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PROJECT PERFORMANCE ASSESSMENT REPORT

WHAT WORKS

ETHIOPIA

Sustainable Land Management Project I and II

Report No. 153559
OCTOBER 14, 2020

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Report No.: 153559

PROJECT PERFORMANCE ASSESSMENT REPORT

Ethiopia

Sustainable Land Management Project I (P107139)
(IDA-H3770, TF-92320)
and
Sustainable Land Management Project II (P133133/P133410)
(IDA-53180, TF-15838)

October 14, 2020

Financial, Private Sector, and Sustainable Development

Independent Evaluation Group

Currency Equivalents (annual averages)

Currency unit = Ethiopian birr (Br)

2008	$1.00	Br 9.91
2009	$1.00	Br 12.67
2010	$1.00	Br 16.60
2011	$1.00	Br 17.28
2012	$1.00	Br 18.24
2013	$1.00	Br 19.09
2014	$1.00	Br 20.16
2015	$1.00	Br 21.12
2016	$1.00	Br 22.38
2017	$1.00	Br 27.39
2018	$1.00	Br 28.08

Abbreviations

ICR	Implementation Completion and Results Report
IEG	Independent Evaluation Group
M&E	monitoring and evaluation
PPAR	Project Performance Assessment Report
SLM	sustainable land management
SLMP	Sustainable Land Management Project (implemented in two phases, SLMP I and SLMP II)

All dollar amounts are US dollars unless otherwise indicated.

Fiscal Year

Government: July 1– June 30

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This is a Project Performance Assessment Report (PPAR) by the Independent Evaluation Group (IEG) of the World Bank Group on Ethiopia Sustainable Land Management Project I, P107139, and Ethiopia Sustainable Land Management Project II, P133133 including Global Environment Facility supplement under P133410. This instrument and the methodology for this evaluation are discussed in appendix C. Following standard IEG procedure, copies of the draft PPAR were shared with relevant government officials for their review and comment. Borrower comments are included in appendix E.

Ethiopia Sustainable Land Management Project I (P107139)

Basic Data

Country	Ethiopia	World Bank financing commitment	$29 million
Global Practice	Environment, Natural Resources and Blue Economy	Actual project cost	$29.2 million
Project name	Sustainable Land Management Project I	Expected project total cost	$37.8 million
Project ID	P107139	Actual amount disbursed	$26.7 million
Financing instrument	IDA credit (IDA-H3770), GEF grant (TF-92320)	Environmental assessment category	B
Financing source	IDA, GEF		

Note: GEF = Global Environment Facility; IDA = International Development Association.

Dates

Event	Original Date	Actual Date
Board approval	n.a.	04/29/2008
Effectiveness	10/10/2008	10/10/2008
Restructuring	n.a.	03/15/2013
Mid-Term Review	03/13/2011	04/08/2011
Closing date	09/30/2013	09/30/2013

Note: n.a. = not applicable.

Key Staff Responsible

Management	Appraisal	Completion
Project Team Leader	Herbert Acquay	Edward Felix Dwumfour
Practice Manager	Marjory-Anne Bromhead	Magda Lovei
Country Director	Kenichi Ohashi	Guang Zhe Chen

Ethiopia Sustainable Land Management Project II (P133133)

Basic Data

Country	Ethiopia	World Bank financing commitment	$101.5 million
Global Practice	Environment, Natural Resources and Blue Economy	Actual project cost	$101.5 million
Project name	Sustainable Land Management Project II	Expected project total cost	$220.57
Project ID	P133133/P133410	Actual amount disbursed	$97.27 million
Financing instrument	IDA credit ($50 million) GEF grant ($8.33 million) LDC trust fund ($4.629 million) Norway ($38.519 million)	Environmental assessment category	B
Financing source	IDA/GEF/Norway		

Note: GEF = Global Environment Facility; IDA = International Development Association; LDC=Least Developed Countries

Dates

Event	Original	Actual
Board approval	n.a.	11/22/2013
Effectiveness	n.a.	04/07/2014
Restructuring	n.a.	03/09/2017, 08/03/2018
Mid-Term Review	n.a.	12/13/2016
Closing date	04/07/2019	12/31/2018

Note: n.a. = not applicable.

Key Staff Responsible

Management	Appraisal	Completion
Project Team Leader	Edward Felix Dwumfour, Dinesh Aryal, Stephen Danyo	Paul Jonathan Martin
Practice Manager	Magdolna Lovei	Iain G. Shuker
Sector Director or Senior Global Practice Director	Jamal Saghir	Karin Erika Kemper
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Summary

Project Background

Serious long-term degradation of communal areas and farmlands results in substantial losses to the economy. The combination of fragile soils, steep slopes, agro-climatic conditions, environmentally unsustainable intensification of agriculture, and traditional cultivation techniques practiced by smallholder farmers in Ethiopia over many decades has led to excessive soil erosion and land degradation. Around 2005–06, the annual cost of land degradation in Ethiopia was estimated to be in the range of 2–3 percent of the country's agricultural gross domestic product (World Bank 2007), a significant loss in a country where agriculture accounts for nearly 50 percent of the gross domestic product and is the source of livelihood for more than 85 percent of the country's more than 100 million inhabitants.

Land degradation is a major cause of low and declining agricultural productivity, rural poverty, and food insecurity in Ethiopia. Farming systems have been largely dominated by low-input cereal production, which provides insufficient ground cover during the period of most erosive rainfall, and livestock production, which is mainly based on open access to grazing lands in woodlands and forests. Population growth pressures and the expansion of grazing (75 percent of the country's 35 million cattle graze in the agricultural areas of the highlands) have contributed to a loss of vegetation cover on hillsides and accelerated gully formation. Simultaneously, the widespread use of crop residues as livestock feed and the diversion of animal manure as fuel have reduced soil organic matter, further accelerating land degradation and soil nutrient depletion. The high dependence on wood and other biomass for household energy (95 percent of national energy consumption) and the expansion of agriculture into forested areas have reduced forest cover over the past century from 40 percent to 2.4 percent of the total land area in 2005. Sustainable land management (SLM) practices are required to address the serious land degradation that is already being exacerbated by climate change.

Insecure land tenure and land rights accentuate the problem**.** Another driving force for land degradation is the insecurity of land tenure, or lack of clearly defined land rights, for coordinating the management of common pool resources, including communal pastures and hillsides; this insecurity undermines land users' incentives to invest in SLM practices.

Project Description and Scope

The government of Ethiopia has embraced SLM approaches to reduce land degradation and improve land productivity. To address the extensive land degradation problem across the highlands, the government developed the Ethiopia Strategic Investment Framework for SLM (also called the national SLM Program), with support from the TerrAfrica partnership, a World Bank–supported subregional initiative for SLM in Africa. This investment framework reflected the government's new programmatic approach to scaling up SLM supported by the international donor community, including Canada, the German Agency for International Cooperation, and the World Food Programme. The Sustainable Land Management Project (SLMP) was developed as part of the World Bank's support for the national SLM Program of the government and financed through blended International Development Association and Global Environment Facility instruments. The SLMP contained a series of two operations to be implemented over the 12-year period 2008–19, although it was restructured to close in 2018. The SLMP had two main objectives: (i) reduce land degradation and (ii) improve land productivity in agricultural landscapes.

The SLMP's theory of change was based on the idea that the transformation of cultivated agricultural land and noncultivated communal land in watershed landscapes through SLM would address land degradation and boost land productivity. The core assumption was that integrated SLM interventions in watershed landscapes supported by land certification and institutional capacity development would provide incentives for community participation and smallholder investments that would lead to a reduction in land degradation and improved productivity on communal and household farmland. Typical SLM interventions include the construction of physical soil and water conservation measures (for example, stone terraces, soil bunds, check-dams, and trenches); tree planting and area closures to rehabilitate degraded communal lands (hillsides and pastures jointly held by the community for grazing and other needs); and soil and water conservation, water harvesting, agroforestry, and improved seeds and agronomic practices on individual farmlands (land held and cultivated privately by smallholder farmers). The keeping of small ruminant livestock, poultry, and bees also aimed to benefit and enhance the inclusion of landless families, youth, and women. In the long term, these interventions are expected to increase diversification of livelihoods, improve resilience or reduce vulnerability to climate shocks, and reduce greenhouse gas emissions.

Two sequential projects were designed and implemented to achieve the SLMP's objectives**.** Sustainable Land Management Project Phase I (SLMP I) introduced SLM practices in selected areas of the country to rehabilitate previously uneconomical and unproductive degraded areas within 45 critical watersheds situated in six regional

states. SLMP II sought to scale up this support by expanding the geographical coverage to 135 watersheds and continued addressing poor farmland management practices, rapid depletion of vegetation cover, unsustainable livestock grazing practices, and land tenure insecurity. SLMP II also sought to integrate new activities targeting land productivity, deforestation, and reduction of greenhouse gas emissions.

Results

The two projects introduced SLM practices and improved livelihood activities in significant areas of the highlands. The two projects treated more than 860,000 hectares of degraded landscapes in 1,820 microwatersheds, attaining about 98 and 95 percent of the projects' revised and original targets, respectively, in promoting the adoption of improved land management practices on communal land and individual farmlands managed by households. In addition, agroforestry activities and area closures to limit free grazing led to a 5.2 percent increase in vegetation cover and moisture retention in the targeted watersheds. The projects also supported the issuance of landholding certificates, benefiting smallholder farmers and landless youth, who reportedly received holding rights in exchange for managing communal lands. The projects also supported livelihood activities through improved livestock production as well as poultry and beekeeping.

Independent Evaluation Group (IEG) field-based case studies confirm significant but varied levels of effectiveness in reducing land degradation and increasing land productivity. In 22 microwatersheds in the three regional states (Amhara, Oromia, and Tigray) studied in detail by IEG using a standardized field assessment protocol for this Project Performance Assessment Report (PPAR), land degradation on communal lands has been highly reduced in about 32 percent of cases and substantially reduced in 50 percent of cases. On individual farmlands, land degradation was highly reduced in about 9 percent of cases and substantially reduced in 73 percent of cases. These results were further confirmed through statistical analysis of remote-sensed satellite data from 504 SLMP I and 624 SLMP II microwatersheds, which showed that the SLMP treatments (compared with matched controls) had a significant effect in improving the selected remotely sensed performance indicators of land restoration. Similarly, land productivity on communal lands was highly increased in 23 percent of cases and substantially increased in 68 percent of cases. On individual farmlands, agricultural productivity was highly increased in about 9 percent of cases and substantially increased in 73 percent of cases. Integration of SLM practices with innovations that improved land productivity (for example, small-scale irrigation or improved inputs) or diversified incomes also contributed to improving food security and reducing household vulnerabilities in drought-prone areas.

The effectiveness of the interventions varied across socioecological regions. Although the overall effectiveness in reducing land degradation and improving land productivity was higher in the drier areas, where moisture stress is a critical constraint to rainfed agriculture, the results varied according to the adequacy of the technology, local capacity, and access to markets and services. In microwatersheds where there was a high success rate, IEG observed that area closures were seriously enforced by the communities in communal lands; the mix of biological and physical SLM interventions was adequate; and there were sufficient incentives for farmers, including water harvesting systems to improve crop productivity and diversification, particularly in dry areas.

With PPAR ratings of substantial for relevance, efficacy, and efficiency, the overall outcomes for both SLMP I and SLMP II are rated as **satisfactory.** Although the project outcome was assessed as moderately satisfactory when SLMP I was originally closed, through the stimulus provided by the follow-on SLMP II, SLMP I was able to attain and sustain a satisfactory overall outcome rating.

Risk to development outcomes for SLMP I is assessed by IEG as **moderate** given the improved security of land tenure and economic incentives for smallholder farmers for continued maintenance of the SLM infrastructure. The risks to development outcomes for SLMP II are not rated but considered to be similar to those of SLMP I.

What Worked and Why?

Incentives for farmers to adopt SLM worked mainly because of the efforts to provide up-front economic benefits and to sensitize and engage local communities. A key challenge for the SLMP was to design a participatory long-term watershed management approach that reduced land degradation but offered productivity improvements and timely economic and livelihood benefits to the communities and land users. Failure to create incentives through early benefit flows has been a long-standing constraint to successful soil and water conservation in Ethiopia, prompting smallholders to remove physical structures introduced through various top-down government programs. SLMPs I and II were able to foster such livelihood benefits to communities through improved access to small-scale irrigation and modern inputs that helped increase land productivity, livestock, and beekeeping, which helped boost and diversify incomes, including for the landless. In addition, regulated harvesting of biomass from area closures provided otherwise scarce fodder for livestock, strengthening incentives for land restoration and maintenance of the SLM infrastructure. Despite some initial setbacks, SLMPs I and II have also been largely effective in sensitizing and engaging local communities through exchange visits, demonstration of improved land management practices,

participatory local land use planning, and land certification to improve land tenure security.

Building institutional capacity and community support worked mainly because of strong community interest. The experience from SLMPs I and II shows the need to allow enough time, spanning beyond the duration of a single project, to heal degraded landscapes and restore ecological functions, while mitigating potential trade-offs and building local institutional capacity and mechanisms to facilitate local governance and management of SLM infrastructure and practices. SLMPs I and II have supported local capacity development through technical assistance and participatory land use planning at the community level. The communities developed local norms for area closures, cut-and-carry systems, and restrictions on free-grazing on communal pastures. SLMPs I and II have also been able to improve access to markets and services for communities by investing in rural feeder roads, which has also increased returns on investment in land and improved connections to value chains.

What Didn't Work and Why?

SLM in communal areas did not always work because of a lack of alternative sources of fodder. Area closures are difficult to implement using common pool resources when the communities lack alternative sources of livelihoods. Where communal pastures and alternative sources of fodder are limited, communities have faced difficulties in enforcing bylaws for area closures. In addition, the traditional free-grazing system has not been controlled in many communities, undermining private incentives to invest in SLM on farmlands. Although the initial piloting of climate-smart agriculture was useful, climate-smart practices that offer triple wins, in terms of reducing carbon emissions, enhancing climate adaptation, and improving productivity, require more research before scaling up. A stepwise approach that builds on productivity growth and improved climate adaptation is likely to have a greater chance of successfully increasing climate-smart agriculture in drought-prone areas.

SLM in watersheds with large gullies was constrained because of the high capital and maintenance costs of erosion control. The SLMPs did not complete planned activities in some large gullies that had caused erosion. In some highly erodible watersheds where the SLMPs have already closed, new gullies have opened. Communities emphasized that, although they are willing to contribute labor, they lack the means to invest in high-cost capital structures or to pay for installing or maintaining such infrastructure. These challenges call for a different approach to financing the construction or maintenance of major investments in targeted watersheds. Future interventions may also need to strengthen and formalize public or private watershed management institutions at the local level, including the identification of sources of revenue (for example, carbon

payments or payments for ecosystem services). IEG's field mission noted that in some cases, communities were not able to control intruders from neighboring watersheds who want to benefit from land restoration, suggesting the need to coordinate efforts on a wider scale.

Data on the projects' progress were not regularly available because of the inadequate quality of monitoring and evaluation (M&E) design and execution. On the project management side, the M&E system was not designed for the decentralized implementation and decision-making process in the SLMPs. The M&E system failed to include clearly defined plans for baseline data collection, results monitoring, and evaluation and learning efforts. The SLMP experience during the two phases shows that careful thought must be given to the M&E system, consistent with the results framework, the theory of change, and the key learning questions to be addressed. In addition to identifying relevant indicators, an effective M&E system requires detailed protocols for data collection, analysis, learning, and use, which the SLMPs lacked.

Lessons

- **Watershed management programs can lead to significant land restoration outcomes when appropriate structural and biological measures are introduced to treat the affected landscape with active participation of the local community.** Treatment of the upper catchment and the fast-growing gullies with reinforced gabion check-dams and vegetative cover was critical in controlling soil erosion from its source upstream. Demand-driven community participation also contributed to the uptake and effectiveness of watershed interventions. In some highly erodible catchments, additional supply of capital items is needed to treat large gullies.

- **Area closures are relevant for the restoration of degraded lands but require increased investments for alternative supply of forages to convince the local communities to forgo livestock grazing and other benefits during the process of natural regeneration.** Livestock feed is a limited resource in many land-scarce and intensively cultivated highlands. Where alternative sources of fodder are limited, communities are reluctant or unwilling to implement area closures. As shown in some watersheds, a phased approach that allows communities to invest in an alternative supply of forages and successively put more land into conservation through area closures can enhance the local acceptability and viability of this model for land restoration.

- **Farm productivity growth requires arresting both the on-site and off-site soil erosion to prevent the degradation of farmlands and enable investments in**

modern farm inputs. Given the geospatial interdependence within watershed landscapes, farmland restoration and the use of productivity-enhancing inputs significantly depend on controlling the on-site and off-site erosion originating upstream. Farmers were unable to invest in productivity-enhancing inputs to improve the value of land until the underlying sources of erosion were controlled.

- **Effective demonstration of up-front economic and livelihood benefits is fundamental for smallholder farmers to protect and maintain the SLM practices introduced on their lands through project support.** Past soil and water conservation investments promoted through government- and donor-supported programs were not sustained by farmers mainly because of limited local participation and ownership and the focus on structural measures that did not bring short-term benefits. The two phases of the SLMP were able to overcome this through proactive local participation and demonstration of up-front economic benefits through crop and livestock production, which are critical for continued maintenance of the soil and water conservation structures.

- **In drought-prone areas, small-scale irrigation is the key enabler for translating the benefits of land restoration into reduction in household vulnerability to climate shocks through income diversification and protection against droughts.** Small-scale irrigation is the most cherished component of the SLM package in Ethiopia and has become the game changer in creating incentives for improved watershed management. Irrigation offered protection against drought and opened opportunities for income and dietary diversification, allowing households to grow high-value fruits and vegetables throughout the year. In areas of intensive agriculture in drought-prone landscapes, like the Ethiopian Highlands, water harvesting and small-scale irrigation establish strong links among land restoration, resilience, and reduction in vulnerability to drought.

- **Market-oriented agroforestry interventions (for example, *Acacia decurrens*) that provide sustainable income for smallholders can be vital ingredients in creating incentives for the adoption of biological measures for land restoration and improving household resilience to climate shocks.** In microwatersheds where market-oriented agroforestry practices have been supported, these practices have induced transformational changes in restoring highly degraded landscapes, creating employment, generating income, and reducing poverty and out-migration.

- **Watershed management programs can have differential impacts on the landless, women, and youth, but such trade-offs can be reduced by promoting inclusive livelihood activities and land certification to reallocate communal land.** The SLMPs promoted youth employment and gender-inclusive programs, including the keeping of small ruminant livestock, poultry, and bees. In addition, many communities also adopted the sharing of grass and biomass from treated communal lands, actively benefiting the poor and landless. The reallocation of communal land to landless youth has also created incentives for improved management while generating some employment and income benefits, especially when opportunities for youth migration are limited.

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1. Background, Context, and Design

1.1 **Country and sector characteristics.** Ethiopia is a large, landlocked country covering 1.1 million square kilometers, located in the horn of Africa. It is also the second most populous country in Africa, with an estimated population of 109 million in 2018 (World Bank 2018), about 79 percent of whom live in rural areas where agriculture, which accounts for almost 48 percent of gross domestic product and 85 percent of export earnings (World Bank 2013b), is the main source of income and livelihoods and of poverty reduction. Agricultural production is largely rainfed and dominated by small-scale farmers and enterprises, which produce most of the country's crop and livestock products. Therefore, natural resources, including soils, land, water, forests, and biodiversity, play a critical role in economic growth and the livelihood of a majority of the population.

1.2 Land degradation continues to threaten livelihoods and undermines the potential for sustainable agricultural productivity growth, climate resilience, and poverty reduction. Ethiopia, with its extensive highland and mountainous landscapes, is one of the African countries suffering from extensive and severe degradation of land, especially in the intensively cultivated and highly populated watersheds that have been used by smallholder farmers for thousands of years. About 80 percent of the country's land surface is prone to moderate or severe soil degradation. About 27 million hectares of land is considered to be significantly eroded, and over 2 million hectares is estimated to be eroded beyond reclamation (World Bank 2007). These areas compose almost 50 percent of the country's highland areas, and their erosion affects about one in five people in Ethiopia (Bai et al. 2008). Estimates suggest that, on average, about 29.9 tons per hectare of productive soil is lost every year (Haregeweyn et al. 2015), and the minimum estimated annual cost of land degradation is 2–3 percent of agricultural gross domestic product before downstream effects such as water pollution, sedimentation, and increased flood risk are accounted for (World Bank 2007).

1.3 Given the central role of agriculture in the economy, climate change will bring increasing risks and uncertainty for economic growth and development. The intersection of land management, rights to land, and land use is the key development issue for millions of rural Ethiopians facing water insecurity, food insecurity, land tenure insecurity, and livelihood insecurity, which are all being amplified by climate variability and change. Climate impacts in Ethiopia are felt primarily through droughts and water stress, which in turn are affected by land use changes and ecosystem degradation within the productive landscapes.

1.4 To improve agricultural productivity and food security and reduce vulnerability to droughts, successive governments in Ethiopia have supported investments in sustainable land management (SLM).[1] Soil and water conservation activities have been implemented since the 1980s, after severe droughts, but there are limited success stories in terms of rehabilitating or reversing degraded landscapes and preventing or halting degradation in susceptible watersheds in the highlands. Past investments in physical infrastructure for reducing soil erosion introduced through mandatory government programs with donor support were not sustained or were even actively removed by farmers when such control was relaxed (for example, during the transition period after the fall of the military regime in the 1990s). The community-based watershed management approach has been promoted recently to enhance the participation of land users in the planning, design, and implementation of SLM practices. This has now moved further toward a landscape and jurisdictional approach and actively links with efforts for adaptation and resilience to, as well as mitigation of, climate change.

1.5 Under this national context, the SLM Project (SLMP) for Ethiopia was designed in alignment with the regional effort for rehabilitating degraded landscapes and scaling up SLM in Africa. The SLMP was part of a larger government flagship program designed to address land degradation and enhance impacts by employing a programmatic approach to scale up SLM initiatives supported by multiple donors, which had previously been implemented in a piecemeal fashion. The SLMP supported the World Bank's Africa Action Plan to make agriculture more productive and sustainable and to leverage natural resources management for promoting growth and poverty reduction in Africa. The project also supported the TerrAfrica partnership, which aims to increase investments in SLM throughout Africa. Financed by fully blended International Development Association and Global Environment Facility instruments, the SLMP contained two series of operations to be implemented over a 12-year period, 2008–19. It was later restructured to close in 2018.

Objectives, Design, and Financing

1.6 The development objectives of the two SLMPs differed slightly, as follows:

- SLMP I (P107139): "to reduce land degradation in agricultural landscapes and improve the agricultural productivity of smallholder farmers in selected watersheds identified in the Program Implementation Manual" (World Bank 2008a, 5).
- SLMP II (P133133/P133410): "to reduce land degradation and improve land productivity in selected watersheds in targeted Regions of the Recipient's territory" (World Bank 2013a, 5).

1.7 Both projects implemented SLM practices; the second project widened the coverage to new watersheds. SLMP I introduced improved land management practices in selected areas of the country to rehabilitate previously uneconomical and unproductive degraded areas, targeting 45 critical watersheds situated in six regions. SLMP II increased the project geographical coverage to 135 watersheds (and 1,820 microwatersheds) and continued addressing poor farmland management practices, rapid depletion of vegetation cover, unsustainable livestock grazing practices, and land tenure insecurity by expanding the outcomes on watershed restoration, SLM, and systematic land adjudication activities and by integrating new activities targeting land productivity, deforestation, and reduction of greenhouse gas emissions.

1.8 The SLMP I (P107139) project had the following components:

1. **Watershed management (appraisal estimate: $22.2 million; actual cost: $20.57 million).** To support the scaling up of best practices in SLM for smallholder farmers in selected watersheds that were increasingly becoming vulnerable to land degradation and food insecurity. There were four subcomponents: (i) capacity building, (ii) communal land and gully rehabilitation, (iii) farmland and homestead development, and (iv) community infrastructure.

2. **Rural land certification and administration (appraisal estimate: $3.93 million; actual cost: $3.06 million).** To strengthen land tenure security for smallholder farmers in the project area by increasing the government's enhanced land certification process.[2]

3. **Project management (appraisal estimate: $2.87 million; actual cost: $2.83 million).** To provide financial and technical assistance to the Ethiopian Ministry of Agriculture and Rural Development and local government units responsible for SLM to effectively support coordination and implementation of SLMP I and the broader SLM Program.

1.9 The SLMP II (P133133/P133410) project had the following components:

4. **Integrated watershed and landscape management (appraisal estimate: $73.98 million; actual cost: $61.8 million).** To support scaling up and adoption of appropriate sustainable land and water management technologies and practices by smallholder farmers and communities in the selected watersheds or woredas. The component also aims to reduce greenhouse gas emissions at the watershed level and to enhance productivity through the promotion and adoption of low-carbon, climate-smart technologies and practices. There were two subcomponents: (i) sustainable natural resource management on public and communal lands and (ii) homestead and farmland development, livelihood improvements, and climate-smart agriculture.

5. **Institutional strengthening, capacity development, and knowledge generation and management (appraisal estimate: $16.98 million; actual cost: $16.54 million).** To strengthen and enhance capacity at the institutional level and build the relevant skills and knowledge of key stakeholders.

6. **Rural land administration, certification, and land use (appraisal estimate: $12.20 million; actual cost: $7.6 million).** To enhance the tenure security of smallholder farmers in the project area and increase their motivation to adopt sustainable land and water management practices on communal and individual land.

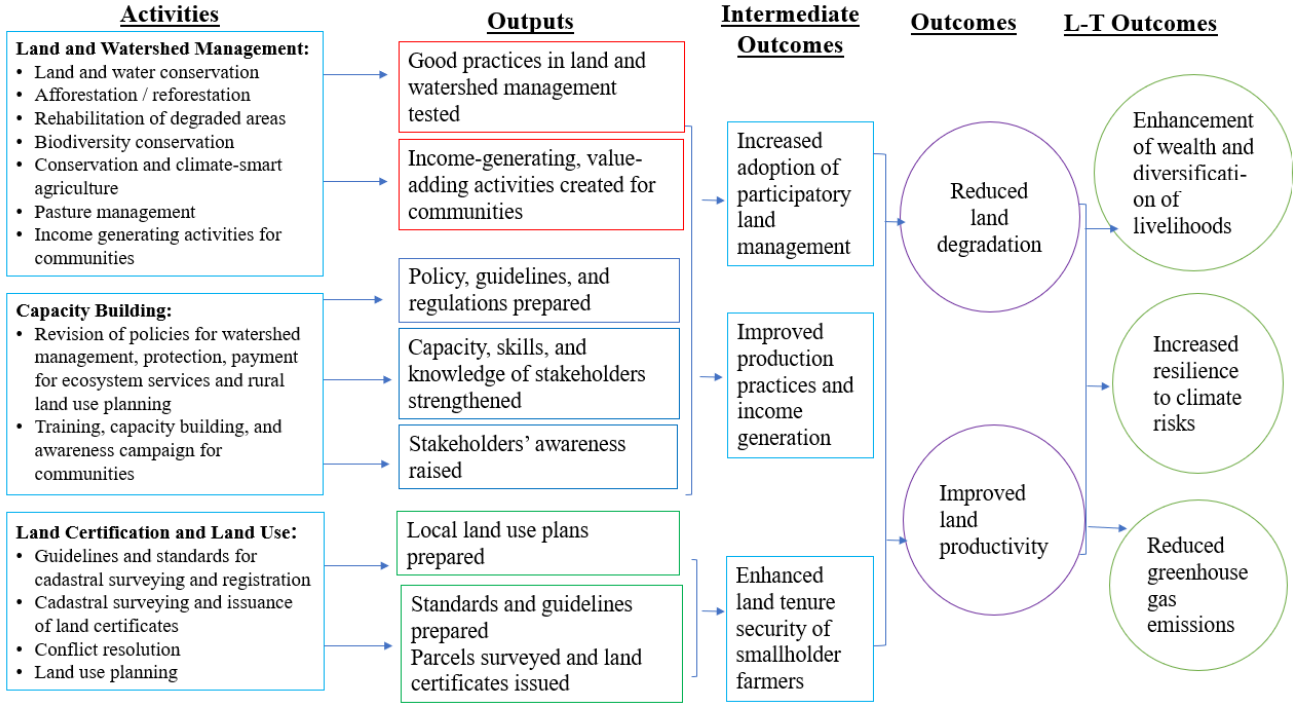
7. **Project management (appraisal estimate: $4.45 million; actual cost: $13.4 million).** To partially finance the operation of the SLM Support Unit to support the Ethiopian Ministry of Agriculture in ensuring efficient delivery of project resources and adequately monitoring and documenting progress and results.

1.10 The theory of change for both projects was to a large extent the same (see figure 1.1)**.** It was premised on the assumption that participatory watershed management, which combines institutional strengthening and land certification with integrated soil and water management practices, would be a key activity for rehabilitating degraded landscapes and improving productivity to benefit smallholders and the landless. Scaling up was more explicit for SLMP II, which sought to expand watershed restoration by integrating new activities, targeting land productivity, and increasing adoption of participatory land management.

1.11 Project interventions and how they led to achieving the objectives**.** Both projects included activities to build local capacity, strengthen institutions, and organize and prepare participatory watershed management plans with the local communities. The biophysical interventions included a comprehensive mix of sustainable land and water

management activities on both communal and individual farmlands identified within these plans. These interventions were expected to directly lead to the achievement of the objective of reducing land degradation, and the resulting impacts on soil fertility and moisture retention were expected to contribute to the objective of increasing land and agricultural productivity. The SLMP also promoted the adoption of high-value crops and enhanced livestock production systems and income-generating activities to increase agricultural productivity and improve incomes and livelihoods. These activities were expected to improve incentives to implement sustainable management practices on farmland and communal land. Both projects also included enhanced georeferenced landholding certificates to enhance tenure security, particularly for women, and reduce conflicts over boundaries, which would provide additional incentives for farmers to adopt SLM practices on their individual farmland. The second project also incorporated climate-smart agriculture in pilot areas, which would further improve land productivity and lead to increased resilience to climate risks, while reducing carbon emissions.

Figure 1.1. Simplified Theory of Change for SLMP



Source: World Bank 2019a.

2. What Worked, What Didn't Work, and Why?

Results

What Worked and Why

2.1 There is strong evidence that the projects were effective in reducing land degradation and improving productivity in the targeted watersheds. Independent Evaluation Group (IEG) stakeholder interviews with project beneficiaries, community watershed teams, and woreda teams, as well as observations of project results during site visits, revealed some important evidence on project impacts and the sustainability of project investments (field visits as case studies included 22 randomly selected microwatersheds: 15 SLMP I and 7 SLMP II sites; see the details in appendix C). The performance ratings were based on field observations, review of preproject conditions, and the resulting changes in land restoration and productivity reported by the beneficiary communities. IEG rated land degradation reduction in both communal and individual farmlands. The data for determining the performance ratings were collected in each case study using multidimensional questions to assess the economic and environmental outcomes related to the project[3] (see the Case Study Assessment Protocol section in appendix C for the detailed, case-level information used for deciding the ratings). The majority of microwatersheds visited displayed significant progress in reducing land degradation. Of the 22 microwatersheds visited, 18 were given an IEG performance rating of **high** or **substantial** for reducing land degradation on communal land and on individual farmland. The distribution of ratings (as a percentage of cases selected in each region) is presented in table 2.1 and table 2.2 for communal land and farmland, respectively.[4] Separate ratings for SLMP I and SLMP II are given in appendix C.[5]

Table 2.1. Performance Ratings for Reducing Land Degradation on Communal Land

	Performance Rating (percentage of cases)				
Region	Negligible	Modest	Substantial	High	Cases (no.)
Amhara	0.0	22.2	33.3	44.4	9
Oromia	0.0	28.6	57.1	14.3	7
Tigray	0.0	0.0	66.7	33.3	6
Total	0.0	18.2	50.0	31.8	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

Table 2.2. Performance Ratings for Reducing Land Degradation on Farmland

Region	Performance Rating (percentage of cases)				Cases (no.)
	Negligible	Modest	Substantial	High	
Amhara	0.0	0.0	88.9	11.1	9
Oromia	0.0	42.9	42.9	14.3	7
Tigray	0.0	16.7	83.3	0.0	6
Total	0.0	18.2	72.7	9.1	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

2.2 In microwatersheds where there was high success, IEG observed that area closures were seriously enforced by the communities in communal lands, the mix of biological and physical technologies was adequate, and there were sufficient incentives for farmers. The technologies used were adequate and included a mix of physical structures and biological measures (19 cases with adequate technologies out of 22). Also high was the commitment of the woreda steering committees; the capacity of the technical committees and the SLMP focal persons to identify recommended practices, strengthen local institutions, and support farmers to implement watershed activities; and the capacity of community watershed teams and their willingness to make desired changes. Furthermore, the SLMP was effective in providing economic and livelihood benefits to strengthen farmer incentives to invest and maintain structures, on both individual farmland and communal lands, to achieve soil and water conservation. This was enabled through water harvesting and irrigation to support diversification into high-value crops (including coffee, fruits, and vegetables), commercial agroforestry (for example, *Acacia decurrens*), livestock production, and beekeeping. In drought-prone areas, water harvesting provided a valuable buffer against droughts and allowed farmers and youth to engage in productive self-employment and earn income during the dry season. Harvesting of grass from communal lands through controlled cut-and-carry systems also allowed communities to practice and benefit from area closures. A summary of the key enabling factors for selected cases in the three regions is presented in appendix C, particularly tables C.20–C.25.

2.3 IEG observed that communities were in most cases adopting the SLM practices and maintaining the structures both on farmlands and communal lands, the latter mainly through mass mobilization. In some areas where maintenance was low, several factors were at play: (i) the required investments for maintenance of the structures were sizeable and beyond the means of the local communities (for example, check-dams built by the project to arrest large gullies requiring gabions, cement, and advanced engineering skills); (ii) the built structures were not sufficient to control severe runoff and erosion on highly erodible slopes, and additional major investments were needed;

and (iii) the community watershed teams were weak, and local collective action was not effective. Therefore, farmers were in some cases reluctant to maintain the structures.

2.4 The majority of microwatersheds visited by IEG displayed significant progress in improving land productivity**.** Of the 22 microwatersheds visited, 20 were given an IEG performance rating of **high** or **substantial** for increasing land productivity on communal land and 18 were given a performance rating of **high** or **substantial** for increasing land productivity on individual farmland. The distribution of performance ratings for the two land types as a percentage of cases is shown in table 2.3 and table 2.4. The semistructured stakeholder interviews of project beneficiaries showed that in most cases crop yields had improved significantly since 2008, albeit from a very low base (for example, teff yields, compared with the before-project situation, increased between 85 and 300 percent; for wheat, yield increases ranged from 75 to 400 percent; for faba bean in the order of 100 percent; for potato about 150 percent; and for sorghum from 60 to 200 percent, depending on local conditions). Although these changes reported by the communities were high and were not directly measured by the project, these productivity changes cannot be fully attributed to the project. The productivity changes were largely facilitated through links with the government's ongoing extension programs for delivering improved technology and marketing services to farmers. However, the SLMPs have also contributed to this change, mainly by controlling the on-site and off-site runoff and soil erosion, which made it possible for smallholders to invest in modern inputs (for example, fertilizer and improved seeds) to increase productivity. In addition, the integration of SLM activities supported by the SLMPs, with the improved access to modern inputs, extension advice, and marketing services under the government's ongoing programs, enhanced access to new crop varieties and other inputs and contributed to boosting productivity. IEG also observed that land productivity improved rapidly when the project provided small-scale irrigation (14 out of 22 cases), when nitrogen-fixating trees (for example, *Acacia decurrens*) were incorporated into the farming system (5 out of 22 cases), and when climate-smart agriculture techniques such as reduced tillage, legume rotation, and leaving crop residues were applied (3 out of 22 cases).

Table 2.3. Performance Ratings for Increasing Land Productivity on Communal Land

Region	Performance Rating (percentage of cases)				Cases (no.)
	Negligible	Modest	Substantial	High	
Amhara	0.0	0.0	66.7	33.3	9
Oromia	0.0	28.6	71.4	0.0	7
Tigray	0.0	0.0	66.7	33.3	6
Total	0.0	9.1	68.2	22.7	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

Table 2.4. Performance Ratings for Increasing Land Productivity on Farmland

	Performance Rating (percentage of cases)				
Region	Negligible	Modest	Substantial	High	Cases (no.)
Amhara	0.0	0.0	77.8	22.2	9
Oromia	0.0	42.9	57.1	0.0	7
Tigray	0.0	16.7	83.3	0.0	6
Total	0.0	18.2	72.7	9.1	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

2.5 The case studies showed lower impacts on improving vulnerability. The IEG team also assessed the livelihood effects of the improvements in land productivity in terms of changes in food security, water security, and out-migration. These were combined to arrive at an aggregate performance rating for household vulnerability to climate shocks (table 2.5; see the Case Study Assessment Protocol section in appendix C). Of the 22 cases assessed in the three regions, the responses from the stakeholders indicated that 14 cases (63.6 percent) had a substantial or high effect on vulnerability to climate shocks (drought). The food security–related effects were highest (i) in areas where degradation levels were severe but improvements in land productivity and household income have reduced the risk of out-migration, and (ii) in drought-prone areas where small-scale irrigation has significantly increased yields and reduced vulnerabilities to drought. Also, income growth through commercial agroforestry or sustainable charcoal production offered an option for reducing vulnerabilities in some communities. These effects did not reflect the situation for the poorest and landless households in the community, which benefited mainly from poultry and some livestock production, beekeeping, and the harvesting of grass from communal lands. The vulnerability reduction effects for these groups of households are positive but limited compared with smallholder farmers in the microwatersheds. Similarly, the effects in drought-prone areas in terms of improving land productivity and food security were modest for households that did not get access to and did not benefit from small-scale irrigation.

Table 2.5. Performance Ratings for Reducing Household Vulnerability

	Performance Rating (percentage of cases)				
Region	Negligible	Modest	Substantial	High	Cases (no.)
Amhara	0.0	11.1	77.8	11.1	9
Oromia	0.0	71.4	14.3	14.3	7
Tigray	0.0	33.3	50.0	16.7	6
Total	0.0	36.4	50.0	13.6	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

2.6 For sustainability of the SLM practices introduced in treated areas, as well as for scaling up within and outside the watersheds, follow-up projects financed by the World Bank are planning several sound measures that could also reduce risks to development outcomes: (i) legalizing community watershed organizations by helping them establish formal watershed user associations, (ii) creating viable sources of financial revenue for these watershed user associations via public-private partnerships and linking with value chains (including payments for ecosystem services and carbon payments) or revenue generated within the communities, (iii) further capacity building for future management of structures and graduation of microwatersheds from project support, and (iv) improving returns further by increasing climate-smart agriculture and other productivity-enhancing practices.

What Did Not Work and Why

2.7 Lack of investment in alternative sources of forage and fodder crops is one key factor resulting in failed area closures in some areas. IEG's field observations revealed that area closures for restoration of degraded lands were not enforced in 7 of the 22 microwatersheds visited. The main reason was that communal pastures were the main of source of livestock feed, which has increasingly become a limited resource in the land-scarce and intensively cultivated highlands, and communities need an alternative supply of forage to accept area closures during the process of regeneration. The project provided awareness raising and training for the communities but did not invest in alternative sources of forage and fodder crops. Since area closures that limit external interference are key to allowing restoration in degraded areas, it would be useful to consider the introduction of forage crops as part of scaling up SLM practices.

2.8 Another key issue observed by IEG was that the microwatershed approach (that is, treating only a fraction of the major watershed) experienced challenges in terms of upstream-downstream interactions. In several microwatersheds visited, IEG observed that when the upstream parts of the larger watershed are not treated (for example, in Sebata Hawas, Oromia), the spatial interdependence in the larger landscape made it difficult to control soil erosion and runoff in the lower reaches of the catchment downstream, limiting land productivity benefits. The continued degradation process and lack of productivity change undermined the incentives for the individual farmers and communities to adopt SLM interventions and participate in the program. This challenge of excessive runoff and soil erosion is higher in the high rainfall areas.

2.9 The overall impact of SLM interventions in reducing land degradation (table 2.6) and improving land productivity (table 2.7) is lower in the high rainfall areas and higher in the drier areas, where moisture stress is a critical constraint during the growing season.[6] Managing the excessive runoff originating upstream and controlling the on-site

soil erosion using the right combination of technical interventions and institutional innovations at the watershed or landscape level are key for land restoration in high rainfall areas. Furthermore, for scaling up SLM activities to the larger watershed level (going beyond the microwatershed), it is important to put in place the requisite technical and institutional mechanisms for proper planning coordination at different levels.

Table 2.6. Performance Ratings for Reducing Land Degradation on Communal Land by Agroecological Zone

Agroecological Zone	Performance Rating (percentage of cases)				Cases (no.)
	Negligible	Modest	Substantial	High	
Dry dega	0	0	0	100	1
Dry kolla	0	0	0	100	1
Dry weyna dega	0	0	80	20	5
Moist dega	0	22	44	33	9
Moist weyna dega	0	33	50	17	6
Total	0	18	50	32	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

Table 2.7. Performance Ratings for Increasing Land Productivity on Communal Land by Agroecological Zone

Agroecological Zone	Performance Rating (percentage of cases)				Cases (no.)
	Negligible	Modest	Substantial	High	
Dry dega	0	0	0	100	1
Dry kolla	0	0	100	0	1
Dry weyna dega	0	0	80	20	5
Moist dega	0	11	67	22	9
Moist weyna dega	0	17	67	17	6
Total	0	9	68	23	22

Source: Independent Evaluation Group case studies in 22 microwatersheds.

2.10 The projects showed greater success in abating land degradation than in improving livelihoods or reducing vulnerability. Improvements in addressing land degradation alone are not sufficient to reduce vulnerability to climate shocks. More than a third of the cases (36.4 percent) visited by IEG had shown only modest improvements in vulnerability to climate shocks. The best results were obtained when SLM practices were combined with income-generating activities. Communities in drought-prone areas were not able to reduce vulnerability without improved water harvesting mechanisms (including access to small-scale irrigation) and other techniques for farm productivity growth and income diversification to horticulture, beekeeping, and livestock. The IEG team was informed that the follow-up project (the Resilient Landscapes and Livelihoods

Project) could not include small irrigation works and water harvesting structures as part of the participatory watershed management interventions owing to the inclusion of Safeguard Policy International Waterways (Operational Policy / Bank Procedure 7.50). However—bearing in mind the impact of landscape restoration and SLM activities on improving ecosystem services, which generate positive spillover benefits across the basin, including better protection of watersheds upstream, regeneration of springs, and increased water flow across seasons—the inclusion of very small-scale irrigation works and water harvesting techniques as part of the menu of interventions to incentivize smallholder farmers to invest in and maintain these good practices should be counted as a positive outcome, and such projects should be reviewed accordingly under the relevant safeguards policy. Without farmer investments in these SLM practices to protect critical watersheds upstream, the continued degradation of landscapes associated with deforestation and loss of biodiversity could lead to desertification and significant negative externalities that would affect water flow and availability for downstream users across the basin. This effect would be exacerbated and further amplified by climate change (IPBES 2018).

2.11 The benefits for the landless, women, and youth from SLMP interventions are limited but demonstrate opportunities to foster inclusive approaches. Although very few cases visited by IEG displayed results in providing direct economic benefits for women, youth, and the landless, the SLMPs experimented with various approaches to enhance inclusion. For example, the second-level land certificates were particularly beneficial for women; for those who were married, it conferred equal rights as landholders with their spouses. Regulated harvesting and equitable sharing of grass and biomass for livestock and other uses from area closures (for example, in multiple sites visited in Tigray) were strongly valued as important sources of income by the landless and youth, who also benefited from beekeeping activities on restored local communal lands. In addition, other gender-inclusive activities, such as the keeping of poultry, small ruminant livestock, and bees, as well as fuel efficient stoves, were provided to benefit selected women (using local criteria at the discretion of the community). These activities were beneficial, although more needs to be done to produce significant results for women and the landless and to reduce poverty and vulnerability to drought. IEG site observations also showed that in some areas, youth groups were established and had started carrying out income-generating activities (for example, beekeeping or planting trees), often using some rehabilitated communal lands (10 out of 22), but were yet to be provided with land certificates.[7] In some cases, the youth groups preferred to migrate to other areas instead of using the allocated communal lands, which were perceived as unproductive.

Design and Preparation

2.12 The SLMP followed a participatory watershed management approach that necessitated complex and often challenging implementation structures. The two phases of SLMP were implemented through a highly decentralized decision-making system, in which the six targeted regional states had their own coordination units. This required a comprehensive and complex set of institutional arrangements to coordinate activities at the national level and to support the organization, planning, and implementation of activities at the local level in each region.

2.13 Despite its complexity, the SLMP in general was successful, through its two phases, in designing and providing capacity-building support at different levels. Institutional strengthening efforts were achieved at all levels of implementation and included government agencies, service providers, communities, and farmers. Capacity building comprised financing the purchase of equipment; providing training to public officials at the national, regional, and local (woreda and kebele [village]) levels; and providing training and technical assistance to community members in the target watersheds. Through this support, community watershed teams were organized and watershed management plans with the local communities were prepared. Woreda-level technical and steering committees and focal persons were recruited to support communities with SLM activities. Kebele-based development agents were also assigned and trained to provide agricultural extension services. Participatory land use planning was designed and implemented, and cadastral surveys were performed and land certificates issued through the help of the land administration departments. Nevertheless, given the limited capacity and experience in implementing knowledge-intensive participatory watershed management programs, future efforts for technical assistance and capacity development may need to give higher priority to those areas that need it most (for example, Gambela and Benishangul-Gumuz). Scaling up watershed interventions in these regions is likely to require solid piloting and institutional capacity development at all levels.

2.14 The results framework and monitoring and evaluation (M&E) systems under both projects were weak. An internet-based M&E system was designed and established, but this was not helpful as many woredas did not have internet connection. The M&E framework used was an activity-based system rather than an outcome-focused one. So both projects had challenges in monitoring and reporting on outcomes related to land degradation and productivity. Some proxy indicators, involving remote sensing, were used but without any control group comparison to adequately assess the resulting effects. Baseline data were inadequate, and in-situ measurement of soil erosion, sediment loss, and water levels in the target microwatersheds was very limited. In addition, local-level capacity to monitor and collect some basic information on the

implementation of SLM activities was weak; except in Tigray, many of the woredas were unable to provide any documentation or data during the IEG visits. The M&E task was also affected by staff turnover, and the focal persons indicated that the overlapping demands on their time limited their ability to pay enough attention to the SLMPs. The woredas mostly relied on local extension agents to collect M&E information, partly because of the distance and mobility constraints on regularly visiting the targeted watersheds.

Implementation and Supervision

2.15 The World Bank supervision was overall effective, albeit with disruptions at times. The World Bank undertook regular supervision missions as part of the joint implementation support; these missions were organized on a semiannual basis. It developed comprehensive and informative aide-mémoire summarizing the key findings, recommendations, and agreements reached during the supervision missions and Implementation Status and Results Reports that record achievements against the intended development objectives of the projects. The composition of the supervision teams reflected the technical and fiduciary requirements of the projects, with locally based specialists in financial management, procurement, and safeguards participating in all missions. The World Bank's oversight of project progress was key in addressing the shortcomings in the project's quality at entry. However, the availability and dedication of key World Bank resources to supervision tasks were affected by the design of the successor projects and by the high number of other ongoing World Bank–assisted operations within the environment portfolio in Ethiopia.

2.16 The national coordination unit hosted by the Ministry of Agriculture conducted regular monitoring and supervision missions to the implementing regional states, but the success of this effort was affected by social instability and by the different capacities and levels of support required in different regions. The national coordination unit will need to further strengthen its capacity to capture, aggregate, and analyze data from all regions and share timely lessons from future projects with the implementing regions. The regional coordination units that IEG visited were generally well staffed to support activities downstream and to coordinate efforts and report progress upstream to the national coordination unit.[8]

2.17 Administrative and staffing disruptions also posed a challenge within the agencies involved in project implementation**.** IEG's stakeholder interviews revealed reports of frequent transfer and turnover of woreda focal persons and local-level development agents that affected the fieldwork and timeliness of implementation. In addition, many of the woredas visited had weak capacity in terms of internet access and vehicles for accessing the watersheds in their districts. Enhanced recruitment

procedures, incentive mechanisms, and better working conditions are essential in enabling effective local implementation structures to be established and maintained.

3. Lessons

3.1 The watershed management approach can lead to significant land restoration when appropriate structural and biological measures are introduced to treat the affected landscape with active participation of the local community. Treatment of the upper catchment and the fast-growing gullies with reinforced gabion check-dams and vegetative cover was critical in controlling soil erosion from its source upstream. Demand-driven community participation is key for the uptake and effectiveness of watershed interventions. In some highly erodible catchments (for example, the Dalocha watershed in Gimbichu), the resource-poor communities were willing to contribute labor but required a supply of capital items for treating large gullies. The lesson is that natural resource restoration advanced significantly when the right SLM practices were implemented to arrest and reverse degradation.

3.2 Area closures are relevant for the restoration of degraded lands but require increased investments for alternative supply of forages to convince the local communities to forgo these benefits during the process of natural regeneration. Livestock feed is a very limited resource in many land-scarce and intensively cultivated highlands. Some communities that agreed initially to enforce area closures were highly reluctant or unwilling to implement area closures unless alternative sources of fodder and fuelwood were available (for example, some microwatersheds in Upper Guder, Amhara). Controlled harvesting of livestock feed and beekeeping activities within area closures facilitated compliance. The lesson is that a supply of alternative sources of livestock feed and fuelwood, information about the long-term costs of traditional free-grazing systems, and a shift to a phased approach to area closures, which allows communities to successively put more communal land into conservation, can all enhance the local acceptability and viability of this model for land restoration.

3.3 Farm productivity growth requires arresting both the on-site and off-site soil erosion to prevent degradation of farmlands and to enable investments in modern farm inputs. Given the geospatial interdependence within watershed landscapes, farmland restoration and the use of productivity-enhancing inputs significantly depends on controlling the off-site erosion originating upstream. A good example is the farm productivity growth in the Adikelkel microwatershed (in Enderta, Tigray), where arresting soil erosion and runoff originating from the upper reaches was critical to achieving sustainable intensification and productivity growth on farmlands in the lower valley. The lesson is that farm productivity growth requires arresting both the on-site

and off-site soil erosion that leads to degradation of farmlands and therefore lowers incentives to adopt SLM practices and modern inputs.

3.4 Effective demonstration of up-front economic and livelihood benefits is fundamental for smallholder farmers to protect and maintain the SLM practices introduced on their lands through project support. Past soil and water conservation investments promoted through government- and donor-supported programs were not sustained by farmers mainly because of limited local participation and ownership and the focus on structural measures that do not bring short-term benefits. In Ethiopia, many smallholder farmers are unable to forgo immediate benefits for long-term sustainability gains. The lesson is that the SLMP, under the two phases, was able to overcome this challenge through proactive local participation and the demonstration of up-front economic benefits, such as increased crop and livestock production and other income-generating activities, which are critical for continued interest in and maintenance of the soil and water conservation structures.

3.5 In drought-prone areas, small-scale irrigation is the key enabler for translating the benefits of land restoration into reduction in household vulnerability to climate shocks through income diversification and protection against droughts. Small-scale irrigation is the most cherished component of the SLM package in Ethiopia and has become the game changer in creating incentives for improved watershed management. Water harvesting and small-scale irrigation also offered opportunities for income and dietary diversification, allowing households to grow high-value fruits and vegetables throughout the year. This created additional income and employment and reduced the pressure to migrate to the cities or other areas, especially for youth. Small-scale irrigation also provides protection against drought (for example, the Weinalem microwatershed in Raya Azebo, Tigray). The key lesson is that in high-pressure and drought-prone productive landscapes like the Ethiopian Highlands, water harvesting and small-scale irrigation establish strong links among land restoration, resilience, and reduction in human vulnerability.

3.6 Market-oriented agroforestry interventions (for example, *Acacia decurrens*) that bring sustainable income for smallholders can be vital ingredients in creating incentives for the adoption of biological measures for land restoration and improving resilience to climate shocks. Agroforestry systems, such as *Acacia decurrens*, that bring additional benefits through nitrogen fixation while also generating cash income are vital win-win options for land restoration, income growth, and asset creation. The lesson is that in the microwatersheds where such market-oriented agroforestry practices have been supported (for example, Akusty in Fagita Lekoma, Amhara), this has induced transformational changes in restoring highly degraded landscapes, creating employment, generating income, and reducing poverty and out-migration.

3.7 Watershed management programs can have differential impacts on the landless, women, and youth, but such trade-offs can be reduced by promoting inclusive livelihood activities and land certification to reallocate communal land. The SLMPs promoted off-farm youth employment and gender-inclusive programs, including the keeping of small ruminant livestock, poultry, and bees. In addition, many communities adopted the sharing of grass and biomass from treated communal lands, actively benefiting the poor and landless. Reallocation of communal land to landless youth has also created incentives for improved management while generating some employment and income benefits, especially when opportunities for youth migration are limited. The lesson is that, although area closures in some locations forced women to travel long distances in search of fuelwood, this challenge was mitigated in some cases through on-farm agroforestry production in conjunction with controlled harvesting of biomass in closed areas.

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[1] Sustainable land management (SLM) is defined by the Food and Agriculture Organization of the United Nations as "the use of land resources, including soils, water, animals, and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions" (http://www.fao.org/nr/land/sustainable-land-management/jp/). Typical SLM practices include the following: physical soil and water conservation; flood control and drainage; water harvesting and runoff management for multiple uses; soil fertility management and biological soil conservation; agroforestry, forage development, and forestry; and gully control.

[2] The second-level land certificates use geospatial data to better define a plot's location, size, and boundaries to provide landholding rights. These certificates show all the different parcels managed by farm households and include women as equal landholders. These improvements from the initial first-level certificates are expected to facilitate access to finance (serving as collateral), facilitate land rental and lease transactions, and help resolve land-related disputes.

[3] Structured discussions with focus groups and key informants, including community- and woreda-level watershed teams, were held to solicit information on the extent of adoption of SLM practices; changes in the levels of soil erosion, runoff, and vegetation cover; use of improved inputs; crop and biomass yields; and changes since the beginning of the SLMP, separately for farmland and communal lands. As outlined in the protocols (see appendix C), this information was summarized in detail for each case study and was used to provide a performance rating in terms of achievement of the project objectives. The IEG team also assessed the livelihood and vulnerability effects in terms of changes in food security, water security, and out-migration.

[4] Given the sampling approach, the distribution of ratings in each region does not represent the regional situation. The interpretation is only valid at the aggregate level (across the three regions). This applies across all the tables where similar ratings are presented.

[5] The separate performance ratings for Sustainable Land Management Project (SLMP) I and SLMP II shown in appendix C are consistent with the joint performance ratings given for reducing land degradation and improving land productivity.

[6] These findings are consistent with other evidence showing that the returns on SLM investments are higher in drier areas, where rainfall is a binding constraint to productivity growth and SLM offers moisture conservation benefits that facilitate land regeneration and yield growth (for example, Kassie et al. 2008, 2009).

[7] However, the Implementation Completion and Results Report (ICR) for SLMP II stated that some 9,661 landless youth were issued second-level land certificates or other legal documentation to use communal landholdings in exchange for restoring land.

[8] The regional coordination units also serve as the coordinators of the watershed management and SLM activities supported by other donors (for example, the International Fund for Agricultural Development, KfW, and the German Agency for International Cooperation).

Bibliography

Ali, D. A., K. Deininger, and M. Monchuk. 2018. "Using Satellite Imagery to Assess Impacts of Soil and Water Conservation Measures: Evidence from Ethiopia's Tana-Beles Watershed." Policy Research Working Paper 8321, Washington, DC: World Bank.

Bai, Z. G., D. L. Dent, L. Olsson, and M. E. Schaepman. 2008. *Global Assessment of Land Degradation and Improvement: 1. Identification by Remote Sensing*. Report 2008/01. Wageningen, Netherlands: ISRIC—World Soil Information.

Ethiopia, Ministry of Agriculture. 2013. *Sustainable Land Management Project Impact Assessment Report*. Addis Ababa: Ethiopia Ministry of Agriculture.

Eyasu, E. 2003. "National Assessment on Environmental Roles of Agriculture in Ethiopia." Addis Ababa: Ethiopian Economic Association.

Haregeweyn, N., A. Tsunekawa, J. Nyssen, J. Poesen, M. Tsubo, D. Tsegaye Meshesha, B. Schütt, E. Adgo, and F. Tegegne. 2015. "Soil Erosion and Conservation in Ethiopia: A Review." *Progress in Physical Geography: Earth and Environment* 39 (6): 750–74.

IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). 2018. *The Assessment Report on Land Degradation and Restoration—Summary for Policymakers*. Bonn: IPBES.

Kassie, M., J. Pender, M. Yesuf, G. Köhlin, R. A. Bluffstone, and E. Mulugeta. 2008a. "Estimating Returns to Soil Conservation Adoption in the Northern Ethiopian Highlands." *Agricultural Economics* 38: 213–32.

Kassie, M., J. Pender, M. Yesuf, G. Köhlin, R. Bluffstone, P. Zikhali, and E. Mulugeta. 2008b. "Sustainable Land Management Practices Improve Agricultural Productivity: Evidence on Using Reduced Tillage, Stone Bunds, and Chemical Fertilizer in the Ethiopian Highlands." Gothenburg: Environment for Development.

Kassie, M., P. Zikhali, K. Manjur, and S. Edwards. 2009. "Adoption of Organic Farming Technologies: Evidence from Semi-Arid Regions of Ethiopia." *Natural Resources Forum* 33: 189–98.

Schmidt, E., and F. Tadesse. 2014. "Household and Plot Level Impact of Sustainable Land and Watershed Management (SLWM) Practices in the Blue Nile." ESSP II Working Paper 42, Addis Ababa: International Food Policy Research Institute.

Schmidt, E., and F. Tadesse. 2018. "The Impact of Sustainable Land Management on Household Crop Production in the Blue Nile Basin, Ethiopia." *Land Degradation and Development* 30: 777–87.

World Bank. 2007. *The Cost of Land Degradation in Ethiopia: A Review of Past Studies.* Washington, DC: World Bank.

World Bank. 2008a. *Ethiopia—Grant H377-ET Financing Agreement*. Washington, DC: World Bank.

World Bank. 2008b. "Ethiopia—Sustainable Land Management Project." Project Appraisal Document 42927-ET, World Bank, Washington, DC.

World Bank. 2008c. "Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up." Water Sector Board Discussion Paper Series No. 11, Washington, DC: World Bank.

World Bank. 2013a. *Ethiopia—Grant 5318-ET Financing Agreement*, Washington, DC: World Bank.

World Bank. 2013b. "Ethiopia—Sustainable Land Management Project II." Project Appraisal Document PAD525, World Bank, Washington, DC.

World Bank. 2014. "Ethiopia—Sustainable Land Management Project." Implementation Completion and Results Report ICR3074, World Bank, Washington, DC.

World Bank. 2015. "Ethiopia—Sustainable Land Management Project." Implementation Completion and Results Report Review ICRR14656, Independent Evaluation Group, World Bank, Washington, DC.

World Bank. 2018. "World Development Indicators." Washington, DC: World Bank. https://databank.worldbank.org/source/world-development-indicators#

World Bank. 2019a. "Ethiopia—Sustainable Land Management Project II." Implementation Completion and Results Report ICR4449, World Bank, Washington, DC.

World Bank. 2019b. "Ethiopia—Sustainable Land Management Project II." Implementation Completion and Results Report Review ICRR21785, Independent Evaluation Group, World Bank, Washington, DC.

World Population Review. 2019. https://data.worldbank.org/country/ethiopia.

Appendix A. Project Ratings

Sustainable Land Management Project I (P107139)

Table A.1. Principal Ratings

Indicator	ICR	ICR Review	PPAR
Overall outcome	Moderately satisfactory	Moderately satisfactory	Satisfactory
Risk to development outcomes	Moderate	Moderate	Moderate
Bank performance	Moderately satisfactory	Moderately satisfactory	Moderately satisfactory
Borrower performance	Moderately satisfactory	Moderately satisfactory	Moderately satisfactory
Quality of M&E	Negligible	Negligible	Negligible

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. M&E = monitoring and evaluation; PPAR = Project Performance Assessment Report.

1. Relevance of the Objectives and Design

Objectives

According to the loan agreement, the project development objective (PDO) was "to reduce land degradation in agricultural landscapes and improve the agricultural productivity of smallholder farmers in selected watersheds identified in the Program Implementation Manual" (World Bank 2008a, 5).

A similar statement of the project's objectives was presented in the Project Appraisal Document: "to reduce land degradation in agricultural landscapes and improve the agricultural productivity of smallholder farmers" (World Bank 2008b, 3).

The global environment objective stated in the Project Appraisal Document was "to reduce land degradation, leading to the protection and/or restoration of ecosystem functions and diversity in agricultural landscapes" (World Bank 2008b, 3).

For the purpose of this Project Performance Assessment Report (PPAR), the PDO has been separated into two objectives, namely objective 1 (reduce land degradation in agricultural landscapes) and objective 2 (improve the agricultural productivity of smallholder farmers in selected watersheds). The extent to which each of these objectives was achieved will be assessed under the heading of Efficacy in this appendix.

The PDO was to be achieved through the implementation of three components:

Component 1. Watershed management: (appraisal estimate: $22.2 million; actual cost: $20.57 million).

The objective of the watershed management component was to support scaling up of sustainable land management (SLM) best practices in watersheds located in the high-potential, food-secure areas that were increasingly becoming vulnerable to land degradation and food insecurity. There were four subcomponents:

(i) Capacity building, comprising technical assistance, training, equipment for government units responsible for SLM to support the preparation of participatory community-based watershed management plans.

(ii) Communal land and gully rehabilitation, which supported the implementation of locally appropriate physical and biological measures to stabilize hillsides, degraded communal lands, and gullies. The project financed the reclamation of degraded communal lands, hillsides, and gullies through measures such as terraces, forage contour bunds, reforestation, afforestation, deep-trenching, and amelioration of acidic or saline-sodic soils; the building of check-dams; reshaping; cultivation with multipurpose perennial trees, shrubs, and grasses; and the provision of relevant goods and equipment, including hand tools, seeds, seedlings, and fencing materials.

(iii) Farmland and homestead development, which financed subprojects involving the application of soil and water conservation measures, including the introduction of high-value crop varieties, such as horticulture and orchard development, forage and grassland development, restoration and sustenance of soil fertility, improvement of water use efficiency in smallholder farming systems, and establishment of woodlots.

(iv) Community infrastructure, which financed subprojects for the construction of small-scale, community-based infrastructure such as water harvesting systems, including farm ponds, storage tanks, roadside flood harvesting, and spring development.

Component 2. Rural land certification and administration (appraisal estimate: $3.93 million; actual cost: $3.06 million).

The objective of this component was to expand the coverage of and enhance the government's land certification program, with the aim of strengthening land tenure security for smallholder farmers in the project area. The component supported scaling up of an enhanced land certification process (known as stage 2), building on experiences from two pilot projects financed by the Swedish International Development Agency and the United States Agency for International Development. The component also financed land certification interventions such as cadastral surveying, parcel-based land

registration, and the development of registries for rural land. Such interventions were expected to facilitate the timely processing and issuance of land certificates, with important features such as georeferencing and mapping of household plots, farm plots, and communal lands in all the participating woredas.

Component 3. Project management (appraisal estimate: $2.87 million; actual cost: $2.83 million).

This component was supported by the Ministry of Agriculture and the institutions at regional, woreda, and kebele (village) levels responsible for SLM and for coordination and implementation of the SLMP I and the broader flagship SLM Program of the government, including procurement, financial management, and monitoring and evaluation (M&E).

These components contributed to the government's broader SLM Program, which included four additional components not financed by the project: (i) knowledge management; (ii) improved framework for SLM; (iii) strengthening of the implementation structure for watershed development; and (iv) support to agricultural extension services for SLM. Support from German Development Cooperation, through the German Agency for International Cooperation, was obtained in 2009 for the implementation of these additional program components (which amounted to €11.8 million) and was focused on three of the six regions supported by the project (Amhara, Oromia, and Tigray).

Relevance of the Objectives

The project's development objectives were and remained substantially relevant to the country context and priorities highlighted in government strategy documents, World Bank regional and sector strategies, and past and current World Bank Country Assistance Strategies for Ethiopia.

Ethiopia's Poverty Reduction Strategy for the period 2005–06 to 2009–10, called for land degradation to be addressed by strengthening tenure security through expansion of the ongoing land certification project; building capacity in community-based approaches to watershed management; scaling up successful models for watershed management; and strengthening natural resource information management, specifically rigorous evaluation, synthesis, and dissemination of best management practices and innovations in SLM. Addressing land degradation and enhancing agricultural productivity remained priorities in Ethiopia's growth and transformation plans for the periods 2010–11 and 2014–15.

The project's objectives were also consistent with the World Bank's Africa Action Plan goal of making agriculture more productive and sustainable, and taking advantage of opportunities for natural resources management to promote growth and poverty reduction.

The objectives support the TerrAfrica partnership goal of scaling up investments in SLM throughout Africa and were aligned with the Global Environment Facility's Land Degradation Focal Area.

The World Bank's interim Country Assistance Strategy for fiscal year (FY)06–07 noted that land degradation was at the top of the environmental agenda in Ethiopia because of the threat it posed to sustainable agricultural growth, infrastructure, and other development challenges. The project objectives remained relevant to the Country Partnership Strategy (2013–16) in place at closing, which identified improvements in land and water management practices as a means to increase agriculture productivity under the pillar for fostering competitiveness and employment. The objectives also remained relevant to the Country Partnership Strategy goals of enhancing the resilience of vulnerable households to food insecurity and improving sustainable natural resource management and resilience to climate change under the pillar for enhancing resilience and reducing vulnerabilities.

These objectives were, however, overambitious given that the project duration (of approximately 4.5 years from effectiveness to closing) was unlikely to be sufficient to observe substantial reductions in land degradation and improvements in productivity. Sustainability-enhancing farm investments typically require several years to rehabilitate affected ecosystem functions that contribute to landscape restoration. An International Food Policy Research Institute (IFPRI) study evaluating the impacts of the SLMP in 177 microwatersheds using panel survey data from 2010 to 2014 showed that the project had no significant impact on the value of agricultural production after four years of implementation in project kebeles compared with control kebeles, regardless of the agroecological zone or landscape type. This indicates that, depending on the severity of degradation, it could take several years before one could see significant improvements in farm productivity gains (Schmidt and Tadesse 2014). In addition, the complex operating environment for watershed management projects—in which local actors and communities with limited capacity play a key role—often means that longer preparatory and implementation periods are required for success.

Relevance of Design

The relevance of design was **substantial.** The project included activities to organize and prepare participatory watershed management plans with the local communities. It supported a comprehensive mix of sustainable land and water management activities on

both communal and individual farmlands identified within these plans. The sustainable land and water management interventions would directly lead to the achievement of the objective of reducing land degradation, and the resulting beneficial impacts on soil fertility and moisture retention would contribute to the objective of increasing land and agricultural productivity. The component promoted the adoption of high-value crops and improved livestock production systems and income-generating activities, which would have a direct impact on agricultural productivity and improve incomes and livelihoods. This would provide an enhanced incentive to implement the sustainable management practices for the communities. The project also included the preparation of georeferenced landholding certificates to enhance tenure security, including for women, and to reduce land disputes over boundaries, which would provide additional incentives for farmers to continue with SLM practices on their farmland.

The M&E framework had weaknesses in terms of indicators to measure project outcomes on land degradation: although two indicators—the normalized difference vegetation index (NDVI) and soil carbon content (which was included after restructuring)—were identified as relevant proxies, there was no control group comparison. Similarly, the indicator for agricultural yields did not include a baseline or control group measurements (see the Quality of Monitoring and Evaluation section in this appendix for details).

Implementation

Initial Delays and Challenges

Implementation progress was very slow during the first two years of the project. The project faced several initial challenges: the requirement for setting up and training the entire implementation structure at central, regional, and local levels; the time and effort needed for the participatory preparation of watershed development plans; and the complications in applying the World Bank's fiduciary requirements at the regional and local levels. In addition, M&E capacity was inadequate at the woreda level.

Throughout the project, high staff workload and turnover at the local level had a negative effect on the critical function of providing technical, operational, and fiduciary support to the beneficiary communities. This was further compounded by the lack of adequate working conditions (mainly transportation and internet access for communication and reporting purposes).

Mid-Term Review and Restructuring

A Mid-Term Review was conducted in March 2011, two years after project effectiveness. The aide-mémoire for the review highlighted several factors requiring attention: (i) the lack of reliable data to measure progress toward the PDO and the global environment

objective; (ii) the need to incorporate the upper catchments of the selected watersheds in the project; (iii) the poor performance of the rural land certification component, mainly because a sound technical basis for second-level certification had not yet been established; and (iv) the need to refine or introduce new performance indicators to more accurately track progress toward intermediate results and project objectives. As a result of the Mid-Term Review, agreement was reached between the government and the World Bank to restructure the project. However, the restructuring took two years and was only finalized in March 2013 (about six months before closing). It included the following changes: the revision of targets for certain indicators, the reallocation of funds among categories, and a waiver for the use of funds to cover value-added tax expenses. The incorporation of additional watersheds and the restructuring of the land administration component were agreed by the World Bank as part of a revision to the project implementation manual. Other aspects agreed at the Mid-Term Review—such as additional knowledge management activities, scaling up, and incorporating lessons learned from the clean development mechanism–type Humbo carbon offset operation supported by the World Bank's BioCarbon Fund (through which communities raise funds for SLM practices from carbon revenue)—were not incorporated. The carbon finance operation is a knowledge-intensive practice and requires a willing buyer for carbon credits, which became more difficult after the carbon markets collapsed in 2012.

2. Efficacy

To assess the efficacy of the project, the following methods were used by this PPAR: (i) triangulation of evidence obtained via semistructured interviews with stakeholders at the national, regional, woreda, and community watershed levels; (ii) analysis of causal links among SLM treatments, land restoration, and land productivity using project-level and remote-sensed satellite imagery data from microwatersheds in three selected regions. The Independent Evaluation Group (IEG) mission visited a stratified sample of 15 watersheds included in SLMP I in three regions (out of six) for a detailed case-based analysis and to assess project outputs and outcomes (see details on methodology and case selection in appendix C).

Objective 1: Reduce Land Degradation in Agricultural Landscapes

The extent to which objective 1 was achieved is rated **substantial.** The project interventions continued for two more years in the SLMP I microwatersheds after SLMP I closed as part of the follow-up project, and this was instrumental in achieving substantial outcomes, as it takes longer than the typical World Bank–assisted investment project duration to design and implement participatory watershed management activities. IEG visited 15 randomly selected project sites and found that about 73 percent of the sites showed a substantial or high reduction of land degradation in communal

land and that 87 percent of sites showed a substantial or high reduction of land degradation on individual farmland. IEG also found that communities were generally continuing to maintain the soil and water conservation structures, unless they required substantial financing. These were substantial achievements, thus the higher overall outcome rating than assessed by either the Implementation Completion and Results Report (ICR) or the ICR Review. The following paragraphs provide more detail on the outputs and outcomes of this assessment.

Outputs

Sustained land management. According to the project's ICR, the following outputs were achieved:

- The project worked in 45 watersheds, of which 35 were included at the beginning of the project; the 10 additional watersheds were included two years later, during implementation. As noted already, SLMP I watersheds continued to get support for two more years under the follow-up project.
- In total, 849 community watershed management teams and 508 kebele watershed teams were set up and trained; 135,921 people in total were trained in SLM.
- Forty-five participatory watershed management plans and 613 community-based microwatershed management plans were prepared.
- A comprehensive set of 39 soil and water conservation measures for communal and individual farmlands were selected and implemented in accordance with the government's *Community-Based Participatory Watershed Development Guidelines*.
- The area under SLM practices in the targeted watersheds increased from 86,892 to 209,926 hectares by project closure. Although this increase of 140 percent exceeded the targeted increase of 80–90 percent in the M&E framework, the achievement was lower than the targets in the work plan in general.
- Of this, 63,630 hectares of communal land were treated or rehabilitated (grazing, gullies, and hillsides) with appropriate biophysical measures and technologies (less than the planned 83,333 hectares). Bylaws were prepared and applied in 500 microwatersheds to govern the management and use of communal lands, including grazing lands (fewer than the planned 822 microwatersheds).
- In addition, 90,069 hectares of farmland and homesteads were treated with biophysical measures and technologies (less than the planned 134,484 hectares).
- In total, over 300,000 hectares were treated with SLM practices in the 45 watersheds targeted under SLMP I.

Land certificates. With the aim of increasing land tenure security and increasing the incentives for landholders to invest in SLM practices, the project aimed to issue level one land certificates for 700,000 parcels. At restructuring, the target was revised to 70,000 certificates. By project closure, only 59,999 level one certificates had been issued, but 229,642 parcels had been surveyed in preparation for the issuance of second-level certificates. In addition, 5,079 parcels of communal lands were titled. The shortfall in this intermediate indicator was due to the limited capacity of implementation agencies at the district and local levels.

Outcomes

Evidence from the ICR. The project originally used the NDVI, a measure of vegetation cover and soil carbon content, to identify improvement in soil conditions as a proxy indicator for land degradation; a control group was not used. In addition, because about 60 percent of the actual work started only during the last two years of the project, it would have been very ambitious to expect significant reductions in land degradation by the end of project in 2013. The ICR reported the following results (World Bank 2014):

- The NDVI increased by 0.543 (9 percent) over the baseline of 0.498. This was less than the revised target of 0.586 (17 percent) over the baseline in the project areas.
- The soil carbon content increased by 0.31 percent during the period 2009–13, exceeding the target of a 0.01 percent increase over the baseline.

Evidence from IEG field-based case studies. IEG conducted detailed field-based case studies in 15 selected SLMP I microwatersheds (see appendix C). The stakeholder interviews with project beneficiaries, community watershed teams, and woreda teams, as well as observations of project investments, revealed important evidence on project impacts and the sustainability of project investments. In each microwatershed visited, IEG collected detailed data on project activities, outputs, and outcomes using a standardized protocol (see appendix C). These data were used to assess changes in land degradation and productivity separately on communal and individual farmland.

The majority of microwatersheds visited displayed significant progress in reducing land degradation (see table A.2). Of the 15 microwatersheds visited, IEG gave 11 a performance rating of **high** or **substantial** in reducing land degradation on communal land and 13 a performance rating of **high** or **substantial** in reducing land degradation on individual farmland. The technologies used were adequate in general (13 cases out of 15). In some cases, the upper parts of the catchment had been inadequately or ineffectively treated, making it difficult to control runoff from its sources and negatively impacting land users downstream (for example, the Gogetti microwatershed in Sebata Hawas, Oromia).

Table A.2. SLMP I Ratings for Reducing Land Degradation in Selected Project Sites

Reducing Land Degradation on	Rating				Total
	Negligible	Modest	Substantial	High	
Communal land *(cases)*	0	4	6	5	15
Communal land *(%)*	0	27	40	33	100
Individual farmland *(cases)*	0	2	11	2	15
Individual farmland *(%)*	0	13	73	13	100

Source: Independent Evaluation Group site visits, 2020.
Note: SLMP = Sustainable Land Management Project.

Communities were in most cases maintaining the soil and water conservation structures to a large extent, mostly through mass mobilization (for communal land); in areas where maintenance was low, several factors were at play:

- The necessary treatment was sizeable and therefore required substantial financial means. For example, in the Jijiga microwatershed in Gimbichu, Oromia, the maintenance of check-dams built by the project to address soil erosion in large gullies required gabions, which could not be financed by the communities themselves.
- The community watershed team was inactive, and farmer awareness raising and training was not continued after project closure; therefore, some farmers were reluctant to continue maintaining the structures. For example, in the Gogetti microwatershed in Sebata Hawas, Oromia, some of the soil and water conservation structures were not properly maintained and the individual farmlands and communal lands upstream were not treated.

In microwatersheds where there was high success, IEG observed that area closures were seriously enforced by the communities in communal lands and the traditional free-grazing system was adequately controlled (for example, Akusty microwatershed in Fagita Lekoma, Amhara, and Chenetali microwatershed in Bure, Amhara). In addition, the capacity of the woreda or the focal person to work with and raise awareness and enhance the capacity of community watershed teams, and their willingness to make the desired changes, was quite high. The adoption of complementary SLM practices was also higher when the smallholder farmers had strong economic incentives from using improved practices. Examples include commercial agroforestry, such as *Acacia decurrens*, in the Akusty microwatershed in Fagita Lekoma, Amhara, and access to small-scale irrigation, which allows farmers to grow high-value crops such as coffee, chat, fruits, and vegetables (as in the Worebo microwatershed in Woliso, Oromia) or fruits and vegetables (as in the Firfir microwatershed in Shewa Robit Zuria, Amhara).

Objective 2: Improve the Agricultural Productivity of Smallholder Farmers in Selected Watersheds

The extent to which this objective was achieved was rated **substantial.** IEG's site visits to 15 randomly selected watersheds showed substantial increases in agricultural productivity on both communal and individual farmland in the majority of microwatersheds visited. The following paragraphs provide more detail on the outputs and outcomes of this assessment.

Outputs

Sustained land management. In addition to the outputs of the SLM activities reported above, the activities were expected to contribute to increased agricultural productivity via improvements in soil fertility, moisture retention, and reduced soil loss. In addition, the project promoted improved livestock practices and high-value crop production based on small-scale irrigation, surface water harvesting systems, and water point construction. The construction and maintenance of community feeder roads was intended to contribute to the availability of agricultural inputs, the marketing of outputs, and improved livelihoods and incomes.

According to the project's ICR, the number of households or acreage of land treated under various practices were as follows:

- Livestock:
  - 7,339 hectares for pasture development (target: 19,738 hectares)
  - 20,535 households for fodder planting (target: 33,289 households)
  - 7,780 households for poultry raising (target: 18,911 households)
  - 2,617 households for sheep/goat raising (target: 9,087 households)
- Community infrastructure:
  - 2,719 hectares of land under small-scale irrigation (target: 3,982 hectares)
  - 2,784 water harvesting systems (target: 4,815 systems)
  - 308 potable water points (target: 593 water points)
  - 634 kilometers of community feeder road construction (target: 593 kilometers) and 575 kilometers of road construction (target: 856 kilometers)
- Income-generating activities:
  - 12,731 farmers trained on income-generating activities (beekeeping, goat or sheep raising, horticulture production)

- 10,835 farmers provided with materials and or finance for income-generating activities (target: 14,823 farmers)
- 370 user groups formed and functional, comprising unemployed youth and women (target: 699 groups)

Outcomes

(a) Evidence from the ICR. According to the ICR, by project closure there was on average a 10 percent increase in yields for major crops in all treated watersheds; this increase was well below both the original and revised targets of 50 and 30 percent, respectively (World Bank 2014).

(b) The impact assessment carried out by the Ministry of Agriculture concluded that comparing yields between 2009/10 and 2012/13, using the Central Statistical Agency's survey data, showed a decline in yields for all evaluated crops in both treated and control areas. The impact assessment found with regard to the productivity of dairy cows that the overall comparison of the annual milk yield in liters per cow between 2009/10 and 2012/13 showed an increase of 2.7 percent in treatment areas compared with 0.8 percent in control areas (Ethiopia, Ministry of Agriculture 2013).

(c) IEG field visit observations. In the majority of microwatersheds visited, the communities affirmed that there had been significant progress in improving land productivity (see table A.3). Of the 15 microwatersheds visited, IEG gave 13 a performance rating of **high** or **substantial** in increasing land productivity on communal land and 12 a performance rating of **high** or **substantial** in increasing land productivity on individual farmland. Land productivity improved rapidly when the project provided small-scale irrigation (10 out of 15 sites); it improved in substantial amounts when nitrogen-fixating *Acacia decurrens* was planted (5 out of 15 sites) or climate-smart agriculture techniques, such as reducing tillage, practicing crop rotation, and leaving crop residues as mulch in the field, were applied (3 out of 15 sites visited).

Table A.3. SLMP I Ratings for Increasing Land Productivity in Selected Project Sites

Increasing Land Productivity on	Rating				Total
	Negligible	Modest	Substantial	High	
Communal land *(cases)*	0	2	10	3	15
Communal land *(%)*	0	13	67	20	100
Individual farmland *(cases)*	0	3	11	1	15
Individual farmland *(%)*	0	20	73	7	100

Source: Independent Evaluation Group case studies, 2019.
Note: SLMP = Sustainable Land Management Project.

Stakeholder interviews showed that in most microwatersheds yields improved significantly, although some baseline yields were very low (for example, for teff, yield increases compared with before the project ranged from 85 to 300 percent; for wheat yield increases ranged from 75 to 400 percent, for faba bean in the order of 100 percent, and for potato about 150 percent, depending on the microwatershed). Although these (2008–19) increases reported by the communities to the IEG team were high and were not measured by the project, the increases cannot be fully attributed to the project for many reasons. The yield increases were primarily due to the government's long-standing effort to increase access to modern inputs and varieties through the national extension program (supported separately by the World Bank and other donors). However, the SLMP's important contribution came through its role in reducing or controlling soil erosion and runoff, which was often the crucial enabler for smallholder farmers to invest in productivity-enhancing modern inputs, such as fertilizer and improved seeds. The visited communities explained to the IEG team that they were able to invest in modern inputs including fertilizers and new seeds after the SLMPs helped reduce excessive soil erosion, which has been a major constraint in the past. The closer integration of the SLMP activities with ongoing market and productivity-focused activities coordinated by the Ministry of Agriculture and implemented by the regional states (also the implementing agencies for the government's overall SLM Program) further strengthened this synergy.

In all three cases where there was below-target improvement in land productivity, accessibility was difficult and market links were underdeveloped. The project funded the construction or rehabilitation of rural feeder road in some areas, but not everywhere owing to budget limitations. Overlapping commitments and a shortage of transportation for understaffed and under-resourced woreda offices, in addition to poor roads and weak accessibility during the rainy season, were cited by extension agents, SLMP focal points, and woreda watershed teams as key factors limiting their mobility and ability to support and supervise activities at the community level. The IEG team noted that the woreda SLMP focal points, as regular government staff, were involved in multiple other activities and projects that put competing demands on their time, especially during periods of peak field activity. This was done to avoid staff cost increases resulting from the SLMP should a dedicated project staff have been hired. In addition, the severity of the land degradation before the project was an important factor that constrained improvements in land productivity. Therefore, it is likely that a longer time and more intensive efforts are needed before significant benefits from SLM can be realized.

3. Efficiency

On the basis of the positive estimated economic rates of return, the project's efficiency is rated **substantial.**

The ICR reported that an ex ante economic analysis was conducted and, owing to data availability, only covered cultivated land. A universal soil loss equation, adapted to Ethiopian conditions, was used to model the soil loss associated with the adoption of different soil and water conservation technologies. Annual soil loss for each watershed and the associated productivity effect were computed accordingly. In addition to the benefit streams that were estimated to accrue from reduced soil loss, an increase in crop productivity was assumed, largely arising from the combined effect of increased conservation of soil moisture, topsoil depth, and soil fertility. It was estimated by the ICR that crop productivity decreased by 2 percent annually without land conservation technologies; over the course of the project period, this would mean that average yields would have declined over four years by 8 percent, which is a large decline. This was a strong assumption and would drive any benefit-cost analysis in favor of the project. The major costs considered in the analysis were investments in labor (constituting the largest share) and soil and water conservation technology inputs and maintenance costs (assuming structures would stabilize after three years and there would be a 75 percent reduction in labor after three years). The financial and economic net present values were estimated using a discount rate of 10 percent, and internal rates of return were computed for 25 years under two investment scenarios: the first considered investments in soil and water conservation in the form of physical structures (stone bunds, soil bunds, and grass strips); the second used a more integrated approach in which physical structures were combined with high-value fodder on bunds and fertility management measures through intercropping.

The ex ante economic internal rate of return was about 10 percent and 17 percent in scenarios 1 and 2, respectively, indicating that to achieve higher returns, farmers should be encouraged to combine physical and biological soil and water conservation technologies. The Project Appraisal Document argued that the net returns may have been understated because the analysis did not take into account (i) other added benefits associated with the lower risk of vulnerability as a result of farmers' diversifying their cropping patterns and the improved resilience of the landscape, and (ii) improved soil organic matter, moisture retention, or soil fertility.

The ex ante analysis also included the quantifiable benefit streams, which were soil erosion prevention, soil carbon changes, increased vegetation cover, and higher farmer incomes. However, not all outcomes were included because of the time lag before impact and because up to 60 percent of the interventions were carried out in final two years.

The ex post analysis (using the same methodology as the ex ante analysis) generated an economic internal rate of return that ranged from 10.41 to 22.60 percent. The high estimate was based on an assumption of higher producer prices (consistent with an

observed increase in price trends) and the larger land area covered with the SLM practices. The low estimate assumed only a conservative area of 60,000 hectares treated with SLM practices, which was the targeted area for intensive intervention. However, the higher bound assumed an additional 60,000 hectares benefiting through scaling up in a wider landscape impact zone, resulting from the successful demonstration of the project. The ICR for SLMP II reported that the baseline area treated at the start of SLMP II reached 304,589 hectares, which indicates a significant expansion (World Bank 2019a, 10). Although it cannot be fully attributed to the SLMP, farm-level agricultural productivity also increased substantially. In addition, several less tangible but valuable benefits were not quantified, including the value of water retention, water quality, biodiversity, resilience building, and risk reduction. Given that the reported area treated was more than 120,000 hectares and land productivity growth has been more than 10 percent in the long term, this project has been economically viable at the 10 percent discount rate with a positive net return. Adding the nonquantified benefits would make this conclusion even stronger.

4. Overall Outcome

The overall outcome of SLMP I was rated **satisfactory** by this PPAR. Although the project's outcome was rated moderately satisfactory by the ICR at the time it was closed, through the help of the follow-on SLMP II, which continued activities in the 45 target major watersheds, the project was able to attain its objectives and sustain its outcomes. The field-level case studies by IEG verified that this project's objectives were substantially achieved. Those objectives were and remained highly relevant to the World Bank's Country Partnership Strategy for Ethiopia and were aligned with the government's development strategies, including the commitment to restore 15 million hectares of land by 2030. Relevance of design was, however, rated **modest** because of shortcomings in the project's results framework. SLMP I interventions generated favorable economic rates of return. Accordingly, project efficiency was assessed as **substantial.**

5. Risk to Development Outcomes

The risk to development outcomes for SLMP I is rated **moderate.** The first phase project benefited from the follow-on project, which continued the support for at least two more years in all the selected microwatersheds and expanded the microwatersheds to new areas. The risks to development outcome included the need for continued investments and maintenance of infrastructure built as well as continued technical capacity building at the service provider level and awareness raising at the beneficiary level. In addition, the government, with the support of the World Bank, still needed to strengthen institutional implementation conditions to reduce staff turnover, improve financial

management at the local level, and develop a functional M&E system to adequately measure outcomes and address bottlenecks.

6. Bank Performance

Bank performance is rated **moderately satisfactory.**

Quality at Entry

Despite the World Bank's responsiveness to the government's priorities, as evidenced by its timely support in designing this project by fully adopting the community-based participatory guidelines as the basis of SLM intervention, the project's quality at entry had several shortcomings. The implementation readiness was insufficiently assessed for a highly decentralized project where local institutional structures had to be established and trained and watershed development plans had to be developed. There was a great need for technical assistance but a lack of availability of technical service providers. Some of the preparatory work, including the technical assistance activities that the German Agency for International Cooperation oversaw, could have been handled before implementation started. The ICR noted that the impact of institutional constraints was more acute in those regions where the German Agency for International Cooperation did not provide technical assistance. In addition, the technical rationale for the land certification component was not sufficiently assessed. The ICR notes that a sound technical basis for second-level certification had not yet been established (World Bank 2014, 18). The M&E design also had several shortcomings. There were deficiencies in the selection of indicators, and many of the targets were too ambitious. The M&E budget was also insufficient. A project implementation manual was developed during preparation, in keeping with good practice for decentralized projects, but the ICR reports that field staff found it cumbersome to use and that there was insufficient clarity about their roles and responsibilities on fiduciary aspects (World Bank 2014, 5). However, the IEG team did not get any feedback from field staff confirming this issue during the PPAR mission.

Quality of Supervision

According to the ICR, and confirmed by the IEG field visit during supervision, the deficiencies in the project's M&E system were not adequately addressed. The Mid-Term Review was carried out as planned and identified several issues affecting implementation, resulting in a proposal to restructure the project. However, the restructuring process was delayed by protracted discussion within the World Bank over how to improve the results framework. The ICR notes that owing to the imminent closing date and the expected approval of a second phase of the project, the changes made through restructuring only addressed a limited number of the identified issues

(World Bank 2014, 6); the remaining issues were deferred to be addressed in the design of the second phase of the project.

7. Borrower Performance

Government Performance

Government performance is rated **moderately satisfactory.** The government showed strong commitment to the SLMP I, evidenced by the project being part of a large multidonor flagship program, as well as the government's creation of the Land Administration Directorate, which was key for achieving land certification activities. However, the deficiency was that the administrative and staffing disruptions within the agencies responsible for implementation were not addressed adequately to support the implementation of this project. In addition, the regional authorities' lack of support was not sufficiently addressed in resolving local staffing issues.

Implementing Agency Performance

Implementing agency performance is rated **moderately satisfactory.** The implementation structure included four levels (federal, regional, woreda, and kebele). The implementing agency at the national level was the Ministry of Agriculture, and project coordination and implementation supervision were performed through the Project Support Unit within the ministry, which also served as the coordinating unit for the overall flagship program. Central coordination by the Project Support Unit was valuable in terms of following relevant government policies, reviewing and approving work plans, and developing a system of monitoring implementation progress but lacked an effective M&E system to monitor and measure progress toward results.

Shortcomings included inadequate M&E and weak financial management capacity, as well as poor capacity at the local level, causing significant delays in implementation. High staff turnover at the local level negatively impacted the technical and operational functions.

8. Quality of Monitoring and Evaluation

M&E quality in the project is rated **negligible.**

Design

The M&E framework had weaknesses in terms of indicators to measure project outcomes on land degradation; two indicators—NDVI and soil carbon content (which were included after restructuring)—were designed, and although they can be relevant proxies, there was no control group comparison. The project did not attempt to establish

structures to monitor biophysical indicators, such as sedimentation loss, soil moisture retention, water availability, or reduced flooding, to better capture the impact of project interventions on land degradation. Some of the project key performance indicator targets were also unrealistic; for example, the target for the number of land certificates to be issued did not match the existing technical knowledge and institutional capacity for implementation at the federal, regional, and local levels.

Implementation

Many of the overall M&E functions for the project were expected to be implemented by the German Agency for Technical Cooperation, which was responsible for developing and implementing an M&E system for the overall SLM Program. The ICR reported that the German Agency for Technical Cooperation focused on a detailed M&E system for overall program indicators, rather than the indicators defined for the project, resulting in weak reporting on the project's achievements (World Bank 2014). The project's M&E budget was insufficient for the requirements of the operation given the gap left by the German Agency for Technical Cooperation. Consequently, a sound baseline was not established until late in the project, and there were difficulties in collecting and reporting on progress at the local level owing to the low institutional capacity, insufficient technical know-how, persistent staff turnover, and equipment and communication deficiencies.

The regional project implementation unit developed a comprehensive internal planning process as part of the budget allocation procedures, whereby each district and region was required to present an extensive list of targets for field activities each year, which were used to track implementation progress and prepare annual reports.

The PPAR mission found that the issue noted in the ICR regarding the difficulty in preparing annual reports owing to problems of decentralized data generation and aggregation was continuing under the follow-up projects. Many woredas still did not have enough capacity in terms of computers, skilled staff, and internet access, which was limiting their ability to produce M&E reports.

The World Bank team pushed for the implementation of remote sensing data for the soil carbon and NDVI indicators to demonstrate the results of the project's land management activities. The data were complemented by site visits for confirmation of improvements in land cover.

Use

Unfortunately, M&E inputs were not regularly and adequately generated to inform decision-making on project progress. The IEG mission found that at the local level, disaggregated M&E data by project activity and outcomes were still not being produced.

Thus, the overall M&E quality is rated **negligible.**

Sustainable Land Management Project II (P133133 including P133410)

Table A.4. Principal Ratings

Indicator	ICR	ICR Review	PPAR
Overall outcome	Satisfactory	Satisfactory	Satisfactory
Overall efficacy	Substantial	Substantial	Substantial
Bank performance	Satisfactory	Moderately satisfactory	Moderately satisfactory
Quality of M&E	Substantial	Modest	Modest

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. M&E = monitoring and evaluation; PPAR = Project Performance Assessment Report.

1. Relevance of Objectives and Design

Objectives

The PDO and the global environment objective, as stated in the Project Appraisal Document, was "to reduce land degradation and improve land productivity in selected watersheds in targeted regions in Ethiopia" (World Bank 2013b, viii). The project financing agreement with the government of Ethiopia has a slightly different formulation of the PDO: "to reduce land degradation and improve land productivity in selected watersheds in targeted Regions of the Recipient's territory" (World Bank 2013a, 5). However, the two are considered equivalent, as the "Recipient's territory" is identical to "Ethiopia," the recipient country. SLMP II constitutes the second in a series of planned SLM operations in Ethiopia and follows from SLMP I, implemented from 2008 to 2013. These objectives were expected to be achieved through the provision of capital investments, technical assistance, and capacity building for smallholder farmers in the watersheds and government institutions at the national and subnational levels.

For the purpose of this PPAR, the PDO in the project's financing agreement has been separated into two objectives, namely objective 1 (reduce land degradation in selected watersheds in targeted regions) and objective 2 (improve land productivity in selected watersheds in targeted regions). The extent to which each of these objectives was achieved will be assessed under the heading of Efficacy later in this appendix.

Components

Component 1: Integrated watershed and landscape management (appraisal estimate: $73.98 million; actual cost: $61.8 million). This component supported the participatory process of scaling up and adopting sustainable land and water management technologies and practices by smallholder farmers and communities in the selected watersheds and woredas. It also supported activities to promote and adopt low-carbon, climate-smart technologies and practices. It contained the following two subcomponents: (i) comprehensive package of demand-driven soil and water management practices implemented on public and communal lands at the watershed scale and (ii) homestead and farmland development, livelihood improvements, and climate-smart agriculture activities implemented on individual farmlands in watersheds supported by the project.

Component 2: Institutional strengthening, capacity development, and knowledge generation and management (appraisal estimate: $16.98 million; actual cost: $16.54 million). This component aimed to strengthen the institutions and stakeholders involved in the sustainable management of natural resources, including national and regional governmental institutions, academia, the private sector, community leaders, and smallholder farmers. It included interventions such as policy revision, capacity building and training, and value chain development to complement the soil and water conservation activities under component 1.

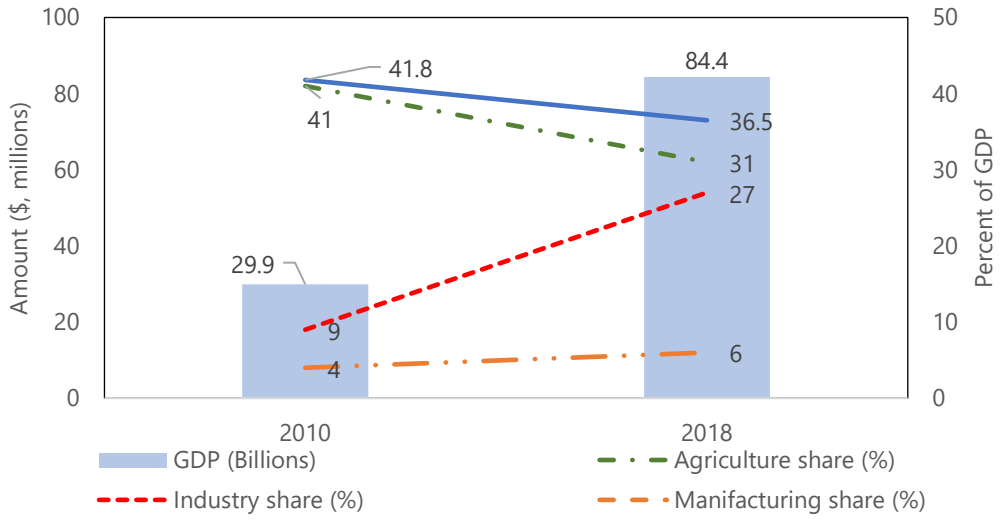
Component 3: Rural land administration, certification, and land use (appraisal estimate: $12.2 million; actual cost: $7.6 million). This component aimed to enhance the security of land tenure for smallholder farmers in the project area and the local land use planning in the target watersheds and kebeles supported by the project. The activities included surveys, adjudications, and public awareness campaigns, resulting in the provision of second-level landholding certificates to landholders, which include formal registration and spatial data in the form of parcel maps. This component also supported the creation of participatory land use planning on the territories of kebeles that include project watersheds.

Component 4: Project management (appraisal estimate: $4.45 million; actual cost: $13.4 million). This component provided support for project coordination and management at the national and regional levels, M&E, technical assistance, and procurement of goods and equipment for the national and regional public agencies involved in project implementation.

Relevance of the Objectives

Agriculture remains an important source of growth and poverty reduction in Ethiopia and accounted for about 41 percent of gross domestic product from 2010 to 2013 (figure A.1) and 85 percent of export earnings. Although agriculture's share in the economy declined to about 31 percent in 2018, it remains important to employment, food security, and poverty reduction. Nevertheless, agricultural productivity growth and resilience to climate variability and change remain dependent on rainfed smallholder production and subject to chronic degradation of land and water resources. Land degradation is a particularly serious challenge in the land-scarce and densely populated highlands, but it has also increased in the drought-prone semiarid areas. Land degradation is generally considered one of the underlying causes of the country's diminishing productive land resources, biodiversity loss, low agricultural productivity, persistent food insecurity, and rural poverty. Accordingly, the minimum annual cost of land degradation in Ethiopia has been estimated in the range of 2–3 percent of agricultural gross domestic product (World Bank 2013b, 2). Some 30,000 hectares of productive land are lost annually as a result of soil erosion, representing over 1.5 billion tons of soil being removed annually by a variety of land degradation processes, while 14 million hectares have been seriously eroded and over 2 million hectares have been eroded beyond reclamation (World Bank 2013b, 2).

Figure A.1. Sectoral Composition of Ethiopian Economy (2010–18)



Source: World Bank 2018; World Development Indicators database: http://wdi.worldbank.org/table/4.2.
Note: GDP = gross domestic product.

The PDO for SLMP II was well aligned with the priorities of the government of Ethiopia, the World Bank, and the Global Environment Facility, both at appraisal and completion. It was well aligned to the government's ongoing strategies—the Growth and

Transformation Plan and the Climate Resilient Green Economy—and supports Ethiopia's international commitments under the Bonn Challenge and TerrAfrica, including the commitment to restore 15 million hectares of land by 2030. The project was particularly designed to contribute to the achievement of the objectives under pillar two (enhancing resilience and reducing vulnerabilities) of the World Bank Group's Country Partnership Strategy (FY13–16). It was also well aligned with the biodiversity, climate change, and land degradation focal area strategies of the Global Environment Facility. The PDO also remained relevant at completion both in terms of the priorities identified under the new Country Partnership Framework (FY17–21), specifically under focus area 2 (building resilience and inclusiveness), which aims to enhance the management of natural resources and climate risks through improved natural resources and forest management, scaling up the government's SLM Program, and addressing land tenure uncertainty through the issuance of land use certificates. The continued relevance of the SLMP and the overall SLM Program to the World Bank's Country Partnership Framework is also reflected in the two recently approved follow-on projects, the Resilient Landscapes and Livelihoods Project (P163383) and the Climate Action through Landscape Management Program-for-Results (P170384). These operations are expected to consolidate the gains from the SLMP, especially in terms of completing some of the unfinished SLM activities initiated under SLMP II: strengthening local institutions and scaling up the success stories to additional major watersheds.

The discussions between IEG and the relevant agencies of the government of Ethiopia and the stakeholders in SLM indicate that SLMP II's objectives were highly relevant to the country's development strategies. The government continues to accord high priority to sustained development of agriculture and natural resources and remains one of the few countries to have met the Comprehensive Africa Agriculture Development Program commitment by allocating more than 10 percent of its annual budget to the sector.

For the reasons summarized above, the relevance of objectives is assessed as **high.**

Implementation

Delays and Challenges

The project experienced some procurement-related delays, including the difficulties faced in the preparation of the climate-smart agriculture field manual, which was a key factor in the delayed initiation and consequent limited coverage of climate-smart agriculture interventions. The climate-smart agriculture practices were supported through pilot initiatives implemented in 70 selected microwatersheds located in 30 watersheds where SLM interventions had covered a minimum of 70 percent of the degraded area.

The project's original closing date was April 7, 2019, but the actual closing date was December 31, 2018. The project faced some initial financing gaps—estimated at $14 million at the Mid-Term Review (World Bank 2019a, 11)—which affected the planning and scaling up of activities in the target watersheds. Nevertheless, the final financing gap was reduced to $6.69 million—the difference between the amount at approval ($102.69 million) and the actual amount at closing ($96.00 million). Given the financing gaps, the closing date was brought forward from the original date of April 7, 2019, to December 31, 2018, leading to some scaling down of planned activities and unfinished activities in several of the microwatersheds visited by IEG.

Mid-Term Review and Restructuring

The Mid-Term Review was undertaken on December 13, 2016. The project had two level 2 restructurings after the Mid-Term Review. The first restructuring was agreed during the December 2016 Mid-Term Review mission as a response to the significant financing gap caused by foreign currency exchange rate fluctuations (both in the special drawing rights and the Norwegian krone). This restructuring changed neither the objectives nor the components but introduced some new PDO-level indicators or refined existing ones. For example, subindicators were introduced to provide specific measurements of project progress for communal land and individual farmland treated with sustainable and climate-smart or climate-resilient land management practices under PDO indicator 1. A new PDO indicator (indicator 4: land area in the targeted microwatersheds with vegetation increase of at least 4 percent compared with baseline [hectares]) was added to improve the measurement of changes in land productivity and land degradation. None of these changes reduced the project's level of ambition, but owing to the lessons from SLMP I, they resulted in the reallocation of funds toward project management. The second level-2 restructuring introduced in March 2018, about one year before the original closing date, resulted in only marginal adjustments in the target values of the PDO indicators.

2. Efficacy

Objective 1: Reduce Land Degradation in Selected Watersheds in Targeted Regions

The achievement of the first objective—"to reduce land degradation in selected watersheds in targeted regions in Ethiopia"—was rated **substantial.** The project made substantial progress in terms of expanding the area treated with SLM practices and reforestation or afforestation to help reverse land degradation or restore degraded lands. IEG field-level assessments and econometric analysis of remote-sensed geospatial data showed that SLMP II had significantly reduced land degradation.

Although the project's scope and ambition decreased through a downward revision of PDO targets during the second level-2 restructuring (August 2018), these changes were relatively marginal and were largely justified after the reduced financing, which forced the project to close early. Therefore, as was done for the ICR Review, this PPAR will use the adjusted targets to assess the achievement of objectives and will not apply a split rating.[9]

Outputs

According to the project's ICR, the following outputs were achieved:

- Land area treated with SLM practices covered 556,776 hectares (of which 65 percent was communal land and 35 percent was individual land).
- Total land area restored (36,375 hectares) and reforested or afforested (26,112 hectares) on both individual and communal land totaled 62,487 hectares.
- Uptake of SLM and climate-smart agriculture on individual farmland: 270,670 farmers applied soil and water conservation; 65,536 farmers applied high-value crops interventions; 84,924 farmers—of which 28.3 percent were female-headed households—applied climate-smart agriculture practices.
- Fifty-seven percent of targeted microwatersheds had a management and use plan approved (partially achieved by 65.5 percent of the target).
- Thirteen percent of farm households use cut-and-carry practices as a result of project intervention (93 percent, compared with the original and restructured target value).
- In total, 2,876 formal community-based institutions, self-help groups, and associations were established and functional.
- Eighty-one woredas were equipped with information centers on SLM practices.
- Sixteen SLM-related strategies, manuals, and guidelines were developed.

Outcomes

Evidence from the ICR. The project's performance under this objective was assessed by the ICR, using the project's two PDO indicators: (i) land area with SLM practices disaggregated by communal and individual land and (ii) total land area restored, reforested, or afforested on both individual and communal land.

(i) Land area with sustainable landscape management practices disaggregated by communal and individual land. The overall achievement using this indicator was

mainly reflected in the 556,776 hectares of communal land and individual farmland brought under more sustainable and climate-smart or climate-resilient land management practices in 1,820 microwatersheds within the targeted 135 critical watersheds (including the new areas treated in the 45 watersheds supported under SLMP I).[10] Using this indicator, about 98 percent of the adjusted targets were achieved when the new area treated under this project was included. This indicates that using the adjusted targets, the project was very effective in achieving its goal of treating large areas of affected watershed landscapes through improved land management practices.

The project's performance under this indicator was, however, slightly different for communal land (subindicator 1a) and farmland (subindicator 1b). Using the adjusted targets, and for the new area under SLMP II, the average success was about 102 percent for communal land but about 90 percent for individual farmland (World Bank 2019b).

(ii) Total land area restored, reforested, or afforested on both individual and communal land. Under this indicator, the project achieved about 87 percent of its adjusted target. About 58 percent of this achievement is due to degraded areas restored through gully treatment and area closures, while the remaining 42 percent is due to reforestation and afforestation to increase vegetation cover in affected landscapes. Although SLMP II did not directly measure the effects in reducing land degradation, these two indicators showed that the project made substantial progress in terms of expanding the area treated with SLM practices and reforestation or afforestation to help reverse land degradation or restore degraded lands. To further ascertain the effects in achieving the objective, IEG assessed this effect using field-based case studies and quantitative analysis of remote-sensed geospatial data with control locations (see details in appendix C: Results).

Evidence from IEG field-based case studies. To assess the project performance in the field, IEG visited seven microwatersheds supported under SLMP II in the three regions (see appendix C).11 The stakeholder interviews with project beneficiaries, community watershed teams, and woreda teams, as well as observations of project investments, revealed some important evidence regarding project impacts and the sustainability of the project's development outcomes. Accordingly, in each microwatershed visited, IEG rated the land degradation reduction in both communal and individual farmland.

The majority of microwatersheds visited displayed significant progress in reducing land degradation. IEG gave all seven microwatersheds a performance rating of **high** or **substantial** for reducing land degradation on communal land and five microwatersheds a performance rating of **high** or **substantial** for reducing land degradation on individual

farmland (table A.5). The technologies used were adequate in general (six cases out of seven). In one case (Sesemat microwatershed in Degua Temben, Tigray), conservation structures and gully treatments were not sufficient, particularly on individual farms, owing to a lack of gabion supply and to the limited duration of the project (active since 2017). Thus, land degradation on farmland was not sufficiently addressed.

Table A.5. SLMP II Ratings for Reducing Land Degradation in Selected Project Sites

	Rating				
Reducing Land Degradation on	Negligible	Modest	Substantial	High	Total
Communal land (cases)	0	0	5	2	7
Communal land (%)	0	0	71	29	100
Individual farmland (cases)	0	2	5	0	7
Individual farmland (%)	0	29	71	0	100

Note: SLMP = Sustainable Land Management Project.

Communities were in most cases maintaining the structures to a large extent, mostly through mass mobilization. In some areas, maintenance was low, mainly owing to weak community watershed teams and ineffective awareness raising and training of farmers. For example, in the Adama microwatershed in Ejere, Oromia, some terraces were not properly maintained on individual farms.

In microwatersheds where there was high success, IEG observed that area closures were seriously enforced by the communities in communal lands and there was zero free grazing (for example, Ambelten microwatershed in Atsbi Wonberta, Tigray, where reforestation was observed to be quite successful in attracting wildlife and strict area closures improved biomass, fodder production, and beekeeping).

Objective 2: Improve Land Productivity in Selected Watersheds in Targeted Regions

The achievement of the second objective was rated **substantial.** Even if the project did not directly measure land productivity for smallholder farmers and land users, there is evidence showing improvements in vegetation cover, which has contributed substantially to increased biomass production (and hence land productivity). The IEG field-level assessments confirmed that SLMP II has significantly improved land productivity. This was enabled through reduced soil erosion and increased adoption of modern inputs, small-scale irrigation, and increased livestock productivity.

Outputs

According to the project's ICR, the following outputs were achieved**:**

- Incremental carbon dioxide equivalent accumulated in the project area was estimated to be 5,369,151 metric tons of carbon dioxide equivalent.
- Incremental biomass production in the target microwatersheds was 8 tons per hectare.
- Increase in vegetation cover over 315,631 hectares, as measured using satellite data—land areas with vegetation increase of at least 4 percent compared with baseline in targeted microwatersheds.
- 1,495,636 land parcels were surveyed and mapped for certification, of which 97.4 percent were individual parcels and 2.6 percent were communal parcels.
- 360,205 households received second-level landholding certificates, of which 70 percent were women (female heads or joint holders).
- 21,277 second-level land certificates were issued for communal landholdings.
- 9,661 landless youth (of which 33 percent were women) were issued a second-level certificate or other legal documentation to use communal landholdings in exchange for restoring land.
- 1,908 hectares of degraded communal land were restored by landless youth who were issued a second-level certificate or other legal documentation.
- 545 participatory land use plans were prepared.
- 301,354 beneficiaries (of which 41 percent were women) participated in income-generating activities supported by the project.
- 5.6 percent change in dry season base flow was observed within sampled microwatersheds.
- 4,600 hectares of irrigated areas were developed via small-scale irrigation schemes, including 10,836 households (20 percent female) that benefited from beekeeping and produced 209.7 tons of honey and 11.9 tons of wax.

Outcomes

Evidence from the ICR. Vegetation cover, carbon sequestration, and moisture availability were indicators used as proxies for measuring improvement in ecological functions and agricultural productivity potential throughout the targeted watersheds and landscapes (World Bank 2019a, 13). More specifically, the two PDO indicators to assess this objective were (i) land area in the targeted microwatersheds with a vegetation

increase of at least 4 percent compared with baseline (hectares) and (ii) incremental carbon dioxide equivalent accumulated in the project area (metric tons).

(i) Vegetation increase and reduced water runoff. Using remote-sensed satellite data, the ICR reported that the land area in the targeted microwatersheds achieved a vegetation increase of at least 4 percent, reaching about 316,000 hectares (compared with the original target of 610,000 hectares and the revised target of 574,000 hectares). Using the revised targets, the project achieved about 55 percent of this indicator target. In addition, the average biomass production in the target watersheds increased from 151 tons per hectare (in 2013) to 159 tons per hectare by the end of the project (2018). The surface water flow (one season) measured in 10 representative pilot sites showed that average discharge flow increased by 5.6 percent between 2017 and 2018. However, these data over one season did not control for weather-related seasonal differences and thus may not show the actual effect of the interventions (World Bank 2019a, 13).

(ii) Carbon sequestration. The increased vegetation cover and biomass production in the treated watersheds (reported under the previous indicator) is estimated to have led to an incremental carbon sequestration of about 5.4 million metric tons of carbon dioxide equivalent. Using the adjusted targets, this corresponds to about 64 percent of the project target.

The IFPRI study evaluating the impacts of the SLMP I and SLMP II interventions targeting 177 microwatersheds using a panel survey from 2010 to 2014 showed that the project had no significant impact on the value of agricultural production after four years of implementation in project kebeles compared with control kebeles, regardless of the agroecological zone or landscape type (Schmidt and Tadesse 2018). A similar IFPRI study on SLMP I showed that plots with SLM infrastructure that maintained for at least seven years had a positive increase in value of production (Schmidt and Tadesse 2014). This indicates that although the satellite data show that the SLM interventions (for example, terraces, bunds, check-dams, and area closures) have improved ecosystem functions and increased biomass-related land productivity, this may not translate into increased farm productivity in the short term unless complemented by yield-enhancing innovations.

IEG field visit observations. The majority of microwatersheds visited displayed significant progress in improving land productivity. Of the seven microwatersheds visited, IEG rated the achievement of all seven **high** or **substantial** in increasing land productivity on communal land and rated the achievement of six as **high** or **substantial** in increasing land productivity on farmland (table A.6). Land productivity improved rapidly when the project provided irrigation (four out of seven sites).

Stakeholder interviews showed that in most microwatersheds, yields improved significantly (for example, compared with the before-project situation, teff yields increased from 85 percent to 300 percent, for wheat from 75 to 400 percent, for barley from 70 to 300 percent, for faba bean in the order of 100 percent, for potato 150 percent, and for sorghum from 60 to 200 percent, depending on local agroecological conditions and use of productivity-enhancing inputs). Although these increases, as discussed earlier, are quite high and were made possible by ties with the ongoing government agricultural extension programs, the SLMP's contribution to reducing soil erosion and land degradation seems to be the one important enabler for unlocking the yield potentials and necessary smallholder investments in modern productivity-enhancing inputs (see the discussion under SLMP I).

Table A.6. SLMP II Ratings for Increased Land Productivity in Selected Project Sites

Increased Land Productivity on	Rating				Total
	Negligible	Modest	Substantial	High	
Communal land *(cases)*	0	0	5	2	7
Communal land *(%)*	0	0	71	29	100
Individual farmland *(cases)*	0	1	5	1	7
Individual farmland *(%)*	0	14	71	14	100

Note: SLMP = Sustainable Land Management Project.

In one case where there was below-target improvement in land productivity, the project duration was very short and not enough capacity development had taken place (Sesemat microwatershed, Degua Temben, Tigray).

A summary of the enabling factors and the key drivers of effectiveness for selected microwatersheds depicting substantial and modest levels of performance in the three regions are presented in appendix C, particularly tables C.20–C.25.

Geospatial analysis. To strengthen the evidence in terms of effectiveness in achieving the two objectives, IEG used statistical methods for the analysis of causal links between SLM treatments and land restoration and land productivity. IEG used project-level and remote-sensed satellite imagery from 504 SLMP I and 624 SLMP II microwatersheds in the three regions to compute three interrelated indexes—(i) the NDVI, (ii) the enhanced vegetation index, and (iii) the land surface water index—to measure the impacts of the project on land restoration for three seasons each year.[12] To assess the impact of the SLMPs, seasonal averages were computed for each index for 250 by 250 meter pixels for the period 2001–19. Depending on when activities were implemented in each microwatershed, this provided about 10 years of preintervention and 7–8 years of postintervention data for SLMP I, and about 13 years of preintervention and 3–4 years of postintervention data for SLMP II. Defining a control area by drawing a 10-kilometer

buffer around treated areas allowed IEG to use propensity score matching at the pixel level in conjunction with a difference-in-differences specification, with pixel-level fixed effects, to systematically estimate the project's impacts.

The results from the difference-in-differences estimation of the matched pixels shown in table A.7 (and details in appendix C, tables C.26 and C.27) confirmed that the SLMP treatments (compared with controls) had a significant effect in improving the three selected remotely sensed performance indicators of land restoration.[13] This was further confirmed using alternative model specifications, including difference-in-differences estimation with matched pairs and fixed effects estimation, where the intensity of one-year-lagged cumulative area treated with SLM was used as a share of microwatersheds. Despite some regional differences, the analysis of the remotely sensed geospatial satellite data with matched controls at the pixel level provided strong evidence regarding the effectiveness of SLMP I and SLMP II in reducing land degradation and improving biomass production. When combined with the effects reported by the stakeholders during IEG visits to selected sites, there is robust evidence that SLMP I and SLMP II achieved their objectives.

Table A.7. Difference-in-Differences Analysis of SLMP Impacts Using Pixel-Level Matching of Treatment and Control Sites

	SLMP I (Pooled)			SLMP II (Pooled)		
Selected Variables	**EVI**	**NDVI**	**LSWI**	**EVI**	**NDVI**	**LSWI**
Treatment effects	.00100***	.00112***	.00246***	.00115***	.00145***	.00167***
	(–14.22)	(–10.23)	(–23.1)	(18.33)	(14.96)	(17.41)
Rainfall	.00013***	.00019***	.00024***	.00007***	.00005***	.00014***
	(–865.58)	(–796.23)	(–1,058.41)	(650.30)	(307.18)	(795.62)
Constant	.28504***	.49818***	.29130***	.24818***	.44603***	.23120***
	(–2,135.48)	(–2,379.97)	(–1,440.26)	(2,541.81)	(2,951.72)	(1,550.55)
R^2	.639	.547	.746	.689	.606	.782
N	5,971,307	6,006,512	5,980,668	8,616,069	8,615,963	8,626,266

Source: Independent Evaluation Group analysis of geospatial data from SLMP I and SLMP II microwatersheds in three regions.

Note: Treatment indicator variable 1= if pixel is located in treated microwatersheds; 0= otherwise. Season-year fixed effects are not shown. Values in parentheses are standard errors. EVI = enhanced vegetation index; LSWI = land surface water index; *N* = number of pixels; NDVI = normalized difference vegetation index; SLMP = Sustainable Land Management Project.

****p* <.01.

3. Efficiency

Economic Efficiency

Both ex ante and ex post economic and financial analyses in the Project Appraisal Document and the ICR estimated high economic and financial returns. IEG took a closer look at the ex post efficiency analysis model and found that the assumptions of the model were sound. It used a 25-year time frame, a 12 percent financial discount rate, and a 10 percent economic discount rate. The same methodology used at appraisal was employed, and the ex post analysis was based on quantifying incremental net benefits on cultivated land, which included 91 percent of the watersheds and 100 percent of the project costs.[14] Benefit streams quantified on the basis of improved croplands and crops produced in the project area were as follows: (i) avoided soil erosion achieved by soil and water conservation measures (31 percent of the benefit stream), (ii) productivity increase due to the adoption of improved farming practices associated with the implementation of this project and continuous and proper maintenance of soil and water conservation structures (60 percent of the benefit stream), and (iii) production of fodder crops via intercropping (9 percent of benefit stream). Costs considered were loss of cropland to soil and water conservation structures (32 percent), SLM investment and maintenance costs (50 percent), and variable costs of fodder production on bunds and through intercropping (18 percent).

The value of soil was calculated by estimating the soil loss avoided through SLMP interventions and assuming an average soil depth of 50 centimeters and an average soil density of 1.4 grams per cubic centimeter; each hectare of farmland was assumed to have 6,993 tons of soil.[15] The annual soil loss with and without the SLMP interventions was estimated for each watershed using the universal soil loss equation, adapted to Ethiopian conditions. Annual soil loss is estimated for each site as a function of the rainfall erosivity of a given soil type, the slope length, the crop cover factor, and the soil and water conservation practice on the land.[16] The productivity changes were estimated assuming that in the first and second years yields go down by 20 percent and 5 percent, respectively, owing to disturbance of the soil near soil and water conservation structures during project implementation. Productivity was assumed to recover to the baseline after three years and increase by 10 percent gradually over a seven-year period. Although not all the changes can be attributed to the SLMPs, from the productivity increases for different crops reported by the smallholder farmers to IEG, this assumption seems conservative. The local and global environment benefits (for example, ecosystem services, climate mitigation, and biodiversity conservation) were not quantified.

Using these assumptions, the ICR estimated that the financial and economic internal rates of return were 21 percent and 23 percent, respectively, and that the economic net

present value was $150 million, or $6 million per year. The estimated rates of return are comparable to the appraisal financial and economic analysis returns, which were 19 percent and 26 percent, respectively.[17]

The sensitivity analysis showed mixed results about sensitivity to various factors, but the greatest sensitivity was to productivity changes. For example, a 1 percent decrease in soil unit value for estimating the value of avoided soil erosion would lead to a 1.3 percent decrease in economic net present value. However, if the soil unit value of Br 0.70 per ton were used, as in the Project Appraisal Document analysis, the project would still remain viable, with an economic internal rate of return of 14 percent. In relation to sensitivity to changes in land productivity, if the projects failed to achieve any of the 10 percent productivity gains from implementing SLM activities, the economic internal rate of return would fall to 7 percent and the project would no longer be financially viable. This indicates that long-term maintenance of the SLM infrastructure is vital for the project to be economically viable. The IEG field visits showed that the SLM practices were largely maintained by smallholder farmers on their fields, mainly because the SLM practices that reduce runoff and soil erosion also made it possible for farmers to invest in modern inputs (for example, seeds and fertilizers) or provided small-scale irrigation to increase yields, which also reduced vulnerability to droughts. Along with benefit flows from communal lands, this significantly strengthened the local incentives for participation in watershed management.

The PPAR did not conduct a new economic analysis to estimate the efficiency of the project. However, together with the field-level data on the uptake and maintenance of SLM practices, as well as the productivity benefits reported by the smallholder farmers to IEG, the economic efficiency estimated in the ICR was sound and credible and indicated that the project was financially and economically viable.

Operational and Administrative Efficiency

The project closed four months early owing to a shortfall in available funds. Although the project management costs increased substantially from the appraisal estimates, IEG was informed that the increase was due to inclusion under project management of the staff costs for technical experts and consultants at the regional levels and of the costs of workshops related to investments. It was clarified that as part of the scaling up of the results from SLMP I by expanding coverage from 45 to 135 watersheds, the project management costs were increased from 4.5 percent of the total project costs at appraisal to 10 percent at the Mid-Term Review. This increase was justified by the nature of the project, which follows the participatory watershed management approach, necessitating the establishment of coordination units at regional levels, including at the district and community levels. When these costs are accounted for under the two main project

components, rather than under project management, the project management costs fall to about 9.5 percent of the total costs.

On the basis of substantial economic and administrative efficiency, the overall efficiency of the project is rated **substantial.**

4. Overall Outcome

The overall performance of SLMP II was **satisfactory.** This second phase significantly expanded the SLM interventions to new watersheds across six regional states. The project objectives were and remain strongly relevant to the World Bank's country strategy and were aligned to the government's development strategies. Given the critical importance of addressing land degradation for sustainable development and poverty reduction in Ethiopia, the relevance of objectives was rated **high.** The continued relevance to the national development strategy has been affirmed by two follow-on projects supported by the World Bank. The IEG field-level case studies and statistical analysis of geospatial data with counterfactuals to establish causal links conducted as part of this PPAR filled the evidence gaps in the ICR and showed that the two project objectives were substantially achieved, although the project faced tracking and measurement problems. The project costs have generated significant results with favorable returns on investment.

5. Risk to Development Outcomes

The level of adoption of SLM practices by beneficiaries is one of the main risks to development outcomes. Both projects included substantial awareness raising and capacity building of communities before and during implementation. The IEG mission's site visits revealed that in most areas, beneficiaries were continuing with the maintenance of the SLM structures constructed with the projects' help. At almost all sites visited, beneficiaries mentioned that they were seeing the benefits in terms of reduced land degradation and increased land productivity. In areas where productivity increases were substantial and/or alternative income-generating activities were created, the vulnerability of communities to drought and food insecurity has been reduced. This was a positive reinforcer for communities to continue with the practices. When there are sizeable structures to be maintained, however, communities faced difficulties in mustering the financial resources needed for maintenance (for example, gabions for check-dams).

IEG also observed that the communities in general prepared bylaws that included area closures; however, bylaws were not consistently enforced everywhere. Communities

were generally not receptive to area closures that restricted grazing when there was a fodder shortage, so alternative sources of fodder needed to be introduced.[18]

Public policies and interventions at the national and regional levels should provide the necessary assistance to address systemic issues that pose risks to project outcomes. This may include integrating natural resource management into agricultural extension services; institutionalizing local governance structures, such as watershed user associations; implementing sustainable livestock production systems compatible with restoration and improved land management; and reducing overgrazing in fragile communal areas. The continuing support of the World Bank to further consolidate and expand the achievements of SLMP II through the new Resilient Landscapes and Livelihoods Project and the Climate Action through Landscape Management Program-for-Results will be instrumental in addressing the abovementioned risks and ensuring the long-term impact and sustainability of project outcomes.

6. Bank Performance

Bank performance is rated **moderately satisfactory.**

Quality at Entry

The SLMP II preparation was, according to the ICR, considerably facilitated by the operational experience and lessons learned for the predecessor project (SLMP I). Because of this, beneficiaries, stakeholders, and implementation structures were adequately identified. In addition, appropriate mitigation measures to perceived risks—such as the recruitment of fiduciary staff at the regional level—were identified, and implementation readiness was not a limiting factor. In addition, safeguard-related elements of project preparation were adequately addressed, and the design included important partnerships with other international partners such as Germany and Norway.

Nevertheless, the design of the M&E system did not adequately incorporate the project's expanded scope and failed to establish appropriate links to adequately monitor the progress of the indicators included in the results framework.

Quality of Supervision

The task team leader for the project was based in Ethiopia. This provided opportunities for regular and timely interaction with the Project Coordination Unit, implementing agencies, and stakeholders to address operational issues. The World Bank carried out 11 supervision missions as part of the joint implementation support with other donors; these missions were organized on a semiannual basis. The composition of the supervision team reflected the technical and fiduciary requirements of the project, with locally based specialists from financial management, procurement, and safeguards

participating in all missions. The missions included field visits and workshops with national and regional agencies that were responsible for project implementation. The ICR notes that this led to effective collaboration between the World Bank team and the Project Coordination Unit (including the regional project implementation units) and improved support for implementing the World Bank's recommendations. After these missions, comprehensive and informative aide-mémoire and Implementation Status and Results Reports were produced on time (World Bank 2019a, 33). The World Bank's support for the project was further enhanced by the recruitment of a team of specialists, financed by Norway through a World Bank–executed trust fund, to provide technical assistance to the client.

The World Bank's oversight of project progress was pivotal in addressing some of the shortcomings during project design and entry, but M&E weaknesses could not be resolved adequately. However, the availability and dedication of key World Bank resources to supervision tasks was affected partly owing to the design of the successor projects. IEG was informed that a more comprehensive M&E and data collection framework is being implemented under the successor projects, including impact evaluations by IFPRI and the Gender Innovation Lab at the World Bank.

7. Quality of Monitoring and Evaluation

Design

The M&E system of the project presented weaknesses that limited the capacity of the system to generate quality data for monitoring of project results and outcomes. The M&E system of SLMP II was designed mainly with the same format used by SLMP I. However, the lessons learned on M&E were not fully taken into consideration, although the second phase became more complex owing to its increased scope. The M&E framework was oriented to measure activities rather than land degradation outcomes. SLMP II did not include indicators directly measuring land productivity. The first objective (reduce land degradation) was measured using two indicators: (i) land area with SLM practices and (ii) total land area restored, reforested, or afforested. These indicators do not directly measure changes in land degradation resulting from investments in SLM. The second objective (improve land productivity) was measured using two outcome indicators: (i) incremental soil carbon accumulated and (ii) vegetation increase in the target watershed. Although increase in biomass-related land productivity is relevant, the indicator for measuring agricultural productivity (used in SLMP I) was dropped, although increasing productivity would be key in terms of creating economic incentives for smallholder farmers to invest in and maintain the improved practices for SLM. An assessment conducted post–Mid-Term Review by a team of M&E specialists of the World Bank found that more than half the original

indicators (14 out of 21) did not meet one or more of the SMART (specific, measurable, achievable, relevant, and time-bound) criteria (World Bank 2019a, 27). The M&E data collection capacity at the regional and local levels was weak. The IEG PPAR mission's site visits verified the low local capacity for M&E.

Implementation

Several efforts were jointly made during implementation to address the difficulties encountered in monitoring project implementation and in generating data appropriate to measure progress on the results framework indicators. This necessitated an agreement with other SLM partners to develop a harmonized results framework; recruitment of an M&E specialist in each of the six regions; preparation of a "below woreda" operational manual for data collection and reporting (World Bank 2019a, 27); and development of a web-based system, the Planning and Reporting Tool, aimed at improving the management of information at all levels (community, woreda, regional, and federal). However, the web-based system did not work very well, as many woredas did not have internet access. Actual implementation of the revised results framework and M&E system was further constrained by lack of clarity in the responsibilities and methodologies for data collection and capacity limitations of the partners. During this time, an added obstacle was a three-year delay in hiring the project's M&E consultant because of procurement problems. Although some progress has been made in improving the overall M&E system, significant limitations constrained its consistent and satisfactory implementation.

Use

The M&E system was not fully implemented to track the progress of the outcome indicators set out in the results framework or to monitor annual targets set by the Ministry of Agriculture to support project planning, implementation, and management. However, the M&E data were used for managerial decision-making, regional performance assessments, and overall reporting. Stakeholder interviews during the IEG mission suggested that M&E data were indeed used for project management, including planning and budgeting. Despite some delays, the regional agencies collected some implementation data from the microwatersheds in their jurisdictions; these data were consolidated by the Project Coordination Unit at the central level. The analysis, interpretation, and timely sharing of findings from these data by the Ministry of Agriculture, however, have been limited by capacity constraints.

On the basis of these observations and evidence, the overall quality of M&E for SLMP II is assessed as **modest.**

[9] The project was subject to two level-2 restructurings, which led to some marginal changes in the project development objective indicators and targets. The first restructuring (March 2017), after the Mid-Term Review, refined some of the indicators and dropped or replaced others, mainly to address issues with clarity of wording or definitions, as well as data collection and aggregation. The second restructuring (August 2018) scaled down the target values for the indicators, mainly in response to the reduced financing, which also necessitated early project closure.

[10] The total area treated with improved land management practices under the two phases was reported as 861,364 hectares, including 304,589 hectares under SLMP I (World Bank 2019a, 10, 14).

[11] The Independent Evaluation Group team had planned to visit additional SLMP II sites in North, Central and South Gondar zones of the Amhara region, but these visits had to be dropped for logistical and other reasons that were beyond the control of the team.

[12] The normalized difference vegetation index (NDVI) is a calculation between the near-infrared light reflected by vegetation and the visible light. Good vegetation cover absorbs more visible light and reflects more near-infrared light, while less vigorous or sparse vegetation reflects both more visible and near-infrared light. The enhanced vegetation index is calculated similarly to NDVI but uses additional wavelengths of light to correct for the inaccuracies of NDVI caused by particles in the air and corrects for signals from the ground cover below the vegetation. Each season covers four months: October 1 to January 31 is the dry season (*Bega*), February 1 to May 31 the pre-rainy season (*Belg*), and June 1 to September 30 the rainy season (*Kiremt*).

[13] For additional details, including the effects at the regional level, see table C.26 for SLMP I and table C.27 for SLMP II, in appendix C.

[14] The analysis conducted at appraisal was only based on a sample of 28 percent of the watersheds and 56 percent of the project costs, but the estimated net present value equivalent was $1.67 million (Br 31.6 million), indicating a positive return from the project.

[15] The avoided soil loss was valued at a price of Br 2.1 per ton, which was based on a gross margin study conducted in 2015. This value was higher than the more conservative Br 0.79 per ton assumed in the Project Appraisal Document but lower than the price estimated by the follow-on project, the Resilient Landscapes and Livelihoods Project. The follow-on project indicates soil values ranging between Br 0.8 per ton on non-cropland to Br 7.4 per ton on productive agricultural land (Ali, Deininger, and Monchuk 2018, 111).

[16] The universal soil loss equation estimates indicated that the average annual soil loss per hectare with the intervention in each watershed in the project ranged between 0 and 63 tons per hectare per year, with an average of 20 tons per hectare per year (ICR appendix for estimating efficiency for SLMP II, shared with the Independent Evaluation Group). The values without SLMP treatment used to estimate the avoided soil loss were not reported. There is a lack of reliable and consistent data on the extent and rate of soil loss on cropland in Ethiopia. The estimates based on runoff plots from eight stations across the country before the SLMP indicated 42 tons per hectare per year (Eyasu 2003).

[17] The ICR analysis included 91 percent of the targeted watersheds and 100 percent of the project costs; the Project Appraisal Document analysis included 28 percent of the watersheds and 55 percent of the project costs.

[18] This could include planting of multipurpose trees on soil bunds and field boundaries as well as planting of forage legumes, which also add nitrogen and facilitate the restoration of farmland not used for crops.

References

Ali, D. A., K. Deininger, and M. Monchuk. 2018. "Using Satellite Imagery to Assess Impacts of Soil and Water Conservation Measures: Evidence from Ethiopia's Tana-Beles Watershed." Policy Research Working Paper 8321, Washington, DC: World Bank.

Ethiopia, Ministry of Agriculture. 2013. *Sustainable Land Management Project Impact Assessment Report*. Addis Ababa: Ethiopia Ministry of Agriculture.

Eyasu, E. 2003. "National Assessment on Environmental Roles of Agriculture in Ethiopia." Addis Ababa: Ethiopian Economic Association.

Schmidt, E., and F. Tadesse. 2014. "Household and Plot Level Impact of Sustainable Land and Watershed Management (SLWM) Practices in the Blue Nile." ESSP II Working Paper 42, Addis Ababa: International Food Policy Research Institute.

Schmidt, E., and F. Tadesse. 2018. "The Impact of Sustainable Land Management on Household Crop Production in the Blue Nile Basin, Ethiopia." *Land Degradation and Development* 30: 777–87.

World Bank. 2008a. *Ethiopia—Grant H377-ET Financing Agreement*. Washington, DC: World Bank.

World Bank. 2008b. "Ethiopia—Sustainable Land Management Project." Project Appraisal Document 42927-ET, Washington, DC: World Bank.

World Bank. 2013a. *Ethiopia—Grant 5318-ET Financing Agreement*, Washington, DC: World Bank.

World Bank. 2013b. "Ethiopia—Sustainable Land Management Project II." Project Appraisal Document PAD525, Washington, DC: World Bank.

World Bank. 2014. "Ethiopia—Sustainable Land Management Project." Implementation Completion and Results Report ICR3074, Washington, DC: World Bank.

World Bank. 2019a. "Ethiopia—Sustainable Land Management Project II." Implementation Completion and Results Report ICR4449, Washington, DC: World Bank.

World Bank. 2019b. "Ethiopia—Sustainable Land Management Project II." Implementation Completion and Results Report Review ICRR21785, Independent Evaluation Group, Washington, DC: World Bank.

Appendix B. Fiduciary, Environmental, and Social Aspects

Financial Management

The overall financial management showed improvement over the duration of both projects. The Sustainable Land Management Project (SLMP) I had some poor financial management capacity at the woreda level, but no major issues were reported on internal controls or audits, although some audits were submitted with delays. Annual external audit reports for SLMP II were consistently clean (unqualified opinion), except for the July 7, 2018, report, which contained observations that were satisfactorily addressed (World Bank 2015, 10). The appointment of regional accountants as "mobile accountants" in regions where a significant number of project watersheds existed helped improve financial reporting at decentralized levels and assigning a project internal auditor at the federal level helped address internal control weaknesses. In addition, the fiduciary risks were rated moderate in the last three Implementation Status and Results Reports.

Financial management weaknesses noted during project implementation included delays in preparation and dissemination of approved budgets, the manual accounting system at the woreda level, weak internal controls over project fixed assets, and timeliness and quality of financial reporting.

The Independent Evaluation Group (IEG) was also informed during the Project Performance Assessment Report mission that the approval of the financial report submitted to the World Bank usually takes about two months and that the approval is a prerequisite for annual work plan and budget approval. IEG learned that this process delays the annual budget approval and disbursement of funds to the regions by about three months. Since this was raised by the implementing agency as a recurring issue delaying budget allocation, the World Bank and the implementing agency need to design a joint solution to address this bottleneck. This may require streamlining the budgeting process to ensure preparation of accurate, reliable, and timely periodic financial reports by the implementing agency and timely approval of reports by the World Bank.

Procurement

Procurement delays in general affected the initial years of SLMP I implementation, but this was resolved mostly through the World Bank's guidance and the provision of training on procurement management to decentralized implementation agencies. Although the procurement decisions were decentralized in general under four levels—

federal, regional, woreda, and kebele—the procurement of vehicles, goods, and services for all regions was centralized. This improved administrative efficiency. The Implementation Completion and Results Report of SLMP II noted that procurement processing and contracting were in line with the agreed procedures (World Bank 2019, 31). One key issue faced owing to procurement delays was the three-year delay in hiring the monitoring and evaluation consultant under SLMP II, which led to significant delays in measuring baseline values for result framework indicators.

Environmental and Social Safeguards

Both SLMP I and SLMP II were classified as category B projects, triggering Environmental Assessment (Operational Policy [OP] / Bank Procedure [BP] 4.01). In addition, SLMP II triggered Natural Habitats (OP/BP 4.04), Pest Management (OP/BP 4.09), Physical Cultural Resources (OP/BP 4.11), Involuntary Settlement (OP/BP 4.12), Indigenous People (OP/BP 4.10), Forests (OP/BP 4.36), and Safety of Dams (OP/BP 4.37). An environmental and social management framework to screen all proposed interventions was developed and disclosed under both projects.

For SLMP I, no adverse environmental or social impacts were detected during project supervision, and Implementation Status and Results Reports rated compliance with environmental safeguards as satisfactory throughout the project. However, documentation and reporting on compliance with environmental safeguards was weak. In terms of social safeguards, no land acquisition or resettlement issues were detected. Although no noncompliance with safeguards policies was reported, the Implementation Completion and Results Report noted that there was some scope for improving implementation and mitigation measures, particularly using the environmental and social management framework to assess potential social impacts of drainage and small irrigation infrastructure, as well as area closures, and to enhance the participation of women in decision-making and leadership (World Bank 2014, 7).

For SLMP II, compliance with safeguards policies was rated by the World Bank as satisfactory or moderately satisfactory throughout the project (World Bank 2019, 30). In total, 2,754 subprojects were categorized as having some potential environmental or social impacts under the environmental and social management plan, and their screening process and mitigation measures were reviewed by the Woreda Environmental Protection and Land Administration Unit. A resettlement policy framework was prepared to mitigate any potential social impacts resulting from eventual involuntarily restrictions of access to natural resources, small-scale irrigation schemes, or land acquisition, or the creation of a disturbance affecting the livelihoods of the communities of SLMP II beneficiaries. Some 805 households voluntarily donated small parcels of land for project activities. The project also established a grievance

redress mechanism to solve unforeseen issues during project implementation, and some cases were satisfactorily resolved. A gender analysis of the project was conducted, and mainstreaming guidelines were prepared; gender awareness trainings and capacity-building activities were implemented at different levels (World Bank 2019). IEG stakeholder interviews also did not reveal any environmental or social safeguards noncompliance issues.

References

World Bank. 2014. "Ethiopia—Sustainable Land Management Project." Implementation Completion and Results Report ICR3074, Washington, DC: World Bank.

World Bank. 2015. "Ethiopia—Sustainable Land Management Project." Implementation Completion and Results Report Review ICRR14656, Independent Evaluation Group, Washington, DC: World Bank.

World Bank. 2019. "Ethiopia—Sustainable Land Management Project II." Implementation Completion and Results Report ICR4449, World Bank, Washington, DC.

Appendix C. Methods, Assessment Protocol, and Evidence Collection during Field Assessment

Evaluation Questions

The Project Performance Assessment Report started with the identification of the following questions and evidence gaps:

- **Evidence in reducing land degradation and improving productivity.** The Implementation Completion and Results Reports did not provide sufficient data on the effectiveness of the Sustainable Land Management Project (SLMP) interventions under SLMP I and SLMP II in reducing land degradation and improving productivity and income-related outcomes for smallholders. Is there additional evidence that SLMP interventions reduced land degradation and improved the economic productivity of land for resource-dependent households? The team collected perspectives on the benefits in terms of land restoration, productivity increases, income growth, and asset creation. Are there differences between upstream and downstream households in terms of capturing watershed management benefits? How strong are the economic benefits to motivate land users to maintain the SLM infrastructure or to invest in similar improved management practices?

- **Sustainability of the infrastructure supported by the SLM projects.** Are the land users willing and able to maintain the SLM infrastructure established through the projects on individual farmland? If this is happening, what were the key incentives to induce this behavioral change for sustained adoption? If not, what are the constraints and incentives for the maintenance of SLM practices on individual farmlands? What are the communal and individual constraints and incentives to maintain SLM infrastructure on communal lands?

- **Functionality of local watershed institutions.** Are the local institutions (community watershed teams, water user associations, and self-help groups) in the watersheds able to facilitate and support local communities in addressing land degradation at the relevant landscape level and on communal lands? Is there evidence of sustained joint action by the community for SLM on communal lands? How are the local institutions able to facilitate the planning and improved management of land at the community and landscape levels? What are the lessons and challenges?

- **Land certification and SLM.** In Ethiopia, the state owns the land and smallholder farmers maintain usufruct rights to cultivate their parcels. The land can be inherited and rented out but cannot be sold or used as collateral. This has made investment in SLM practices difficult in the past. The project provided second-level land certificates, which use geospatial data and define the plot boundaries more accurately (compared with the first-level land certificates). The more immediate expected benefit is the potential to resolve conflicts and reduce land-related disputes. Also, these certificates formally included women as landholders. These changes are generally considered important in improving the security of land tenure in Ethiopia to incentivize smallholder investments in SLM. How do the beneficiaries assess the added value of the land certificates in terms of improving tenure security both for men and women and creating incentives for SLM on individual and communal land?

- **Land certificates for the landless in exchange for restoration.** The project has supported an innovative and promising approach of providing degraded land to landless youth in exchange for restoration. This approach tried to benefit the landless and the unemployed youth in rural areas. How was this implemented? Were capital, technology, and agricultural advisory services provided? Has this enabled landless youth to restore degraded lands? Can it offer productive employment? Can this approach be scaled up?

Methods for Data Collection

The Project Performance Assessment Report used a mix of methods to address the evaluation questions, including desk-based document reviews, field-based semistructured group and individual interviews, discussions with woreda and watershed or microwatershed institutions, and site visits for verification of the establishment and maintenance of SLM infrastructure. The in-depth local-level interviews were conducted at a sample of microwatersheds or watersheds from different agroecological zones and socioecological systems.

- Desk review of key documents: premission desk review of documents by the World Bank, including Country Partnership Strategies or Country Partnership Frameworks, client country development strategies, policy coherence, and alignment.

- Semistructured interviews of World Bank task team leaders and senior staff: World Bank headquarters or by phone.

- Semistructured interviews with implementing agencies and stakeholders at different levels, including the Ministry of Agriculture; the national Project Coordination Unit and monitoring and evaluation (M&E) team; various state ministers or directors and technical staff; the Commission on Environment, Forests and Climate Change; the Productive Safety Nets Program; and research institutes and universities.

- Semistructured interviews with donors: German Agency for International Cooperation, Norway, KfW, and others.
- Semistructured interviews of regional bureaus of agriculture (Amhara, Oromia, Tigray) and the regional Project Implementation Unit and M&E team.
- Semistructured interviews of woreda and local institutions (internalizing watershed externalities through collective action, functionality, viability, effectiveness, and challenges):
    - Woreda Offices of Agriculture (SLM resource centers)
    - Woreda Watershed Development Committee
    - Kebele Watershed Development Committee
    - Community watershed teams
    - Watershed user associations

8. Field visit and detailed studies in selected microwatersheds or watersheds (user perspectives, state of SLM infrastructure on individual farmland and communal land) from different agroecological regions:
    - Terraces, bunds, grass trips, water harvesting structures (check-dams, percolation ponds), communal access roads, agroforestry, reforestation and afforestation, and area closures
    - Semistructured group interviews with selected communities and individual land users, including men, women, youth groups (resource user perspectives on realized benefits, costs, incentives for maintenance of SLM, land certification, evidence of land restoration, area closures, winners and losers, and challenges)
    - Discussion with community watershed teams, watershed user associations, and self-help groups

Site Selection

For the Project Performance Assessment Report, the site selection was based on the list and mapping of watersheds and microwatersheds targeted under Sustainable Land Management Project (SLMP) I and SLMP II (see Map C.1). The SLMPs were implemented in 1,820 microwatersheds located in 135 watersheds in 142 woredas or districts (including the 45 watersheds supported under SLMP I) in the six regional states composing the Ethiopian Highlands (Amhara; Benishangul-Gumuz; Gambela; Oromia; Southern Nations, Nationalities,

and Peoples' Region; and Tigray). To select a stratified sample for the case study, the watersheds supported under each phase were classified by the main agroecological zones in the country (see table C.1). Like the national situation (table C.7), most of the cases in the three selected regions also fall into the high-rainfall midaltitude highland areas (moist *weyna dega*), high-rainfall highlands (moist *dega*), and the semiarid midaltitude highland areas (dry *weyna dega*) (table C.1).

Table C.1. Distribution of Sustainable Land Management Project Watersheds by Agroecological Zone

Region	Moist Berha (a)	Moist Kolla (b)	Dry Kolla (c)	Dry Weyna Dega (d)	Moist Weyna Dega (e)	Dry Dega (f)	Moist Dega (g)	Moist High Dega (h)	Total
Amhara	0	0	1	1	13	3	14	2	34
Benishangul-Gumuz	0	6	0	0	5	0	0	0	11
Gambela	3	2	0	0	1	0	0	0	6
Oromia	0	1	0	1	24	0	13	0	39
SNNPR	0	3	0	0	18	0	10	0	31
Tigray	0	0	0	11	0	3	0	0	14
Total	3	12	1	13	61	6	37	2	135
Percent	2.2	8.9	0.7	9.6	45.2	4.4	27.4	1.5	100.0

Note: a=humid and hot lowlands; b= humid lowlands; c= dry lowlands; d= dry midaltitude; e= wet midaltitude; f= dry high altitude; g= wet high altitude; h= wet very high altitude; SNNPR = Southern Nations Nationalities and People's Region.

From the mapping of the intervention areas in the three regions (Amhara, Oromia, Tigray), a stratified sample of watersheds and microwatersheds was selected for detailed visit and case studies. The stratification by region and agroecology aimed to select

- Watersheds that benefited from both SLMP I and SLMP II and those that benefited from SLMP II alone.
- Watersheds from different socioecological regions and vulnerabilities to drought (for example, drought-prone or low-rainfall dryland watersheds versus high-rainfall and high-pressure highland watersheds that suffer from intensive cultivation).

The three regions together account for about 56 percent of the watersheds and 44 percent of the microwatersheds targeted by both SLMPs. A stratified sample of 22 microwatersheds was selected from the three regions and the main agroecologies for detailed site-level assessments (tables C.2 and C.3). These sites were selected after consultations with the project teams and took account of the logistical and security conditions for organizing the field visits and conducting local discussions to gather reliable data.

The Independent Evaluation Group mission visited and conducted detailed site-level studies at the 22 microwatersheds: 15 from SLMP I and 7 from SLMP II (tables C.2–C.5). Site visits for case analysis included semistructured group interviews with selected communities, community and kebele watershed teams, and key informants. Detailed data were collected from each of the 22 microwatersheds on activities, outputs, and outcomes using semistructured group interviews with 10–15 key informants purposefully selected from each community, including smallholder farmers, women, youth, and landless, resource-dependent households. In addition to an interview protocol with the stakeholders, observations on the sustainability and maintenance of soil and water conservation structures were recorded (including with photographs).

Table C.2. SLMP I Microwatersheds Visited and Included in the Case Analysis (15 cases)

Region	Woreda	Watershed	Microwatershed	Admin. Zone	AEZ
Amhara	Fagita Lekoma	Upper Guder	Akusty	Awi	Moist dega
Amhara	Fagita Lekoma	Upper Guder	Enchetab	Awi	Moist dega
Amhara	Bure	Yesir	Chenetali	West Gojjam	Moist dega
Amhara	Machakel	Ketech	Merechit	East Gojjam	Moist dega
Amhara	Tarmaber	Robi	Teter Wuha	North Shewa	Moist dega
Amhara	Gonji Kolela	Yezat	Sharashima	West Gojjam	Moist weyna dega
Amhara	Dembecha	Kechem	Tejima	West Gojjam	Moist weyna dega
Amhara	Shewa Robit Zuria	Robi	Firfir	North Shewa	Dry kolla
Oromia	Sebata Hawas	Dima	Gogetti	South West Shewa	Moist weyna dega
Oromia	Hindabu Abote	Aleltu	Kufema	North Shewa	Moist weyna dega
Oromia	Woliso	Rebu	Worebo	South West Shewa	Moist dega
Oromia	Gimbichu	Dalocha	Jijiga	East Shewa	Moist dega
Oromia	Degem	Lemen	Cheleleki	North Shewa	Moist dega
Tigray	Raya Azebo	Lower Burka Abagabir	Weinalem	South Tigray	Dry weyna dega
Tigray	Endamehone	Upper Burka Abagabir	Hadush Adi	South Tigray	Dry weyna dega

Source: Independent Evaluation Group and project data.
Note: Admin. = Administrative; AEZ = agroecological zone; SLMP = Sustainable Land Management Project.

Table C.3. SLMP II Microwatersheds Visited and Included in the Case Analysis (7 cases)

Region	Woreda	Watershed	Microwatershed	Admin. Zone	AEZ
Amhara	Ensaro	Jemma	Bera	North Shewa	Moist weyna dega
Oromia	Ejere	Berga	Adama	East Shewa	Moist dega
Oromia	Kuyu	Chirecha	Harere	North Shewa	Moist weyna dega
Tigray	Enderta	Gereb	Adikelkel	South Tigray	Dry weyna dega
Tigray	Degua Temben	Kerano	Sesemat	Central Tigray	Dry weyna dega
Tigray	Degua Temben	Kerano	Mihni	Central Tigray	Dry weyna dega
Tigray	Atsbi Wonberta	Wonberta Sedah	Ambelten	Eastern Tigray	Dry dega

Source: Independent Evaluation Group and project data.
Note: Admin. = Administrative; AEZ = agroecological zone; SLMP = Sustainable Land Management Project.

Table C.4. Selected SLMP Sample for Field-Level Case Studies, by Region

Region	SLMP I	SLMP II	Total
Amhara	8	1	9
Oromia	5	2	7
Tigray	2	4	6
Total	15	7	22

Source: Independent Evaluation Group.
Note: SLMP = Sustainable Land Management Project.

Table C.5. Selected SLMP Sample for Field-Level Case Studies, by Agroecological Zone

	Sample Share	Sample	Region (no.)		
Agroecological Zone	(%)	(no.)	Amhara	Oromia	Tigray
Dry dega	4.5	1	0	0	1
Dry kolla	4.5	1	1	0	0
Dry weyna dega	22.7	5	0	0	5
Moist dega	40.9	9	5	4	0
Moist weyna dega	27.3	6	3	3	0
Total	100.0	22	9	7	6

Source: Independent Evaluation Group.

Methods for Data Analysis

Preparation of Detailed Case Study Summaries

The evaluation team prepared detailed case studies from each of the 22 microwatersheds, covering the following main issues (see Case Study Assessment Protocol section in this appendix for more details):

- Biophysical and socioeconomic characterization of the selected sites

- Land degradation and vulnerability issues and challenges before the SLMP
- Main interventions supported by the SLMP and implemented at the site on communal land and farmlands (including the detailed chronology and sequence of the interventions)
- Identification of interventions supported by other actors and potential effects on observed changes
- The extent of uptake and maintenance of SLM activities introduced by the project and who undertook them
- The observed effects in reducing land degradation on communal land (compared with the baseline) and the reasons for change (for example, area closures or controlling gullies)
- The observed effects in reducing land degradation on farmland (compared with the baseline) and the reasons for change
- The observed effects in improving land productivity on communal lands (compared with the baseline) and the reasons for change (for example, area closures)
- The observed effects in improving land productivity on farmlands (compared with the baseline) and the reasons for change (for example, reduced flooding and soil erosion, enabling use of modern inputs and small-scale irrigation)
    - Observed productivity change for selected crops
    - Observed changes in income (for example, poultry, livestock, and bees)
- Effects in terms of improving food security and livelihoods
    - Food security effects
    - Water security effects
    - Livelihoods and employment effects for the landless, women, and youth
    - Perceived benefits of land certification
- The functioning of the local institutions
    - Community watershed teams and kebele watershed teams
    - Presence of bylaws for communal management
    - Challenges in enforcing area closure or controlling external threats

Analysis of the Case Study Data

The effectiveness of interventions in reducing land degradation and improving productivity were rated separately for communal land and farmlands. Among other activities, this required looking at the reported changes (relative to the situation before the project) in soil erosion levels, vegetation cover, gully control, and enforcement of area closures on communal lands. Using the

case study assessment protocol (described in this appendix), the ratings on the positive impacts of the interventions were made from negligible (1) to high (4) (table C.6).

Table C.6. Sustainable Land Management Project Intervention Ratings

Rating	Description
Negligible (1)	No visible effects (compared with the before situation)
Modest (2)	Some observed effects on the selected indicators
Substantial (3)	Significant observed effects on the selected indicators
High (4)	Very significant effects in the selected indicators

Source: Independent Evaluation Group.

Descriptive Analysis and Tabulation

The rate of effectiveness in achieving the stated objectives and the drivers of change and the success factors were tabulated by project phase, agroecology, and region. Some of the results from this stage are presented in tables C.9–C.19.

Analysis of Geospatial Remote-Sensed Data on Selected Outcome Indicators

SLM implementation was linked with remote-sensed geospatial data on selected outcome indicators using plausible counterfactuals. These data were used to establish causal links between SLM and land restoration and land productivity using project-level and satellite data. This process was based on the Development Economics Vice Presidency, World Bank, methodology used for the Tana Beles Integrated Water Resource Development Project, which used satellite data to assess the effectiveness of SLM interventions in Ethiopia (Ali, Deininger, and Monchuk 2018). This methodology was based on accessing and processing a large number of readily available remotely sensed satellite images via Google Earth Engine and combining them with information on the timing and location of SLM interventions to evaluate the impact of soil and water conservation activities on land restoration at the pixel level. The MODIS sensor, with a resolution of 250 by 250 meters, was used to create time series of vegetative conditions at the sites (including before and after the project in treated and control watersheds) by computing indexes that are routinely used, namely the normalized difference vegetation index and the enhanced vegetation index (to measure vegetation cover and photosynthetic activity) and the land surface water index. The analysis used local time series rainfall data (for example, based on the Climate Hazards Center InfraRed Precipitation with Station data, with daily rainfall measured at the five hydro stations in the area). A control area was determined by drawing a 10-kilometer buffer around each of the treated microwatersheds to apply a difference-in-differences specification with pixel-level fixed effects for identification and to assess how the cumulative area treated affected the mean photosynthetic activity, vegetation cover, and plant or soil water content in different seasons. This was done through the following:

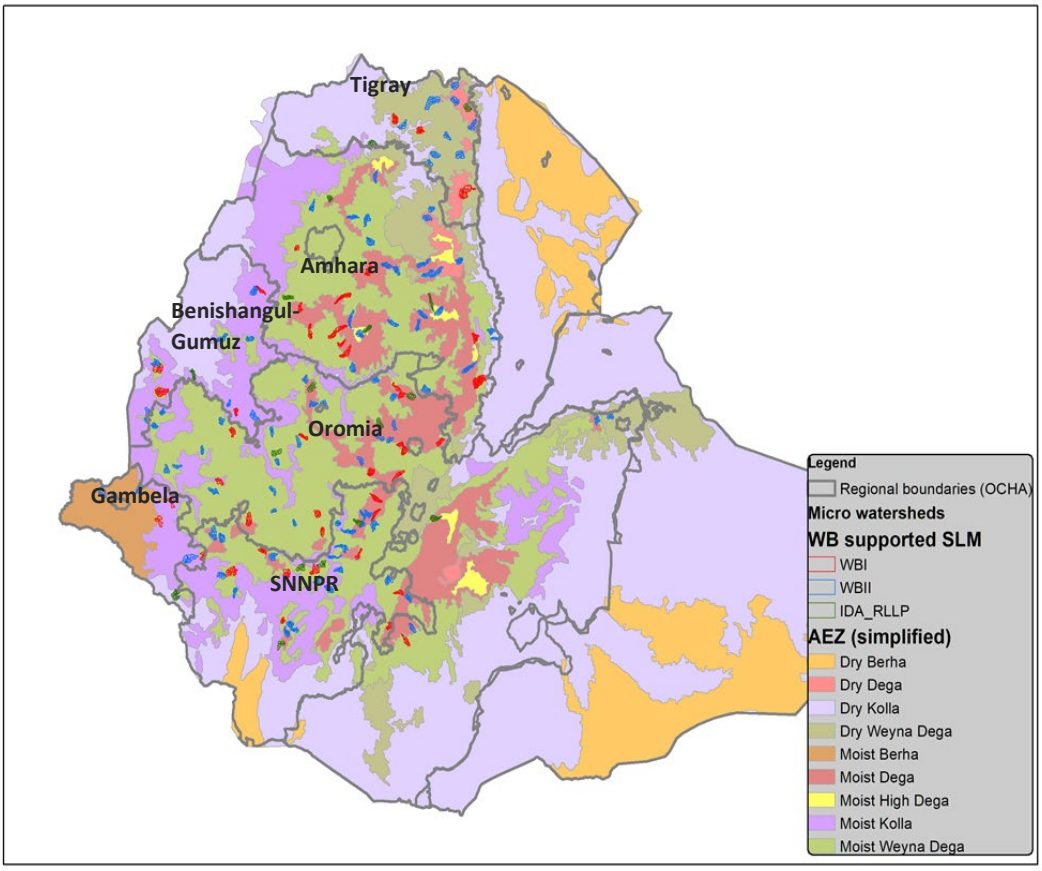
- Collaboration with the Development Economics Vice Presidency, World Bank, for accessing, processing, and analyzing SLM and satellite data from selected watersheds
- Statistical and econometric analysis of data jointly with the Development Economics Vice Presidency, World Bank

Interpretation of the Results

The statistical analysis of geospatial data benefited from the qualitative data from the site visits and case studies on improvements in the management of watershed landscapes as well as changes in livelihoods and vulnerability. The main enabling factors and drivers were identified for each case study. Selected examples from the three regions showing the reasons for strong and modest performance in achieving the objective are summarized in tables C.20–C.25.

The results from the statistical analysis of treatment effects for SLMP I and SLMP II are presented in tables C.26 and C.27, respectively. Although the effects overall for the pooled analysis across the three regions are significantly positive, the SLMP II results did not show a consistently positive impact across the three indicators in Oromia, perhaps because of incomplete data on the starting year for project interventions in all microwatersheds and the short postintervention period considered for SLMP II. Although the analysis was based on the best available data from microwatersheds in the three regions, further assessment is needed to fully ascertain the impacts at the regional level, covering longer postintervention years to account for the time needed for land restoration. However, this also requires good quality M&E data showing the starting year as well as the type and intensity of project activities implemented in each microwatershed. The intensity of activities implemented was not available for several SLMP I sites at the desired microwatershed level in Amhara. Hence, the effect of the intensity of the different interventions implemented could not be evaluated for SLMP I with the available data. The weak M&E system of the SLMP during the two phases did not enable the systematic collection of comparable monitoring data at the microwatershed level.

Map C.1. Map of Sustainable Land Management Project Areas in Ethiopia



Note: AEZ = agroecological zone; IDA_RLLP = new watersheds added under the Resilient Landscapes and Livelihoods Project, which started at the end of Sustainable Land Management Project (SLMP) II; OCHA = United Nations Office for the Coordination of Humanitarian Affairs; SLM = sustainable land management; SNNPR = Southern Nations, Nationalities, and Peoples' Region; WB = World Bank; WBI = SLMP I watersheds; WBII = SLMP II watersheds. *Source*: Independent Evaluation Group

Table C.7. Microwatersheds by Agroecological Zone for Sample Selection (number)

Number of Microwatersheds

a) Sustainable Land Management Project I

		Agro-Ecological Zone										
Region	**Major Watershed**	**Non-classified**	**Dry Dega**	**Dry Kolla**	**Dry Weyna Dega**	**Moist Dega**	**Moist Kolla**	**Moist Weyna Dega**	**Wet Dega**	**Wet Kolla**	**Wet Weyna Dega**	**Total**
Amhara	Chena Gomit								14			14
	Dijil					4			3		11	18
	Kechem							16	10		5	31
	Ketech					4		1	5		4	14
	Mati Zirgi							7				7
	Robi			15		2	2	36	6		1	62
	Sal							10	13		1	24
	Upper Guder								13		1	14
	Yesir	1							8		13	22
	Yezat							4	20		17	41
Amhara Total		**1**		**15**		**10**	**2**	**74**	**92**		**53**	**247**
Oromiya	Aleltu					4		4				8
	Bangasa							16			1	17
	Dalocha					12						12
	Dima					4		11	1			16
	Geba									8	3	11
	Gefere										15	15
	Halu Danaba								3		11	14
	Lemen					3			7			10
	Meki										15	15
	Nada Asensabo							11				11
	Nedhi								1		10	11
	Rebu					12		9				21
	Tiliku Lemen					9		2	4			15
	Wechecha					6		1	1			8
Oromiya Total						**50**		**54**	**17**	**8**	**55**	**184**
Tigray	Adi Tsegora				27							27
	Burka Abagabir		9		2							11
	Burka Gerba		2		15							17
	Selam			3	15							18
Tigray Total			**11**	**3**	**59**							**73**
Total		**1**	**11**	**18**	**59**	**60**	**2**	**128**	**109**	**8**	**108**	**504**

b) Sustainable Land Management Project II

		Agro-Ecological Zone													
Region	**Major Watershed**	**Dry Dega**	**Dry Kolla**	**Dry Weyna Dega**	**Moist Dega**	**Moist High Dega**	**Moist Kolla**	**Moist Weyna Dega**	**Moist Wurch**	**Wet Dega**	**Wet High Dega**	**Wet Kolla**	**Wet Weyna Dega**	**Wet Wurch**	**Total**
Amhara	Arefa				1			3		13	3				20
	Awuga							19							19
	Bela Amba	13		3											16
	Dendo				4			12							16
	Diba			10											10
	Dinkiye		6					11							17
	Gan Wuha				2			5		13					20
	Gedalas				3	15			2						20
	Gunda				1					12	10				23
	Indodie		9					2							11
	Jemma				1		2	13							16
	Kabtiya				2			16							18
	Kulbit							1		18			2		21
	Laygnaw Chefa									19	4				23
	Muga									7	10			1	18
	Retmet				1					16	2				19
	Rib Ebnat				3			18							21
	Tikur Wuha	10		8											18
	Tilk Wonz	1			10	2		2							15
	Tilkit Deremo				16			4							20
	Yeda Baso				4			14							18
	Zana							18							18
	Zhita_D	20			2			2							24
	Zhita_W				10			8							18
Amhara Total		**44**	**15**	**21**	**60**	**17**	**2**	**148**	**2**	**98**	**29**		**2**	**1**	**439**
Oromiya	Ababa									8			4		12
	Amerti									10			2		12
	Begi												12		12
	Berga				6			2							8
	Bilacha				1					8					9
	Boji												12		12
	Chirecha				3			8							11
	Dendi				4					6					10
	Dero_Welege									5			5		10
	Dhidhesa												7		7
	Fincha'a									3			8		11
	Gechi												10		10
	Gewiso												11		11
	Gimbi												9		9
	Guye												8		8
	Haro			6				5							11
	Hawagelan											1	8		9
	Haya												9		9
	Kondala						2						7		9
	Lalokile												10		10
	Lege Danse				1		1	9							11
	Metu												13		13
	Seyo							1					10		11
	Weter				3			7							10
	Wonchi				2					8					10
Oromiya Total				**6**	**20**		**3**	**32**		**48**		**1**	**145**		**255**
Tigray	Feres May			13											13
	Gereb	1		13											14
	kerano			6											6
	Kortoto	6		4											10
	May Agazen			7											7
	Ruba Adiet			9											9
	Siasa			9											9
	Suluh	13													13
	Tsesewe			11											11
	Wonberta Sedah	12		1											13
Tigray Total		**32**		**73**											**105**
Total		**76**	**15**	**100**	**80**	**17**	**5**	**180**	**2**	**146**	**29**	**1**	**147**	**1**	**799**

Source: Based on data provided by World Bank SLMP operations team and national project coordination unit.

Case Study Assessment Protocol

9. General introduction. Biophysical and socioeconomic characteristics and project interventions in the microwatershed:
    - Sustainable Land Management Project (SLMP) or Productive Safety Nets Project (PSNP) phase
    - Year activity started
    - Year activity ended or ongoing
    - Size of the microwatershed (area of communal land, area of farmland, and so on)
    - Main SLMP or PSNP interventions on farmland
    - Presence of project-supported small-scale irrigation
    - Main SLMP or PSNP interventions on communal land
    - Socioeconomic and demographic conditions (number of households, male, female, and so on)
    - Main livelihood activities (crops, livestock, and so on)
    - Road network and accessibility to markets
10. Natural resource degradation before the project:
    - Extent and severity of the problem before the project
    - Level of community commitment or resolve to address the problem
    - Challenges in mobilizing the community
11. Level of effectiveness of interventions in arresting or reversing land degradation. Rate each factor (negligible, modest, substantial, high):
    - Extent of the microwatershed area treated with soil and water conservation activities (area, share)
    - Extent of tree plantations or biological interventions on communal land
    - Extent of tree plantations or biological interventions on farmland
    - Extent of land restoration or effectiveness of the interventions (for example, gully treatments, reduced erosion, reduced flooding, or increased vegetation cover) on communal land

- Extent of land restoration or effectiveness of the interventions on farmland
- Extent of maintenance of SLM activities on farmland (how many farmers are doing this, share from total households)
- Extent of maintenance of SLM activities on communal land. Indicate how they are maintained and who is performing the maintenance

  Indicate your assessment using the rating table below:[19]

Effect of the project in reducing land degradation on communal land

Negligible (1)	No visible effect on degradation
Modest (2)	Some effect in reducing degradation
Substantial (3)	Significant effect in reversing or arresting degradation
High (4)	Very significant effect in reversing or arresting degradation

Provide additional justifications for your rating and the explanatory factors for success or failure.

Effect of the project in reducing land degradation on individual farmland

Negligible (1)	No visible effect on degradation
Modest (2)	Some effect in reducing degradation
Substantial (3)	Significant effect in reversing or arresting degradation
High (4)	Very significant effect in reversing or arresting degradation

Provide additional justifications for your rating and the explanatory factors for success or failure.

12. Level of effectiveness of interventions in improving land productivity. Rate each factor (negligible, modest, substantial, high):
    - Extent of productivity change reported on farmland (crops). Provide the changes before and after for each cropping activity and the how the project contributed to this change.
    - Extent of productivity change reported on farmland (livestock). Provide the changes before and after for affected livestock activity and the how the project contributed to this change.
    - Extent of productivity change reported on communal land (for example, grass and biomass production, beekeeping, or agroforestry, such as *Acacia decurrens*). Provide the changes before and after for each activity.

Rate the productivity change using the table below.

Effect of the project in increasing land productivity on communal land

Negligible (1)	No visible effect on land productivity
Modest (2)	Some effect on land productivity
Substantial (3)	Significant effect on land productivity
High (4)	Very significant effect on land productivity

Provide additional justifications for your rating and the explanatory factors for success or failure.

Discuss how the productivity change occurred and the contribution of SLMP or PSNP in increasing productivity.

Effect of the project in increasing land productivity on farmland

Negligible (1)	No visible effect on land productivity
Modest (2)	Some effect on land productivity
Substantial (3)	Significant effect on land productivity
High (4)	Very significant effect on land productivity

Provide additional justifications for your rating and the explanatory factors for success or failure.

Discuss how the productivity change occurred and the contribution of SLMP or PSNP in increasing productivity.

13. Level of effectiveness of interventions in reducing the vulnerability of the targeted communities to drought or other climatic stress. Rate each factor (negligible, modest, substantial, high):

    - Changes in food security in the community (before and after)
    - Changes in access to water (drinking, washing, and livestock)
    - Extent of reduction in risk of food insecurity in times of poor rains or drought conditions
    - Extent of increase in diversification of food sources or income sources
    - Extent of increase in asset accumulation in community (for example, livestock or corrugated iron roof houses)
    - Extent of reduction in poverty or improvement in the welfare of the community
    - Extent of reduction in out-migration from the community that can be associated with the project interventions

Rate the effect of the project in terms of reducing vulnerability using the table below.

Negligible (1)	No visible effect in reducing vulnerability
Modest (2)	Some effect in reducing vulnerability
Substantial (3)	Significant effect in reducing vulnerability
High (4)	Very significant effect in reducing vulnerability

Provide additional justifications for your rating and the explanatory factors for success or failure.

Which household groups have benefited from reduced vulnerability?

14. Level of effectiveness of interventions in empowering women. Rate each factor (negligible, modest, substantial, high):

    - The extent of participation of women in the project
    - Overall relevance of project activities for addressing issues for women
    - The extent to which the project was able to affect or benefit women—either positive or negative

Rate the overall effectiveness of the project in benefiting women.

Negligible (1)	No visible effect in empowering women
Modest (2)	Some effect in empowering women
Substantial (3)	Significant effect in empowering women
High (4)	Very significant effect in empowering women

Provide additional justifications for your rating and the explanatory factors for success or failure.

Describe any negative effects of the project on women.

15. Level of effectiveness of interventions in creating opportunities for youth. Rate each factor (negligible, modest, substantial, high):

    - The extent of participation of youth in the project
    - Area of communal land allocated to youth
    - Overall relevance of project activities for addressing issues for youth
    - The extent to which the project was able to affect or benefit youth—either positive or negative

Rate the effectiveness of the project in benefiting youth.

Negligible (1)	No visible effect in creating opportunities for youth
Modest (2)	Some effect in creating opportunities for youth
Substantial (3)	Significant effect in creating opportunities for youth
High (4)	Very significant effect in creating opportunities for youth

Provide additional justifications for your rating and the explanatory factors for success or failure.

Describe any negative effects of the project on youth.

16. Are the local institutions (community watershed teams, kebele watershed teams) still functional?

    - Does the community establish bylaws?
    - Are there area closures in the community?
    - Are there area closures enforced (respected by the community)?
    - Is free grazing controlled? If not, explain why and why the community is not able to control this.
    - Are the institutions doing their job in supporting communal management?
    - Any challenges for viability of the local institutions.

17. Summarize the findings from the woreda-level discussion:

    - How important was the SLMP or PSNP at the woreda level for watershed management?
    - What was the extent of completion of the project at the major watershed level?
    - What was the share of land treated in the major watershed?
    - How effective was the project at the major watershed level?
    - Which microwatersheds received irrigation access?
    - Which microwatersheds had area closures?
    - Which microwatersheds failed to enforce the bylaws for area closure?
    - Is there evidence of strong government commitment at the woreda level to the project?
    - How was the technical and institutional capacity of the woreda in supporting the project?
    - What were the challenges faced by the woreda?

- Provide the explanatory factors for success or failure at the watershed level (for example, staff turnover, short intervention time, weak coordination between the woreda technical committee (WTC) and the woreda steering committee (WSC), large watershed, or thinly distributed effort).

18. Concluding observations (emphasize the factors for success or failure and the key lessons from experience of the project).

Table C.8 shows the local experts that helped the Independent Evaluation Group team in implementing the case study assessment protocol in the different regions. Their contributions in collecting data from the different communities and microwatersheds and in summarizing the main findings were vital in enhancing the quality of this evaluation.

Table C.8. Local Experts Involved in the IEG Case Study

Name	Regions Visited	Qualifications
Daniel Jaleta	Amhara, Oromia	PhD in soil and water management
Selamawit Damtew	Amhara	PhD student in land management and soil physics
Asmare Woubet	Amhara	PhD student in land management and soil physics
Menasbo G. Tesfay	Tigray	PhD student resource and development economics
Girma B. Araya	Tigray	PhD student resource and development economics

Results

Some of the findings from the different stages of analysis are presented in tables C.9–C.19.

Table C.9. Ratings for Reducing Land Degradation on Communal Land (SLMP I)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry kolla	n.a.	n.a.	n.a.	100	1
Dry weyna dega	n.a.	n.a.	100	n.a.	2
Moist dega	n.a.	25	38	38	8
Moist weyna dega	n.a.	50	25	25	4
Total	n.a.	27	40	33	15

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.10. Ratings for Reducing Land Degradation on Farmland (SLMP I)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry kolla	n.a.	n.a.	100	n.a.	1
Dry weyna dega	n.a.	n.a.	100	n.a.	2
Moist dega	n.a.	13	63	25	8
Moist weyna dega	n.a.	25	75	n.a.	4
Total	n.a.	13	73	13	15

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.11. Ratings for Reducing Land Degradation on Communal Land (SLMP II)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry dega	n.a.	n.a.	n.a.	100	1
Dry weyna dega	n.a.	n.a.	67	33	3
Moist dega	n.a.	n.a.	100	n.a.	1
Moist weyna dega	n.a.	n.a.	100	n.a.	2
Total	n.a.	n.a.	71	29	7

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.12. Ratings for Reducing Land Degradation on Farmland (SLMP II)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry dega	n.a.	n.a.	100	n.a.	1
Dry weyna dega	n.a.	33	67	n.a.	3
Moist dega	n.a.	100	n.a.	n.a.	1
Moist weyna dega	n.a.	n.a.	100	n.a.	2
Total	n.a.	29	71	n.a.	7

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.13. Ratings for Increasing Land Productivity on Communal Land (SLMP I)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry kolla	n.a.	n.a.	100	n.a.	1
Dry weyna dega	n.a.	n.a.	100	n.a.	2
Moist dega	n.a.	13	63	25	8
Moist weyna dega	n.a.	25	50	25	4
Total	n.a.	13	67	20	15

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.14. Ratings for Increasing Land Productivity on Farmland (SLMP I)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry kolla	n.a.	n.a.	100	n.a.	1
Dry weyna dega	n.a.	n.a.	100	n.a.	2
Moist dega	n.a.	25	75	n.a.	8
Moist weyna dega	n.a.	25	50	25	4
Total	n.a.	20	73	7	15

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.15. Ratings for Increasing Land Productivity on Communal Land (SLMP II)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry dega	n.a.	n.a.	n.a.	100	1
Dry weyna dega	n.a.	n.a.	67	33	3
Moist dega	n.a.	n.a.	100	n.a.	1
Moist weyna dega	n.a.	n.a.	100	n.a.	2
Total	n.a.	n.a.	71	29	7

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.16. Ratings for Increasing Land Productivity on Farmland (SLMP II)

	Rating (percent distribution)				
Agroecological Zone	Negligible	Modest	Substantial	High	All Cases
Dry dega	n.a.	n.a.	100	n.a.	1
Dry weyna dega	n.a.	33	67	n.a.	3
Moist dega	n.a.	n.a.	100	n.a.	1
Moist weyna dega	n.a.	n.a.	50	50	2
Total	n.a.	14	71	14	7

Source: Independent Evaluation Group.
Note: n.a. = not applicable; SLMP = Sustainable Land Management Project.

Table C.17. Rating of Sustainable Land Management Project Effects in Amhara Region

Effects	Land Type	High	Substantial	Modest	Low	Total
Reducing land degradation	Communal *(no.)*	4	3	2	0	9
	(percent)	44.4	33.3	22.2	0.0	100.0
	Farmland *(no.)*	1	8	0	0	9
	(percent)	11.1	88.9	0.0	0.0	100.0
Increasing land productivity	Communal *(no.)*	3	6	0	0	9
	(percent)	33.3	66.7	0.0	0.0	100.0
	Farmland *(no.)*	2	7	0	0	9
	(percent)	22.2	77.8	0.0	0.0	100.0
Reducing vulnerability	Household *(no.)*	1	7	1	0	9
	(percent)	11.1	77.8	11.1	0.0	100.0

Source: Independent Evaluation Group.

Table C.18. Rating of Sustainable Land Management Project Effects in Oromia Region

Effects	Land Type	High	Substantial	Modest	Low	Total
Reducing land degradation	Communal *(no.)*	1	4	2	0	7
	(percent)	14.3	57.1	28.6	0.0	100.0
	Farmland *(no.)*	1	3	3	0	7
	(percent)	14.3	42.9	42.9	0.0	100.0
Increasing land productivity	Communal *(no.)*	0	5	2	0	7
	(percent)	0.0	71.4	28.6	0	100
	Farmland *(no.)*	0	4	3	0	7
	(percent)	0	57.1	42.9	0	100
Reducing vulnerability	Household *(no.)*	1	1	5	0	7
	(percent)	14.3	14.3	71.4	0.0	100.0

Source: Independent Evaluation Group.

Table C.19. Rating of Sustainable Land Management Project Effects in Tigray Region

Effects	Land Type	High	Substantial	Modest	Low	Total
Reducing land degradation	Communal *(no.)*	2	4	0	0	6
	(percent)	33	67	0.0	0.0	100.0
	Farmland *(no.)*	1	5	0	0	6
	(percent)	17	83	0	0.0	100.0
Increasing land productivity	Communal *(no.)*	2	4	0	0	6
	(percent)	33.3	66.7	0.0	0.0	100.0
	Farmland *(no.)*	0	5	1	0	6
	(percent)	0.0	83.3	16.7	0.0	100.0
Reducing vulnerability	Household *(no.)*	1	3	2	0	6
	(percent)	16.7	50.0	33.3	0.0	100.0

Source: Independent Evaluation Group.

Table C.20. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Selected Examples in Weinalem, Raya Azebo, Tigray Region

Performance Issues	Performance	Institutions (Woreda)	Institutions (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land	Substantial reduction	Strong technical team in woreda	Proactive community watershed team	High: • Cut-and-carry for all households (including landless) • Beekeeping	Solid: Gully rehabilitation + biological + area closure	Strong (woreda to local)	Moderate: • Gullies (capital cost) • Fuel wood shortage • Unemployed youth • External threat
Land degradation on individual farmland	Substantial reduction	Strong leadership and commitment from GoT at all levels; PSNP support	Farmer awareness	High: Fear of drought, flow of economic benefits	Treatment at source (upstream) + good maintenance	Farmer training	Low: • Most farmers maintain structures • Mass mobilization
Land productivity	Substantial increase	Strong leadership and commitment from GoT at all levels; PSNP support	—	High: • Irrigation (SSI) • Increase in yields	Sustainable land management + agronomic practices	Local natural resources management + extension agents	Low: • Unequal SSI access • Unequal benefits
Vulnerability	Substantial reduction: • Substantial for youth • Modest for women	Strong leadership and commitment from GoT at all levels; PSNP support	—	• Reduced drought vulnerability • Diversification • Better food security	Game changer is irrigation (SSI)	PSNP backstop	Moderate: • Limited irrigation • Land scarcity • Drought • Dirt road link

Source: Independent Evaluation Group.
Note: — = not relevant; GoT = Regional Government of Tigray; PSNP = Productive Safety Nets Project; SSI = small-scale irrigation.

Table C.21. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Sesemat, Degua Temben, Tigray Region

Performance Issues	Performance	Institutions (Woreda)	Institution (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land	Substantial reduction	Strong technical team in woreda	Proactive community watershed team	High: • Grass harvesting (including landless) • No beekeeping	Strong: • Gully treated: physical + biological • Area closure	Good (woreda to local)	Moderate: • Reforming gullies • Fuel wood • Unemployed youth • External threat
Land degradation on individual farmland	Modest reduction	New project but strong leadership and commitment from GoT at all levels; PSNP support	Farmer awareness	Low: Limited flow of economic benefits	Modest: • Bunds + terraces • Gullies not fully treated (new project: 2 years)	Limited farmer training	Moderate: • Few farmers maintain sustainable land management • Mass mobilization
Land productivity	Modest increase	New project but strong leadership and commitment from GoT at all levels; PSNP support	—	Low: • No irrigation (SSI) • Poor soil quality • Poor drainage • Low yields	Low: • No irrigation • Poor drainage	Local natural resources management + extension agents	Low: • Unequal SSI access • Unequal benefits
Vulnerability	Modest reduction: • Negligible for youth • Modest for women	New project but strong leadership and commitment from GoT at all levels; PSNP support	—	• High drought vulnerability • Low Diversification • Low food security	Inadequate: • No irrigation (SSI) • Landlessness	PSNP backstop	High: • No irrigation • Land scarcity • No benefits to youth

Source: Independent Evaluation Group.
Note: — = not relevant; GoT = Regional Government of Tigray; PSNP = Productive Safety Nets Project; SSI = small-scale irrigation.

Table C.22. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Akusty, Fagita Lekoma, Amhara Region

Performance Issues		Performance	Institutions (Woreda)	Institutions (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land		Substantial reduction	Good technical team but weak mobility	Proactive community watershed team + bylaws for area closure	High: • Cut-and-carry for all households • *Acacia decurrens* (8–10 hectares)	Solid: Gully rehab + *Acacia decurrens* + area closure	Moderate (woreda to local)	Low: • Gullies (capital cost) • Untreated grazing land (downstream)
Land degradation on individual farmland		Substantial reduction	Strong leadership and commitment from GoT at all levels; PSNP support	Farmer awareness • Highly degraded (high RF, steep slopes) • Looming threat of out-migration	High: Fear of out-migration Nitrogen fixation benefits	Treatment at source (upstream) + good upkeep	Farmer training	Low: • Good upkeep • Viable agroforestry system • Degraded soils
Land productivity	Substantial increase	Strong leadership and commitment from GoT at all levels; PSNP support	—	High: • Nitrogen fixation (Acacia) • Rotation system • Increase in yields		Gully control + nitrogen fixation + rotation	Local extension agents	Low: • No irrigation • Land scarcity
Vulnerability	Substantial reduction: • Substantial for youth • Modest for women	Strong leadership and commitment from GoT at all levels; PSNP support	—	High income: • Charcoal from *Acacia decurrens* • Income diversification • High food security		Game changer is *Acacia decurrens*	PSNP backstop	Moderate: • Limited irrigation • Land scarcity • Drought • Poor accessibility

Source: Independent Evaluation Group.
Note: — = not relevant; GoT = Regional Government of Tigray; PSNP = Productive Safety Nets Program; SSI = small-scale irrigation.

Table C.23. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Enchetab, Fagita Lekoma, Amhara Region

Performance Issues		Performance	Institutions (Woreda)	Institution (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land		Modest reduction	Strong technical team in woreda	Proactive community watershed team	Low: • No area closures • No grass harvesting • Open grazing	Modest: • Gully treated: physical + biological • No area closures	Good (woreda to local)	Moderate: • No area closures • Limited grazing land • Shortage of grass
Land degradation on individual farmland		Substantial reduction	• Links with woreda are good • Good road • Good market access	Farmer awareness	High Flow of economic benefits from agroforestry	Moderate: • Agroforestry • Bunds + terraces • Good adoption	Good farmer training	Low: • Most farmers maintain sustainable land management • Mass mobilization
Land productivity	Substantial increase	• Links with woreda are good • Good road • Good market access	—	High: • Irrigation (SSI) • Nitrogen fixation • Good crop yields	Moderate: • Agroforestry • Agriextension	Local natural resources management + extension agents	Low: • Unequal SSI access • Unequal benefits	
Vulnerability	Substantial reduction: Substantial for youth (communal land for Acacia) Modest for women	• Links with woreda are good • Good road • Good market access	2 hectares of communal land for youth group for *Acacia decurrens*	Significant change: • Income from trees • Good diversification • Good food security	Adequate: • Agroforestry • Irrigation (SSI)	Market access	Low: • Have irrigation • Land scarcity • Limited grazing land and no area closure • Shortage of fodder (grass)	

Source: Independent Evaluation Group.
Note: — = not relevant; SSI = small-scale irrigation.

Table C.24. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Worebo, Woliso, Oromia Region

Performance Issues	Performance	Institutions (Woreda)	Institutions (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land	High reduction (reduced flooding and erosion)	Good technical team and frequent visits	Proactive community watershed team + bylaws for area closure	High: Cut-and-carry for all households	Good: Terrace, bunds + area closure + reforestation + gully rehabilitation + groundwater restoration	High (woreda to local)	Low: • Some untreated works • Threats of encroachment by neighboring communities
Land degradation on individual farmland	High reduction	Strong leadership and commitment + good market access	High farmer awareness	High: • CSA • Soil fertility management (composting, organic fertilizer)	Good: Terraces + irrigation	Farmer training	Low: • Good maintenance • Reduced floods and erosion
Land productivity	Substantial increase	Strong leadership and commitment + good market access	High farmer awareness	High: • CSA • Soil fertility management • Double cropping • Increased yields	Strong agriextension support	Local extension agents (agriculture, natural resources management)	Low: • Irrigation • Reduced floods and erosion
Vulnerability	Substantial reduction: • Substantial for youth • Substantial for women	Strong leadership and commitment + good market access	High farmer awareness	• Crop diversification • Substantial food security	Irrigation + new varieties + crop diversification + market access	—	Moderate: Forage production is low

Source: Independent Evaluation Group.
Note: CSA = climate-smart agriculture.

Table C.25. Enabling Factors for Effectiveness in Substantial and Modest Performing Microwatersheds: Gogetti, Sebata Hawas, Oromia Region

Performance Issues	Performance	Institutions (Woreda)	Institution (Local)	Incentives	Adequacy of Technology	Capacity	Threats
Land degradation on communal land	Modest reduction	Strong technical team in woreda	Proactive community watershed team	Low: • Area closures not enforced • No grass harvesting • Open grazing	Modest: • Gully treated: physical + biological • No area closures	Good (woreda to local)	Moderate: • No area closures • Limited grazing land • Shortage of grass
Land degradation on individual farmland	Substantial reduction	• Links with woreda are good • Good road • Good market access	Farmer awareness	High: Flow of economic benefits from agroforestry	Moderate: • Agroforestry • Bunds + terraces • Good adoption	Good farmer training	Low: • Most farmers maintain sustainable land management • Mass mobilization
Land productivity	Substantial increase	• Links with woreda are good • Good road • Good market access		High: • Irrigation (SSI) • Nitrogen fixation • Good crop yields	Moderate: • Agroforestry • Agriextension	Local natural resources management + extension agents	Low: • Unequal SSI access • Unequal benefits
Vulnerability	Substantial reduction: • Substantial for youth (communal land for Acacia) • Modest for women	• Links with woreda are good • Good road • Good market access	2 hectares of communal land for youth group for *Acacia decurrens*	Significant change: • Income from trees • Good diversification • Good food security	Adequate: • Agroforestry • Irrigation (SSI)	Market access	Low: • Have irrigation • Land scarcity • Limited grazing land and no area closure • Shortage of fodder (grass)

Source: Independent Evaluation Group.
Note: — = not relevant; SSI = small-scale irrigation.

Table C.26. Effect of SLMP I Interventions: Difference-in-Differences Analysis of Geospatial Data Using Matched Treatment and Control Pixels

Selected Variables	Pooled	Amhara	Oromia	Tigray
Enhanced Vegetation Index				
Treatment effects	.00100***.00064***		.00057***	.00319***
	(14.22)	(6.50)	(4.82)	(25.50)
Rainfall	.00013***	.00014***	.00013***	.00015***
	(865.58)	(535.54)	(551.86)	(437.31)
Constant	.28504***	.26260***	.32164***	.23309***
	(2,135.48)	(1,355.64)	(1,428.96)	(991.86)
R^2	.639	.732	.565	.733
N	5,971,307	2,486,221	2,548,348	936,738
Normalized Difference Vegetation Index				
Treatment effects	.00112***	–.00039**	.00154***	.00419***
	(1.23)	(–2.64)	(8.25)	(22.98)
Rainfall	.00019***	.00020***	.00018***	.00029***
	(796.23)	(495.97)	(478.48)	(573.92)
Constant	.49818***	.47459***	.54860***	.41234***
	(2,379.97)	(1,643.47)	(1,547.57)	(1,203.02)
R^2	.547	.713	.397	.74
N	6,006,512	2,489,985	2,548,325	968,202
Land Surface Water Index				
Treatment effects	.00246***	.00119***	.00249***	.00597***
	(23.10)	(7.93)	(14.32)	(28.93)
Rainfall	.00024***	.00031***	.00021***	.00033***
	(1,058.41)	(757.46)	(618.22)	(578.14)
Constant	.29130***	.25896***	.33695***	.21299***
	(1,440.26)	(875.02)	(1,024.19)	(549.03)
R^2	.746	.82	.697	.783
N	5,980,668	2,463,084	2,548,356	969,228

Source: Independent Evaluation Group analysis of geospatial data from SLMP I microwatersheds in three regions.
Note: Treatment indicator variable 1= if pixel is located in treated microwatersheds; 0= otherwise. Season-year fixed effects are not shown; SLMP = Sustainable Land Management Project. Values in parenthesis are standard errors.
***p <.01.

Table C.27. Effect of SLMP II Interventions: Difference-in-Differences Analysis of Geospatial Data Using Matched Treatment and Control Pixels

Selected Variables	Pooled	Amhara	Oromia	Tigray
Enhanced Vegetation Index				
Treatment effects	.00115***	.00185***	.00026*	.00107***
	(18.33)	(2.25)	(1.99)	(15.37)
Rainfall	.00007***	.00010***	.00009***	.00005***
	(65.30)	(416.33)	(398.37)	(255.08)
Constant	.24818***	.22297***	.33160***	.17131***
	(2,541.81)	(1,549.54)	(1,618.15)	(1,590.72)
R^2	.689	.714	.677	.827
N	8,616,069	3,545,830	2,887,141	2,183,098
Normalized Difference Vegetation Index				
Treatment effects	.00145***	.00306***	–.00108***	.00213***
	(14.96)	(21.23)	(–5.54)	(2.91)
Rainfall	.00005***	.00011***	.00011***	.00010***
	(307.18)	(298.79)	(331.72)	(365.44)
Constant	.44603***	.41963***	.57278***	.29170***
	(2,951.72)	(1,843.55)	(1,875.16)	(1,852.48)
R^2	.606	.664	.538	.843
N	8,615,963	3,545,838	2,886,912	2,183,213
Land Surface Water Index				
Treatment effects	.00167***	.00339***	–.00038*	.00138***
	(17.41)	(23.32)	(–2.14)	(1.93)
Rainfall	.00014***	.00022***	.00015***	.00013***
	(795.62)	(577.05)	(502.07)	(369.27)
Constant	.23120***	.21762***	.35337***	.07075***
	(1,550.55)	(948.85)	(1,254.39)	(363.52)
R^2	.782	.795	.796	.851
N	8,626,266	3,545,856	2,896,170	2,184,240

Source: Independent Evaluation Group analysis of geospatial data from SLMP II microwatersheds in three regions.
Note: Treatment indicator variable 1= if pixel is located in treated microwatersheds; 0= otherwise. Season-year fixed effects are not shown. Values in parenthesis are standard errors. SLMP = Sustainable Land Management Project.
***p <.01.

Reference

Ali, D. A., K. Deininger, and M. Monchuk. 2018. "Using Satellite Imagery to Assess Impacts of Soil and Water Conservation Measures: Evidence from Ethiopia's Tana-Beles Watershed." Policy Research Working Paper 8321, Washington, DC: World Bank.

[19] The overall rating depends on the assessment of the changes in the selected indicators. *Negligible* implies that there were visible effects on most of the indicators; *modest* implies that there were some effects on several of the indicators; *substantial* implies that there were significant effects on most of the indicators; *high* implies that there were very significant effects on most of the key indicators. Each rating was verified with a justification statement. The uptake of SLM practices on communal lands and farmlands and the land restoration effects were seen and documented with pictures taken during the site visit to the treated microwatershed. Local facilitators and the woreda experts explained the activities undertaken, the observed changes, and answered questions from the Independent Evaluation Group team. Additional information, including video and pictures documenting the biophysical changes before and after the project, were provided in some cases.

Appendix D. List of Persons Met

Name	Title	Organization
World Bank Group active and retired staff and consultants		
Iain G. Shuker	Practice Manager	World Bank
Paul Jonathan Martin	Lead Natural Resources Management Specialist	World Bank
Michael Carroll	Consultant	World Bank
Edward Dwumfour	Sr Environmental Specialist	World Bank
Million Alemayehu Gizaw	Sr Natural Resources Management Specialist	World Bank
Lucian Bucur Pop	Sr Social Protection Specialist	World Bank
Vikas Choudhary	Sr Agricultural Specialist	World Bank
Hisham Osman	Young Professional	World Bank
Ian Leslie Campbell	Consultant	World Bank
Hailu Tefera Ayele	Consultant	World Bank
Shimeles Sima Erketa	Consultant	World Bank
Sisay Nune Hailemariam	Consultant	World Bank
Government		
Kaba Urgessa	State Minster for Natural Resources	Ministry of Agriculture
Habtamu Hailu	Project Implementation Unit Coordinator, SLMP	Ministry of Agriculture
Feta Zeberga	Monitoring and Evaluation Coordinator, SLMP	Ministry of Agriculture
Andarg Firew	Monitoring and Evaluation Officer Productive Safety Nets Project	Ministry of Agriculture
Abiot Wondie	Agricultural Specialist PSNP	Ministry of Agriculture
Bogale Terafa	Team Leader on Land Use	Ministry of Agriculture
Abebaw Abebe	Land Law Legal Expert	Ministry of Agriculture
Abebe Seifu	Director, Ecosystem Rehabilitation and Combating Desertification	Environment, Forest and Climate Change Commission
Enideg Diress	SLMP Project Regional Coordinator, Amhara	Amhara Regional Bureau of Agriculture
Markos Wondie	Deputy Director, Natural Resource Management	Amhara Regional Bureau of Agriculture
Getahun Alameneh	Director, Land Administration	Land Administration and Use Bureau, Amhara
Tamirat Demissie	Director, Land Use	Land Administration and Use Bureau, Amhara
Derbew Ayalew	Director, Remote Sensing	Land Administration and Use Bureau, Amhara
Mohammed Ali	Senior Expert, Land Use and Focal Point for Land Certification under SLMP	Land Administration and Use Bureau, Amhara

Name	Title	Organization
Mehari Gebremedhin	SLMP—Regional Coordinator, Tigray	Regional Bureau of Agriculture, Tigray
Arefe Kiros	Productive Safety Nets Project —Regional Coordinator, Tigray	Regional Bureau of Agriculture, Tigray
Yitbarek Gebremedhin	Team Leader, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Muez Hailu	Director, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Girum Hagos Berhe	Procurement Specialist, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Gebreyohannes Kidanu Hindeya	Financial Management Specialist, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Berihu Tafere Mekonen	Monitoring and Evaluation Specialist, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Gebrecherkos Teka Gebreslassie	Infrastructure Specialist, Resilient Landscapes and Livelihoods Project	Regional Bureau of Agriculture, Tigray
Goyteom Gebreegziabher Gebrehiwet	Regional Planning, Monitoring and Evaluation Specialist	Regional Bureau of Agriculture, Tigray
Kiros Gebrehiwot Abraha	Regional Environment and Social Safeguards Specialist	Regional Bureau of Agriculture, Tigray
Sileshi Lemma	Deputy Director for Natural Resources Management	Regional Bureau of Agriculture, Oromia
Mohammed Haji	SLMP Project Regional Coordinator, Oromia	Ministry of Agriculture
Teshde Workinch	Sebata Hawas Woreda Head	Oromia Region
Taye Garema	Woliso Woreda Head	Oromia Region
Nigusu Degefe	Gimbichu Woreda Head	Oromia Region
Mulugeta	Fagita Lekoma Woreda Watershed Focal Person	Amhara Region
Melsew	Bure Woreda Watershed Focal Person	Amhara Region
Bayh Sineshaw	Gonji Kolela Woreda Watershed Focal Person	Amhara Region
Dessie Admass	Dembecha Woreda Watershed Focal Person	Amhara Region
Worku Aschale Nigat	Machakel Woreda Watershed Focal Person	Amhara Region
Multilateral, regional, and bilateral development partners		
Michael Glueck	Program Manager	German Agency for International Cooperation
Ato Tewodros Asefa	Program Officer	German Agency for International Cooperation
Fikirte Regassa Beyene	Program Officer	Norwegian Embassy
Shijie Yang	Evaluation Officer	International Fund for Agricultural Development
Ato Tesfaye Checkol	Program Officer	German Development Bank (KfW)

Appendix E. Borrower Comments

The Independent Evaluation Group invited the borrower to comment on the draft report. Accordingly, Mr. Habtamu Hailu, National Program Coordinator for the Sustainable Land Management Program, Ministry of Agriculture (Ethiopia), submitted the following response by email on Monday, September 21, 2020.

We have no major comments from our side.