area."*[35]

35 Zenebe Adimassu et al, "Impacts of Soil and Water Conservation Practices on Crop Yield, Run-off, Soil Loss and Nutrient Loss in Ethiopia: Review and Synthesis," Environmental Management 59, no. 1 (January 2017), 87-101.

Section 2.4.4 – Focus on soil health

Soil health is both a goal and an indicator of successful watershed restoration activities, especially where interventions focus on promoting sustainable agriculture practices. For this Guidebook, we want to highlight soil health as a priority because this can generate multiple benefits, including improved crop productivity, natural vegetative regeneration, overall biomass production, biodiversity, increase carbon sequestration above and below ground, climate resilience, and others.

Below are several key resources related to soil health.

- 4R Guide to Integrated Soil Fertility Management. The CRS WSA program and SCP3 Principles emphasize the 4R approach to Integrated Soil Fertility Management. CRS adopted the 4R approach from the International Plant Nutrition Institute.[36] Over the past decade the 4R approach has become a key strategy for the global agricultural industry[37] and conservation organizations.[38] 4R is designed to work with farmers to promote efficient and effective use of soil amendments (particularly fertilizers). The methodology works because it is simple and straightforward. Each "R" refers to a "right" practice, including: (1) the right source of nutrient, (2) the right dosage, (3) the right timing, and (4) the right way (how to apply it). CRS has had very good experience in working with farmers who frequently highlight 4R as the most helpful and impactful practices they learn from CRS-led projects.

36 Nutrient Stewardship Initiative (NSI), "What are the 4Rs | Nutrient Stewardship," Nutrient Stewardship Initiative, accessed September 30, 2023.

37 International Fertilizer Industry Association (IFA), The Global '4R' Nutrient Stewardship Framework (IFA, 2009).

38 NSI, What are the 4Rs.

- Maximize living roots. The SCP3 8 Land Restoration Principles (described above) are similar and consistent with the Four Health Management Principles of the Natural Resources Conservation Services of the United States. These four principles are: Minimize soil disturbance (SCP3 #2); Maximize soil cover (SCP3 #1); Maximize biodiversity (SCP3 #6); and ***maximize the presence of living roots***.[39] This fourth principle (living roots) is key for promoting and measuring soil health under WSA systems.
- Assessing Soil Health. NRCS has created a matrix to choose conservation agricultural practices that contribute to these 4 Principles.[40] The United States Department of Agriculture (USDA) created a guide for assessing soil healthy with recommendations for practices to improve soil health deficiencies.[41]

Rewat Prasad Khanal showing some farming techniques to one of their members, Til Bahadur BK.
[Photo by Amit Rudro / CRS]

39 Natural Resources Conservation Service (NRCS) of the USDA, The Basics of Addressing Resource Concerns with Conservation Practices within Integrated Management Systems on Cropland: Soil Health Technical Note No. 450-04, (USDA, October 2019).

40 NRCS-USDA, Soil Health: Technical Note No. 450-04, (USDA, 2019).

41 NRCS-USDA, Cropland In-Field Soil Health Assessment Guide: Soil Health Technical Note No. 450-06, (USDA, January 2021).

Section 2.4.5 – Guidance on structures and built infrastructure

Where built structures are required to protect and restore lands, carefully analyze multiple options

As discussed in Part 1 of this Guidebook, there are often risks associated with introducing built infrastructure into watersheds. There are many cases from around the world where development agencies caused harm by promoting terracing, trenches, and other activities at a large scale without first assessing the environmental risks. Large scale projects have led to greater erosion, landslides, and other disasters.

A. WOCAT Database. A great resource for analyzing options for land restoration interventions is the WOCAT data base, a global initiative to document and share good practices in sustainable land management practices.

- WOCAT database on Sustainable Land Management Technologies
- WOCAT homepage on Sustainable Land Management Approaches
- Example: WOCAT database, Small Earth Dams in Zambia

B. TNC Factsheet on Nature-based Solutions. TNC and the French Development Agency (AFD) produced a Deep Dive on Nature-based Solutions for Water Security, providing comprehensive descriptions and evaluations of potential interventions and how they may contribute to water security.[42]

C. WALA field interventions. The CRS WALA project and follow-on projects included several activities related to soil and water conservation. Below is a summary of these interventions.[43]

- **Water Absorption Trenches** are large diagonal pits that capture and retain run-off while recharging the water table. They are designed to capture large amounts of run-off so are relatively wider and deeper than trenches used within crop fields (described below). Because of the substantial area they require for operation, water absorption trenches are used at the boundaries of fields and are used to control sheet erosion.[44]
- **Continuous Contour Trenches** are smaller than water absorption trenches and used to trap run-off flowing within crop fields. They are diagonal pits running along the contour of fields trenches.[45] As the water absorption trenches, they are designed to recharge the water table as well as reduce sheet erosion.
- **Stone Bunds** are low, semi-permeable rock walls built by farmers to follow a slope's contour and to slow the flow of run-off. If well built, every point along the barrier will be at the same level, hence water should flow downhill and not along the barrier where it could concentrate at a particular spot. Since its velocity is slowed by the barrier, the run-off drops much of its sediment load on the uphill side of the barrier. Over time, the deposited sediment can form into a terrace, thereby increasing a farmer's arable land. Because the run-off would have likely transported topsoil that contained SOM and finer soil particles—such as clay—the soil deposited behind the structure would have been enriched at the expense of the soils above.

42 TNC, "Deep Dive: Factsheets of Nature-based Solutions for Water Security," Financing Nature for Water Security: A How-to Guide to Develop Watershed Investment Plans (TNC and AFD, 2022).

43 Mike McGahuey et al, "Annex A," Wellness for Agriculture and Life Advancement Activity (WALA): A retrospective of three studies on the impact of watershed restoration (CRS, 2021), 18.

44 C. M. Reichert, Watershed Development in Malawi: A Study from the Wellness and Agriculture for Life Advancement (WALA) Program (CRS, 2014).

45 Ibid.

- **Check Dams** are stone walls built within gullies perpendicular to the flow of the run-off. They are built at strategic points in gullies in order to slow the erosive power of run-off and force the deposition of soil being carried by the flow. Over time the gully behind the dam fills up, often with soil that was richer than the resident soil. Check dams not only reduce gully erosion but convert an unproductive and erosive gully to highly productive farmland.[46]

John Nyama, watershed management committee (WMC) treasurer, and Wilfred Charles, 38 years old, maintain a stone bund in Lingoni, Machinga district, Malawi. [Photo by Dooshima Tsee / CRS]

- **Land levelling**. Land levelling is an expensive and labor-intensive activity, which may be required for some crops (e.g., flooded rice) and for some irrigated crops. However, advances in drip irrigation technologies and other irrigation systems make it less critical to have land leveled. Land levelling can be done with heavy equipment or by hand, depending on conditions and resources.[47]

46 Reichert, Watershed Development (2014).

47 For definition and examples of land levelling, see "Land levelling," WOCATpedia, WOCAT, September 2016.

- **Water harvesting and pond construction**. Water harvesting, or pond construction, is the collection and management of floodwater or rainwater runoff to increase water availability for domestic and agricultural use ad well as ecosystem restoration.[48] There are many types of water harvesting practices, which must be adapted to local conditions for specific purposes.[49] It is highly recommended that hydrology assessments be carried out before selecting water harvesting, including cost-benefit comparison of various options.

Small coffee producers who are members of COMICOVEL seen at the oxidation lagoons of San Isidro Dry Coffee Mill in San Isidro Municipality, Honduras. [Photo by Oscar Leiva, Silverlight / CRS]

Section 2.4.6 Irrigation Practices

Please note that this Guidebook does not provide guidance on irrigation technologies and practices. Given the cost, complexity, and fast-changing technologies associated with efficient irrigation, CRS will provide guidance on efficient irrigation in a separate guidance tool. For references see these guides:

- World Bank – The Farmer-led Irrigation Development Guide
- International Water Management Institute (IWMI) – Small-scale Irrigation and Water Management Technologies
- Alabama Extension – Step-by-Step Guide to Small Farm Irrigation

48 Definition taken from "Water harvesting," WOCATpedia, October 2017.

49 For more information on water harvesting technologies, see: WOCAT SLM Database, "Water harvesting," WOCAT, accessed September 30, 2023.

CATHOLIC RELIEF SERVICES

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ANNEXES AND RESOURCES

Annex 1 - Key resources for watershed programming

Below are the key reference documents used for the Guidebook, including CRS documents and external publications.

#	RESOURCE NAME	DESCRIPTION
1	**CRS SMART Skills Model**	The CRS' SMART Skills Competency Model is an introduction to the SMART Skills approach for promoting Water Smart Agriculture.[1] The competency model is intended to support the design, implementation and evaluation of training and field activities. SMART Skills set #2 is focused Natural Resources Management and Climate Risk Management, with seven related competencies (p.14-18), plus related livestock production competencies (p.19-20).
2	**CRS SMART Skills training manual, "Managing Natural Resources"**	The CRS SMART Skills training manual, "Managing Natural Resources" shows how field agents, extension workers and program managers can help farmers manage their natural resources.[2] A companion manual, "Understanding Natural Resources" describes how to help them understand their natural resources and why they should manage them in a sustainable way.[3]

1 CRS, SMART Skills Competency Model: A theory of action for capacity building in agriculture and livelihoods programming (CRS, 2021), 14-19.

2 CRS, Managing natural resources: A SMART Skills Manual (CRS, 2022).

3 CRS, Understanding Natural Resources (CRS, 2022)

3	**CRS Malawi WALA Project**	The Wellness and Agriculture for Life Advancement (WALA) project in southern Malawi was a CRS-led project implemented between 2009-2014 funded through USAID's Food for Peace platform. WALA emerged as a flagship project for CRS watershed restoration programming when post-project evaluations discovered impressive and sustained results. Significant results from WALA: • **Resilience to drought**: Following the El Niño-induced drought of 2015/2016, WALA participants within the watersheds were substantially less affected than non-participants and WALA participants that were not in the watershed management areas.[4] • **Improved water resources**: Streams and boreholes that had formerly dried up had become perennial, increasing the area under irrigation that produced two or three crops/year instead of one (or none).[5] • **Soil health**: Soil health, measured in terms of soil organic matter and presence of key soil minerals (e.g., nitrogen, potassium, and phosphorous), improved significantly.[6]
4	**CRS Afghanistan Natural Resources Management Manual (2015)**	This manual was designed for project implementers as a primer (a) introduce the basics of the watershed approach, (b) describe improved agricultural practices, and (b) explain soil and water conservation (SWC) structures to restore degraded lands. It is a very clear and helpful resource, especially for arid and semi-arid climates.
5	**EMPOWERS Approach to Water Governance Guidelines, Methods, and Tools (2008)**	The EMPOWERS approach is an excellent, comprehensive manual for facilitating water resources management, with clear concepts, methods, and tools.[7] The approach is based on two pillars, (1) Stakeholder dialogue and (2) Strategic management. The EMPOWERS' 6 Steps of the Management Cycle were especially helpful for the CRS Watershed Restoration Guidebook.
6	**United States EPA Handbook for Developing Watershed Plans to Protect our Waters**	EPA's 400-page Handbook for Developing Watershed Plans to Protect our Waters (published in 2008)[8] is a complete and useful guide, divided in 13 clear chapters and sections. The steps in the EPA manual are similar and logic and flow as the CRS Guidebook, but with much more detail. The bibliography provides an exhaustive set of resources on every detail.

4 "Nine of 24 WALA communities did not require any food aid during the El Niño.. and an additional ten needed less food aid than in past drought." David Soroko, et al, Assessment of The Wellness and Agriculture for Life Advancement Activity: Report of an assessment of the WALA project conducted in 2017 (CRS, 2018).

5 C. M. Reichert, Watershed Development in Malawi: A Study from the Wellness and Agriculture for Life Advancement Program (CRS, 2014).

6 F. Amadu and P. E. McNamara, The Wellness and Agriculture for Life Advancement Project's Community Watershed Restoration in Southern Malawi (The University of Illinois, 2020).

7 P. Moriarty et al, The EMPOWERS Approach to Water Governance: Guidelines, Methods, and Tools (Amman, Jordan: Inter-Islamic network on Water Resources Development and Management (INWRDAM), 2007).

8 Handbook for Developing Watershed Plans to Restore and Protect our Waters, United States Environmental Protection Agency, March 2008. https://www.epa.gov/sites/default/files/2015-09/documents/2008_04_18_nps_watershed_handbook_handbook-2.pdf

Resources designed specifically to protect and manage drinking water sources

#	RESOURCE NAME	DESCRIPTION
7	**CRS Source Water Protection Toolbox**	This Guidebook draws from Source Water Protection (SWP) Toolbox,[9] a CRS initiative designed to embed source water protection in CRS' water security programs. The SWP project developed a set of tools for assessing and managing water sources, which are themselves based on the American Water Works Association manual on Source Water Protection (G300-14).[10]
8	**Water Funds Toolbox – The Nature Conservancy**	The Nature Conservancy (TNC) developed a detailed set of tools (Toolbox) to guide teams to design "Water Funds", which are programs designed to fund the protection and restoration of source watersheds. CRS has collaborated with TNC on a few Water Funds in Africa and Latin America. TNC's online tools and files are practical and designed for field practitioners and facilitators.

9 "CRS Source Water Protection Toolbox and Repository," SWP Toolbox, CRS, accessed September 30, 2023.

10 Richard W. Gullick, Operational Guide to ANSI/AWWA G300: Source Water Protection (Denver, CO: American Water Works Association, 2017).

Resources for market systems development and value chains that can be applied to watershed restoration.

#	RESOURCE NAME	DESCRIPTION
9	**The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion**	The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion is a comprehensive manual (124 pages) on applying MSD in various humanitarian and development contexts.[11] The CRS MSD approach provides a common process and seven benchmark practices, including: (1) Conduct an in-depth market system analysis; (2) Develop a vision for system change and a strategy to implement across the HDP Nexus; (3) Co-create innovations in partnership with market actors; (4) Facilitate agreements in which market actors take the lead in implementation; (5) Monitor and apply adaptive management, (6) Build up a portfolio of discrete agreements that support system strengthening; (7) Create empowered local teams to implement MSD in country programs.
10	**CRS Value Chain Toolkit**	CRS' Value Chain Toolkit (2018) is a comprehensive guide on CRS' approach to value chain development, which "seeks to understand the needs of connected "core chain actors" (i.e., those who buy and sell products from farmers, traders, processors, wholesalers, and retailers, as well as consumers) and to identify the key business development services… that support the competitiveness and efficiency of value chain operations.
11	**CRS SMART Skills 7 Steps of Marketing**[12]	The CRS 7 Steps of Marketing Guide is a training manual on methods and tools to assist field staff who work with a community on agroenterprise development. This manual builds on a guide on Marketing Basics. The manual is designed to help farmers shift from production to a market-led approach to agricultural investment. This manual is very detailed and includes many specific tools that can be adapted for watershed restoration.
12	**The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion**	The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion is a comprehensive manual (124 pages) on applying MSD in various humanitarian and development contexts.[13] The CRS MSD approach provides a common process and seven benchmark practices, including: (1) Conduct an in-depth market system analysis; (2) Develop a vision for system change and a strategy to implement across the HDP Nexus; (3) Co-create innovations in partnership with market actors; (4) Facilitate agreements in which market actors take the lead in implementation; (5) Monitor and apply adaptive management, (6) Build up a portfolio of discrete agreements that support system strengthening; (7) Create empowered local teams to implement MSD in country programs.
13	**Operational Guide for Making Markets Work for the Poor (M4P) Approach**[14]	The M4P Operational Guide "aims to provide an accessible operational resource to help practitioners put the market systems development approach into practice. It explains key principles and frameworks.

11 The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion. Authors: Harald Bekkers, Alexandra Miehlbradt. 2023.

12 CRS, The Seven Steps of Marketing: A SMART Skills Manual (CRS, 2015).

13 The CRS Approach to Market Systems Development for Scale, Inclusion, Resilience, Environmental Stewardship, and Social Cohesion. Authors: Harald Bekkers, Alexandra Miehlbradt. 2023.

14 The Springfield Centre, The Operational Guide for the Making Markets Work for the Poor (M4P)

Other CRS guides and tools that can be adapted and applied to watershed restoration

#	RESOURCE NAME	DESCRIPTION
14	**CRS Guide to Facilitating Community-Led Disaster Risk Management**	This guide is designed to support CRS and partners in designing and managing disaster risk projects. This guide was the basis of the structure and much of this Watershed Restoration Guide. The guide emphasizes the empowerment of local people in assessing risks, design risk management plans, and carrying out activities. The guide highlights the need to empower communities to plan and drive change and reinforce governments' responsibility to provide their people with a protective and enabling environment. The guide provides step-by-step instructions and tools divided in three stages and 10 processes.
15	**CRS The Ties That Bind**	This guide provides guidance for building and restoring social cohesion between groups and/ or communities. This guide is especially useful for contexts where social division and conflict inhibits development activities. It combines the four key parts of the Appreciative Inquiry Approach (Discover, Dream, Design, and Deliver) with three key steps of CRS' peacebuilding approach (Binding, Bonding, and Bridging). The guide is divided into four chapters with 16 modules. Each module offers detailed guidance on objectives, timing, steps, tools, and notes for the trainer.
16	**CRS Gender Analysis Toolkit**	The CRS Gender Analysis Toolkit is an online platform with various tools and resources to carry out Gender Analysis and gender-sensitive programming.
17	**CRS SMART Skills – Gender Competency**	The CRS SMART Skills Gender Competency guide can be applied to watershed restoration design. In particular: 1) Reduced barriers for women engagement in agriculture and livelihood activities; 2) Joint decision-making for pursuing agriculture and livelihoods opportunities.
18	**CRS Rapid Rural Appraisal and Participatory Filed Manual (2008)**	This 120-page manual provides principles and tools of Participatory Rural Appraisals and Rapid Rural Appraisals. It explains how PRA and RRA help triangulate information gathered from different local actors and external actors

Annex 2: Resources for watershed mapping and modelling

Annex 2 provides descriptions of various watershed mapping and modelling tools and resources that may be applied to specific situations.

DOCUMENT / RESOURCES	DESCRIPTION	WHY IS IT HELPFUL?
CRS Mapeo A-Mano[15] On-line Guide for Mapeo A-Mano: Visual Mapping Tool for Community-based Development.[16]	"A-Mano" is a CRS tool developed by CRS that combines geographic technologies and community development tools to empower local people to analyze their environment, monitor changes, and propose solutions and plans for a better future.	Using A-MANO enables field teams to collect information about the watershed in a participatory way. Web reference.
Google Earth[17]	Google Earth is a free application that provides impressive detail on land and water resources. The base layers for Google Earth maps are constantly improved, and the capability for measuring and analyzing watersheds is powerful. Many researchers and environmental agencies regularly use Google's mapping tools as part of a suite of watershed tools.	Google mapping tools should be the starting point for any preliminary mapping of watersheds, including gathering most of the basic information (size, topography, land-use, etc.).
Google Earth Engine for Water Resources Management (Full Course Material)[18]	This is a course on how to use Google Earth Engine for Water Resources Management. It will enable users to leverage this platform for water resource management applications, including: (a) Surface Water Mapping, (b) Precipitation Time Series Analysis, (c) Land Use Land Cover Classification, (d) Flood Mapping, and (e) Drought Monitoring	This course requires basic preliminary skills and experience in computer programming and hydrology.

15 Mathew L. Hamilton, A-MANO: A Technical Guide on Community Mapping and Participatory GIS (CRS, 2019).

16 Ibid.

17 "Google Earth," Google, accessed September 30, 2023.

18 See link to online course: "Google Earth Engine for Water Resources Management (Full Course Material)," Spatial Thoughts, accessed September 30, 2023.

Computer-based modeling tools for watershed analysis and planning.

MODEL	DESCRIPTION	RECOMMENDATIONS
World Bank—Modeling for Watershed Management: A Practitioner's Guide[19]	This is a brief guide on modeling for watershed management, full of helpful insights on the pros and cons of modelling. "An important aspect of modeling is to have and keep a focus around a well-defined problem. Often the first contribution of a modeling effort is to lead to a better definition of the problem. All modeling should fit and be interpreted in the context of this problem."	This guide is highly recommended for anyone designing or implementing watershed restoration projects. The introduction, conclusions, and references are especially helpful.
SWAT: Soil and Water Assessment Tool[20]	The soil and water assessment tool (SWAT) is widely recognized as one of the top hydrological models applied in addressing hydrologic and environmental issues across the globe. It is an open-source tool that was developed by Texas A&M University and the online application is hosted by TAMU.	For large, long-term, or complex watershed restoration programs, SWAT or similar tool should be used, and is often required by funders. SWAT (like virtually all models) requires specialists in hydrology and GIS. SWAT is available in multiple languages.
SWAT: Using the Soil and Water Assessment Tool (SWAT) to model ecosystem services: A systematic review[21]	This academic paper describes the pros and cons of using SWAT. Summary: SWAT's data input and know-how requirements are sophisticated and not easily accessible to environmental managers and decision-maker. As an open-source software tool, the model is well documented, and its worldwide application demonstrates its widespread adoption and application.	For any team considering using SWAT or other hydrological modeling tools, it would be valuable to read this paper.
SWAT: A Review of SWAT Model Application in Africa[22]	This academic paper reviews the application of SWAT in African countries. The paper highlights how the limitation of watershed data is a constraint for applying SWAT in many African contexts.	This paper is helpful to review as it includes information about sites in Africa where SWAT has been applied with references on the organizations and experts who use SWAT in Africa.

19 Jay R. Lund, et al, Water Working Notes Number 27: Modeling for Watershed Management: A Practitioner's Guide (World Bank, June 2010).

20 "Soil & Water Assessment Tool," SWAT, accessed September 30, 2023.

21 Wendy Francesconi et al, "Using the Soil and Water Assessment Tool (SWAT) to model ecosystem services: A systematic Review," Journal of Hydrology 535 (2016): 625–636.

22 George Akoko et al, "A Review of SWAT Model Application in Africa," Water 2021, 13(9), 1313.

SWAT: Modeling for Management A Case Study of the Cañete Watershed, Peru[23]	This case study of a watershed in Peru provides a thorough description of the SWAT methodology and results.	This case study would be helpful for any team considering applying SWAT or other hydrological monitoring tool.
BASINS Application of BASINS to data-scarce watersheds.[24]	BASINS (Better Assessment Science Integrating Point and Nonpoint Sources) is a multi-purpose tool that enables users to delineate watersheds, perform various analyses, and manage data. It is designed by the United States Environmental Protection Agency (EPA) as an intuitive and efficient design intended to decrease processing time and minimize errors where data is scarce or not compatible with other models.	BASINS may be a useful alternative to SWAT in places where data is hard to obtain. This guide provides case examples from Africa, with links to tutorials.
WEAP Water Evaluation and Planning[25] WEAP User Guide[26]	WEAP operates on the principle of a water balance and can be applied to municipal and agricultural systems, a single watershed or complex transboundary river basin systems. WEAP is designed to simulate a broad range of natural and engineered components of these systems. A financial analysis module also allows the user to investigate cost-benefit comparisons for projects.	The WEAP website provides resources in multiple languages, with examples from watershed around the world.
WEAP – Mara River Basin WEAP Model[27] USAID Sustainable Water Partnership	This 27-page report describes the WEAP methodology as applied to a river basin in Kenya and Tanzania.	This is a thorough but relatively brief report that serves as a good example.
InVEST Integrated Valuation of Environmental Services and Tradeoffs[28] Natural Capital Project – Stanford University	InVEST is a suite of models used to map and value the goods and services from nature that sustain and fulfill human life. It helps explore how changes in ecosystems can lead to changes in the flows of many different benefits to people.	InVEST is sophisticated modeling suite that requires specialists in environmental modelling and GIS.

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