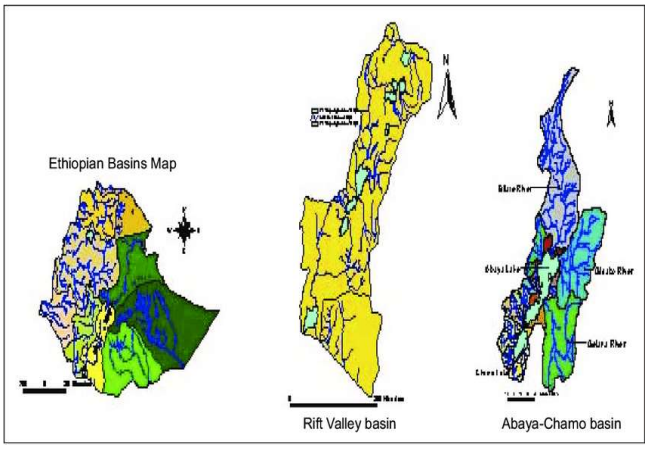


FINAL W-FLR ROADMAP REPORT FOR ABAYA-CHAMO CATCHMENT, ETHIOPIA

SIWI

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Sida

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Preface

This report is part of the SIWI program for the development and piloting of the W-FLR tool handbook, supported by GIZ and SIDA. We acknowledge the invaluable support and collaboration of GIZ Ethiopia's Forests4Future project office in Arba Minch and Addis Ababa, whose commitment and cooperation were essential to the successful execution of this pilot in the Abaya-Chamo catchment.

We also express our sincere appreciation to the national and local stakeholders who participated in the national webinar and the local workshop. Their expertise, insights, and feedback were critical in validating and refining the roadmap, ensuring its relevance and practicality for the communities and ecosystem serves.

Special thanks go to the 47 federal and regional government stakeholders who attended the national webinar and the 38 zonal (Gamo) and wereda (Gerese and West Abaya) participants of the local stakeholder workshop in Arba Minch, whose contributions significantly enriched this process. Finally, we extend our gratitude to the communities of Gerese and West Abaya Woredas, whose engagement during the field visits provided essential context and reality checks for the roadmap.

The Water-smart Forest and Landscape Restoration (W-FLR) Roadmap for the Abaya-Chamo Catchment is the final output of a comprehensive process that began with the development of the W-FLR tool handbook, a pioneering effort by SIWI, supported by GIZ and SIDA. The roadmap was developed as part of a pilot program conducted in three countries, including Ethiopia, where the Abaya-Chamo catchment was selected as the pilot site due to its critical environmental and socio-economic significance.

The roadmap development process was structured into two main phases: the Preparatory Phase and the Workshop Phase. During the Preparatory Phase, the SIWI technical team conducted an extensive analysis based on publicly available information, focusing on three key modules: assessing the need for W-FLR at national and sub-national levels, mapping risks and opportunities for water ecosystem services, and identifying and engaging key stakeholders. The outcomes of this phase were compiled into a draft preparatory phase report, which served as the foundation for the subsequent Workshop Phase.

The pre-workshop phase involved the application of the W-FLR tool modules by the SIWI technical team to identify priority actions for capacity development, policy mainstreaming, and implementation. This phase also included the development of monitoring and evaluation indicators and the drafting of a proposed W-FLR roadmap. These outputs were subjected to validation and verification processes through a national webinar and local stakeholder workshops, which provided additional insights and led to the refinement of the roadmap.

The final roadmap incorporates the feedback and recommendations from these consultations and field visits, ensuring that it reflects the needs and priorities of the stakeholders involved. It includes newly proposed priority areas, issues, and stakeholders, as well as considerations for water ecosystem services that were identified during the workshops.

The W-FLR roadmap provides a strategic guide for analysis-planning -implementing water-smart forest and landscape restoration in the Abaya-Chamo catchment. It outlines a clear path forward for enhancing ecosystem services, improving livelihoods, and building resilience to climate change. The successful implementation of this roadmap will depend on continued collaboration among all stakeholders, ensuring that the vision of a sustainable and resilient Abaya-Chamo catchment becomes a reality.

Executive Summary

This Water-smart Forest and Landscape Restoration (W-FLR) roadmap for the Abaya-Chamo Catchment in Ethiopia represents a key strategy to integrate water ecosystem services with forest landscape restoration. It builds on traditional Forest Landscape Restoration (FLR) strategies, emphasizing the interconnection between forest and water management to enhance ecosystem services and climate resilience. The roadmap was developed through a collaborative process involving stakeholders, government bodies, NGOs, and international agencies.

This W-FLR roadmap is designed to address pressing environmental issues in the region while promoting sustainable land and water management. The catchment is ecologically vital, featuring two major lakes, Lake Abaya and Lake Chamo, which play a crucial role in the livelihoods of about 1.5 million people. However, the region faces significant challenges, including deforestation, land degradation, and declining water ecosystem services, all of which are exacerbated by extreme weather events and unsustainable agricultural practices. These environmental issues threaten not only biodiversity but also the well-being of local communities.

The roadmap underscores the urgent need to restore water ecosystem services in the catchment. These services, such as freshwater provision, nutrient cycling, soil formation, and biodiversity support, , are deteriorating due to pollution, land degradation, and deforestation. The decline in these services has adverse effects on water regulation, agricultural productivity, and climate resilience. The roadmap therefore focuses on reversing this trend by promoting water-smart restoration efforts that integrate forest and water management.

Components of the Roadmap

A key component of the roadmap is the action plan, which is structured around three strategic areas. The first area is policy integration, which aims to incorporate water ecosystem services into national and regional policies, aligning these efforts with climate initiatives like the Climate Resilient Green Economy (CRGE) strategy. The second area is capacity building, which seeks to strengthen the technical expertise of stakeholders through training and knowledge-sharing platforms. The third area focuses on implementation, with priority given to launching pilot projects that target forest and wetland restoration, developing early warning systems for water-related risks, and promoting integrated landscape management.

The roadmap emphasizes the importance of stakeholder engagement in ensuring the success of W-FLR initiatives. It outlines a comprehensive stakeholder mapping process that identifies key actors, including government agencies, local communities, NGOs, and the private sector. Engagement strategies are tailored to ensure inclusive participation and foster sustained commitment from these groups. This collaborative approach is crucial for achieving long-term restoration goals.

System readiness is another critical focus of the roadmap. It assesses the capacity of existing structures to implement W-FLR, identifying gaps in policy integration, capacity building, and institutional coordination. The roadmap calls for aligning water and forest management policies and creating synergies across sectors to enhance the effectiveness of restoration efforts. Additionally, it advocates for improved monitoring and evaluation systems to track progress and ensure adaptive management.

Despite the challenges faced in the Abaya-Chamo Catchment, the roadmap identifies several opportunities for advancing W-FLR initiatives. Barriers such as socio-economic pressures, deforestation, and climate variability can be overcome through the support of Ethiopia's national policy frameworks, including the CRGE and the Green Legacy Initiative. International funding mechanisms and strong community engagement also provide a solid foundation for scaling up restoration efforts. By addressing these challenges and leveraging available opportunities, the W-FLR roadmap aims to create a sustainable path forward for restoring and managing the critical water ecosystem services in the Abaya-Chamo Catchment.

Recommendations

To ensure the successful implementation of the W-FLR roadmap, several key recommendations have been identified. First, it is crucial to strengthen policy integration by developing clear W-FLR policies and aligning

them with existing national strategies such as the Climate Resilient Green Economy (CRGE) and Green Legacy initiatives. This will create a more cohesive policy framework that supports restoration efforts.

Additionally, enhancing capacity building is essential. This can be achieved by providing targeted training for local stakeholders, including communities, government bodies, and NGOs, while establishing platforms for knowledge sharing to facilitate collaboration and learning. Increasing stakeholder engagement is also vital. Special attention should be given to involving underrepresented groups, such as indigenous communities and women's associations, and encouraging private sector partnerships to support restoration initiatives.

Pilot projects should be implemented in high-impact areas where restoration is most urgently needed. These projects should incorporate adaptive management approaches to allow for flexibility and continuous improvement based on outcomes. Moreover, improving monitoring and evaluation (M&E) systems is necessary to track progress effectively. Robust M&E frameworks should be established, with community involvement to ensure local ownership and long-term sustainability.

Finally, securing sustainable funding is key to the roadmap's success. Efforts should be made to leverage both international and national funding sources while also establishing local-level financial mechanisms to support community-driven restoration projects. These steps will collectively ensure the long-term success and sustainability of W-FLR initiatives in the Abaya-Chamo Catchment.

1. Overview of the Abaya-Chamo Catchment

The W-FLR approach represents a significant shift in thinking about forest and landscape restoration, recognizing the critical role of water in ecosystem health and human well-being. The Abaya-Chamo catchment, a region of significant ecological and socio-economic importance, was selected as the piloting area for the W-FLR tool in Ethiopia.

The SIWI technical team conducted a comprehensive review of the catchment, utilizing publicly available data, facts, and figures to assess the region's environmental status and identify key challenges and opportunities. The review focused on understanding the geographic and environmental characteristics of the catchment, the socio-economic significance of its natural resources, and the critical environmental challenges it faces. The findings provide a detailed analysis of the drivers of degradation, potential barriers to restoration, and the enabling opportunities that could support sustainable and water-smart restoration efforts.

1.1. Geographic and Environmental Characteristics

The Abaya-Chamo Catchment, situated in the Southern Ethiopia regional state, encompasses a diverse and ecologically significant landscape. The catchment, spanning approximately 3,000 square kilometres, includes two major lakes: Lake Abaya and Lake Chamo, which are central to its hydrological and ecological systems.

System Boundary: The boundary of the Abaya-Chamo Catchment is defined by the watershed that drains into Lake Abaya and Lake Chamo. The catchment encompasses:

- **Lake Abaya**: Covering about 1,262 square kilometres, Lake Abaya is the largest lake in the catchment and plays a crucial role in regional water regulation and biodiversity support (MoWR, 2022).
- **Lake Chamo**: With a surface area of approximately 550 square kilometres, Lake Chamo is the second largest lake in the catchment and is known for its rich fishery resources and unique aquatic ecosystems (Kebede et al., 2021).
- **Catchment Area**: The catchment includes the river systems and tributaries flowing into these lakes, including the Aba'ar and Wabe rivers, which contribute significantly to the lakes' water inflow and ecological health (Gordon et al., 2017).

- **Elevation and Topography**: The catchment's topography varies from highland plateaus at elevations of 1,800 to 2,200 meters above sea level to lowland areas around the lakes at approximately 1,200 meters above sea level. This gradient influences the hydrological dynamics and vegetation types within the catchment (Hurni et al., 2015)

Climate: The large variations in topography over the catchment results in diverse microclimates and vegetation zones. The region experiences a bimodal rainfall pattern with annual precipitation ranging between 800 and 1,200 millimeters. The primary rainy season extends from June to September, crucial for replenishing water resources and supporting agricultural activities. The variability in rainfall patterns has significant implications for water availability and soil erosion (Hurni et al., 2015; MoWR, 2022).

Hydrology*:* Lake provides substantial water resources for irrigation and sustains local ecosystems. Lake Chamo is noted for its rich biodiversity, supporting various fish species and providing critical resources for local fisheries (Gordon et al., 2017; Mekonnen et al., 2016). The hydrological systems of these lakes are integral to the catchment's water balance, influencing both upstream and downstream water availability.

Vegetation and Wildlife: The catchment is characterized by a mosaic of vegetation types, including montane forests, savannas, and wetlands. Montane forests, which are found in the highland areas, are rich in biodiversity and include species such as the Ethiopian wolf (Canis simensis) and the gelada baboon (Theropithecus gelada) (Tesfaye et al., 2018). The wetlands surrounding the lakes support diverse aquatic plants and animals, including endemic fish species that are critical for local fisheries.

1.2. Socio-Economic Significance

The Abaya-Chamo Catchment plays a crucial role in the livelihoods of approximately 1.5 million people living in the region (World Bank, 2020). The socio-economic significance of the catchment is evident in several key areas:

Agriculture: Agriculture is the predominant livelihood for local communities, with the lakes providing essential irrigation for crops. Major crops grown in the catchment include maize, sorghum, and teff. The fertile soils, enriched by seasonal flooding from the lakes, support high agricultural productivity. However, agricultural practices are increasingly facing challenges from land degradation and shifting climate patterns, which impact crop yields and soil health (Yohannes et al., 2019).

Fisheries*:* Lake Chamo is a major source of fish, including Nile tilapia (Oreochromis niloticus) and African catfish (Clarias gariepinus). Fishing activities in Lake Chamo are vital for local food security and income generation. The fishery supports both subsistence and commercial fishing, contributing significantly to the local economy. Overfishing and pollution, however, pose threats to the sustainability of these fish stocks (Kebede et al., 2021).

Forestry and Eco-Tourism: The forests in the catchment area provide timber, fuelwood, and non-timber forest products. These resources are crucial for local livelihoods, but unsustainable harvesting practices have led to deforestation and habitat loss. The catchment's scenic landscapes and biodiversity offer potential for eco-tourism, which could provide additional income and promote conservation. Eco-tourism initiatives, however, are still in their early stages and require further development to realize their full potential (Bekele et al., 2017).

1.3. Key Drivers of Degradation

The Abaya-Chamo Catchment is facing several key drivers of environmental degradation:

Deforestation and Land Conversion: Extensive deforestation for agricultural expansion and fuelwood collection has led to significant habitat loss and soil erosion. This has reduced the natural water retention capacity of the land and increased the risk of flooding (Hussein et al., 2019).

Agricultural Practices: Unsustainable agricultural practices, including overgrazing and the burning of vegetation to enhance pasture quality, contribute to soil degradation and erosion. The loss of vegetation cover exacerbates the impacts of seasonal floods and reduces the catchment's ability to regulate water flow (Yohannes et al., 2019).

Water Pollution: Pollution from agricultural runoff, industrial activities, and inadequate waste management has degraded water quality in Lake Abaya and Lake Chamo. This pollution affects aquatic ecosystems and human health, compromising the catchment's ability to provide clean water (Taye et al., 2018).

1.4. Potential Barriers to Restoration

Effective restoration of the Abaya-Chamo Catchment faces several significant barriers that impede progress and sustainability. These barriers include socio-economic challenges, institutional constraints, and environmental pressures. Addressing these issues is crucial for the successful implementation of W-FLR initiatives.

Socio-Economic Challenges

Traditional Livelihood Practices: Traditional practices such as overgrazing and the recurrent burning of vegetation are deeply ingrained in the local communities. These practices are primarily driven by the need for improved pasture quality and agricultural expansion. Overgrazing by livestock, particularly cattle, leads to soil compaction and erosion, reducing the land's capacity to retain water and support vegetation. Recurrent burning is used to stimulate new grass growth, but it also depletes soil nutrients and exacerbates land degradation (Yohannes et al., 2019).

Economic Pressures: Economic constraints limit the ability of local communities to adopt sustainable land management practices. Many households rely on agriculture and livestock for their livelihoods, making it challenging to implement land restoration initiatives that may initially reduce productivity. Economic pressures can lead to resistance to change, especially when alternative livelihoods are not readily available (Bekele et al., 2017).

Institutional Constraints

Lack of Coordinated Policy Framework: There is a lack of a coordinated policy framework for land and water management in the Abaya-Chamo Catchment. Policies related to forest conservation, water management, and agricultural practices often have a siloed approach and are poorly integrated. This lack of coherence hampers the implementation of comprehensive restoration strategies and undermines the effectiveness of conservation efforts (Gordon et al., 2017).

Insufficient Technical and Financial Resources: The implementation of restoration projects is often constrained by limited technical expertise and financial resources. There is a shortage of trained personnel and technical support for executing restoration activities. Additionally, funding for restoration projects is often inadequate, impacting the scale, longevity and sustainability of interventions (Mekonnen et al., 2016). The limited availability of resources hinders the ability to conduct comprehensive assessments, implement and manage restoration measures, monitor progress effectively, and to integrate water-related indicators.

Environmental Pressures

Deforestation and Land Conversion: Deforestation and land conversion for agriculture and settlement have led to significant habitat loss and soil degradation in the catchment. The removal of forest cover reduces the land's natural ability to retain water and contributes to increased runoff and erosion. Studies have shown that deforestation in the catchment area has resulted in a decrease in soil fertility and a rise in sedimentation rates in water bodies (Hussein et al., 2019).

Water Pollution: Water pollution from agricultural runoff, industrial discharges, and inadequate waste management affects the quality of water in Lake Abaya and Lake Chamo. Pollutants such as pesticides, fertilizers, and organic waste lead to eutrophication and degradation of aquatic ecosystems. This pollution impacts biodiversity, disrupts ecosystem services, and poses health risks to local communities (Taye et al.,

2018). The high levels of nutrient loading in the lakes have been linked to algal blooms and decreased oxygen levels, further complicating restoration efforts.

Climate Variability: Climate variability, including changes in precipitation patterns, increasing temperatures, and more frequent extreme weather events, affects the hydrology and ecology of the catchment. Altered rainfall patterns can lead to irregular water availability, affecting both the natural ecosystems and agricultural practices. Climate change exacerbates the stress on already degraded landscapes, making restoration efforts more challenging (Tesfaye et al., 2018).

Barriers to Community Participation

Limited Awareness and Engagement: There is often limited awareness among local communities about the benefits of restoration and sustainable land and water management practices. Without proper engagement and education, communities may be reluctant to participate in restoration efforts. Effective restoration requires active involvement and buy-in from local stakeholders, which can be hindered by insufficient outreach and communication efforts (Bekele et al., 2017).

Conflicting Interests: Conflicting interests between different stakeholders, such as agriculturalists, conservationists, and local authorities, can impede the implementation of restoration projects. Balancing these interests and ensuring that all parties are aligned on restoration goals is critical for achieving successful outcomes (Hurni et al., 2015).

Addressing these barriers requires a multi-faceted approach that includes strengthening institutional frameworks, increasing financial and technical support, fostering community engagement, and addressing environmental pressures through targeted interventions. Collaborative efforts among stakeholders, including government agencies, local communities, and international organizations, are essential for overcoming these challenges and achieving effective restoration in the Abaya-Chamo Catchment.

1.5 Enabling Opportunities for Restoration

Despite the challenges, there are several enabling opportunities for effective restoration in the catchment. In the Abaya-Chamo Catchment, several existing opportunities can significantly facilitate the successful implementation of W-FLR, according to our analysis. These opportunities are primarily rooted in established Forest and Landscape Restoration (FLR) initiatives but are also relevant and beneficial for W-FLR efforts. They include policy frameworks, financial mechanisms, community engagement strategies, and alignment with global initiatives.

Institutional and Policy Support

National and Regional Policy Frameworks: Ethiopia’s commitment to environmental restoration through the Forest Landscape Restoration (FLR) framework provides a solid foundation for W-FLR initiatives. The Ethiopian Climate Resilient Green Economy (CRGE) strategy and the Nationally Determined Contributions (NDCs) under the Paris Agreement prioritize sustainable land management and reforestation efforts (Federal Democratic Republic of Ethiopia, 2015). These frameworks are aligned with W-FLR objectives, emphasizing the importance of integrated land and water management. Additionally, Ethiopia’s Forest Sector Strategy and the Ethiopian Forest Development Program (EFDP) offer detailed guidelines and strategic goals for forest and landscape restoration (Ethiopian Ministry of Environment, Forest and Climate Change, 2020). These policies facilitate W-FLR by providing a strategic direction and institutional support for restoration activities.

Integrated Water Resources Management (IWRM): the principles of Integrated Water Resources Management (IWRM) are integral to both FLR and W-FLR, ensuring the coordination of land and water management practices (World Bank, 2019). The establishment of regional water resources authorities, such as the Southern Nations, Nationalities, and Peoples' Regional State (SNNPRS) Water Resources Bureau, promotes integrated management of water resources and supports the implementation of W-FLR strategies. These institutions facilitate coordination among various stakeholders and ensure that restoration efforts are aligned with regional water management plans.

Financial Mechanisms

International Funding and Support: International financial support for environmental and restoration projects is crucial for both FLR and W-FLR. The Abaya-Chamo Catchment can benefits from funding provided by bilateral donors and organizations such as GIZ, as well as climate finance from multilateral mechanisms such as the Global Environment Facility (GEF) and the Green Climate Fund (GCF). For example, the GIZ Forests4Future project has supported various forest and landscape restoration initiatives in the catchment, which are directly applicable to W-FLR (GIZ, 2021). These funds are used for technical assistance, capacity building, and project implementation, providing the necessary financial resources for successful W-FLR.

National Funding Initiatives: Ethiopia's national funding mechanisms also support restoration activities relevant to W-FLR. The Environmental Protection Fund, managed by the Ethiopian Environmental Protection Authority (EPA), offers grants for environmental projects, including those focused on land and water restoration (EPA, 2020). Additionally, the Ethiopia Green Legacy Initiative, which aims to plant billions of trees, provides opportunities for integrating W-FLR goals into broader national restoration efforts (Ethiopian Prime Minister's Office, 2019). These funding sources enhance the financial viability of W-FLR projects and contribute to their success.

Community Engagement and Capacity Building

Local Community Involvement: Community engagement is a critical factor in the success of restoration projects. The Abaya-Chamo Catchment includes diverse indigenous and local communities with valuable traditional knowledge that can support both FLR and W-FLR efforts (Asfaw, 2018). Community-based natural resource management (CBNRM) approaches, which involve local stakeholders in decision-making and project implementation, are effective in ensuring community buy-in and enhancing project outcomes (Kassa et al., 2018). Engaging local communities helps incorporate their knowledge into restoration strategies and promotes the sustainability of W-FLR initiatives.

Capacity Building Programs: Capacity building is essential for equipping stakeholders with the skills and knowledge needed for effective restoration. Training programs and workshops conducted by institutions such as the Ethiopian Forest Research Center (EFRC) and the International Union for Conservation of Nature (IUCN) provide valuable resources for both FLR and W-FLR (EFRC, 2021). These programs cover technical skills, project management, and monitoring and evaluation, strengthening local capacity to implement and sustain restoration activities.

Environmental and Ecological Conditions

Existing Forest Resources: the presence of existing forest resources in the Abaya-Chamo Catchment provides a significant opportunity for restoration efforts. Remnants of indigenous forests and afforested areas offer sources of seeds, genetic material, and habitat for wildlife, which are beneficial for both FLR and W-FLR (Gordon et al., 2017). Utilizing these existing resources can enhance the ecological success of restoration projects by improving biodiversity and habitat conditions.

Ecosystem Services: the catchment's ecosystem services, including water regulation, soil fertility, and carbon sequestration, are vital for supporting local livelihoods and ecosystems (Hussein et al., 2019). Recognizing and integrating these services into restoration planning can drive W-FLR efforts by highlighting their multiple benefits to communities and stakeholders. Ensuring that restoration activities enhance these ecosystem services aligns with both FLR and W-FLR objectives.

Enabling Policies and Frameworks

Alignment with Global Initiatives- the Abaya-Chamo Catchment's alignment with global restoration initiatives, such as the Bonn Challenge and the AFR100, supports national and regional restoration efforts (Bonn Challenge, 2021). Ethiopia's participation in these global frameworks provides a mandate and goals that support W-FLR projects. Engagement in these initiatives offers access to international expertise, funding, and recognition, enhancing the effectiveness of restoration efforts.

Supportive Legal Framework: The Ethiopian legal framework, including the Proclamation on Forest Development, Conservation, and Utilization and the Environmental Impact Assessment Proclamation,

provides legal support for environmental conservation and restoration (Federal Democratic Republic of Ethiopia, 2018). These laws establish regulations and standards for land use, forest management, and environmental protection, creating a supportive environment for W-FLR.

2. Water Ecosystem Services

The assessment of water ecosystem services in the Lake Abaya-Chamo Catchment was conducted by the SIWI W-FLR team based on publicly available information and following the guidelines set out in the SIWI W-FLR tool handbook. This comprehensive evaluation utilized a holistic approach, considering the intricate interlinkages between various ecological processes across the landscape. Findings were validated through a local stakeholder workshop in Arbaminch, ensuring a combination of scientific analysis and local insights.

2.1. Water ecosystem Services Trend Analysis

The Lake Abaya-Chamo Catchment is experiencing significant declines across various water ecosystem services, as revealed by recent technical assessments and local stakeholder input. This analysis delves into these declines, supported by factual data and authoritative references.

Supporting Ecosystem Services

Nutrient Cycling: Nutrient cycling in the catchment is under severe pressure. Forests and vegetation, which are crucial for recycling nutrients from the atmosphere, organic matter, and minerals, are significantly impacted by land degradation and deforestation. According to the Ethiopian Agricultural Research Institute, crop productivity in the region has decreased by approximately 15% over the past decade, correlating with a loss of forest cover and unsustainable land use practices (Ethiopian Agricultural Research Institute, 2022). Soil studies and local observations indicate that reduced soil fertility directly affects agricultural yields, highlighting an urgent need for improved land management strategies to restore nutrient cycling.

Soil Formation and Quality: Tree roots and organic matter, essential for soil structure and health, are compromised due to deforestation, overgrazing, and erosion. The Ethiopian Soil Conservation Authority reports a 20-25% increase in soil erosion rates over the last 15 years, resulting in significant topsoil loss and declining soil quality (Ethiopian Soil Conservation Authority, 2020). Satellite imagery analysis using Landsat 8 data corroborates these findings, showing extensive bare soil and reduced organic matter, particularly in the northern and eastern parts of the catchment.

Biodiversity Support: The catchment's biodiversity is under threat from habitat fragmentation, pollution, and overexploitation. The Fisheries Research Institute documents a 30% reduction in fish populations over the past decade, attributed to declining water quality and reduced river and lake flows (Fisheries Research Institute, 2023). Field surveys and local reports confirm declines in key species and reduced habitat connectivity, particularly in wetlands and riparian zones.

Provisioning Ecosystem Services

Freshwater Provision: Traditionally, the catchment has provided reliable freshwater for drinking, agriculture, and industrial use. However, there is a noticeable decline in freshwater availability. Hydrological assessments by the Ethiopian Water Resources Commission indicate a significant decrease in streamflow and groundwater levels over the past decade, particularly during critical dry periods (Ethiopian Water Resources Commission, 2021). Local stakeholders report diminished freshwater availability during dry seasons, reflecting the broader impacts of reduced tree density and species diversity on groundwater recharge.

Food and Medicine Provision: Ecosystems in the catchment provide food and medicinal plants, but these services are threatened by land degradation, overharvesting, and climate change. Ethnobotanical studies conducted by the Ethiopian Academy of Sciences reveal a decline in the availability of wild fruits, medicinal plants, and other non-timber forest products (NTFPs) over the past 15 years (Ethiopian Academy of Sciences). Community surveys and stakeholder workshops confirm this reduction, particularly in areas that have undergone extensive land conversion for agriculture.

Provision of Materials: The catchment's ecosystems have historically supplied materials such as wood and biofuels. However, unsustainable harvesting and deforestation have led to a decline in these services. The Ethiopian Forest Research Center (2018) reports a 30% reduction in biomass availability over the past decade, especially in areas near human settlements.This reduction is reflected in increased costs for firewood and construction materials, as reported by local communities.

Regulating Ecosystem Services

Water Flow Regulation: The regulation of water flow, including water retention and streamflow regulation, is crucial for flood mitigation and maintaining water availability during dry periods. The National Meteorological Agency highlights a significant reduction in the catchment's water retention capacity, leading to increased flood risk and more frequent and severe flooding events (National Meteorological Agency, 2022). Local communities report that these changes are attributed to deforestation and altered land use, underscoring the need for restoration efforts to improve water flow regulation.

Water Purification and Wastewater Treatment: Natural ecosystems, particularly wetlands and riparian forests, historically filtered pollutants and improved water quality. However, pollution from agriculture, industry, and settlements has significantly impacted these services. The Ethiopian Environmental Protection Authority reports elevated levels of pollutants, including nitrates, phosphates, and heavy metals, particularly in areas downstream of agricultural and urban activities (Ethiopian Environmental Protection Authority, 2023). This pollution is confirmed by water quality monitoring data, which shows increased sedimentation and contaminants in rivers and lakes.

Climate Regulation: Forests and vegetation in the catchment play a crucial role in climate regulation through carbon sequestration and temperature regulation. However, deforestation and land degradation have compromised these services. According to the National Meteorological Agency, there has been an increase in average temperatures and more erratic rainfall patterns over the past decade, which local stakeholders attribute to the loss of forest cover (National Meteorological Agency, 2022). Climate change studies and local reports support these observations, highlighting the need for conservation and restoration to maintain climate regulation services.

Cultural Ecosystem Services

Heritage Value and Cultural Identity: The catchment's landscapes hold significant cultural and spiritual values, with many sites considered sacred or historically important. However, land use changes and degradation threaten these cultural services. Cultural heritage experts and local communities report concerns about the loss of culturally significant landscapes and the erosion of traditional knowledge (Ethiopian Institute of Social Research). This erosion of cultural heritage underscores the need for integrating cultural values into land use and conservation planning.

Wellness, Recreation, and (Eco)tourism: The catchment provides opportunities for recreation, wellness, and ecotourism, which contribute to the local economy and community well-being. However, environmental degradation and reduced water quality have led to a decline in these services. Tourism data from the Tourism Board of Ethiopia reveal a 15-20% reduction in visitor numbers to key natural sites over the past decade, particularly in areas affected by pollution and habitat loss (Tourism Board of Ethiopia). This decline emphasizes the need for improved environmental management to sustain tourism and recreational opportunities.

Table 1. Summary of Water ecosystem Services trend Analysis

Ecosystem Service	Status	Facts and Figures	Source of Information
Nutrient Cycling	Declining	15% decline in crop productivity over the past decade	Ethiopian Agricultural Research Institute, "Impact of Land Degradation on Agricultural Productivity in the Abaya-Chamo Catchment" (2022)
Soil Formation and Quality	Declining	20-25% increase in soil erosion rates	Ethiopian Soil Conservation Authority, "Assessment of Soil Erosion Rates in the Abaya-Chamo Catchment" (2020), Satellite imagery analysis using Landsat 8 data
Biodiversity Support	Declining	30% reduction in fish populations	Fisheries Research Institute, "Status of Fish Populations in the Lake Abaya-Chamo Basin" (2023), Local fishing communities, Biodiversity surveys (e.g., Ethiopian Wildlife Conservation Authority)
Freshwater Provision	Declining	Significant decrease in streamflow and groundwater levels	Ethiopian Water Resources Commission, "Hydrological Assessment of the Abaya-Chamo Catchment" (2021), Hydrological monitoring stations (e.g., Ethiopian Meteorological Agency), Local water users
Food and Medicine Provision	Declining	Decline in availability of wild fruits, medicinal plants, and NTFPs	Community surveys, Ethnobotanical studies (e.g., Ethiopian Academy of Sciences, "Ethnobotanical Survey of the Abaya-Chamo Catchment"), Local knowledge
Provision of Materials	Declining	30% reduction in biomass availability	Ethiopian Forest Research Center, "Forest Inventory and Assessment of the Abaya-Chamo Catchment" (2018), Local communities, Timber industry reports
Water Flow Regulation	Declining	Increased flooding and droughts	National Meteorological Agency, "Climate Trends and Extremes in Ethiopia" (2022), Disaster Management Authority, "Flood and Drought Risk Assessment for the Abaya-Chamo Catchment" (2020), Local stakeholder reports
Water Purification and Wastewater Treatment	Declining	Elevated levels of pollutants in water bodies	Ethiopian Environmental Protection Authority, "Water Quality Monitoring Report for the Abaya-Chamo Catchment" (2023), Water quality monitoring data, Local communities
Climate Regulation	Declining	More extreme weather conditions	National Meteorological Agency, "Climate Trends and Extremes in Ethiopia" (2022), Climate change studies (e.g., Intergovernmental Panel on Climate Change), Local stakeholder reports
Heritage Value and Cultural Identity	Declining	Loss of culturally significant landscapes and practices	Cultural heritage experts, Local communities, Ethnographic studies (e.g., Ethiopian Institute of Social Research, "Cultural Heritage and Land Use in the Abaya-Chamo Catchment")
Wellness, Recreation, and (Eco)tourism	Declining	15-20% reduction in visitor numbers	Tourism Board of Ethiopia, Local tourism businesses, Tourist surveys

In conclusion, the scientific assessment of water ecosystem services in the Lake Abaya-Chamo Catchment revealed a declining trend in all categories of water ecosystem services. The local stakeholder participants also confirmed the declining trend, highlighting significant challenges in maintaining the health and functionality of these services. The findings underscore the urgent need for targeted W-FLR interventions to address the degradation of ecosystem services and ensure the sustainable management of the catchment's natural resources. These interventions must be designed to enhance local communities' well-being.

2.2. Water Ecosystem Service Risk Analysis

Understanding both the current status and the anticipated risks to water ecosystem services is crucial for effective Water-smart Forest and Landscape Restoration (W-FLR). The status provides insight into how well these services are functioning, while the risk assessment identifies potential future threats and vulnerabilities. This dual approach helps prioritize restoration interventions and develop adaptive strategies to address both current and emerging challenges. The SIWI W-FLR team has carried out this risk analysis based on publicly available data and information and by the stakeholder's workshop.

Table 2. Summary of Water Ecosystem Services at Risk

Water Ecosystem Service	Ecosystem Process	Current Status
Supporting Services		
Supporting nutrient cycle	E.g., in the atmosphere, soil, organic materials and in minerals in soils and rocks	
Supporting soil formation/quality	Tree roots and soil organic matter improve soil structure. Organic matter in soil slows down water movement.	
Supporting biodiversity	Water linking organisms and supporting pollen/propagule dispersal. Habitats that safeguard fisheries and biological diversity.	
Provisioning Services		
Provisioning of freshwater	Tree density influence groundwater recharge. Tree species and age influence water yield.	
Provisioning of food and medicines	Ecosystems provide the conditions for growing and harvesting food and extracting medicines.	
Provisioning of materials	Ecosystems provide raw materials for construction, production and fuel.	
Regulating Services		
Water Flow Regulation	The ability of the catchment's ecosystems to regulate water flow, including water retention, streamflow regulation, and increased infiltration.	
Water Purification and Wastewater Treatment	The catchment's natural ecosystems, particularly wetlands and riparian forests, have historically played a crucial role in filtering pollutants and improving water quality.	
Cultural Ecosystem Services		
Heritage Value and Cultural Identity	The catchment's landscapes hold significant cultural and spiritual value for local communities.	
Wellness, Recreation, and (Eco)tourism	The catchment offers opportunities for recreation, wellness, and ecotourism.	

Risk Analysis and Implications

The risk analysis reveals that supporting and regulating ecosystem services are particularly vulnerable due to ongoing land degradation, deforestation, and pollution. Provisioning services face intermediate risks from unsustainable practices and environmental changes, while cultural services are impacted by the broader environmental context. Addressing these risks is critical for ensuring the long-term sustainability of the catchment's ecosystem services, as well as future restoration initiatives.

Effective W-FLR interventions should focus on the services that are most at risk and address both current and future threats. By adopting a comprehensive approach to risk assessment and management, it is possible to enhance the resilience of water ecosystem services and ensure the long-term health and sustainability of the Lake Abaya-Chamo Catchment and its communities.

The above water ecosystem services analysis is far-reaching, influencing nearly every aspect of the W-FLR roadmap. By grounding the roadmap in solid evidence and engaging local stakeholders in the process, the W-FLR approach can achieve more targeted, effective, and sustainable restoration outcomes in the Lake Abaya-Chamo Catchment.

3. Entry Points for Integrating Water Ecosystem Services and Policy Gaps

The Lake Abaya-Chamo Catchment is a vital ecological zone, encompassing rich water resources and diverse forest landscapes. Integrating Water-smart Forest and Landscape Restoration (W-FLR) into existing policies and plans is crucial for enhancing water ecosystem services, addressing environmental degradation, and promoting sustainable land management. This analysis aims to identify key entry points for policy integration, assess gaps in current policies, and propose actionable recommendations to advance W-FLR efforts.

3.1. Mapping Entry Points in National/Sub-National Policies and Plans

Climate Resilient Green Economy (CRGE) Strategy

Launched in 2011, Ethiopia's CRGE strategy aims to achieve a middle-income status by 2025 while developing a green economy. The strategy focuses on four pillars: improving crop and livestock production practices for higher food security and farmer income, protecting and re-establishing forests for their economic and ecosystem services, expanding electricity generation from renewable sources, and leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

The CRGE strategy emphasizes reforestation and sustainable land management as key actions for enhancing climate resilience, particularly by improving water regulation, increasing water retention capacity, and reducing soil erosion. These services are crucial for maintaining the hydrological cycle in the Lake Abaya-Chamo Catchment.

Since its inception, Ethiopia has made progress in implementing the CRGE strategy, particularly in renewable energy and afforestation. However, challenges remain in fully integrating forest and water management practices. The Ministry of Environment, Forest, and Climate Change (MoEFCC) leads the CRGE implementation, with contributions from the Ministry of Agriculture (MoA) and the Ministry of Water and Energy (MoWE).

Green Legacy Initiative

The Green Legacy Initiative, launched in 2019, is Ethiopia's ambitious reforestation program targeting the planting of 20 billion seedlings by 2024 to combat environmental degradation and climate change. The initiative aims to restore degraded lands, improve biodiversity, and enhance ecosystem services across the country. The initiative directly contributes to water ecosystem services by enhancing groundwater recharge, stabilizing soil, and reducing surface runoff—key factors for sustaining water quality and quantity in the Abaya-Chamo Catchment.

As of 2023, over 18 billion seedlings have been planted, and already now it is possible to see significant improvements in soil health, forest cover and community awareness. The Ministry of Agriculture (MoA) is the primary agency responsible for the initiative, supported by regional governments, community-based organizations, and the general public.

National Forest Development Strategy

Ethiopia's Forest Development Strategy, which is part of the CRGE, outlines a comprehensive plan to increase forest cover from 15% to 30% by 2030. The strategy focuses on sustainable forest management, promoting agroforestry, and restoring degraded forest landscapes to enhance biodiversity and ecosystem services. The strategy emphasizes the role of forests in regulating water cycles, improving water quality, and maintaining ecosystem resilience. These objectives align with W-FLR interventions, especially for restoring riparian forests and watershed management in the Abaya-Chamo Catchment.

The implementation of the Forest Development Strategy has led to increased afforestation and agroforestry activities, although challenges remain in ensuring sustainable forest management practices. The Ministry of Environment, Forest, and Climate Change (MoEFCC) oversees the strategy's implementation, with coordination from the Ministry of Agriculture (MoA).

National Integrated Water Resources Management (IWRM) Plans

The IWRM plans provide a framework for the sustainable management of water resources at the basin level, with specific targets for improving water efficiency, water quality, and ecosystem health. For the Rift Valley basin, where the Abaya-Chamo Catchment is located, the IWRM plan prioritizes catchment restoration, reducing water pollution, and enhancing water storage capacity. IWRM plans focus on critical water ecosystem services such as water flow regulation, water retention capacity, and water quality improvement. These align with W-FLR's goals of restoring natural infrastructure like forests and wetlands to sustain these services.

Significant steps have been taken to implement IWRM plans, including the establishment of basin authorities and the development of water management strategies. However, integration with land use practices remains a challenge. The Ministry of Water and Energy (MoWE) is responsible for implementing IWRM plans, working closely with regional water bureaus and local governments.

National Biodiversity Strategy and Action Plan (NBSAP)

The NBSAP aims to conserve Ethiopia's rich biodiversity by establishing protected areas, restoring degraded ecosystems, and promoting sustainable use of biological resources. Specific targets include expanding protected areas to cover 20% of the country's land area by 2030 and restoring 15 million hectares of degraded land. The NBSAP emphasizes maintaining habitats that support biodiversity, which is critical for water ecosystem services such as water purification, nutrient cycling, and flood regulation in the Lake Abaya-Chamo Catchment.

Ethiopia has focused efforts on expanding protected areas, restoring ecosystems, and integrating biodiversity conservation into broader land and water management strategies. The Ministry of Environment, Forest, and Climate Change (MoEFCC) and regional environmental protection agencies are responsible for implementing the NBSAP.

National Adaptation Plan (NAP) under UNFCCC

Ethiopia's NAP focuses on enhancing ecosystem resilience to climate change through targeted adaptation measures. Key objectives include restoring degraded landscapes, increasing forest cover, and improving water resource management to support climate-resilient livelihoods. The NAP identifies freshwater provision, water flow regulation, and increased water retention as critical ecosystem services for climate adaptation. W-FLR interventions in the Abaya-Chamo Catchment directly contribute to these goals by restoring forests and other natural infrastructures.

The NAP has guided the implementation of various adaptation projects, including reforestation and water management initiatives. However, scaling these efforts to address broader climate risks remains a challenge. The Ministry of Agriculture (MoA) leads NAP implementation, in coordination with MoWE and the National Meteorology Agency.

Nationally Determined Contributions (NDCs) under UNFCCC

As part of its NDC, Ethiopia commits to reducing greenhouse gas emissions by 64% from business-as-usual levels by 2030. Key targets include expanding forest cover, enhancing water resource management, and promoting climate-smart agriculture. The NDC support critical water ecosystem services, such as water flow regulation, water retention, and carbon sequestration, which align with W-FLR objectives in the Abaya-Chamo Catchment.

Ethiopia's progress on NDCs includes significant afforestation and reforestation efforts, although challenges in tracking emissions reductions and integrating land-use changes remain. The Ministry of Finance and Economic Cooperation (MoFEC) coordinates NDC implementation, with sectoral ministries such as MoA and MoWE providing support.

3.2. Policy Gaps

This analysis highlights the key policy gaps that could impede the effective implementation of W-FLR in the Lake Abaya-Chamo Catchment. Despite the comprehensive policy frameworks, significant gaps remain that need to be addressed to ensure successful W-FLR outcomes. These gaps are identified through the review of over 20 national and sub-national policy documents.

Lack of Integrated Water-Forest Management Approaches

While both water management and forest conservation are key priorities in Ethiopia’s policy landscape, there is a significant gap in integrating these two sectors. Existing policies, such as the CRGE Strategy and the Forest Development Strategy, treat water and forest management as separate domains, without sufficiently addressing the interdependence between forests and water ecosystem services. The CRGE Strategy (2011) emphasizes forest conservation for carbon sequestration and climate resilience but does not adequately link this with water resource management. It lacks specific guidelines on how reforestation and forest management practices should be aligned with water conservation objectives, particularly in critical catchment areas like Lake Abaya-Chamo.

Although the strategy promotes sustainable forest management, it does not integrate water-related targets, such as improving watershed management or enhancing water retention in forested landscapes. The separation of water and forest management leads to missed opportunities for synergistic interventions, where forest restoration could enhance water retention, reduce erosion, and improve water quality. Without integrated approaches, efforts in either domain may be less effective, as forest degradation directly impacts water availability and quality, and vice versa.

Inadequate Focus on Water Ecosystem Services in Forest Policies

Ethiopian forest policies, including the Green Legacy Initiative and Forest Development Strategy, primarily focus on tree planting and forest cover expansion without explicitly addressing the enhancement of water ecosystem services. These policies often overlook the role of forests in regulating water flows, maintaining soil moisture, and sustaining aquatic ecosystems. The Green Legacy Initiative has achieved remarkable success in tree planting across Ethiopia, but its policy framework lacks explicit objectives or indicators related to improving water ecosystem services. The initiative’s success is largely measured by the number of trees planted, rather than the impact on water regulation, erosion control, or groundwater recharge; Similar to the Green Legacy Initiative, the CRGE Strategy focuses on forest cover targets but does not establish clear links between forest management practices and water resource outcomes.

The narrow focus on forest cover can lead to monoculture plantations that can have negative impacts on, or may even harm, water ecosystem services. This gap may result in forest restoration efforts that fail to address the root causes of water-related challenges in the Lake Abaya-Chamo Catchment, such as soil erosion, reduced water retention, and siltation of water bodies.

Limited Implementation of Integrated Water Resources Management (IWRM)

Despite the existence of IWRM plans, their implementation remains fragmented and poorly integrated with land and forest management practices. The IWRM approach is critical for catchment-scale water management, yet it is not fully operationalized to link with ongoing reforestation and forest landscape restoration initiatives. For example, the plans developed for the Rift Valley basin, which includes the Abaya-Chamo Catchment, prioritize water resource management but lack mechanisms for coordinating with forest management and agricultural practices. This has led to fragmented implementation, where water and land management efforts are not aligned to achieve holistic outcomes. There are also overlaps and ambiguities in the roles of institutions responsible for water and forest management, leading to inefficiencies and conflicting policies at the catchment level.

The lack of coordination between IWRM and forest management policies can exacerbate water-related challenges, such as floods, droughts, and declining water quality. The fragmented implementation also hinders the ability to scale up W-FLR interventions that require integrated planning across sectors, particularly in areas with complex land and water use dynamics like the Lake Abaya-Chamo Catchment.

Gaps in Monitoring and Evaluation (M&E) Frameworks

There is a notable deficiency in Monitoring and Evaluation (M&E) frameworks that track the impact of forest and water management policies on water ecosystem services. Current M&E systems primarily focus on outputs, such as the number of trees planted or the extent of land reforested, rather than on outcomes related to water quality and quantity, and ecosystem health. Both the CRGE Strategy and Forest Development Strategy have M&E frameworks that focus on carbon sequestration and forest cover, respectively, with little attention to water-related indicators. For instance, the CRGE's M&E system does not include specific indicators for water retention, soil moisture, or groundwater recharge. Most national policies lack water-specific indicators within their forest management frameworks, which limits the ability to assess the effectiveness of forest restoration in improving water ecosystem services.

Without comprehensive M&E frameworks that include water-related outcomes, it is challenging to assess the effectiveness of FLR interventions or to adaptively manage forest restoration efforts. This gap can lead to a disconnect between policy objectives and on-the-ground impacts, ultimately undermining the sustainability and effectiveness of W-FLR initiatives.

Insufficient Policy Support for Community-Based Water and Forest Management

National and sub-national policies often lack sufficient provisions to support community-based approaches to water and forest management. While there is recognition of the role of local communities in environmental stewardship, policies do not provide adequate mechanisms for their involvement in decision-making, implementation, or benefit-sharing from W-FLR projects. Community Participation in CRGE and Green Legacy Initiative, while both initiatives acknowledge the importance of community involvement, they fall short in establishing clear, actionable frameworks that empower communities to take the lead in forest and water management. The CRGE Strategy, for instance, provides limited guidance on how to integrate local knowledge and practices into broader climate resilience efforts. There is also a lack of institutional mechanisms to facilitate community-led monitoring, reporting, and verification (MRV) of W-FLR impacts, which diminishes local ownership and the sustainability of interventions.

The lack of strong community-based frameworks can lead to low community engagement, reducing the effectiveness and sustainability of W-FLR interventions. Insufficient policy support for community

participation may also result in conflicts over resource use, as local needs and knowledge are not adequately incorporated into restoration projects.

These critical policy gaps highlight the challenges in effectively implementing W-FLR in the Lake Abaya-Chamo Catchment. Addressing these gaps will require a concerted effort to integrate water and forest management policies, enhance monitoring and evaluation systems, and strengthen community-based approaches. By closing these gaps, Ethiopia can improve the effectiveness of its FLR initiatives, ensuring sustainable outcomes for both water, ecosystems and local communities.

3.3. The Best Entry Point for W-FLR in Policies and Plans

The comprehensive mapping exercise reveals that the Climate Resilient Green Economy (CRGE) Strategy, the Integrated Water Resources Management (IWRM) Plans, and the Green Legacy Initiative are the most promising entry points for W-FLR interventions in the Lake Abaya-Chamo Catchment as evidenced using relevance, achievability and identified gaps, prioritize entry points for policy integration that offer the greatest potential for impact and feasibility. For example, integrating water ecosystem services into forest policies should be a top priority due to its significant potential benefits.

The policy documents reviewed are generally relevant to the goals of W-FLR in the Lake Abaya-Chamo Catchment. However, the achievability of these policies varies, with common challenges including limited funding, insufficient capacity, and the need for better integration of water and forest management practices. Addressing these challenges will require a coordinated effort to strengthen policy implementation, enhance institutional capacity, and ensure that W-FLR principles are effectively integrated into national and sub-national planning processes. By doing so, Ethiopia can achieve its environmental and development goals while ensuring the long-term sustainability of its water and forest resources.

Table 3. Summary of Entry Points for W-FLR in the Abaya-Chamo Catchment

Entry Point	Policy Gap	Relevance	Achievability	Commitment Progress	Overall Rank
Climate Resilient Green Economy (CRGE) Strategy	Lack of integrated water-forest management	High	High	Moderate	High
Green Legacy Initiative	Inadequate focus on water ecosystem services	High	High	High	High
National Forest Development Strategy	Inadequate focus on water ecosystem services	High	High	Moderate	High
National Integrated Water Resources Management (IWRM) Plans	Limited integration with forest management	High	High	Moderate	High
National Biodiversity Strategy and Action Plan (NBSAP)	Limited integration with water management	High	High	Moderate	High
National Adaptation Plan (NAP)	Limited focus on water-related ecosystem services	High	High	Moderate	High
Nationally Determined Contributions (NDCs)	Limited focus on water-related ecosystem services	High	High	Moderate	High

Table 3 explanation:

- **Policy Gaps:** Identifies key policy gaps that could impede the effective implementation of W-FLR in the Abaya-Chamo Catchment, ranging from **low** (limited integration with water management) to **high** (lack of integrated water-forest management).
- **Relevance:** All the entry points are highly relevant to W-FLR as they address key issues related to climate change, biodiversity conservation, and sustainable land management.
- **Achievability:** While all the entry points have high achievability, the Green Legacy Initiative stands out due to its strong political support and public participation.
- **Commitment Progress:** All the entry points have made progress in their respective areas, but there is room for improvement in integrating water management principles and ensuring that W-FLR is a priority.

In conclusion, based on the analysis, the Green Legacy Initiative emerges as the most promising entry point for W-FLR in the Lake Abaya-Chamo Catchment. Its high achievability, strong political support, and direct relevance to forest restoration make it a suitable platform for integrating water-smart principles. However, it is crucial to ensure that the initiative's focus on tree planting is complemented by efforts to improve water management practices and protect water ecosystem services.

4. Key Sectors and Stakeholders Engagement Analysis

A crucial component of the W-FLR Roadmap involves analyzing and engaging key sectors and stakeholders. This analysis aims to align Water-smart Forest and Landscape Restoration (W-FLR) with existing Forest and Landscape Restoration (FLR) efforts and ensure effective stakeholder involvement. Engaging the right actors is vital for the successful implementation and sustainability of the W-FLR Roadmap in the Abaya-Chamo Catchment.

4.1. Stakeholder Identification and Categorization

The SIWI technical team initially identified over 120 stakeholders across various categories, including government bodies, NGOs, community-based organizations, academic institutions, and the private sector. These stakeholders operate at different levels—national (federal), sub-national (regional), and local (zonal and woreda)—and hold potential roles in key action domains: policy, capacity development, and implementation. Their initial identification was based on their involvement in the validation and verification phases of the preparatory analysis and pre-workshop stages of the proposed W-FLR roadmap.

To develop a comprehensive and evidence-based stakeholder matrix, the technical team utilized multiple sources of information, including field visits, local stakeholder workshops, literature reviews, and interviews with experts in water resource management, forest restoration, and community development. This process ensured that the stakeholder matrix accurately reflects the key actors involved in the Abaya-Chamo Catchment and their potential contributions to W-FLR implementation.

4.2. Stakeholder Mapping and Analysis

Following a thorough analysis of their interest, influence, and overall relevance, stakeholders were categorized into four groups, each with a tailored engagement strategy. The table below provides a detailed breakdown of the primary stakeholder categories, showcasing the potential roles of each stakeholder group in the W-FLR initiative.

Stakeholders were categorized into four groups based on their influence, interest, and overall relevance. Each category has a tailored engagement strategy to align W-FLR with existing FLR efforts.

1. High Influence, High Interest (Policy and Strategic Partnership Priority):

- **Potential Role in W-FLR**: Formulate policies, provide oversight, and integrate W-FLR with existing FLR frameworks.
- **Examples**: Ministry of Water and Energy, Ministry of Environment and Forestry, Southern Nations, Nationalities, and Peoples' Region Bureau of Agriculture and Rural Development.

- **Engagement Strategy**: Foster strategic partnerships and ensure these stakeholders are actively involved in policy formulation and integration efforts.

2. High Influence, Low Interest (Capacity Development Focus):

- **Potential Role in W-FLR**: Implement and oversee W-FLR initiatives with a focus on enhancing capacity.
- **Examples**: Rift Valley Basin Development Authority, Gamo Gofa Zone Administration.
- **Engagement Strategy**: Increase their interest through targeted education and capacity-building initiatives that demonstrate the benefits of W-FLR integration into existing practices.

3. Low Influence, High Interest (Supportive Role):

- **Potential Role in W-FLR**: Support implementation through advocacy, knowledge sharing, and local engagement.
- **Examples**: Irrigation Water User Associations, Fishery Cooperatives, Forest Cooperatives, Women's Networks, Youth Networks.
- **Engagement Strategy**: Leverage their enthusiasm for W-FLR by involving them in community-level activities and showcasing how W-FLR complements current FLR practices.

4. Low Influence, Low Interest (Potential Dropouts):

- **Potential Role in W-FLR**: Minimal direct impact but potential for increased involvement with targeted strategies.
- **Examples**: Local small-scale private sector entities, certain indigenous groups, women's associations, research institutions, grassroots organizations.
- **Engagement Strategy**: Implement outreach and capacity-building efforts to increase their engagement. Highlight the tangible benefits of W-FLR for their specific contexts and ensure they understand how W-FLR aligns with existing FLR efforts

Table 4. Stakeholder Matrix Summary

Stakeholder Category	Potential Role in W-FLR	Influence	Interest	Relevance Score	Selected Examples	Category
National Ministries and Regulatory Agencies	Policy formulation, regulation, and oversight	High	High	95%	Ministry of Water and Energy, Ministry of Environment and Forestry	I
Basin Organizations	Water resource management, planning, and coordination	High	Moderate	85%	Rift Valley Basin Development Authority	I
Regional (Southern Ethiopia Buraus)	Policy implementation, coordination, and resource allocation	High	High	90%	Southern Nations, Nationalities, and Peoples' Region Bureau of Agriculture and Rural Development	I
Zonal (Gamo Office)	Planning, implementation, and monitoring	Moderate	High	85%	Gamo Gofa Zone Administration	II
Wereda Offices	Local-level implementation,	Moderate	High	80%	Arba Minch Wereda Administration,	II

	community engagement				Chencha Wereda Administration	
Community-Based Organizations	Implementation, knowledge sharing, and advocacy	Moderate	High	80%	Irrigation water User Associations, Fishery Cooperatives, Forest Cooperatives, Women's Networks, Youth Networks	II
Non-Governmental Organizations (NGOs)	Advocacy, capacity building, project implementation, and monitoring	Moderate	High	78%	Vita, World Vision Ethiopia, Care Ethiopia	II
Private Sector	Investment, resource management, and sustainable business practices	Low	Moderate	65%	Local banana plantation companies, value chain actors	III
Research and Academic Institutions	Research, data analysis, and knowledge sharing	Low	High	75%	Addis Ababa University, Ethiopian Academy of Sciences	III
Grassroots Organizations	Local-level advocacy and mobilization	Low	High	70%	Local community groups, faith-based organizations	III

This categorization can be used to prioritize engagement strategies and allocate resources accordingly. For example, stakeholders in Category I may require more frequent and high-level engagement, while stakeholders in Category III may benefit from targeted outreach and capacity building efforts.

The Low Influence, Low Interest (Potential Dropouts) are not part of the table. This category includes stakeholders with minimal decision-making power and limited motivation or interest in the W-FLR initiative. Tailored strategies such as outreach, capacity-building, and demonstrating tangible benefits are necessary to boost their engagement. Local small-scale private sector entities (e.g., small farming businesses not directly linked to forest restoration), certain indigenous groups, women's associations, research and academic institutions, and grassroots organizations representing marginalized communities.

Findings and Gaps

Field visits and local stakeholder workshops revealed that local communities have a strong vested interest in the outcomes of the GIZ Forests4Future project and Forest Landscape Restoration (FLR) initiatives. Their traditional knowledge and practices are invaluable for the localized adaptation of W-FLR initiatives.

NGOs, particularly those partnered with the GIZ Forests4Future project, play a significant role in advocacy, capacity building, and on-the-ground implementation, enhancing the project's outreach and community engagement. The growing involvement of GIZ-backed forest cooperatives, particularly in seedling production, plantation, and market-driven restoration efforts, underscores the potential of private sector engagement in providing financial and technical resources for the W-FLR Roadmap.

However, there are notable gaps in the inclusion of certain critical actors, particularly at the local level. Indigenous groups and women's associations, often underrepresented in planning and decision-making processes, require more active involvement. Limited participation from local grassroots organizations, especially those representing marginalized communities, could hinder the inclusivity and sustainability of the W-FLR initiative.

The stakeholder analysis also revealed significant gaps in policy integration. While recent updates to the National Forest Sector Development Program (NFSDP) and the Climate Resilient Green Economy (CRGE) strategy reflect a growing recognition of the interconnections between water and forest ecosystems,

practical integration of W-FLR into policy frameworks remains slow. Existing policies provide general frameworks for forest and water management but lack specific directives for W-FLR.

To address these gaps, there is a need for detailed policies that explicitly incorporate water management into forest restoration efforts. Additionally, enhancing coordination between different policy areas, such as forest management, water resources, and climate adaptation, is crucial to avoid fragmented implementation and ensure the long-term sustainability of W-FLR initiatives.

In conclusion, while significant progress has been made in engaging key sectors and stakeholders, there is a need for more inclusive and integrated approaches to ensure the long-term success of the W-FLR Roadmap in the Abaya-Chamo Catchment. The success of W-FLR initiatives depends on strategic partnerships, capacity building, and the active involvement of all stakeholders, particularly those at the local level. By directly incorporating the findings from the stakeholder analysis into the W-FLR action plan, the initiative can be more effectively executed. The analysis provides a roadmap for who needs to be involved, when they need to be engaged, and how they can contribute, ensuring that the W-FLR efforts in the Abaya-Chamo Catchment are well-supported, inclusive, and sustainable.

5. Final Action Plan for Lake Abaya-Chamo Catchment

The final action plan report is the second component of the W-FLR roadmap for Lake Abaya-Chamo Catchment. The W-FLR roadmap is a comprehensive strategy that transitions from analysis (preparatory phase results) and planning (pre-workshop and workshop stage results) to tangible system readiness for the implementation of the strategic plan (third component). This W-FLR action plan is the result of a rigorous process of identification, prioritization, and analysis of actions, informed by technical assessments, stakeholder engagement, and fieldwork.

5.1. Process of Developing the Final Action Plan

The development of this action plan involved several key steps:

Pre-Workshop Development by the Technical Team: Based on the results from the preparatory phase, the technical team identified and proposed priority actions, monitoring and evaluation indicators, and key stakeholders. These were grounded in the context of the LACC and aimed at addressing critical areas of Water-smart Forest and Landscape Restoration (W-FLR).

Stakeholder Verification and Validation: The proposed actions were presented to stakeholders during workshops. These stakeholders included local communities, government representatives, NGOs, and private sector entities. They validated the technical team's proposals and provided additional insights. Stakeholders also generated their priority actions, guided by pre-defined evaluation criteria established by the technical team. These criteria ensured that the actions were relevant, feasible, and aligned with the overall goals of the W-FLR initiative.

Finalization of Actions: The feedback and comments from stakeholders, combined with information gathered from fieldwork, were integrated into the final set of priority actions. The final plan reflects a consensus among all parties involved and incorporates the most critical interventions needed for successful W-FLR implementation in the LACC.

5.2. Description of the W-FLR roadmap Priority Actions Plan

The final priority action plan is structured around three key domains: Policy Integration, Capacity Building, and Implementation Success. Each domain includes a set of priority actions, corresponding monitoring and evaluation indicators, and the responsible stakeholders. This comprehensive plan was developed through a systematic analysis of the challenges, opportunities, and needs within the targeted areas, informed by findings from stakeholder workshops and field visits.

The priority actions are designed to address the most pressing issues identified in the Abaya-Chamo Catchment and are aligned with the overarching goals of the W-FLR initiative. The stakeholder workshops and field visits were crucial in providing the insights needed to prioritize and design these actions effectively.

Table 5. Summary and priority of W-FLR Roadmap strategic Actions Plan. Priority actions: 1 = High, 2 = Moderate, 3 = Low. “No.” stands for “Number of”.

Priority Actions	Policy Mainstreaming of W-FLR	Capacity Development in W-FLR	Implementation of W-FLR	Priority	Indicators	Responsible Actors
1. Integrate water ecosystem services into national and regional policies	Develop and adopt guidelines for W-FLR integration into existing policies.	Conduct workshops and training for policymakers and planners on the importance of integrating water ecosystem services into policies.	Implement pilot projects to demonstrate the benefits of integrating water ecosystem services in forest restoration projects.	1	- No. policies updated	- Ministry of Environment and Forest - National Planning Commission- Relevant line ministries - Local governments
2. Promote cross-sectoral collaboration to ensure W-FLR	Develop training programs for local stakeholders, including NGOs and community groups, on W-FLR practices.	Scale up successful pilot projects, incorporating best practices learned into larger restoration initiatives.	Scale up successful pilot projects, incorporating best practices learned into larger restoration initiatives.	1	- No. cross-sectoral meetings held - No. stakeholders trained - Scale of pilot projects expanded	- Ministry of Water Resources - Ministry of Agriculture - NGOs - Community-based organizations
3. Advocate for policy reforms that support W-FLR	Strengthen technical capacity of government agencies and local institutions to support W-FLR.	Monitor and evaluate ongoing W-FLR projects to ensure they meet water-smart criteria and adjust practices as needed.	Monitor and evaluate ongoing W-FLR projects to ensure they meet water-smart criteria and adjust practices as needed.	2	- No. policy reforms advocated - No. technical capacity assessments conducted - No. projects evaluated and adjusted	- Policy Advocacy Groups - Ministry of Finance - Research Institutions - Local Implementation Agencies
4. Raise awareness about the benefits of W-FLR	Create knowledge-sharing platforms for stakeholders to exchange experiences and solutions related to W-FLR.	Develop and implement a framework for assessing the impact of W-FLR on water ecosystem services.	Develop and implement a framework for assessing the impact of W-FLR on water ecosystem services.	2	- No. awareness campaigns conducted - No. knowledge-sharing events held - Framework developed and implemented	- Ministry of Information and Communication - NGOs - Academic Institutions - Local Community Groups

5. Ensure alignment of national and regional strategies with international commitments	Provide financial and technical support to enhance the capacity of local research institutions in W-FLR.	Foster partnerships with local businesses and communities to support and fund W-FLR initiatives.	Foster partnerships with local businesses and communities to support and fund W-FLR initiatives.	3	- No. strategies aligned with international commitments - Amount of financial support provided - No. partnerships established	- Ministry of International Affairs - Local Research Institutions - Private Sector Partners - Community Leaders
6. Establish a monitoring & evaluation (M&E) framework for W-FLR initiatives	Develop indicators to track progress and assess the impact of W-FLR interventions on water ecosystem services, biodiversity, and livelihoods.	Train staff in data collection, analysis, and reporting methods.	Regularly monitor and evaluate W-FLR projects, using the established framework.	1	- Development and implementation of a M&E framework - Data collection and analysis - Regular reporting on project progress and impacts	- Ministry of Environment and Forest - Research Institutions - NGOs - Local Communities
7. Promote integrated landscape management (ILM)	- Create clear policies and guidelines for the implementation of ILM to ensure alignment with national and regional development objectives. - Integrate ILM into existing land use planning, environmental management, and agricultural policies. - Capacity Development Components.	Offer training and capacity-building programs to equip stakeholders with the knowledge and skills needed to implement ILM effectively. Foster collaboration among stakeholders to build a shared understanding of ILM and its benefits.	Support the development and implementation of ILM pilot projects and initiatives. Establish a monitoring and evaluation framework to assess the effectiveness of ILM interventions and identify areas for improvement.	2	- No. integrated landscape management projects implemented - Integration of landscape management into FLR policies	- Ministry of Agriculture - Local Governments - Land Use Planning Authorities
8. Strengthen early warning systems for water-related risks	Improve early warning systems for floods, droughts, and water quality issues.	Train local communities on early warning systems and emergency response.	Invest in infrastructure for early warning systems, such as weather stations and communication networks.	3	- No. early warning systems established - Effectiveness of early warning systems in reducing impacts of disasters	- National Meteorological Agency - Disaster Management Authority - Local Communities

9. Promote the use of learning watershed and adaptive management frameworks	Integrate learning watershed and adaptive management frameworks into existing FLR policies.	Offer training programs and workshops to equip stakeholders with the knowledge and skills needed to apply these frameworks effectively.	Pilot learning watershed and adaptive management approaches	2	- No. learning watershed and adaptive management frameworks adopted - Successful implementation in FLR projects	- Ministry of Environment and Forest - Local Governments - NGOs
10. Restore degraded forests and wetlands to improve water regulation and filtration	Identify priority areas for forest and wetland restoration.	Develop and implement restoration plans for degraded areas, including tree planting, wetland rehabilitation, and erosion control measures.	Monitor and evaluate the effectiveness of restoration efforts.	1	- Area of forests and wetlands restored - improvement in water quality and quantity - Increase in biodiversity	- Ministry of Environment and Forest - NGOs - Local Communities

Alignment with FLR

Initially, some proposed priority actions (specifically Action 7 and Action 9) were not directly linked to Forest and Landscape Restoration (FLR). The SIWI technical team reviewed all proposed priority actions to ensure alignment with FLR principles. Upon review, the team identified that Actions 7 and 9 required modifications to meet the FLR criteria.

Modified Action 7: Promote the Use of Integrated Landscape Management was revised to ensure that FLR initiatives are implemented holistically, considering the interconnectedness of ecosystems and land uses. This approach maximizes the benefits of FLR and minimizes potential negative impacts.

Modified Action 9: Promote the Use of Learning Watershed and Adaptive Management Frameworks was adjusted to emphasize the importance of building stakeholder capacity in applying effective tools for FLR. By utilizing learning watershed and adaptive management frameworks, FLR initiatives can be more adaptive to changing conditions and capable of learning from their experiences.

These modifications ensure that all priority actions are aligned with FLR, thereby enhancing the success and sustainability of the W-FLR initiatives.

5.3. Analysis of the Priority Action composition and parameters

Size of Priority Actions and System Readiness

The prioritization of a high number of (No.) actions in the Policy Mainstreaming domain (15 actions) is a proactive approach to addressing significant gaps, which is essential for enhancing overall system readiness. The focused improvements identified for Capacity Development (10 actions) and Implementation (12 actions) indicate that while these areas are relatively better prepared, they still require strategic attention to fully integrate W-FLR practices.

The prioritization of 15 actions within Policy Mainstreaming reflects a deep understanding of the critical need to align existing policies with W-FLR objectives. This strategic emphasis on policy integration is crucial for creating an enabling environment where W-FLR initiatives can thrive. Addressing these policy gaps is not only foundational but also paves the way for smoother implementation of W-FLR activities by ensuring that all necessary frameworks and guidelines are in place.

In the domains of Capacity Development and Implementation, the identified actions demonstrate that while there is already a certain level of readiness, targeted improvements are necessary to fully equip stakeholders with the skills and resources they need. The moderate No. actions in these areas suggests that the system is on the right track, but continued focus on capacity building and strategic implementation is key to achieving long-term success.

Domain with the Strongest Impact on System Readiness

Policy Mainstreaming is recognized as the most critical domain for enhancing system readiness, with a substantial weight of 45%. This domain directly influences the effectiveness of capacity-building efforts and the success of implementation strategies, underscoring its foundational importance in the successful adoption of W-FLR practices in the Abaya-Chamo Catchment.

The strong emphasis on Policy Mainstreaming reflects its pivotal role in the W-FLR roadmap. The lack of specific W-FLR targets in existing policies highlights the necessity of substantial improvements in this area. By focusing on policy integration, the W-FLR initiatives are more likely to gain the necessary institutional support, legal backing, and resource allocation needed for successful implementation. The prioritization of Policy Mainstreaming is a strategic move to ensure that W-FLR practices are embedded within the broader policy frameworks, thereby ensuring their sustainability and long-term impact.

Capacity Development, with a 35% weight, is identified as the second most critical domain. The success of W-FLR initiatives heavily depends on the capacity of stakeholders to implement them effectively. This domain's importance is closely linked to the presence of supportive policies, which underscores the interconnectedness of the two areas. By focusing on building capacity, the W-FLR initiatives will benefit from a well-prepared and knowledgeable workforce that is capable of executing the necessary actions.

Implementation, while critical, is assigned a 20% weight, reflecting its reliance on the readiness of policy and capacity frameworks. The lower weight does not diminish its importance but rather highlights the need for a strong foundation in policy and capacity to ensure successful execution. The prioritization of implementation actions is strategic, ensuring that once the policy and capacity frameworks are in place, the initiatives can be rolled out effectively and efficiently.

Alignment with National and Local Strategies

The analysis reveals that the identified priority actions resonate strongly with Ethiopia's flagship initiatives, such as the Climate Resilient Green Economy (CRGE) strategy and the National Forest Sector Development Program (NFSDP). These actions are designed to integrate seamlessly with national efforts aimed at reducing greenhouse gas emissions, enhancing carbon sequestration, and promoting sustainable land use practices. For instance, actions related to reforestation and forest management are directly tied to the CRGE's objectives of building a climate-resilient economy by 2025. Moreover, by aligning with these high-level strategies, the W-FLR initiatives in the Abaya-Chamo Catchment are more likely to attract national funding and technical support, thereby increasing their chances of success.

Consensus-Building and Inclusivity

During the prioritization process, a wide array of stakeholders, including local communities, NGOs, government agencies, and private sector representatives, were actively involved. This diverse participation was particularly evident in the Arbaminch workshop, where stakeholders from various sectors came together to discuss and prioritize actions. The inclusive nature of the process is further evidenced by the consideration of inputs from local NGOs and community-based organizations, which were integrated into the final set of priority actions. This broad-based engagement not only ensured that the selected actions reflect a wide range of perspectives but also built trust among stakeholders. By fostering a collaborative environment, the process has laid the groundwork for sustained stakeholder commitment, which is crucial for the long-term success of W-FLR projects.

Balance Between Short-Term and Long-Term Goals

The prioritization process combined actions that yield quick wins, such as immediate reforestation efforts and erosion control, with those that build a foundation for long-term ecosystem health and community resilience. For example, while reforestation projects can quickly improve soil stability and water retention, the integration of long-term strategies like adaptive water resource management and climate resilience planning ensures that these benefits are sustained over time. This dual focus is particularly important in the context of the Abaya-Chamo Catchment, where immediate environmental interventions are needed to combat degradation, but where long-term planning is equally crucial to adapt to the impacts of climate change. By addressing both short-term needs and long-term goals, the W-FLR initiatives are positioned to deliver enduring ecological and socio-economic benefits.

Influence of Stakeholder Interests on Priority Setting

The technical analysis indicates that while influential stakeholders, such as national ministries and large international NGOs, played a significant role in the decision-making process, there was also substantial input from local stakeholders. This balanced approach ensured that the final set of priority actions addresses high-level policy goals while remaining grounded in the practical needs of local communities. For instance, the prioritization of policy mainstreaming and capacity development actions aligns with the agendas of powerful stakeholders but also includes grassroots initiatives that directly benefit local populations. This strategic alignment across different levels of governance not only enhances the relevance of the W-FLR initiatives but also ensures broader support and smoother implementation across all stakeholder groups.

Variation in Priority Across Domains

The distribution of priority actions—15 for policy mainstreaming, 10 for capacity development, and 12 for implementation—demonstrates a deliberate focus on addressing the critical gaps identified in national and local assessments. The emphasis on policy mainstreaming actions reflects the urgent need to create an enabling environment that supports W-FLR, while the attention to capacity development ensures that local stakeholders are equipped with the necessary skills and knowledge to implement these policies effectively. This strategic variation ensures that all dimensions of system readiness are addressed, laying a strong foundation for the successful implementation of W-FLR initiatives in the Abaya-Chamo Catchment. By ensuring that each domain receives adequate attention, the prioritization process has set the stage for a holistic approach to forest landscape restoration.

Resource Allocation and Feasibility Considerations

The technical analysis highlights that the prioritization process carefully considered the availability of financial, technical, and human resources when selecting priority actions. This pragmatic approach is particularly evident in the implementation domain, where resource-intensive actions, such as large-scale reforestation and advanced water management systems, were prioritized based on the feasibility of securing the necessary support. By aligning the selected actions with the resource landscape, the W-FLR initiatives are positioned for successful implementation, with a clear understanding of the resources required and a realistic plan to secure them. This careful consideration of feasibility not only increases the likelihood of achieving the desired outcomes but also ensures that the initiatives are sustainable in the long term.

Impact of Priority Actions on System Readiness

The analysis underscores the critical role of capacity development in improving system readiness, with actions such as training programs for local stakeholders, the establishment of monitoring systems, and technical assistance initiatives being prioritized. These actions are directly linked to enhancing the skills, knowledge, and organizational capacity necessary to support the broader W-FLR objectives. By focusing on capacity development, the prioritization process has ensured that the foundational elements needed for effective and sustained restoration efforts are in place. This focus on building local capacity is particularly important in the context of the Abaya-Chamo Catchment, where local stakeholders play a crucial role in the day-to-day management and success of W-FLR initiatives.

Stakeholder Capacity to Implement Priority Actions

The capacity assessment conducted by the technical team highlights the significant disparities in resources and expertise between national and local stakeholders. In response, the prioritization process has placed a strong emphasis on capacity-building initiatives aimed at local communities and organizations. For example, targeted training programs and technical support have been prioritized to bridge the gap in specialized knowledge areas, such as advanced water management and climate resilience. By proactively addressing these capacity gaps, the W-FLR initiatives are better positioned for successful implementation, with local stakeholders empowered to take on leadership roles and drive the projects forward.

Monitoring and Evaluation (M&E) Enhancements

While the initial prioritization process focused on immediate implementation actions, there is a clear recognition of the need to strengthen M&E frameworks to ensure the long-term success of W-FLR projects. The emphasis on M&E is evident in the identification of actions that include clear indicators, baseline data, and timelines for tracking progress. These M&E mechanisms are critical for adaptive management, allowing for real-time adjustments to strategies based on ongoing feedback and performance data. By integrating robust M&E frameworks into the priority actions, the W-FLR initiatives are equipped to continuously evolve and improve, ensuring that they remain effective and relevant in the face of changing environmental and socio-economic conditions.

This expanded narrative emphasizes the strengths and strategic foresight of the prioritization process, highlighting how it has effectively addressed key challenges and set the stage for successful implementation of W-FLR initiatives in the Abaya-Chamo Catchment. The evidence-based justifications

provide above are a strong foundation for understanding the positive impacts of the prioritization process, reinforcing the potential for long-term success and sustainability.

6. System Readiness for W-FLR

6.1. W-FLR Policy Mainstreaming Readiness

The Abaya-Chamo Catchment has a long-standing history of employing Forest and Landscape Restoration (FLR) strategies to combat environmental degradation, soil erosion, and deforestation. However, the concept of Water-smart Forest and Landscape Restoration (W-FLR) is new to the region. W-FLR goes beyond traditional FLR by emphasizing the integration of water resource management within forest restoration practices, addressing both terrestrial and aquatic ecosystems. The transition to W-FLR requires significant adjustments in policy, knowledge, and practices to fully incorporate this innovative approach. The policy mainstreaming readiness greatly depends on policy gaps and limitations.

Policy Gaps and Limitations

- **Absence of Explicit W-FLR Policies**: The policy review indicates a complete absence of explicit references to W-FLR in national, subnational, and local policy documents within the Abaya-Chamo Catchment. Although existing policies address components of forest restoration and water management separately, there is a critical gap in policies that integrate these two areas. This lack of explicit W-FLR policies poses a significant challenge to mainstreaming the concept, as it limits the ability to design, implement, and monitor projects that effectively combine forest and water resource management.
- **Traditional FLR Focus**: Policies in the Abaya-Chamo Catchment, such as those related to the Climate Resilient Green Economy (CRGE) Strategy and the National Forest Sector Development Program, are primarily focused on traditional FLR. These policies emphasize reforestation, afforestation, and soil conservation but do not address the hydrological aspects essential to W-FLR. The traditional focus of these policies on terrestrial restoration efforts may inadvertently overlook the critical interdependencies between forests and water systems.
- **Fragmented Water Resource Management Policies**: Water resource management in the Abaya-Chamo Catchment is governed by fragmented policies that do not fully consider the role of forests in maintaining water quality, quantity, and ecosystem services. Policies related to water resource management tend to focus on irrigation, drinking water supply, and hydropower generation, with limited consideration of the ecological functions of forests in regulating water cycles.

Alignment with National Strategies

- Partial Alignment with Broader National Strategies: The policy framework in the Abaya-Chamo Catchment aligns partially with broader national strategies like the CRGE Strategy, which promotes sustainable land and water management. However, the CRGE Strategy and similar policies do not explicitly address the integration of W-FLR, which is essential for ensuring that forest restoration efforts also enhance water-related ecosystem services.
- Missed Opportunities for Integrated Approaches: The lack of alignment between forest restoration and water management strategies represents a missed opportunity to adopt a holistic approach to environmental management in the Abaya-Chamo Catchment. For example, the National Biodiversity Strategy and Action Plan (NBSAP) recognizes the importance of conserving biodiversity within forests but does not link these efforts to the management of water resources, which are critical for maintaining biodiversity.

Policy Coherence and Integration

- Moderate Policy Coherence: There is moderate coherence between existing policies related to forestry, water management, and climate change in the Abaya-Chamo Catchment. However, the lack of integration across these sectors hinders the effective implementation of W-FLR initiatives. For instance, while the National Action Plan for Adaptation to Climate Change (NAPACC) highlights the need for ecosystem-based adaptation, it does not provide guidance on how to integrate W-FLR into these adaptation efforts.
- Sectoral Silos: The persistence of sectoral silos in policy-making and implementation is a significant barrier to W-FLR mainstreaming. Policies are often developed and implemented within the confines of individual sectors (e.g., forestry, water, agriculture), leading to a disjointed approach that fails to capitalize on the synergies between forest restoration and water management. Bridging these silos requires policy reforms that promote cross-sectoral collaboration and integrated planning.

Challenges and Opportunities for Policy Reform

Challenges: The introduction of W-FLR into existing policies faces several challenges, including:

- Institutional Inertia: The entrenched focus on traditional FLR and the separation of forestry and water management policies create resistance to change. Policymakers and implementing agencies may lack the knowledge and motivation to adopt W-FLR principles.
- Capacity Gaps: The successful mainstreaming of W-FLR requires not only policy changes but also a significant upgrade in the capacity of institutions to understand and implement the integrated approach. This includes developing new skills, knowledge, and attitudes among policymakers, practitioners, and stakeholders.

Opportunities: Despite the challenges, there are significant opportunities to advance W-FLR mainstreaming in the Abaya-Chamo Catchment:

- Leveraging Existing Environmental Strategies: The existing environmental strategies, such as the CRGE and NAPACC, provide a foundation upon which W-FLR can be built. By explicitly integrating W-FLR into these strategies, the Abaya-Chamo Catchment can strengthen its resilience to climate change, enhance biodiversity conservation, and improve water security.
- Cross-Sectoral Collaboration: Promoting cross-sectoral collaboration offers an opportunity to break down silos and develop integrated policies that support W-FLR. This can be achieved through multi-stakeholder platforms, joint planning sessions, and the creation of intersectoral task forces dedicated to W-FLR.

Based on the above analysis the overall Readiness Score of the component is low. The Abaya-Chamo Catchment 's policy framework demonstrates a moderate level of readiness for W-FLR mainstreaming, with foundational policies in place that support environmental conservation and forest restoration. However, the absence of explicit W-FLR policies and the lack of integration between forestry and water management pose significant challenges. To achieve high readiness, concerted efforts are needed to reform existing policies, bridge sectoral silos, and build institutional capacity for W-FLR.

Component Specific Recommendations

Recommendation 1. **Policy Reform**: Develop and revise key policy documents to explicitly incorporate W-FLR principles, ensuring that forest restoration efforts also enhance water-related ecosystem services. This includes integrating W-FLR into national strategies like the CRGE, NAPACC, and NBSAP.

Recommendation 2. **Cross-Sectoral Integration**: Promote the integration of forestry and water management policies through cross-sectoral collaboration mechanisms. Establish intersectoral task forces

and multi-stakeholder platforms to facilitate joint planning, implementation, and monitoring of W-FLR initiatives.

Recommendation 3. **Capacity Building**: Strengthen the capacity of institutions, policymakers, and practitioners to understand and implement W-FLR. This includes training programs, knowledge-sharing platforms, and the development of technical guidelines specific to W-FLR.

By addressing these areas, the Abaya-Chamo Catchment can enhance its policy readiness for W-FLR, paving the way for sustainable forest and water resource management that supports environmental resilience and community well-being.

6.2. W-FLR Capacity Development Component Readiness

Capacity development readiness assesses the ability of local and regional institutions, stakeholders, and communities to effectively implement W-FLR activities, with a focus on the adequacy of human resources, institutional frameworks, and technical expertise necessary for the successful integration and execution of W-FLR strategies.

Institutional Capacity

- **Foundational Understanding vs. Specific Expertise**: Key institutions, such as the Ministry of Agriculture (MoA), regional environmental agencies, and local governmental bodies, possess a strong foundational understanding of general Forest and Landscape Restoration (FLR) strategies. However, the W-FLR approach, which emphasizes the integration of water management into forest restoration, is a new concept in the region. As a result, these institutions lack specific expertise and training in W-FLR, which is crucial for adapting existing FLR strategies to address the complex interdependencies between forest ecosystems and water resources.
- **Need for Targeted Capacity Building**: There is a critical need for targeted capacity-building programs tailored to W-FLR. These programs should focus on equipping institutional staff with the knowledge and skills required to integrate water-smart approaches into their existing FLR efforts. Without this specialized training, institutions may struggle to effectively implement W-FLR initiatives, leading to suboptimal outcomes.

Technical Expertise

- **Skill Gaps in Water-Smart Restoration Practices**: While local experts and practitioners in the Abaya-Chamo Catchment are well-versed in traditional forest restoration techniques, they lack the necessary skills and knowledge to effectively implement water-smart restoration practices. This gap is particularly evident in areas such as hydrological modelling, water resource management within forest ecosystems, and the application of technologies that enhance water-use efficiency in restoration projects.
- **Necessity for Technical Training and Guidelines**: To address these gaps, it is essential to develop and disseminate guidelines and best practices specific to W-FLR. Additionally, technical training programs must be conducted to build the capacity of local experts in areas such as integrated watershed management, climate-resilient restoration practices, and the use of innovative water management technologies in forest restoration.

Stakeholder Engagement

- **Existing Tradition of Stakeholder Involvement**: The Abaya-Chamo Catchment has a strong tradition of involving stakeholders in environmental and forest management initiatives. Local communities, NGOs, and other stakeholders have been actively engaged in various FLR projects. However, the engagement of these stakeholders in W-FLR activities remains limited, primarily due to a lack of awareness and understanding of the W-FLR approach.

- **Enhancing Community Participation**: To enhance readiness for W-FLR, it is crucial to raise awareness among local communities and stakeholders about the importance of integrating water management into forest restoration. Capacity-building initiatives that focus on educating stakeholders about W-FLR concepts, the benefits of water-smart restoration practices, and their roles in implementing these practices are necessary. This will ensure that local communities are not only passive participants but also active contributors to the success of W-FLR projects.

The capacity development readiness for W-FLR in the Abaya-Chamo Catchment is currently assessed as low to moderate. While the region exhibits a strong foundation in traditional FLR practices, significant efforts are required to build the specific capacities needed for W-FLR implementation. This includes enhancing institutional expertise, bridging technical skill gaps, and fostering greater stakeholder engagement in W-FLR activities.

Component Specific Recommendations

Recommendation 1. **Targeted Capacity Building**: Develop and implement specialized training programs focused on the unique aspects of W-FLR, including the integration of water management into forest restoration efforts. This training should be tailored to the needs of local institutions, technical experts, and community stakeholders.

Recommendation 2. **Development of W-FLR Guidelines**: Create comprehensive guidelines and best practices for W-FLR, with a focus on practical implementation within the specific context of the Abaya-Chamo Catchment. These guidelines should be disseminated widely and supported by ongoing technical assistance.

Recommendation 3. **Stakeholder Awareness and Engagement**: Launch awareness-raising campaigns and capacity-building initiatives aimed at enhancing the understanding of W-FLR among local communities, NGOs, and other stakeholders. Encourage active participation in W-FLR projects through collaborative planning and decision-making processes.

Recommendation 4. **Investment in Technical Infrastructure**: Support the acquisition and deployment of necessary technologies and tools that facilitate water-smart restoration practices. This includes hydrological monitoring equipment, efficient irrigation systems, and tools for integrated watershed management.

By addressing these key areas, the Abaya-Chamo Catchment can significantly enhance its capacity development readiness, paving the way for the successful implementation of W-FLR and the sustainable management of its forest and water resources.

6.3. W-FLR Implementation Component Readiness

Implementation readiness evaluates the preparedness of the Abaya-Chamo Catchment to effectively operationalize W-FLR initiatives. This assessment focuses on the availability and adequacy of financial resources, infrastructure, and implementation mechanisms necessary for the successful execution of W-FLR projects.

Financial Resources

- **General Availability vs. Specific Funding Needs**: While there is a general availability of funding for environmental conservation and restoration activities within the Abaya-Chamo Catchment, these funds are often tied to broader environmental programs and lack specific earmarks for W-FLR initiatives. This absence of dedicated funding for W-FLR projects creates a significant challenge in ensuring the continuity and effectiveness of these initiatives.
- **Need for Dedicated Financial Resources**: To enhance W-FLR implementation readiness, there is a critical need to secure dedicated financial resources. This could involve tapping into existing national

and international funding mechanisms, such as climate finance or green funds, and advocating for the allocation of funds specifically for W-FLR activities. Additionally, the development of innovative financing mechanisms, such as Payment for Ecosystem Services (PES), can provide sustainable financial support for W-FLR projects. PES schemes, in particular, could incentivize local communities and stakeholders to engage in restoration activities by providing financial rewards for the maintenance of ecosystem services.

Infrastructure and Technology

- **Existing Infrastructure for General Restoration Activities**: The Abaya-Chamo Catchment is equipped with basic infrastructure to support general forest restoration activities. This includes nursery facilities for plant propagation, monitoring stations for environmental assessments, and logistical support for field operations. These existing infrastructures provide a solid foundation for restoration efforts but may not fully meet the specific needs of W-FLR projects, which require a more integrated approach that combines forest restoration with water management.
- **Gaps in Technological Infrastructure**: The technological infrastructure necessary for effective W-FLR implementation is currently underdeveloped. Critical gaps include the lack of efficient irrigation systems designed to optimize water use in restoration projects and the absence of advanced hydrological monitoring tools needed to track water resources and their interactions with forest ecosystems. Investing in these technologies is crucial to ensure that W-FLR initiatives can achieve their objectives of enhancing both forest and water resource resilience.
- **Recommendations for Infrastructure Enhancement**: To address these gaps, targeted investments should be made in infrastructure that supports the dual objectives of W-FLR. This could involve upgrading existing nursery facilities to include water-efficient irrigation systems, establishing hydrological monitoring networks, and acquiring tools for integrated watershed management. Additionally, leveraging technological innovations, such as remote sensing and geographic information systems (GIS), can enhance the monitoring and management of W-FLR activities across the catchment.

Implementation Mechanisms

- **Existing FLR Implementation Mechanisms**: The Abaya-Chamo Catchment has established mechanisms for the implementation of general FLR projects, including operational guidelines, cross-sectoral coordination frameworks, and monitoring and evaluation (M&E) systems. These mechanisms have been effective in guiding traditional restoration efforts, but they require adaptation to accommodate the unique considerations of W-FLR, which integrates water management as a core component of forest restoration.
- **Need for Adaptation and Integration**: To enhance W-FLR implementation readiness, it is necessary to adapt existing FLR implementation mechanisms to reflect the water-focused nature of W-FLR. This involves revising operational guidelines to include water management practices, strengthening cross-sectoral coordination between forestry and water management agencies, and developing M&E frameworks that specifically track the outcomes of W-FLR initiatives. Ensuring that these adapted mechanisms are well-integrated and aligned with broader regional and national strategies will be key to their success.
- **Capacity for Adaptive Management**: The ability to implement adaptive management practices is also crucial for the successful implementation of W-FLR. This includes the capacity to adjust strategies based on ongoing monitoring and evaluation results, as well as the flexibility to respond to changing environmental conditions or stakeholder needs. Building this capacity within local institutions and communities will enhance the overall resilience and effectiveness of W-FLR projects.

The overall implementation readiness for W-FLR in the Abaya-Chamo Catchment is assessed as moderate. While the region has a solid foundation in place for general restoration activities, there are significant gaps in financial planning, technological infrastructure, and the adaptation of implementation mechanisms that need to be addressed to fully operationalize W-FLR projects.

Recommendations

Recommendation 1. **Securing Dedicated Funding**: Prioritize the identification and securing of dedicated financial resources for W-FLR projects. This includes advocating for W-FLR-specific funding allocations within existing environmental programs and exploring innovative financing mechanisms such as PES.

Recommendation 2. **Investing in Infrastructure and Technology**: Make targeted investments in the technological infrastructure required for W-FLR, including water-efficient irrigation systems, hydrological monitoring tools, and advanced technologies for integrated watershed management.

Recommendations 3. **Adapting Implementation Mechanisms**: Revise and adapt existing FLR implementation mechanisms to reflect the specific requirements of W-FLR. This includes updating operational guidelines, enhancing cross-sectoral coordination, and developing specialized M&E frameworks.

Recommendation 4. **Building Capacity for Adaptive Management**: Strengthen the capacity of local institutions and communities to implement adaptive management practices within W-FLR projects, ensuring that these initiatives can respond to changing conditions and achieve long-term sustainability.

By addressing these critical areas, the Abaya-Chamo Catchment can enhance its readiness to implement W-FLR, contributing to the sustainable management of its forest and water resources, and supporting broader environmental and socio-economic goals.

6.4. General Readiness

The general readiness assessment for W-FLR in the Abaya-Chamo Catchment aggregates the preparedness across key components necessary for the successful implementation of W-FLR initiatives. These components include policy integration, capacity development, and implementation mechanisms. The analysis highlights the strengths, gaps, and opportunities across these dimensions to evaluate the overall readiness of the catchment.

The analysis above covers different components, each addressing a distinct aspect of readiness for implementing W-FLR in the Abaya-Chamo Catchment. But the general analysis is different in kind. For example, the policy integration assesses how well W-FLR is incorporated into existing policies and whether there is adequate institutional support and coordination for its implementation. It focuses on the policy environment and the need for adaptation to include W-FLR. The policy integration under the general assessment covers the following.

- **Alignment with Existing Policies**: W-FLR principles are generally aligned with national and regional environmental policies in the Abaya-Chamo Catchment. However, specific integration of W-FLR into existing policies remains limited. There is a lack of clear policy directives that mandate the inclusion of water-focused restoration strategies in broader forest landscape restoration (FLR) plans.
- **Need for Policy Adaptation**: For W-FLR to be fully integrated, existing environmental policies and land-use plans must be revised to include specific provisions that address water management in forest restoration. This adaptation is crucial for creating a conducive policy environment that supports the implementation of W-FLR initiatives.
- **Institutional Support**: While there is institutional recognition of the importance of integrated water and forest management, the operationalization of W-FLR requires stronger policy advocacy and institutional coordination. Agencies responsible for water and forest management need to collaborate more closely to ensure that W-FLR becomes a central component of regional development plans.

Capacity Development

- **Current Capacity Levels**: The Abaya-Chamo Catchment has a foundational level of technical expertise and institutional capacity to support general FLR activities. However, the specific skills and knowledge required for W-FLR, particularly in areas like hydrology, integrated watershed management, and adaptive restoration practices, are underdeveloped.
- **Training and Capacity Building Needs**: To build readiness for W-FLR, targeted training programs and capacity-building initiatives are essential. These programs should focus on enhancing the technical skills of local stakeholders, including government officials, community leaders, and NGOs, in water-smart restoration practices.
- **Community Engagement**: The success of W-FLR initiatives also depends on the active participation of local communities. Efforts to build capacity at the community level through education and awareness programs are necessary to ensure that local populations understand the benefits of W-FLR and are empowered to participate in its implementation.

Implementation Mechanisms

- **Existing Implementation Frameworks**: The catchment has established frameworks for the implementation of FLR projects, including operational guidelines and cross-sectoral coordination mechanisms. However, these frameworks need to be adapted to incorporate the specific requirements of W-FLR, particularly in the integration of water management practices into restoration activities.
- **Financial and Technological Gaps**: Financial resources for W-FLR are not specifically earmarked, and technological infrastructure for water management within forest restoration projects is lacking. These gaps pose significant challenges to the effective implementation of W-FLR and need to be addressed through dedicated funding, investment in technology, and the development of innovative financing mechanisms like Payment for Ecosystem Services (PES).
- **Monitoring and Evaluation**: Effective monitoring and evaluation (M&E) systems are critical for assessing the progress and impact of W-FLR projects. The current M&E frameworks in the catchment need to be enhanced to track water-related outcomes alongside traditional forest restoration indicators. This will provide a more comprehensive understanding of the success of W-FLR initiatives.

The overall readiness of the Abaya-Chamo Catchment for W-FLR implementation is assessed as low to moderate. The region has a foundational basis in policy, capacity, and implementation mechanisms for general FLR activities, but significant enhancements are required to meet the specific demands of W-FLR. Addressing gaps in policy integration, capacity development, and financial and technological infrastructure will be critical to advancing W-FLR readiness.

General Recommendations

Recommendation 1. Policy Integration Enhancement: Advocate for the revision of existing environmental and land-use policies to include specific provisions for W-FLR. Strengthen institutional coordination between water and forest management agencies to ensure that W-FLR is prioritized in regional development plans.

Recommendation 2. Capacity Building Programs: Implement targeted training and capacity-building initiatives focused on the technical aspects of W-FLR, particularly in hydrology, integrated watershed management, and adaptive restoration practices. Engage local communities through education and awareness programs to foster grassroots support for W-FLR initiatives.

Recommendation 3. Dedicated Funding and Technological Investment: Secure dedicated financial resources for W-FLR through national and international funding mechanisms. Invest in the technological infrastructure needed for effective water management within forest restoration projects, including irrigation systems and hydrological monitoring tools.

Recommendation 4. Adaptation of Implementation Mechanisms: Revise existing FLR implementation frameworks to incorporate W-FLR considerations. Develop specialized M&E frameworks that track both forest and water-related outcomes to provide a comprehensive assessment of W-FLR project success.

By implementing these recommendations, the Abaya-Chamo Catchment can significantly enhance its readiness for W-FLR, contributing to the sustainable management of forest and water resources and supporting broader environmental and socio-economic goals in the region.

7. Appendices

Appendix A: SIWI W-FLR Initiative: In Profile

Since its inception, the Water-smart Forest and Landscape Restoration (W-FLR) initiative has been dedicated to mainstreaming water into forest and landscape restoration policies and practices. Developed under SIWI with support from GIZ and SIDA, the W-FLR program plays a crucial role in integrating water management into forest and landscape restoration efforts.

The W-FLR initiative is part of broader environmental and socio-economic strategies aimed at enhancing ecosystem services and resilience in critical areas like the Abaya-Chamo Catchment in Ethiopia. The program is instrumental in compiling, organizing, and disseminating technical, scientific, and stakeholder consultation information related to water-smart restoration, and it will also service as input for the upcoming basin strategic planning processes.

The W-FLR program provides stakeholders with a range of tools and resources, including the W-FLR tool handbook and help desk services, to support the effective planning and implementation of water-smart restoration projects. Key reports produced by the program include:

- Technical Report: This foundational document, produced during the preparatory phase, offers a detailed analysis of the W-FLR needs, water risks and opportunities, policy gaps and relevant national and local stakeholders, environmental and socio-economic context within the Abaya-Chamo Catchment. It guides the strategic planning and actions outlined in the W-FLR roadmap.
- National Stakeholders Workshop Report: This report documents the outcomes of workshop held at the national level, focusing on policy integration and strategic alignment.
- Local Stakeholders Workshop Report: Covering the local workshops held in Arba Minch within the Gamo Gofa Zone, this report highlights capacity development initiatives and the practical challenges and opportunities for W-FLR implementation.
- Field Visit Report: This report provides insights from on-site evaluations conducted in the Abaya-Chamo Catchment, offering critical information on environmental and socio-economic conditions to help validate and refine the proposed actions in the roadmap.
- W-FLR Roadmap Report: A comprehensive document that outlines the strategic actions for implementing Water-Smart Forest and Landscape Restoration in the Abaya-Chamo Catchment. It integrates feedback from technical analyses, stakeholder consultations, and field visits, offering a clear pathway for enhancing ecosystem services and building resilience in the region.

For more information about the W-FLR initiative and access to these resources, please visit our program homepage, contact the help desk, or consult the specific reports available through SIWI and associated partners.

Appendix B: Lists of workshop Participants

Organization	Field of Specialization	No. Participants
Nile Basin Initiative (NBI) / Entro	Water resources management, basin development	1
World Resources Institute (WRI)	Environmental research, policy, and solutions	3
Nature for Water (N4W)	Water resource management, conservation, and sustainable development	3
Water and Land Resources Center (WLRC)	Water and land resources management, research, and education	1
Ethiopian National Meteorological Agency (ENGA)	Climate data, forecasting, and services	1
International Water Management Institute (IWMI)	Agricultural water management, climate change adaptation	1
Southern Ethiopia Agriculture Bureau	Agriculture development and promotion	1
Southern Ethiopia Environment Bureau	Environmental protection and conservation	1
Southern Ethiopia Water and Energy Bureau	Water and energy resources management, development, and regulation	1
A Drop of Water	Water conservation, education, and advocacy	1
Helvetas	Sustainable development, humanitarian aid, and social justice	2
Addis Ababa University	Higher education, research, and training in various fields, including water, forest, and land	1
German Agro Action	Sustainable agriculture, food security, and rural development	1
Ministry of Agriculture	Agricultural development, policy, and regulation	1
Ethiopia Biodiversity Institute	Biodiversity conservation, research, and education	1
Ethiopian Environmental Authority	Environmental protection, regulation, and enforcement	1
Wood en Daad	International development cooperation, focusing on water, sanitation, and hygiene	1
Valkenburg Institute for Environmental Studies (VEI)	Environmental research, education, and consultancy	2
Ethiopian Forest Development Enterprise (EFDE)	Forest management, conservation, and development	1
Ministry of Water and Energy (MoWE)	Water and energy resources management, development, and regulation	32
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	German development agency, promoting sustainable development	7
Total		**68**

Appendix C: Methodological Frameworks Used in the Roadmap Development

The methodology employed for the development of the Water-Smart Forest and Landscape Restoration (W-FLR) roadmap in the Abaya-Chamo Catchment is a comprehensive and iterative process that integrates scientific analysis, stakeholder engagement, and field validation. This approach ensures that the roadmap is grounded in both empirical data and local realities, making it relevant and actionable for the target area.

1. Preparatory Phase

The first phase of the methodology involved a thorough preparatory analysis, which laid the groundwork for the entire roadmap. This phase included:

- Data Collection and Analysis: Extensive data collection was carried out using publicly available sources, including satellite imagery, hydrological data, and socio-economic reports. The analysis focused on identifying the environmental, social, and economic conditions within the Abaya-Chamo Catchment that are pertinent to W-FLR.
- Stakeholder Identification: Key stakeholders were identified across various sectors, including federal and regional government agencies, non-governmental organizations (NGOs), local communities, and private sector entities. This identification was crucial for ensuring that the roadmap would address the needs and perspectives of all relevant actors.
- Risk and Opportunity Mapping: The technical team conducted a water risk assessment and opportunity mapping exercise to identify potential barriers and enablers for W-FLR in the catchment. This included assessing policy gaps, environmental challenges, and socio-economic dynamics that could impact the success of the W-FLR initiative.

2. Workshop Phase

The workshop phase was essential for validating the findings from the preparatory phase and refining the proposed actions in the roadmap. This phase involved:

- National and Regional Workshops: Workshops were conducted with stakeholders from both federal and regional state levels. These workshops focused on policy integration, strategic alignment, and the broader implications of W-FLR at a national and regional scale.
- Local Workshops: Additional workshops were held at the zonal and woreda levels within the Gamo Gofa Zone. These workshops centered on the practical implementation challenges and opportunities specific to the local context.
- Field Visit Reports: The workshops were complemented by field visits to key sites within the Abaya-Chamo Catchment. These visits provided firsthand insights into the environmental and socio-economic conditions on the ground, which were essential for refining the proposed actions.
- Stakeholder Engagement and Feedback: During these workshops, stakeholders provided critical feedback on the proposed actions. This feedback ensured that the roadmap was not only technically sound but also aligned with local priorities and capacities across different governance levels.

3. Field Validation

Field validation was conducted to ground-truth the findings from the preparatory and pre-workshop phases. This involved:

- Site Visits: The technical team conducted detailed site visits to critical areas within the catchment to validate the environmental and socio-economic data. These visits were integral to refining the proposed actions based on actual field conditions.

- Community Consultations: Direct consultations with local communities were carried out during the field visits. These consultations provided valuable insights into the local context and ensured that the roadmap addressed community needs and expectations.

4. Finalization of the Roadmap

The final phase involved integrating all the feedback, data, and insights gathered during the previous phases into a coherent and actionable roadmap. This phase included:

- Synthesis of Findings: The technical team synthesized the data, workshop outputs, and field visit insights into a final set of priority actions, monitoring indicators, and implementation strategies. The roadmap was designed to be adaptable and responsive to changing conditions in the catchment.
- Review and modification priority actions: The final draft priority actions of the roadmap generated by stakeholders were reviewed by the technical team from different perspectives including the linkage with an FLR. The final priority actions reflect actions that meet the FLR alignment criteria.

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