Document of
The World Bank

Report No: ICR00003872

# IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IDA-44570, IDA-57150, TF-95045)

ON A

CREDIT

IN THE AMOUNT OF SDR 27.4 MILLION
(US$45.0 MILLION EQUIVALENT)

AND

AN ADDITIONAL FINANCING

IN THE AMOUNT OF SDR 3.7 MILLION
(US$5.1 EQUIVALENT)

TO THE

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

FOR THE

TANA AND BELES INTEGRATED WATER RESOURCES DEVELOPMENT PROJECT

February 21, 2017

Water Global Practice
Africa Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective November 20, 2016)

Currency Unit = Ethiopian Birr (ETB)
SDR 1.00 = US$1.353500
US$1.00 = ETB 22.33

FISCAL YEAR
July 1 to June 30

ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ARBA | Abbay River Basin Authority |
| ARBHC | Abbay River Basin High Council |
| BeSBO | Beles Sub-Basin Organization |
| BoARD | Bureau of Agriculture and Rural Development |
| BIS | Basin Information System |
| BoWIED | Bureau of Water Irrigation and Energy Development |
| CAS | Country Assistance Strategy |
| CWT | Community Watershed Team |
| DA | Development Agent |
| DSS | Decision Support System |
| ENTRO | Eastern Nile Technical Regional Organization |
| ESMF | Environmental and Social Management Framework |
| FMIS | Flood Management Information System |
| FPEW | Flood Preparedness and Early Warning Project |
| FSCDPO | Food Security Coordination and Disaster Prevention Office |
| FTC | Farmer Training Center |
| GIS | Geographic Information System |
| GoE | Government of Ethiopia |
| GoF | Government of Finland |
| GTP | Growth and Transformation Plan |
| HIS | Hydrological Information System |
| IA | Implementing Agency |
| ICR | Implementation Completion and Results Report |
| IFR | Interim Financial Report |
| IO | Intermediate Outcome |
| IP | Implementation Progress |
| IRR | Internal Rate of Return |
| ISR | Implementation Status and Results Report |
| IWRD | Integrated Water Resources Development |
| IWRM | Integrated Water Resources Management |
| IWRMP | Integrated Water Resources Management Plan |
| IWSM | Integrated Watershed Management |
| KWT | Kebele Watershed Team |
| M&E | Monitoring and Evaluation |
| MIS | Management Information System |
| MoFEC | Ministry of Finance and Economic Cooperation |

| | |
|---|---|
| MoU | Memorandum of Understanding |
| MoWIE | Ministry of Water Irrigation and Electricity |
| MTR | Midterm Review |
| NBI | Nile Basin Initiative |
| NMA | National Meteorological Agency |
| NPC | National Project Coordinator |
| NPCU | National Project Coordination Unit |
| NPSC | National Project Steering Committee |
| NPV | Net Present Value |
| NRM | Natural Resource Management |
| PAD | Project Appraisal Document |
| PASDEP | Plan for Accelerated and Sustained Development to End Poverty |
| PCU | Project Coordination Unit |
| PS | Procurement Specialist |
| RBO | River Basin Organization |
| RF | Results Framework |
| RPCU | Regional Project Coordination Unit |
| SBO | Sub-Basin Organization |
| SSI | Small-Scale Irrigation |
| SWAT | Soil and Water Assessment Tool |
| SWC | Soil and Water Conservation |
| TA | Technical Assistance |
| TaSBO | Tana Sub-Basin Organization |
| TBIWRDP | Tana and Beles Integrated Water Resources Development Project |
| TLU | Tropical Livestock Unit |
| WFMG | Woreda Flood Management Group |
| WRIS | Water Resources Information System |
| WRM | Water Resource Management |
| WWT | Woreda Watershed Team |

| | |
|---|---|
| Senior Global Practice Director: | Guang Zhe Chen |
| Practice Manager: | Wambui G. Gichuri |
| Project Team Leader: | John Bryant Collier |
| ICR Team Leader: | John Bryant Collier |
| ICR Author: | Rahel Wogayehu |

**ETHIOPIA**
**Tana & Beles Integrated Water Resources Development Project (P096323)**
**CONTENTS**

**ETHIOPIA**
**Tana and Beles Integrated Water Resources Development Project (P096323)**

**Datasheet**

| **A. Basic Information** | | | |
|---|---|---|---|
| Country: | Ethiopia | Project Name: | Tana & Beles Integrated Water Resources Development (TBIWRDP) |
| Project ID: | P096323 | L/C/TF Number(s): | IDA-44570, IDA-57150, TF-95045 |
| ICR Date: | 01/16/2017 | ICR Type: | Core ICR |
| Lending Instrument: | Specific Investment Loan | Borrower: | GOVERNMENT OF ETHIOPIA |
| Original Total Commitment: | SDR 27.40 million | Disbursed Amount: | SDR 31.10 million |
| Revised Amount: | SDR 31.10 million | | |
| **Environmental Category: B** | | | |
| **Implementing Agencies:**<br>Ministry of Water Irrigation and Electricity | | | |
| **Cofinanciers and Other External Partners:** Government of Finland (GoF) | | | |

| **B. Key Dates** | | | | |
|---|---|---|---|---|
| **Process** | **Date** | **Process** | **Original Date** | **Revised / Actual Date(s)** |
| Concept Review: | 06/26/2006 | Effectiveness: | 10/08/2008 | 10/08/2008 |
| Appraisal: | 02/11/2008 | Restructuring(s): | | 07/07/2010<br>09/27/2011<br>03/28/2013<br>08/23/2013<br>12/19/2014<br>07/15/2015<br>08/25/2015 |
| Approval: | 05/29/2008 | Mid-term Review: | 03/15/2011 | 04/26/2011 |
| | | Closing: | 09/30/2013 | 07/31/2016 |

| **C. Ratings Summary** | |
|---|---|
| **C.1 Performance Rating by ICR** | |
| Outcomes: | Moderately Satisfactory |
| Risk to Development Outcome: | Substantial |
| Bank Performance: | Moderately Satisfactory |
| Borrower Performance: | Moderately Satisfactory |

| C.2 Detailed Ratings of Bank and Borrower Performance (by ICR) | | | |
|---|---|---|---|
| **Bank** | **Ratings** | **Borrower** | **Ratings** |
| Quality at Entry: | Moderately Unsatisfactory | Government: | Moderately Satisfactory |
| Quality of Supervision: | Satisfactory | Implementing Agency/Agencies: | Moderately Satisfactory |
| **Overall Bank Performance:** | Moderately Satisfactory | **Overall Borrower Performance:** | Moderately Satisfactory |

| C.3 Quality at Entry and Implementation Performance Indicators | | | |
|---|---|---|---|
| **Implementation Performance** | **Indicators** | **QAG Assessments (if any)** | **Rating** |
| Potential Problem Project at any time (Yes/No): | Yes | Quality at Entry (QEA): | None |
| Problem Project at any time (Yes/No): | Yes | Quality of Supervision (QSA): | None |
| DO rating before Closing/Inactive status: | Moderately Satisfactory | | |

| D. Sector and Theme Codes | | |
|---|---|---|
| | **Original** | **Actual** |
| **Sector Code (as % of total Bank financing)** | | |
| Other Agriculture, Fishing and Forestry | 30 | 30 |
| Other Public Administration | 15 | 15 |
| Other Transportation | 10 | 10 |
| Other Water Supply, Sanitation and Waste Management | 40 | 40 |
| Water Supply | 5 | 5 |
| | | |
| **Theme Code (as % of total Bank financing)** | | |
| Participation and civic engagement | 25 | 25 |
| Rural services and infrastructure | 25 | 25 |
| Water resource management | 50 | 50 |

| E. Bank Staff | | |
|---|---|---|
| **Positions** | **At ICR** | **At Approval** |
| Vice President: | Makhtar Diop | Obiageli Katryn Ezekwesili |
| Country Director: | Carolyn Turk | Kenichi Ohashi |
| Practice Manager/Manager: | Wambui G. Gichuri | Ashok K. Subramanian |
| Project Team Leader: | John Bryant Collier | E. V. Jagannathan |
| ICR Team Leader: | John Bryant Collier | |
| ICR Primary Author: | Rahel Wogayehu | |

## F. Results Framework Analysis

**Project Development Objectives (**from Project Appraisal Document**)**
The Project Development Objective is to develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basins to accelerate sustainable growth.

**Revised Project Development Objectives (as approved by original approving authority)**
Develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basins for integrated water resources development.

### (a) PDO Indicator(s)

| Indicator | Baseline Value | Original Target Values (from approval documents) | Formally Revised Target Values | Actual Value Achieved at Completion or Target Years |
|---|---|---|---|---|
| **Indicator 1:** | % reduction in sediment loads from targeted watersheds. | | | |
| Value (quantitative or qualitative) | 0 | 10% | Indicator dropped | N/A |
| Date achieved | 05/28/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | The indicator was dropped as part of 2011 restructuring; however, the target was exceeded: sedimentation load average reduction achievement was 50% according to micro-watershed hydrological monitoring & evaluation report and impact assessment. | | | |
| **Indicator 2:** | Period that the lake level is not within agreed limits (days per year) | | | |
| Value (quantitative or qualitative) | Not recorded. | <10 days | Indicator dropped | N/A |
| Date achieved | 05/28/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | Indicator dropped in 2011. Lake levels have not shown 2003 lows that affected navigation and fisheries, nor the 1997 highs (see annex 2). The project supported monitoring, studies (hydrology, bathymetry), and modeling to improve lake-level management. | | | |
| **Indicator 3:** | % increase in private sector investments in the Tana and Beles sub-basins (US$ millions per year) | | | |
| Value (quantitative or qualitative) | 0% | 30% | Indicator dropped | N/A |
| Date achieved | 05/29/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | Indicator dropped in 2011. The country has seen a dramatic rise in private sector outlays and foreign direct investment in recent years, (see annex 2), but it is unclear how much domestic and foreign private sector investment was in these sub-basins. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 4:** | % reduction in average loss of assets due to flooding around Lake Tana (ETB per year relative to flood return period). | | | |
| Value (quantitative or qualitative) | 0% | 30% | Indicator dropped | N/A |
| Date achieved | 05/29/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | Indicator dropped in 2011. The project has positively contributed to flood management, protection, and mitigation. There was no asset loss during the past rainy season, and the project activities should help reduce flood damages in the future. | | | |
| **Indicator 5:** | Tana and Beles sub-basin organizations are sufficiently equipped with knowledge base and analytical tools for integrated water resources planning and management. | | | |
| Value (quantitative or qualitative) | No sub-basin organizations (SBOs) at the beginning of the project. | Interactive knowledge base products launched; knowledge base and analytical tools support sub-basin plan development for Tana and Beles sub-basins. | | Tana and Beles Sub-basin Organizations (TaSBO) and (BeSBO) established with the necessary capacity; knowledge base created. Sub-basins have used a range of modeling/analytical tools and developed initial Sub-basin plans that have been approved by ARBHC. |
| Date achieved | 05/29/2008 | 03/28/2013 | | 07/31/2016 |
| Comments (including % achievement) | Target achieved. The establishment of the SBOs with adequate capacity, knowledge, tools, and institutional infrastructure should improve more integrated water resources planning (for example, through the sub-basin plans) and management. | | | |
| **Indicator 6:** | Land area where sustainable land management practices have been adopted as a result of the project (by hectare). | | | |
| Value (quantitative or qualitative) | 0 | 80,000 | 65,355 | 79,288 |
| Date achieved | 05/29/2008 | 03/28/2013 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | 121% of revised and 99% of original target achieved - 44,355 ha cultivated farm (54,159 ha 122%); 16,000 ha hillside degraded (19,717 ha 123%); and 1000 ha treated eroded gully (1089 ha 109%), land areas were treated and rehabilitated. | | | |
| **Indicator 7:** | Initial integrated basin management plans for Tana and Beles sub-basins developed and discussed by key stakeholders (regional bureaus and authorities, basin organizations, civil society organizations, and community representatives). | | | |
| Value (quantitative or qualitative) | No water resource plans for Tana and Beles sub-basins. | Sub-basin plans for Tana and Beles developed and discussed with key stakeholders. | | The initial integrated water resources management (IWRM) plans for Tana and Beles sub-basins were developed through key stakeholder consultation and approved by ARBHC. |
| Date achieved | 05/29/2008 | 03/28/2013 | | 07/31/2016 |
| Comments (including % achievement) | Target achieved; 14 intensive stakeholder consultations from the planned 6 were conducted to develop the sub-basin plans. This indicator was an original PAD intermediate outcome (IO) indicator, transferred to a PDO indicator during the 2011 restructuring. | | | |

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|---|---|---|---|---|
| **Indicator 8:** | Soil Erosion Monitoring and Evaluation system developed and monitoring network in place. | | | |
| Value (quantitative or qualitative) | No soil and water monitoring system in place in the project area of Amhara Region. | M&E system and network for soil erosion M&E operational. | M&E system and network for soil erosion M&E operational by Bureaus of Water Resource, Amhara Region (for micro-watersheds), and TaSBO (for sub-watersheds). | M&E/MIS network for soil erosion monitoring (BoWRD, BoARD, and TaSBO); hydrological gauging stations at the sub-watershed level installed; sedimentation and hydrological data of micro-watersheds collected and analyzed. |
| Date achieved | 05/29/2008 | 09/27/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. Sedimentation and hydrological data of micro-watersheds monitored and analyzed. | | | |
| **Indicator 9:** | Cumulative area with improved natural resources management practices (hectare) (soil conservation, afforestation, rain-fed agriculture improvement, etc.) in the Ribb, Gumera, and Jemma sub-watersheds in the Farta, Dera, Esite, Merawi, and Sekala Woredas. | | | |
| Value (quantitative or qualitative) | 0 | 80,000 | 83,000 | 79,288 |
| Date achieved | 05/29/2008 | 09/27/2011 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. 95.5% of revised target and 99% of original target achieved. This indicator was originally an IO indicator but transferred to a PDO indicator during the 2011 restructuring; it is similar to indicator 6. | | | |
| **Indicator 10:** | Initial integrated basin management plans for Tana and Beles sub-basins developed and approved by key stakeholders (regional bureaus and authorities, basin organizations, civil society organizations, and community representatives). | | | |
| Value (quantitative or qualitative) | 0 | 2 | | 2 |
| Date achieved | 05/29/2008 | 08/25/2015 | | 07/31/2016 |
| Comments (including % achievement) | Fully achieved; target revised with quantitative value including approval in 2015. Sub-basin plans for Tana and Beles were developed (as reported in indicator 7), and have been presented to and approved by the Abbay River Basin High Council (ARBHC). | | | |
| **Indicator 11:** | Number of direct project beneficiaries. | | | |
| Value (quantitative or qualitative) | 0 | N/A | 219,200 | 219,200 |
| Date achieved | 05/29/2008 | 04/26/2011 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. Not an original PAD indicator but included in 2015 as a World Bank core indicator. This includes targeted direct watershed activity beneficiaries alone. In addition, there were 93,597 people in the targeted flood-prone areas. | | | |

| **Indicator 12:** | % of female beneficiaries. | | | |
|---|---|---|---|---|
| Value (quantitative or qualitative) | 0 | N/A | 50 | 50 |
| Date achieved | 05/29/2008 | 04/26/2011 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. It was calculated based on the male: female ratio in the region, which is 50%. | | | |

**(b) Intermediate Outcome Indicator(s)**

| **Indicator** | **Baseline Value** | **Original Target Values (from approval documents)** | **Formally Revised Target Values** | **Actual Value Achieved at Completion or Target Years** |
|---|---|---|---|---|
| **Indicator 1:** | **Original**: Sub-basin organizations operational.<br><br>**Revised**: Sub-basin organizations operational (with permanent heads appointed and core staff and approved basin plans in place). | | | |
| Value (quantitative or qualitative) | No sub-basin organizations exist. | Sub-basin organization activities initiated. | Office buildings with adequate knowledge base, analytical tools, and capacity for sub-basin planning and management. | TaSBO and BeSBO operational with permanent heads appointed and core staff in place. Office buildings were operational with adequate knowledge base, analytical tools, and capacity for sub-basin planning. |
| Date achieved | 05/29/2008 | 04/26/2011 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. SBO buildings, equipment, permanent heads, and core staff in place, SBO capacity for planning and management created; SBO plans produced through in-house process with analytical and stakeholder inputs and approved by ARBHC. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 2:** | **Original**: Water resources monitoring network operational, information collected and used routinely and DSS fully functional and used routinely.<br><br>**Revised**: Water resources monitoring network operational and information collected and used routinely. | | | |
| Value (quantitative or qualitative) | Fragmented monitoring; no shared knowledge base. | Water resource information system and Decision Support System (DSS) fully operational. | Enhanced HIS/BIS water resource monitoring network (radar, gauging, and earth observation) for TaSBO and BeSBO operational; Comprehensive basin knowledge base and supporting analytical/modeling tools used to support planning and operational decisions. | HIS/BIS monitoring network upgraded; gauging stations were established, and the water resource monitoring network is operational. Different models were developed and used to support the sub-basin planning process including customizing the Nile DSS. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target achieved. The HIS was upgraded and gauging stations were established. TaSBO and BeSBO used a suite of models including the Nile DSS developed by the NBI. Operationalization has been initiated and models are being further refined. | | | |
| **Indicator 3:** | Initial integrated water resources plans developed and operational for Tana and Beles Sub-basins'. | | | |
| Value (quantitative or qualitative) | No water resource plans for Tana and Beles sub-basins'. | Revised lake water balance determined; Tana and Beles sub-basins plans developed'. | Indicator dropped. | N/A |
| Date achieved | 05/29/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | This indicator was upgraded from the IO indicator to PDO-level indicator during the restructuring in 2011 and reported earlier under PDO indicator 7. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 4:** | Flood Management Information System (FMIS) developed and used routinely. | | | |
| Value (quantitative or qualitative) | No FMIS in place; no modern flood forecasting and communication at regional, woreda, and kebele levels. | FMIS fully operational. | Flood forecasting and early warning system in place and used for the flood-prone areas around Lake Tana. | Flood forecasting and early warning system is in place; flood risk maps produced to plan for early warning, flood preparedness, and response to be used for the flood-prone areas around Lake Tana. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target partially achieved. Flood forecasting and early warning system in place but full operationalization of the FMIS is yet to happen. The flood forecasting system is also being linked with the radar to utilize real-time weather data. | | | |
| **Indicator 5:** | Number of stakeholder meetings conduced to develop and review sub-basin plans. | | | |
| Value (quantitative or qualitative) | No broad-based stakeholder meetings to develop/review sub-basin plans. | Greater than or equal to 2 per year. | 6 broad-based stakeholder meetings held (3 by TaSBO and 3 by BeSBO) to support sub-basin planning. | 14 stakeholder meetings (10 by TaSBO and 4 by BeSBO) conducted to support sub-basin planning. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | 230% of target was achieved. Although this indicator was dropped during the 2015 restructuring, it is an important indicator in the sub-basin plan process; sub-basin plans were discussed and awareness created through stakeholder consultations. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 6:** | Cumulative number of hectares of micro-watersheds with improved management (afforestation, rain-fed agriculture improvement) in Ribb, Gumera, and Jemma sub-watersheds in the Farta, Dera, Estie, Merawi, and Sekala Woredas. | | | |
| Value (quantitative or qualitative) | 0 | 80,000 ha managed micro-watershed; 5669 ha soil and water conservation; 1220 ha forestry and 309 ha mix use; 20 nurseries; 3000 ha community forests; 2000 ha household woodlots; 20% households improve fodder production and controlled grazing. | Indicator dropped. | N/A |
| Date achieved | 05/29/2008 | 04/26/2011 | 09/27/2011 | 07/31/2016 |
| Comments (including % achievement) | This indicator was upgraded from IO to PDO-level indicator during the 2011 restructuring; achievement is discussed above under PDO indicators 6 and 9. | | | |
| **Indicator 7:** | **Original**: No. of households adopting improved soil and water management practices<br><br>**Revised**: No. of households (including female beneficiaries) adopting improved soil and water management practices in the project area. | | | |
| Value (quantitative or qualitative) | 0 | 30,000 | — | 44,355 |
| Date achieved | 05/29/2008 | 04/26/2011 | — | 07/31/2016 |
| Comments (including % achievement) | Target exceeded; 147% of the target achieved. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 8:** | Increase in community infrastructure (small-scale irrigation, access roads, foot bridges, rural water supply source development, and flourmills) provided in targeted kebeles. | | | |
| Value (quantitative or qualitative) | 0 ha irrigation; 2500 ha under high-value crops; 0 km access roads and 0 km internal access paths upgraded; 0 foot bridges constructed; 0 springs developed for improved water supply; 0 community flourmills upgraded. | 1500 ha irrigation; 4000 ha under high-value crops; 135 km access roads upgraded; 230 foot bridges constructed; 650 springs developed for improved water supply; 35 community flourmills upgraded; 2 hours after warning issued. | Small-scale irrigation (SSI) 1000 ha (14 schemes); community access path 80 km; foot bridges (8 foot bridges) community water supply points (432); 5 forage nurseries; 35 farmer training centers. | 14 SSI rehabilitated in 1000 ha; 66.79 km access roads, 139.52 km internal access paths, and 84 foot bridges constructed; 740 water points constructed; 20 forage nurseries, 22 farmer training centers constructed/upgraded; 10 flourmills established. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target met; a number of sub-indicator targets were revised in 2013 and 2015. Some of the targets met or exceeded expectation and some were below target, for example, SSI 100%; access road 83%; water points 111%; forage nurseries 400%. | | | |
| **Indicator 9:** | Average warning time for flood forecast information to reach targeted kebeles for improved preparedness. | | | |
| Value (quantitative or qualitative) | No existing effective system for flood forecasting and communication at the regional level. | Flood management plans adopted by relevant institutions and targeted communities. | 2 hours of advance warning for targeted communities using improved forecasting tools and early warning system. | Woreda Flood Management Groups (WFMGs) were established and flood management plans were adopted by relevant institutions and communities; mobile phones for communication provided and early warning indicators installed. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target partially achieved; the project has contributed to flood management. Flood forecasting and early warning systems are largely in place; sirens were installed (after project closure) and operational to improve advance warning. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 10:** | Increased capacity in the project areas for sustainable NRM practices and interventions. | | | |
| Value (quantitative or qualitative) | No project-related capacity development interventions. | 36 tree nurseries established; 3000 ha community forests and 2000 ha household woodlots; 20% households improve fodder production and controlled grazing/stall-feeding. | Demonstrated capacity to sustain improved natural resource management (NRM) practices and interventions. | 163 community watersheds identified; watershed teams at different levels established and capacity strengthened to sustain improved NRM practices; each community watershed prepared comprehensive (multiyear) watershed development plans of their own. |
| Date achieved | 09/27/2011 | 09/27/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Target achieved; watershed teams, woreda specialists, and development agents' capacity strengthened to facilitate the watershed management that would likely sustain improved NRM practices. | | | |
| **Indicator 11:** | Community contribution in the total project costs (US$ millions) | | | |
| Value (quantitative or qualitative) | 0 | 11.47 | 15% | 15% |
| Date achieved | 03/28/2013 | 03/28/2013 | 08/25/2015 | 07/31/2016 |
| Comments (including % achievement) | Target achieved (100%); this indicator was introduced during March 2013 as a World Bank core indicator. It was revised in 2015 as percentage of community contribution in the total project costs, which is US$70.65 million, and target was set at 15%. | | | |
| **Indicator 12:** | Number of land users (including female beneficiaries) adopting sustainable land management practices as a result of the project. | | | |
| Value (quantitative or qualitative) | 0 | 60,000 | — | 44,355 |
| Date achieved | 05/29/2008 | 03/28/2013 | — | 07/31/2016 |
| Comments (including % achievement) | 74% achieved; indicator was introduced in the March 2013 restructuring. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 13:** | Increase in community infrastructure provided in targeted kebeles (access roads in km). | | | |
| Value (quantitative or qualitative) | 0 | 80 | — | 67 |
| Date achieved | 05/29/2008 | 08/25/2015 | — | 07/31/2016 |
| Comments (including % achievement) | 84% achieved; indicator introduced during 2015 restructuring. | | | |
| **Indicator 14:** | Farm area provided with improved irrigation supply through the rehabilitation of damaged small-scale irrigation facilities. | | | |
| Value (quantitative or qualitative) | 0 | 1000 | — | 1000 |
| Date achieved | 05/29/2008 | 08/25/2015 | — | 07/31/2016 |
| Comments (including % achievement) | 100% achieved; indicator introduced during the 2015 restructuring. | | | |
| **Indicator 15:** | Development of community drinking water facilities in the project area. | | | |
| Value (quantitative or qualitative) | 0 | 650 | — | 740 |
| Date achieved | 05/29/2008 | 08/25/2015 | — | 07/31/2016 |
| Comments (including % achievement) | 114% achieved; indicator introduced during the 2015 restructuring. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 16:** | Rehabilitation of internal community access paths and routes. | | | |
| Value (quantitative or qualitative) | 0 | 5 | — | 5 |
| Date achieved | 05/29/2008 | 08/25/2015 | — | 07/31/2016 |
| Comments (including % achievement) | 100% achieved; indicator introduced in the 2015 restructuring. | | | |
| **Indicator 17:** | **Original**: Endowment and Growth Framework in place for the Tana-Beles area.<br><br>**Revised**: Endowment and growth potential and constraints in the Tana-Beles area analyzed and discussed. | | | |
| Value (quantitative or qualitative) | Endowment and growth study consultant in place, study initiated. | 4 growth-oriented investments prepared. | Study findings reflected into Tana and Beles sub-basin planning process. | The endowment and growth study was completed and discussed at a stakeholder consultation workshop; study findings were reflected in the Tana and Beles sub-basin planning process. |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | Revised target was fully achieved. This indicator was revised during the March 2013 restructuring that dropped all activities of Component C, except this activity which was completed by the time of the restructuring. | | | |
| **Indicator 18:** | Incentives in place to enhance targeted private sector participation. | | | |
| Value (quantitative or qualitative) | Only Amhara and Benishangul Gumz (private sector) investment promotion agencies in place. | Incentives in place to enhance targeted private sector participation. | This indicator was dropped. | N/A |
| Date achieved | 05/29/2008 | 04/26/2011 | 03/28/2013 | 07/31/2016 |
| Comments (including % achievement) | This PAD indicator was dropped as part of the March 2013 restructuring when the remaining activities of Component C were dropped. | | | |

| | | | | |
|---|---|---|---|---|
| **Indicator 19:** | Procurement conducted per procurement plan. | | | |
| Value (quantitative or qualitative) | N/A | Procurement done according to the plan. | — | Procurement was done as planned, except for some delays. |
| Date achieved | 05/29/2008 | 04/26/2011 | — | 07/31/2016 |
| Comments (including % achievement) | Target partially met, as there were delays in some of the major procurements. | | | |
| **Indicator 20:** | Reports prepared biannual (project physical and financial progress); annual (audit, training, monitoring); midterm and final (evaluation). | | | |
| Value (quantitative or qualitative) | N/A | Reports of adequate quality on time. | — | Reports were prepared and submitted, but there were delays in submitting interim financial reports, progress reports, and audits and substandard quality in some instances. |
| Date achieved | 05/29/2008 | 04/26/2011 | — | 07/31/2016 |
| Comments (including % achievement) | Target partially achieved. | | | |
| **Indicator 21:** | A full-time National Project Coordinator (NPC) and full-time Procurement Specialist (PS) in place at the National Project Coordination Unit (NPCU) continually to effectively manage the project and its procurements. | | | |
| Value (quantitative or qualitative) | N/A | A full-time NPC and full-time PS in place at the NPCU. | — | Full-time NPC and PS were recruited in 2013 and they worked till the closure of the project. |
| Date achieved | 05/29/2008 | 03/28/2013 | — | 07/31/2016 |
| Comments (including % achievement) | Target fully achieved. This indicator was introduced during the 2013 restructuring. | | | |

## G. Ratings of Project Performance in ISRs

| No. | Date ISR Archived | DO | IP | Actual Disbursements (US$, millions) |
|---|---|---|---|---|
| 1 | 11/25/2008 | Satisfactory | Satisfactory | 0.00 |
| 2 | 05/19/2009 | Satisfactory | Moderately Satisfactory | 3.17 |
| 3 | 12/04/2009 | Satisfactory | Moderately Satisfactory | 3.46 |
| 4 | 05/04/2010 | Moderately Satisfactory | Moderately Unsatisfactory | 3.46 |
| 5 | 12/07/2010 | Moderately Satisfactory | Moderately Unsatisfactory | 5.03 |
| 6 | 03/19/2011 | Moderately Satisfactory | Moderately Satisfactory | 5.25 |
| 7 | 10/19/2011 | Moderately Satisfactory | Moderately Satisfactory | 7.36 |
| 8 | 06/04/2012 | Moderately Unsatisfactory | Moderately Unsatisfactory | 12.12 |
| 9 | 02/03/2013 | Moderately Unsatisfactory | Moderately Unsatisfactory | 16.13 |
| 10 | 10/07/2013 | Moderately Satisfactory | Moderately Satisfactory | 21.40 |
| 11 | 04/09/2014 | Moderately Satisfactory | Moderately Satisfactory | 26.40 |
| 12 | 09/10/2014 | Moderately Satisfactory | Moderately Satisfactory | 30.29 |
| 13 | 02/25/2015 | Moderately Satisfactory | Moderately Satisfactory | 35.96 |
| 14 | 07/17/2015 | Moderately Satisfactory | Moderately Satisfactory | 38.83 |
| 15 | 03/04/2016 | Moderately Satisfactory | Moderately Satisfactory | 42.68 |
| 16 | 10/20/2016 | Moderately Satisfactory | Moderately Satisfactory | 44.19 |

## H. Restructurings

| Restructuring Date(s) | Board Approved PDO Change | ISR Ratings at Restructuring | | Amount Disbursed at Restructuring in US$, millions | Reason for Restructuring and Key Changes Made |
|---|---|---|---|---|---|
| | | DO | IP | | |
| 07/01/2010 | N | MS | MU | 4.27 | Level 2 restructuring extended the date for requiring the establishment of the BeSBO from December 31, 2009, to December 31, 2010. |
| 09/27/2011 | N | MS | MS | 7.17 | Level 2 restructuring, the findings of a comprehensive MTR (April 26 to May 6, 2011) categorized the project as at-risk project since the cumulative time-bound outputs were far behind the agreed targets of the project's Results Framework while the project was left with 50% of the implementation time and only disbursed 19% of the IDA resource: (a) all the PDO indicators were revised; (b) outputs of Component C revised (scaled down); (c) IDA Credit of US$1.15 million reallocated from Component C to Component A; and (d) project outcome indicators and IO indicators and targets for Components A, B, and C revised. |

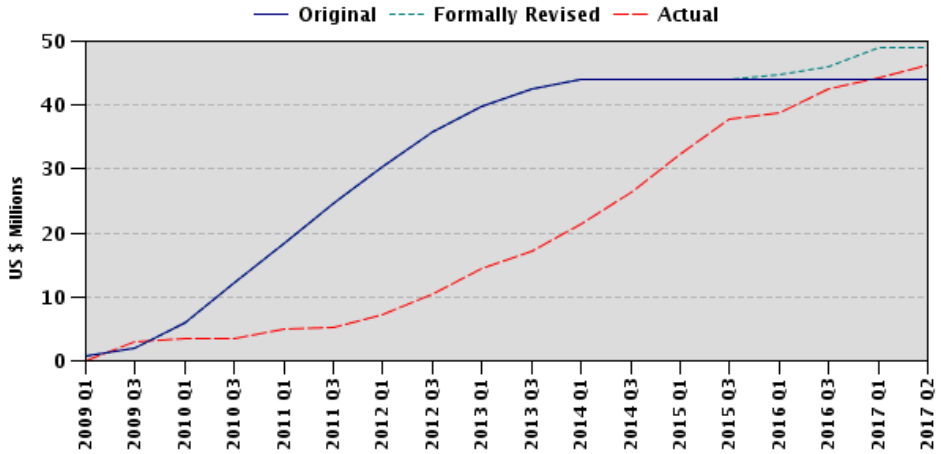
| Restructuring Date(s) | Board Approved PDO Change | ISR Ratings at Restructuring | | Amount Disbursed at Restructuring in US$, millions | Reason for Restructuring and Key Changes Made |
|---|---|---|---|---|---|
| | | DO | IP | | |
| 03/28/2013 | Y | MU | MU | 17.07 | Level 1 restructuring to simplify complex project objective: (a) all Component C remaining activities (scaled down in 2011), except completed activities, dropped and remaining IDA funds of US$6.9 million reallocated to Components A and B; (b) PDO revised and key performance indicators and Results Framework also revised (note to review annex 2); (c) some PDO and IO indicators dropped in line with the revised PDO; World Bank Core Indicators integrated into the indicators; (d) scope of the following components was reduced: (i) Component A, consultancy for the development of DSS was dropped and Eastern Nile Technical Regional Organization (ENTRO) DSS was adopted and (ii) Component B, construction of 14.7 km of access roads to hydrological monitoring stations under Subcomponent B1 and 77 km of escape routes under Subcomponent B2 dropped. |
| 08/23/2013 | N | MU | MU | 21.40 | Level 2 restructuring extended the closing date that was September 30, 2013, to September 30, 2014 (contingent on the achievement of milestones agreed at the time of the fourth restructuring). |
| 12/19/2014 | N | MS | MS | 34.90 | Level 2 restructuring extended the closing date to July 30, 2015 (contingent on the achievement of milestones agreed at the time of the fifth restructuring). |
| 07/15/2015 | N | MS | MS | 38.83 | Level 2 restructuring extended the closing date by 12 months to July 31, 2016, to allow completion of the ongoing tasks and fully achieve the PDO. |

| Restructuring Date(s) | Board Approved PDO Change | ISR Ratings at Restructuring | | Amount Disbursed at Restructuring in US$, millions | Reason for Restructuring and Key Changes Made |
|---|---|---|---|---|---|
| | | DO | IP | | |
| 08/25/2015 | Y | MS | MS | 38.83 | (a) Level 1 restructuring and additional finance of SDR 3.7 million equivalent to US$5.1 million approved to make up a shortfall in project financing due to the depreciation of SDR (US$3.8 equivalent) and US$1.3 million required in additional operating costs and training due to one-year extension.<br>(b) The PDO was revised to make it consistent with the project name and water sector.<br>(c) Closing date was extended by 12 months to July 31, 2016, to allow completion of the ongoing tasks and fully achieve the PDO. |

If PDO and/or key outcome targets were formally revised (approved by the original approving body) enter ratings below:

| | Outcome Ratings |
|---|---|
| **Against Original PDO/Targets** | Moderately Unsatisfactory |
| **Against Formally Revised PDO/Targets** | Satisfactory |
| **Overall (weighted) rating** | Moderately Satisfactory |

## I. Disbursement Profile



# 1. Project Context, Development Objectives, and Design

## 1.1 Context at Appraisal

### Country and Sector Background

1. Ethiopia is one of the most populous countries in Sub-Saharan Africa with a population of 76.5 million at appraisal that is estimated to have reached about 100 million in 2016.[1] It is also one of the poorest, with a per capita gross domestic product of US$240 at appraisal, which is about a fifth of the Sub-Saharan Africa average. The per capita gross domestic product is reported to have reached US$486 in 2015, which is substantially lower than the regional average of US$1257 and among the ten lowest worldwide. Although the country has abundant human and natural resources and good potential for development, poverty is widespread and often directly linked to environmental and natural resource degradation.

2. Ethiopia has substantial water resources, but at the time of appraisal these had significant challenges for monitoring, cross-sectoral coordination, management, and development. The country has 12 major river basins, eight major lakes, significant groundwater resources, and substantial annual rainfall. The Abbay basin (Blue Nile Basin) is the largest with a basin area of about 200,000 $km^2$. Tana (catchment area of 15,054 $km^2$) and Beles (14,200 $km^2$) form important sub-basins of the Abbay basin. Given the significant economic, environmental, and cultural endowments in these sub-basins, these sub-basins offer tremendous opportunities for accelerated economic growth supported by careful sustainable development of these endowments.

3. At appraisal, the Government of Ethiopia (GoE) was implementing its Plan for Accelerated and Sustained Development to End Poverty (PASDEP) 2005–2010. The PASDEP had an objective to lay out the directions for accelerated, sustained, and people-centered economic development as well as paving the way for the attainment of the Millennium Development Goals. To achieve this, "a massive push to accelerate growth" was one of the objectives, with a push for the development of economic growth corridors. Given the vast arable land, labor, and water resources of the country, agriculture and water resources were natural entry points for the growth corridor approach in the country. The PASDEP identified the Tana and Beles Zones as the first of five proposed growth zones. In addition, based on the Ethiopia Water Resources Management Policy, to improve holistic water resources planning and management, the GoE had issued a proclamation (proclamation no. 534/2007) in July 2007 for creating river basin organizations (RBO)and mandate them to have River Basin Plans to provide a long-term framework for systematic water resources management (WRM) in the basin and sub-basins that will ensure equitable sharing, sustainable development, and use of water resources.

### Project Background

4. Lake Tana, the source of the Blue Nile (Abbay), is a valuable water resource, but it is also ecologically fragile. At the time of appraisal, it was showing growing signs of stress resulting from several social, environmental, economic, and institutional factors. For example, significant water and natural resources degradation was resulting in high erosion and sedimentation, leading to flood damages, lake turbidity, fisheries, and navigation. Rural areas around Lake Tana were also subject to significant flooding, especially in the Fogera and Dembia Woredas. The impact of these floods was magnified by the absence of good flood warning systems, poor road access, and lack of small-scale community infrastructure. The lake levels have also dropped as the lakes were operated primarily for hydropower, and thus navigation and fisheries were affected by low lake levels in 2003. The hydropower plant and tunnel from Lake Tana to the

[1] According to the United Nations Population Fund world population dashboard, Ethiopia's estimated population in 2016 was 100 million.

Beles sub-basin was also expected to exacerbate this if not properly operated. The Beles sub-basin was included in the project due to this link. The Beles sub-basin, located southwest of Lake Tana, had significant hydropower and agricultural potential that was considered part of the growth corridor story to provide the inputs for processing in the more populous and connected Tana sub-basin. The Beles sub-basin is endowed with a large range of virgin land and many tributaries to Beles River with reasonably favorable topography, water resource, and land availability that could contribute to the expansion of different economic activities.

5. There was an urgent need to build enabling institutions and capacity to improve the management of Lake Tana and the related Tana and Beles sub-basins to meet these challenges and to balance multisectoral interests with the sustainability of the resource in a sub-basin context. According to the GoE proclamation No. 534/2007, a key task of an RBO is to formulate and monitor the implementation of sub-basin plans for integrated water resources management (IWRM). The Tana and Beles Integrated Water Resources Development Project (TBIWRDP) was, therefore, designed to help improve sustainable resource management, improve livelihoods, and stimulate growth in the area. The project was planned to concentrate on a balance of critical institutional development and resource management investments, as well as to prepare a pipeline of well-designed sub-basin development investments for implementation during successive projects. It should be noted that, at appraisal, it was considered that a single project will not be adequate to undertake all activities required for sustainable development and management of the sub-basins to stimulate economic growth, given the scale and complexity of the challenges.

**Rationale for World Bank Involvement**

6. The World Bank has been a significant development partner for Ethiopia. In 2008, the Country Assistance Strategy (CAS) focused on sustaining the takeoff in service delivery and economic growth. The GoE identified the Tana and Beles corridor as one area for sustainable growth in its poverty reduction strategy, PASDEP, and the World Bank supported this effort to stimulate growth and better manage valuable natural resources. The World Bank support was in line with the World Bank's 2006 Water Resources Country Assistance Strategy (Water CAS) for Ethiopia, which outlined a strategic approach to assisting water-related sectors and described the scope and scale of impacts of hydrological variability on Ethiopia's economic performance, poverty, natural resources, and socioeconomic conditions. The strategy also identified strengthening water resource development and management as one of the priority responses to water resources challenges including institutional strengthening, building capacity for effective WRM, and encouraging community watershed management—all of which are included in this project.

7. The World Bank, through its involvement in multiple development sectors in Ethiopia and its ability to draw upon global experience, was well placed to provide support, to reduce degradation of Lake Tana, and support IWRM of the Tana and Beles sub-basins. The World Bank has extensive global knowledge and experience in watershed management. The World Bank was also in a position to assist the GoE in creating the enabling institutions and investments with the judicious blending of technical assistance (TA), facilitation, and investments required for IWRM and for supporting development.

## 1.2 Original Project Development Objectives (PDO) and Key Indicators (as approved)

8. The Project Development Objective was to "develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basins to accelerate sustainable growth."

9. The key PDO indicators identified at appraisal were (a) percent reduction in sediment loads from targeted watersheds; (b) period that the lake level is not within agreed limits; (c) percent increase in private sector investments in the Tana and Beles sub-basins; and (d) percent reduction in average loss of assets due to flooding around Lake Tana.

### 1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification

10. The revised PDO is "to develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basin for integrated water resources development." During the restructuring in 2011, which was conducted following the midterm review (MTR), all the PDO indicators and targets were revised with no change to the PDO. The PDO was revised through a level one restructuring of the project approved in March 2013, which also considered those revised PDO indicators and targets made in 2011 with minor modifications. The PDO was then clarified through a restructuring and additional financing (AF) approved in August 2015.

11. The key rationale for the revisions was to simplify the PDO and remove sustainable growth from its core following the cancellation of all remaining activities under Component C, except those already completed at the time of the March 2013 restructuring. It was also to make the indicators more realistic and measurable with available baseline information and project monitoring and evaluation (M&E) arrangements. The September 2011 restructuring revised project performance indictors and scaled-down Component C, limiting its scope to two major outputs indicated in paragraph 29. The implementation progress of Component C, which was at the core of the PDO continued to be significantly below targets; therefore, in 2013, the remaining activities of Component C were dropped and the PDO was revised to reflect the change. The 2013 restructuring, as proposed by the Government, was split into three phases (March 2013, August 2013, and December 2014) based on strict milestones agreed by the project for each in order to better ensure delivery of the revised PDO. There was no cancellation of funds made during these restructurings. The revised key PDO indicators are as follows: (a) number of direct project beneficiaries; (b) percentage of female beneficiaries; (c) land area where sustainable land management practices have been adopted as a result of the project; (d) Tana and Beles sub-basin organizations are sufficiently equipped with knowledge base and analytical tools for integrated water resources planning and management; (e) initial integrated basin management plans for Tana and Beles sub-basins developed and discussed by key stakeholders; and (f) soil erosion M&E system developed and monitoring network in place. Please see Table 2.1 in annex 2for details on the original and revised PDO indicators and targets analyzed in this Implementation Completion and Results Report (ICR) to describe results.

### 1.4 Main Beneficiaries

12. The Project Appraisal Document (PAD) did not have a specific section on project beneficiaries; however, it is clear from the PAD descriptions that there are a multiplicity of beneficiaries including individuals, communities, government institutions, and academia or universities at federal, regional, woreda, and kebele levels benefitting especially from watershed, flood management, and irrigation investments. According to the baseline survey conducted after appraisal in the targeted watershed areas, the total number of targeted watershed development beneficiaries was identified to be 219,200 while women make up 50 percent of the beneficiaries. In addition, 93,597 people in the four-targeted flood-prone woredas benefited from the flood management support, according to the Food Security Coordination and Disaster Prevention Office (FSCDPO) report.

13. There were also direct beneficiaries from stakeholder consultation, knowledge management, and transfer opportunities in the form of training, workshops, and so on. Direct beneficiaries also included (a) the Ministry of Water Irrigation and Electricity (MoWIE); (b) National Meteorological Agency (NMA); (c) academia and research institutions (such as Bahir Dar University and Amhara Regional Agricultural Research Institute; (d) Bureau of Water Irrigation and Energy Development (BoWIED); (e) Environment Protection Land Administration and Use Agency; (f) institutions and recipients of support under the case of integrated watershed management (IWSM) such as the Bureau of Agriculture and Rural Development (BoARD), woreda watershed teams (WWTs), kebele watershed teams (KWTs), and communities (in the

35 targeted kebeles); (g) institutions and recipients of support in flood management such as the FSCDPO and communities in the flood-prone areas (targeted 28 kebeles); (h) Abbay River Basin Authority (ARBA); (i) Tana Sub-Basin Organization (TaSBO); and (j) Beles Sub-Basin Organization (BeSBO). In addition, there were indirect beneficiaries (such as neighboring watershed communities and downstream watershed communities) that benefited from the project.

### 1.5 Original Components (as approved)

14. **Component A: Sub-basin Resources Planning and Management (total cost: US$17.61 million, with US$15.69 million IDA and US$1.92 million GoE).** The objective of this component was to develop the enabling institutional infrastructure, develop and capacitate the institutions required for sustainable development and management of the water and land resources of the Tana and Beles sub-basins. Two subcomponents were supported:

(a) **Water Resources Information System Development (US$11.66 million).** This included (a) support for a modern network of hydro-meteorological, groundwater, and environmental monitoring, as well as associated hardware, software, and information systems and (b) special studies, as well as facilitation of the use of the system for pressing management and development problems in Lake Tana and the overall Tana and Beles sub-basins.

(b) **Resource Planning and Management Capacity Building (US$5.95 million).** This aimed to support the establishment and strengthening of TaSBO, BeSBO, and ARBA. It also included particular support to the sub-basin organizations (SBOs) to build an appropriate knowledge base, analytical capacity, and structured stakeholder consultation to develop 'shared vision' sub-basin plans and management instruments to optimize social, environmental, and economic opportunities in the sub-basin.

15. **Component B: Natural Resource Management Investments (total cost US$40.83 million, with US$18.8 million IDA, US$8 million the Government of Finland (GoF),[2] US$2.56 million GoE, and US$11.47 million communities).** This component aimed to undertake critical investments to improve the natural resources management in the Tana sub-basin. Two sub-components were supported:

(a) **Watershed Development (US$35.08 million).** This aimed to support sustainable watershed development investments covering about 80,000 ha in the Ribb, Gumara, and Jemma sub-watersheds in the Lake Tana sub-basin, underpinned by community-based planning and participation.

(b) **Flood Management (US$5.75 million).** This aimed to support community-based flood management and adaptation in the flood-prone areas around Lake Tana and overall flood preparedness at regional and local levels. This subcomponent has strong linkages with the Water Resources Information System (WRIS) developed under Component A, which seeks to improve the gauging, data acquisition, and processing for real-time flood forecasting and communication; train at various government levels; and conduct special studies to enable the sub-basin to be better be prepared for frequent floods.

16. **Component C: Growth-Oriented Investment Facilitation (total cost US$9.17 million, with US$8.44 million IDA and US$0.73 million GoE).** This component aimed to support the institutional

[2] Grant from the GoF amounting to €5.0 million (approximately US$8 million at appraisal) was only for the Watershed Development subcomponent. It includes cofinancing of €3.5 million to investment activities and €1.5 million as direct/bilateral financing to support M&E TA.

capacity building and investment facilitation required for sustainable development of the Tana and Beles sub-basins to realize the growth vision for the region. Two subcomponents to be supported under this component were as follows:

1. **Development Agency Support (US$1.43 million).** It included support to relevant existing government bureaus and to potential public and private entities for the creation of an enabling environment for increased private sector participation and planning for creating a growth zone in the Tana-Beles area.

2. **Growth-Oriented Investment Preparation (US$7.74 million).** It was designed to include support for the preparation of investments in the Tana and Beles sub-basins, including surveys, pre-feasibility and feasibility studies, environmental and social assessments, designs, implementation arrangements, and other associated analytical work and stakeholder consultation.

17. **Component D: Project Management (total cost US$2.24 million, with US$2.07 million IDA and US$0.17 million GoE).** This component aimed to support the management of the project including Project Coordination Units (PCUs) at federal and regional levels and overall project planning, coordination, management, quality oversight, technical supervision, procurement and financial management, as well as monitoring and reporting of project activities.

### 1.6 Revised Components

18. **Component A: Sub-basin Resources Planning and Management.** Consultancy work for the development of a Decision Support System (DSS) was dropped during the March 2013 restructuring. The project instead used the advantage of advances made by the Nile Basin Initiative (NBI) DSS and the Eastern Nile Technical Regional Office (ENTRO) developed models.

19. **Component B: Natural Resources Management.** Construction of 14.7 km access roads to hydrological monitoring stations under Subcomponent B1 and 77 km escape routes under Subcomponent B2 was dropped after the detailed designs were completed because of large estimated costs at the time, safeguard requirements, and time constraints.

20. **Component C: Growth-Oriented Investment Facilitation.** The original expected intermediate results of this component were: enhanced capacity to plan, prepare, and facilitate a pipeline of critical sustainable growth-oriented investments and enabling environment to attract priority private sector. Component C was scaled down in September 2011 because of delay in implementation related to the complex nature of the component and its activities, while enough capacity was also not in place. There was also lack of clarity within the government stakeholders on the growth corridor concept and strategy, and this situation too had delayed action on the agreed outputs.[3] Project performance of Component C continued to be a challenge even after it was scaled down in 2011. Hence, during the March 2013 restructuring, all remaining activities under the component, except the completed activities, (Endowment and Potential Study, stakeholder consultation, and implementation agency capacity-building support) were dropped and the remaining IDA fund was reallocated to Components A and B.

[3] Final agreement reached with the Government to drop the remaining activities of Component C during the March 2013 restructuring.

### 1.7 Other Significant Changes

21. **Change in scope and scale.** (a) The restructuring in September 2011 (i) updated the higher-level results indicators based on the outcomes of the MTR; (ii) scaled down original outputs of component C; and (iii) revised the PDO, intermediate outcome (IO) and output targets and indicators of Results Framework (RF) for Components A, B, and C. (b) The restructuring in March 2013 (i) cancelled all remaining activities under Component C, except the completed activities and (ii) revised PDO indicators and RF; 38 percent of the project resources were expended while 80 percent of the resources were committed at the time of this restructuring and no cancellation of IDA Credit was proposed. (c) The last restructuring in July 2015 approved AF of US$5.1 million and also updated higher-level indicators and the PDO. It also extended the closing date to July 31, 2016. While the achievement of the PDO would not be affected by these changes, PDO and IO indicators and targets were revised.

22. **Reallocation of project funds.** Project funds were reallocated from Component C to Components A and B. During the September 2011 restructuring, US$1.15 million was reallocated to Component A and during the March 2013 restructuring US$6.9 million to Components A and B. A total of €0.75 million was also reallocated from cofinancing part of Subcomponent B1 to direct financing part of the same component to allow continuation of M&E consultancy until the end of the project (closing date was extended at the time of the revision).

23. **Revision of the RF and targets.** The RF and targets were revised following the restructurings in 2011, 2013, and 2015 to simplify outputs and also to make targets realistic (details on RF change and analysis are in annex 2).

24. **The Development Financing Agreement was amended thrice,** in 2011, 2013, and 2015 and the amendments involved a modification of the original PDO including changes to the RF and PDO and IO indicators and targets.

25. **Project cost (budget).** An AF of SDR 3.7 million (equivalent to US$5.1 million) was granted in August 2015 to make up for a shortfall in project financing due to the depreciation of the SDR and additional operating and training costs for the one-year extension approved up to July 31, 2016. It was set at SDR 27.4 million at negotiations of the IDA Credit in April 2008, which was equivalent to US$45 million. The depreciation of the SDR since then resulted in a financing shortfall of about US$3.8 million. In addition, the one-year extension, up to July 31, 2016, required about US$1.3 million in additional operating costs and training. The total project budget with the AF was SDR 31.1 million.

26. **Extension of the project closing date.** The project was designed for five years of implementation (May 2008 to September 2013) but was extended several times to catch up with initial delays and provide sufficient time to achieve the PDO: (a) the August 2013 restructuring extended the closing date to September 30, 2014; (b) the September 2014 restructuring extended the closing date to July 30, 2015; and (c) the July 2015 restructuring extended the closing date to July 31, 2016.

## 2. Key Factors Affecting Implementation and Outcomes

### 2.1 Project Preparation, Design, and Quality at Entry

#### 2.1.1 Background Analysis

27. **The background analysis that informed the project design and the rationale for World Bank support were sound.** It was informed by the country's poverty reduction strategy of the time (PASDEP). The project preparation process, as reflected in the PAD, included studies at the basin, national, and regional

levels as well as review of ongoing projects, to reflect the sound understanding of the fundamental challenges the Tana and Beles sub-basins were facing. The pre-appraisal and appraisal missions and subsequent stakeholder consultation took into account the prevailing challenges around Lake Tana. The project was also informed by a number of preparatory studies[4] that were commissioned by the MoWIE to assist with project design.

28. **The project interfaced with work done by the NBI.** The Eastern Nile Technical Regional Office (ENTRO) played a key role in the investment components of the project financed by the Nile Basin Trust Fund, a multi-donor trust fund administered by the World Bank. It financed preparatory studies for the watershed activities and provided advice during implementation. In addition, it helped prepare the flood-related activities under the Eastern Nile Flood Preparedness and Early Warning Project (FPEWP) - Phase I, which started implementation in June 2007 to establish a regional institutional basis and to strengthen the existing capacity of the Eastern Nile countries for implementation of the subsequent phases of FPEW projects. The TBIWRDP was designed to continue implementing the Ethiopian component of the proposed FPEW - Phase II as an integral part of Subcomponent B2.

### 2.1.2 Project Design

29. **The TBIWRDP design was appropriate and technically sound in the Ethiopian context.** The project's overall design was informed by background analyses and was aligned with the Government strategy and the World Bank CAS of the time. It was also in line with the World Bank's Water CAS (2006) for Ethiopia. The project considered the concepts and guiding principles of the Ethiopian Strategic Framework for Sustainable Land Management by the Ministry of Agriculture and Rural Development. In addition, the project adopted the Government's community-based participatory watershed development approach to planning, implementation, and monitoring. The project was relevant to the GoE priorities and reflected the importance of creation of enabling environment for the management of the natural resources of the sub-basins. However, the conscious choice of the project (as reflected in the PAD alternative considered) to pursue a multi-sectoral approach that balanced investment with institutional development in a longer-term framework resulted in a more complex project with components and subcomponents that have a range of objectives and outputs. It was also ambitious to consider accelerating sustainable growth in parallel with integrated water resources development (IWRD) pilot interventions. In the end, it was clear that the project's scale was ambitious given that such a large-scale integrated approach has never been attempted and that the institutional capacity for implementation was limited. By dropping the growth-related investments and focusing the PDO on WRM, the restructurings allowed the project to focus on achievable results. There was reasonable interrelationship among components, except for Component C that was significantly scaled down[5] later (schematics of the logical chain are provided in annex 2).

30. **Assessment of risks and their mitigation.** At appraisal, key risks to the project were identified and the overall risk to the project was rated Moderate. The project design also identified critical capacity and knowledge gaps, and in the PAD, the project implementation difficulty (coordinating across different agencies) was rated Substantial even after mitigation. Capacity building was identified as part of the mitigation for watershed and flood investments but needed more attention in the activities proposed. Despite the comprehensive risk assessment, some issues emerged during the course of implementation. The very creation of (sub)-basin organizations and the provision of a basin planning TA (which did not materialize

[4] This set of preparatory studies includes hydrologic study, institution and capacity building study, and growth endowment study that were conducted to inform the TBIWRDP.

[5] The 2011 restructuring scaled down Component C to two studies: (a) feasibility study and (b) development of growth corridor strategy, institutional framework, and incentive framework for private sector investments in the Tana and Beles growth corridor. However, since the process was not initiated, all the remaining activities of Component C were dropped during the 2013 restructuring.

during implementation) was expected to mitigate inter-sectoral coordination risks. With the benefit of hindsight, the risks on moving ahead with the Growth Study recommendations were rated too Low, which was to Moderate at appraisal. The original project implementation period was too short given the new concepts being pursued.

## 2.2 Implementation

### Implementation Arrangement

31. **The Government demonstrated commitment by putting in place adequate arrangements to manage project implementation.** The Government demonstrated this through timely provision of counterpart funds and establishment of PCUs at the national and regional level, the National Project Coordination Unit (NPCU) and Regional Project Coordination Unit (RPCU), respectively, that are responsible for the planning, coordination, implementation, monitoring, and reporting of the project. The project area included two regional states (Amhara and Benishangul Gumuz), Bahir Dar City, and eight rural woredas (districts) in the Amhara Region: five (Farta, Dera, Estie, Merawi, Sekala) where watershed development activities took place and four (Dera, Dembiya, Libo Kemkem, and Fogera) where flood management activities were conducted. While the primary implementation responsibility lay with the MoWIE, implementation involved multiple institutions at the federal, regional, woreda, and kebele levels.

32. **Implementation challenge.** Implementation was initially delayed due to the project's staffing and complexity as well as the limited capacity and experience in managing such IWRM activities. The project faced a number of challenges that delayed implementation in all the components. There was also lack of institutional experience to coordinate and implement such an integrated approach. Implementation also suffered due to high staff turnover, especially at the NPCU. Project performance ratings for the PDO and implementation progress (IP) were Moderately Satisfactory for the most part of the project implementation. From July 2010 to February 2011, however, the PDO and overall IP were rated Moderately Satisfactory and Moderately Unsatisfactory, respectively. The PDO and IP were also both rated Moderately Unsatisfactory in the 8th and 9th Implementation Status and Results Reports (ISRs) in June 2012 and February 2013, respectively. The project did not have a full-time M&E specialist and Project Coordinator at the national level until 2012 and 2013, respectively. The project also suffered from significant procurement delays throughout implementation due to both bureaucratic delays within the MoWIE and low capacity at the NPCU and RPCU. There was also a period when the Procurement Specialist (PS) position was vacant for more than eight months, further delaying implementation. The Government took action to put in place a full-time National Project Coordinator (NPC) and M&E specialist and replace the PS, which improved procurement, contract management, and overall implementation. From the World Bank side, though the project had five Task Team Leaders between conception and close, the missions were regularly conducted and the World Bank team provided continuous technical support.

33. **Project restructuring and the MTR.** The project had multiple restructurings during its lifetime that positively affected implementation and outcome. The MTR in April–May 2011 resulted in restructurings that had significant positive impacts on implementation and improved the PDO and IP rating. At the MTR, the project had completed nearly 34 months (more than 50 percent) of its designed lifetime but had only disbursed 19 percent of the US$45 million IDA. This restructuring revised all the PDO indicators and simplified outputs as indicated under section 1.7. It was followed by another restructuring in 2013 that resulted in significantly scaling down the growth-related investments and focusing the PDO on WRM that allowed the project to focus on achievable results. Following the March 2013 restructuring, project implementation significantly improved. That improvement combined with the extensions in the closing date finally resulted in the PDO being broadly achieved. The pace of implementation continued to pick up during the remaining life of the project, and the project has broadly delivered on its objectives. At closing, the project had disbursed US$46.32 million or 92.46 percent of the revised IDA allocation resulting

from additional funding. In total, after the grace period, the project disbursed 100 percent of the total SDR 31.1 million allocation from IDA and 100 percent of the US$3.48 million allocation from the GoF.[6]

34. **Focus on capacity building.** To address the limited capacity and experience of this IWRD, the project gave emphasis on capacity building. The project constructed and handed over office buildings and facilities for TaSBO and BeSBO and weather radar for the NMA. The project also provided the necessary laboratory equipment, office equipment, and furniture to functionalize the newly established systems, and SBOs, as well as strengthen the already established institutions and implementing agencies. A number of trainings were also provided (see annex 9) to strengthen existing capacity at different levels. Through the GoF direct bilateral financing and cost sharing to the watershed subcomponent, the project put in place a dedicated team of international consultants based at the project site in Bahir Dar, to support upgrading and enhance M&E system/management information system (MIS) establishment and capacity strengthening.

### 2.3 Monitoring and Evaluation (M&E) Design, Implementation, and Utilization

35. **M&E design.** The M&E system is designed to assess progress toward higher-level objectives while also responding to the realities of collecting regular monitoring data through government systems. The RF was initially well designed and it was improved by the revisions made during restructurings. A robust supervision and monitoring framework was developed, allowing the project team to track progress on expected outputs through data collection and follow-up with the different institutions involved. Progress was monitored regularly through field visits and reports (monthly, quarterly) by team comprising members of the MoWIE, NPCU, RPCU, and implementing agencies. The NPCU obtained regular information and progress data from the Regional Watershed Coordination Unit for Sub-component B1 and from the other implementing institutions for the remaining component/subcomponents. The watershed development component of the project, which accounts for about 50 percent of the project cost, has a well-designed and functioning M&E system supported by an MIS. It has information units at different levels throughout the project area. Fig 1 below shows information flow and quality control.

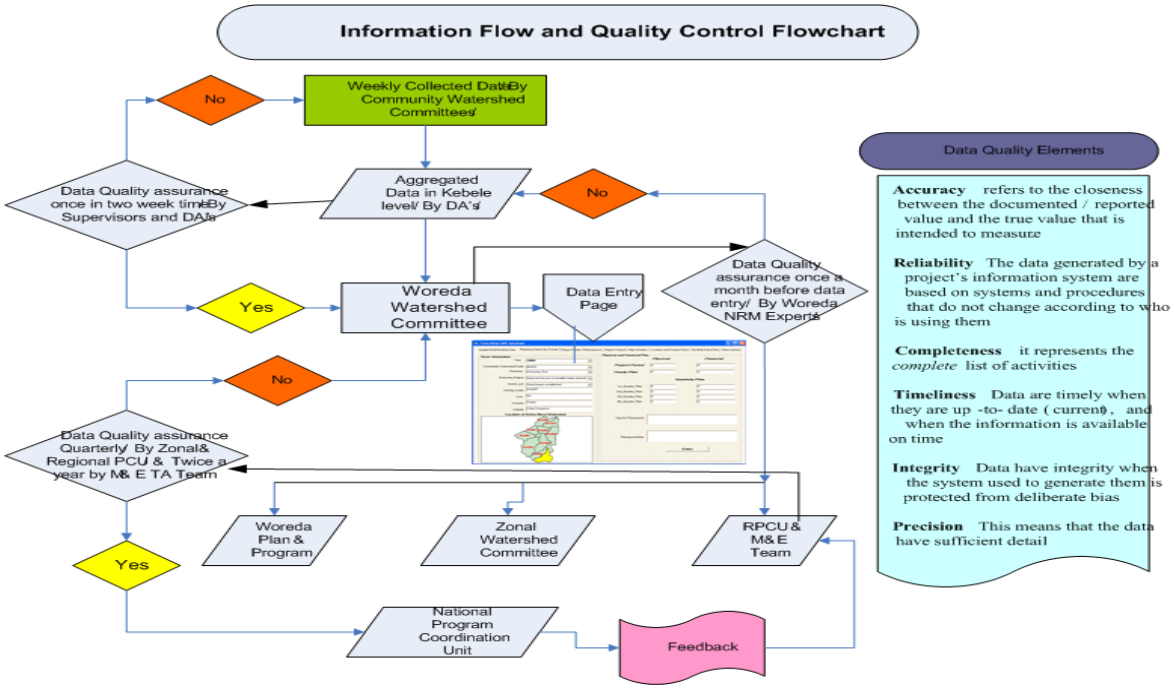
36. **M&E implementation and utilization.** The NPCU was responsible for the overall M&E activities based on the key performance indicators and to ensure the production of the necessary reports. The project RF was used by the client as a basis for supervision and monitoring of the project's IP. At the national level, data and reports were obtained for all the components from the RPCUs, SBOs, and BoARD through e-mail and through routine monitoring field missions conducted by the NPCU. Regular quarterly reports were submitted to the relevant government bodies, and regular input was provided to the World Bank by the NPCU. Project-related photographic evidence was also produced and made available for reference (see annex 11). The implementing agencies' M&E capacity was strengthened through formal and on-the-job training in the use of the M&E system. The project could have benefited from a simple computerized monitoring and reporting system at the NPCU that could have enabled the project to monitor the entire project performance and results and enhance effective documentation and reporting.

37. **One of the key achievements of the project is the establishment of a web-based M&E /MIS, system specifically for the Watershed Development subcomponent, as indicated earlier.** The system was functional since 2010 to demonstrate the benefits of watershed conservation and management practices and facilitate the utilization of information produced for the benefit of all stakeholders. The M&E system has been based on a well-developed hierarchy of a logical framework supported by the Socioeconomic and Natural Resources Baseline Study. The M&E /MIS was a well-functioning system, was simple to use, and enabled a two-way flow of data and information between various levels of users. Capacity on operating the M&E system has been built at all levels and the system was in full use by the respective offices at the

[6] The total US$3.48 million from the GoF after the remaining of the GoF contribution, which originally totaled US$8 million, was transferred directly to the GoE through a bilateral agreement.

regional, woreda, and kebele levels. A particularly innovative aspect of the M&E was the focus on community monitoring of parameters such as water levels, stream widths, and turbidity. All this generated a wealth of information both on the scale and timing of interventions in each micro-watershed as well as their impact at a decentralized level. The M&E was also augmented with analysis using cloud computing software (Google Earth Engine) and other tools to explore the investments with changes of the vegetation index and observed impacts. The process to adapt this M&E model is under way by the Sustainable Land Management Project - Phase II in Ethiopia.

Fig. 1: Watershed M&E/MIS Information Flow and Quality Control Flowchart (*Source: TBIWRDP Government ICR*)




## 2.4 Safeguard and Fiduciary Compliance

38. **The TBIWRDP was classified as Environmental Category B and triggered five safeguard policies:** Environmental Assessment (OP/BP 4.01), Pest Management (OP 4.09), Involuntary Resettlement (OP/BP 4.12), Safety of Dams (OP/BP 4.37), and Projects on International Waterways (OP/BP 7.50). There were no changes in the safeguards triggered at appraisal, and the Integrated Safeguards Data Sheet (ISDS) and Environmental and Social Management Framework (ESMF) remain unchanged during implementation.

39. **Environmental Assessment (OP/BP 4.01).** Formal consultation was held on the ESMF, and training was provided to project implementers at all levels on the ESMF. Environmental and social impacts of subprojects for rehabilitation of watersheds were screened using the ESMF checklists. The watershed activities contributed positively by improving natural resources management practices through soil and water conservation (SWC) activities. A feasibility study along with an environmental impact assessment was prepared for all the 14 small-scale irrigation (SSI) schemes implemented by the project. An internal audit was conducted to assess compliance of the project with safeguards. The challenge observed was poor implementation of mitigation measures, particularly in SSI schemes.

40. **Pest Management (OP 4.09).** The effort in providing training to the farmers on Integrated Pest Management (IPM) was limited. Three major reasons have been identified for the poor implementation of mitigation measures and IPM: (a) limited institutional capacity to fully address environmental concerns;

(b) limited coordination and commitment among implementing entities; and (c) insufficient budget allocation for safeguards implementation.

41. **Involuntary Resettlement (OP/BP 4.12).** There were no significant environmental and social impacts caused by the implementation of the project. There was no significant land acquisition or physical displacement as well as any impact on the livelihood of project-affected persons and the community. While the land used for the radar station development was public land, the Government has paid full compensation for nine households who were squatters/informal users of the land and assisted them to restore their livelihood.

42. **Safety of Dams (OP/BP 4.37).** Though the project had no plan to support the development of any large dams, this policy was triggered as the watershed development activities support the creation of small-scale structures, such as check dams. The safety of these structures are ensured as they are designed by a qualified engineer and there was no impact caused by the project.

43. **Projects on International Waterways (OP/BP 7.50).** At appraisal, the World Bank technical evaluation had determined that the project will have no adverse impacts on any of the Nile riparian countries. In accordance with OP 7.50, the process of notifying the riparian states of the Nile Basin of the proposed project was completed via the NBI Secretariat.

44. **At the close of the project, an internal audit was conducted to assess compliance of the project with safeguards.** While the audit did not identify any major safeguard failings during project implementation, it did identify some safeguards challenges. These included uneven application of ESMF screening criteria and inadequate implementation of mitigation measures in SSI schemes as well as limited efforts to provide training to the farmers on Integrated Pest Management (IPM). Safeguard compliance and management improved greatly during the last two years of the project when the NPCU hired a full-time safeguards specialist.

**Fiduciary Compliance**

45. **Financial management.** The project had its own Financial Management Manual that guided the financial management and internal control process. Budgets were properly proclaimed in the government system, and the project had financial management specialists at all levels to manage the project. Most audit reports were submitted on time with unqualified audit opinions. Furthermore, the project took timely action on audit report findings. However, gaps were noted in areas of properly analyzing budget versus actual expenditure variances, low budget utilization and low disbursement rates in the most part of the project life, limited support of the internal audit function of the MoWIE, delay in signing withdrawal applications, and delayed submission of interim financial reports (IFRs) in some instances with substandard quality. Furthermore, the NPCU was understaffed for the most part of the project, hence limiting the function of capacity building and providing training to the regions and woredas. In addition, the follow-up of advances provided to regional implementers and woredas was only strengthened at the later part of the project's life.

46. **Procurement compliance.** The Procurement Plan was prepared at appraisal and it was revised during the project implementation and incorporated revisions on the Procurement Plan. A large number of contracts (works, goods, consultancy) involving different methods of procurement and contract values were undertaken. A number of trainings and procurement clinics were also provided to strengthen procurement capacity of the implementing agency (IA). In general, the procurement performance was found to be consistent with the World Bank's Procurement Guidelines and the Legal Agreements. There were moderate shortcomings in procurement, mostly associated with capacity, efficiency, and effectiveness in the procurement management, especially in dealing with contract management and supplier management that resulted in procurement delays. The major challenges in the procurement performance of the project were

(a) lack of activity/business delivery standards; (b) frequent revision or updating of Procurement Plans; (c) proper procurement records management; (d) lack of clarity in the contract agreements; and (e) less proactive contracts management and decision-making practice. As a result, delays in achieving agreed milestones and timely completion of significant project activities were an issue.

### 2.5 Post-completion Operation/Next Phase

47. **The appropriate financial, technical, and institutional provisions have been secured to enable the future operation of the project's achievements with respect to the established institutions and investments.** By July 2016, at the end of the project implementation, the majority of the facilities built and systems established or upgraded by the project were completed and fully operational, while a few were completed but only partially operational. The sustainability of the various institutions and investments established/strengthened under the project was appropriately considered during the implementation of the project, and several options were under review to support sustainability. The GoE has approved a one-year budget of ETB 58 million (equivalent to US$2.6 million) to retain capacity, including staff, ensure sustainability of the project, and consider preparing a next phase. The NPCU remains fully staffed to consolidate and disseminate results, manage the full operationalization of the systems put in place, and also replicate the learning in other sub-basins. The Prime Minister's Office has approved a five-year staffing plan for ARBA, TaSBO, and BeSBO, and they are each preparing the necessary operational budgets. These actions by the Government are designed to ensure sustainability and knowledge transfer to other basins and sub-basins.

48. **Most of the project's investment works (hydro-metrological stations, radar, flood shelters, dredger machine, office buildings and facilities for SBOs, SSI schemes, and so on) were fully or provisionally handed over to the relevant government institutions.** Most of the established systems were operational at the completion of the project. The TaSBO/ARBA and BeSBO office buildings were also furnished, equipped, and functional. There were some facilities and equipment yet to be fixed and operationalized, which the Government has continued to work on. For example, the flood warning sirens were installed and satisfactorily tested after closure. However, there are three remaining tasks to be accomplished by the MoWIE to operationalize some of the project facilities: (a) installation of laboratory equipment at the TaSBO and BeSBO buildings; (b) upgrading electrical supply and installation of fuel tank for backup generator at the weather radar site and handover of the site to the NMA; and (c) training of personnel responsible for dredger operations that requires urgent action. The delay in handing over the radar, though the Memorandum of Understanding (MoU) was signed during the ICR preparation, resulted in neither adequate power nor fuel for the generator being available during the last rainy season that the country did not benefit from this new, multimillion dollar asset. The lack of adequate power supply for the weather radar does raise concerns about sustainability that should be addressed by the MoWIE. Regarding the dredger machine operation, the process is well under way to bring expertise from abroad and train local experts to initiate operationalization of the machine. Such action of the Government will ensure operationalization of systems in place and likely ensure sustainability.

49. T**he project positively promoted institutional strengthening at different levels (federal, regional, woreda, and kebele) and has laid the foundation for coordination/collaboration among the different institutions and these changes are likely to be sustained.** As an IWRM and development project, a number of institutions were involved in complementary activities aiming to the same result. The project has supported capacity building of these institutions and strengthened collaboration. Putting in place strong and sustainable linkage among those institutions is a long and ongoing process that requires capacity, resources, and time. For example, in relation to flood management, the FSCDPO, NMA, Hydrological and Water Quality Directorate, and TaSBO were actively engaged. Further strengthening and maintaining the linkage between these institutions would ensure sustainability of the investment and systems that have been put in place by the project. The project, as part of its watershed management intervention, has also provided

capacity building to political leaders, experts, farmers, and other stakeholders within and outside the project area. This has created a strong foundation for integration and community empowerment and hence contributes to project sustainability.

50. **The SBOs have developed their initial sub-basin integrated water resources development and management plans to be implemented for the next 30 years.** The sub-basin plan frameworks are developed utilizing the in-house capacity and through intensive stakeholder consultation at different levels. Scenarios were identified based on previous studies and considered to assess and propose the optimum utilization of the sub-basins' water resources in various sector development interventions. These scenarios are time-bound as base case up to the end of the Growth and Transformation Plan I (GTP I) (2015); medium level up to 2030; and the high level up to 2045. The sub-basins will continue to test and modify the models and initiate implementation of the sub-basin plans.

51. **Exit and post implementation sustainability strategy for the watershed component was developed by the BoARD supported by the project.** The objective was to ensure sustainability of impacts and community assets created after the phasing out of the project. The strategy was intended to serve as a guiding document for phasing out of the undergoing project support and tried to outline some issues to be followed or implemented before the completion of the project. It has envisaged the basic criteria, procedures, and indicators on how to phase out from a project activity and operation areas. It also highlighted the key roles and responsibilities of the different actors or stakeholders in the course of and/or before the project exit. The exit strategy and the subsequent exit plans prepared with the active participation of the community and implementing partners at the woreda level should enable the sustainability of results and creation of long-term impacts in the watersheds and resident communities. For example, the kebeles have started to transfer the rehabilitated hillside and gullies and closed areas to landless individuals.

52. **There is no follow-up or next phase of the project currently in Ethiopia's lending pipeline with the World Bank.** However, the Government has expressed interest in continued engagement and next phase of the project. The MoWIE has submitted the next phase project proposal to the Ministry of Finance and Economic Cooperation (MoFEC), pending an official request to the World Bank from the GoE. There is also an initiative by the Government to conduct a Water Resources Management Joint Technical Review that includes identifying hotspots and initiating discussion on how to scale up the experience of the TBIWRDP to other basins and sub-basins.

## 3. Assessment of Outcomes

### 3.1 Relevance of Objectives, Design, and Implementation

**Relevance of Objectives**
Rating: Substantial
Sub-Rating: (against original PDO and associated indicators): Modest
Sub-Rating: (against revised PDO and associated indicators): Substantial

53. The project objective remained highly relevant to the GoE's development priorities. The original PDO was aligned with the Government's Poverty Reduction Strategy, PASDEP (2005–2010). The PASDEP had identified the Tana and Beles Zone as the first of five proposed growth zones in the country. The original PDO was also fully consistent with the World Bank Group's (2008–2012) Ethiopia CAS that was aimed to help sustain growth and basic services by supporting the implementation of key elements of the GoE's poverty reduction strategy. It was also consistent with the World Bank's Water CAS (2006) that identified strengthening water resource development and management as one of the priority responses to water resources challenges. The project continued to be relevant to the subsequent phases of the country's GTPs, GTP I (2010/11–2014/15) and GTP II (2015/16–2019/20). The consideration of accelerated growth

in the original PDO, however, made the original objective ambitious. Thus, the original objective is rated Modest.

54. The revised project objective continued to be relevant to the country's GTP I and II. The revised PDO has also continued to be relevant to the Ethiopia CAS including the World Bank's Water CAS. It was also relevant to the current CPS (2013–2016) where two of the pillars focus among other objectives on strengthening sustainable natural resource management and resilience to climate change and increasing access to and quality of infrastructure—electricity, roads, and water and sanitation. In addition, the PDO remains relevant with the Sustainable Development Goals and the World Bank's twin goals of ending extreme poverty and promoting shared prosperity. It also remained relevant to the Ethiopia Systematic Country Diagnostic, March 2016, that identified provision of basic services, rural infrastructure, and agricultural growth as one of the drivers of progress, as part of its priorities for ending extreme poverty and promoting shared prosperity.

**Relevance of Design and implementation**
Rating: Substantial
Sub-Rating: (against original PDO and associated indicators): Modest
Sub-Rating: (against revised PDO and associated indicators: Substantial

55. **The relevance of the project design and implementation is assessed as Modest pre-restructuring and Substantial post-restructuring, which was supported by sound implementation arrangement.** The project core components are directly targeted to create the enabling institutional infrastructure and capacity necessary for integrated water resources development investment. Appropriate implementation arrangement was also in place. Overall design of the TBIWRDP and its four core components were broadly aligned to the project's objectives and with each element of the PDO, though there were some shortcomings related to the expected outcomes of Component C. The consideration of accelerated growth in the formulation of the original PDO and its subsequent design made the objective ambitious to achieve certain growth-related outputs that were not possible to be delivered within the planned time and available capacity. This challenge was addressed through significantly scaling down the Growth-Oriented Investment Facilitation component and revision of the PDO to make it more realistic and achievable. The revised PDO was realistic in terms of scale and scope further to its relevance to the country's priority and GTPs.

56. The original PDO and IO indicators and targets that were thought to be difficult to measure results were also modified. The revised PDO and IOs addressed the multisector needs and the environmental and natural resource management (NRM) concerns clearly through focusing on critical activities. The revised RF was well designed with IO indicators and targets that established clear linkages between outputs and outcomes (logical chain that shows linkages is in annex 2). However, in some cases a number of targets are set for a single indicator, which makes measurement of target achievement critical. In addition, some of the IO indicators were transferred to be PDO indicators while similar targets remained at the IO level, which in some cases shows a similar type of results assessment at the PDO and IO levels.

**3.2 Achievement of Project Development Objectives**
S. Rating of Efficacy (against original PDO and associated outcome targets): Modest
S. Rating of Efficacy (against revised PDO and associated outcome targets): Substantial

57. Efficacy is assessed against both the original and revised project objectives in accordance with the requirements of the ICR guidelines for projects whose objectives have been formally revised. In this regard, split evaluation is done and separate outcome ratings against original and revised project objectives were done.

58. **Original PDO.** "Develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles sub-basins to accelerate sustainable growth." The two PDO sub-objectives (elements) considered are: (a) develop enabling institutions for integrated planning, management, and development in the Tana and Beles sub-basins and (b) develop enabling investments for integrated planning, management, and development in the Tana and Beles sub-basins. Outcomes expected to achieve the sub-objectives included facilitation of critical sustainable growth-oriented investments, creating the enabling environment to attract priority private sector investments, and support to preparation of investments in the Tana and Beles sub-basins. This was scaled down with revision of the growth component (Component C), and from the planned outputs of this component, it was only possible to complete i) an Endowment and Growth Study; ii) stakeholder consultations; and iii) implementation agency capacity building support. All remaining activities planned to facilitate critical sustainable growth-oriented public and private sector investment and preparation of investments in the Tana and Beles sub-basins were dropped with the revision. The significant scaling down of this growth component, since it was formulated as a higher level objective in the original PDO, made the achievement of the sub-objective in creating the enabling investment to be rated as Modest while the sub-objective in creating the enabling institutions is rated as Substantial. The efficacy of the project in achieving the original PDO is, therefore rated, Modest. The achievement of the PDO by sub-objective (which is similar for both pre-and post-restructuring is reported below). It should be noted that the analysis on achievement of the sub-objectives is the same for both pre-and post-restructuring, as the sub-objectives remained the same. The rating is, however, different because of the change in scope since the growth component was scaled down.

59. **Revised PDO.** "Develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basin for integrated water resources development."

60. **The sub-objectives remain the same with the revised PDO,[7] though the scope is different with scaling down of the growth-related component and the element "to accelerate sustainable growth" was replaced by "integrated water resources development."** The revised PDO sub-objectives considered, therefore, are as follows: (a) develop enabling institutions and (b) develop enabling investments for integrated planning, management, and development in the Tana and Beles sub-basins. Achievement of the sub-objectives against the revised PDO is assessed considering the scope, and the achievement of the PDO is, therefore, measured by analyzing (a) the extent to which the project achieved the various elements (sub-objectives) of the revised PDO and (b) analysis of PDO indicators against targets identified in the RF,, which is summarized in annex 2, table 2.5 to table 2.10. Building on the analysis of the project's achievement of the revised outcome indicators and targets, the following section assesses the project's contribution to the elements of the PDO (sub-objectives) that are interrelated.

**Achievement of sub-objective 1: Develop enabling institutions for integrated planning, management, and development in the Tana and Beles sub-basins**
Rating: Substantial
Sub-rating (against original PDO and associated outcome targets): Substantial
Sub-rating (against original PDO and associated outcome targets): Substantial

61. The project was able to develop an enabling institution with required capacity at the federal, regional, woreda, and kebele levels, to ensure different levels of integrated water resources planning, management, and development.

[7] The PDO was further revised during the restructuring in August 2015 to match it with the project name, but no material change was made. Therefore, another split evaluation is not done.

62. **The Sub-basin Resources Planning and Management component focused on creating the enabling institution for IWRD through establishing the first two SBOs, TaSBO and BeSBO, and strengthening the sub-basins and ARBA with the necessary software and hardware capacity and their operationalization.** The project supported ARBA since shortly after its establishment; it has now become a big player in the basin and sub-basin resources planning and management. The project also supported establishment of the first two SBOs with required capacity for the sub-basins to be able to develop their own sub-basin Integrated Water Resources Management Plans (IWRMPs) in-house using the analytical tools and knowledge base created and extensive consultations undertaken with stakeholders at different levels. The sub-basins are equipped with the necessary Hydro-metrological and Basin Information System (HIS/BIS) for water resources planning and management including monitoring of water resources of the sub-basins; water resources allocation and management; knowledge base for WRM data and information; and identification and coordination of stakeholder consultation in different areas. Both sub-basins have developed their initial sub-basin IWRMP through using different models based on the different studies conducted (a list of studies is in annex 2) and stakeholder consultations at various levels. They have obtained a suite of models from ENTRO/NBI such as the Nile DSS, General Algebraic Modeling System, and soil and water assessment tool (SWAT), which were calibrated and customized to the needs of the sub-basins. TaSBO and BeSBO are in a position to serve as an institutional focal point for water resources allocation and management in the sub-basins and even support other sub-basins with initiating such efforts.

63. **The real-time hydromet monitoring system established is unique for Ethiopia.** One of the tools for meteorological data collection is weather radar, and the project provided a C-band weather radar to the country with wide coverage, which is the first of its kind for Ethiopia. The data from the weather radar are intended to help Ethiopia provide information on weather forecasting for the northwestern part of the country. The flood forecasting system is linked with the HIS/BIS, models are developed, and real-time data collection from the radar is made possible. As more real-time data are made available, the flood forecasting and early warning services provided by the NMA will continue to improve. The country, according to its GTP II, has a plan to install 12 radars in different basins and the NMA will definitely benefit from the experience and lessons learned from the project to lead the process. The NMA has gained training and experience on the overall installation process, starting from site selection, and utilization of the radar. The NMA has started to access data from the radar, process and provide to users. The stakeholders that potentially benefit from the radar data are the MoWIE, NMA, Bahir Dar meteorological service center, aviation airport (Bahir Dar aeronautical meteorological office), Bahir Dar University, ARBA, TaSBO, and BeSBO. The project has also financed modern instrumentation for hydromet monitoring (for example, weather, water levels, flows, groundwater levels, water quality) with real-time telemetry in the Tana and Beles sub-basins (another first of this kind of system in Ethiopia with great potential for scaling up). These data and associated forecasting tools are expected to be useful to the many stakeholders (for example, government agencies, academia, private sector, general public) that can benefit from real-time flood and drought management and water infrastructure operation and also contribute more reliable long-term data to support planning.

64. **Project coordination, monitoring, and reporting capacity strengthened at the federal and regional levels.** PCUs at the federal and regional levels were strengthened through recruitment of full-time personnel and regular capacity building. Full-time personnel were also recruited at the region in BoARD to facilitate and support the integrated watershed planning and development. The watershed web-based M&E system/MIS system was also established to monitor watershed conservation and management practices and facilitate the utilization of information by all stakeholders in the system. Capacity of the implementing agencies (institutions) strengthened through various trainings, exposure visits, and supply of various materials. These institutions have already started to share their experience within and outside Ethiopia.

65. **The investment in the Integrated Watershed Management contributed in establishing and strengthening the watershed team at the local level and improved NRM and SWC capacity and**

**brought livelihood improvement of the rural community in targeted watersheds.** The project contributed in establishing and strengthening the watershed team at the local level, woreda watershed team (WWT), KWT, and community watershed team (CWT) including woreda specialists and development agents (DAs) at the kebele level who contributed to the participatory planning and implementation of the watershed activities. A total of 163 community watersheds were identified in the targeted 83,000 ha watershed and each community watershed prepared comprehensive (multiyear) watershed development plans of their own. The project also contributed to improve SWC and brought livelihood improvement of the targeted rural community. In the targeted watershed intervention areas, (a) soil erosion has significantly reduced, especially on gully and degraded lands, and these types of lands have changed to productive land (annex 11 has pictures before and after intervention); (b) the practice of free grazing has been changed and 70 percent of grazing lands of the watershed are closed and become fields for useful biomass collection, and vegetation cover of the project areas has increased; (c) animals are stall fed through cut and carry; (d) groundwater levels have increased and in some areas new/lost springs have emerged/re-emerged; (e) access to potable water increased (f) soil fertility has improved, and as a result crop and forage productivity increased; and (g) production increased in major crops in the demonstration sites. According to the impact assessment, production of teff, barley, maize, wheat, finger millet, and potato has increased by 21.5 percent, 21.7 percent, 18.9 percent, 28.5 percent, 27.6 percent, and 88 percent, respectively, from the baseline year, which also increased income. In addition the entry point activities supported resulted in enhanced ownership and thrust by the community in the watershed areas. (details are provided in annex 2)

66. **The project was very innovative in integrating the hydrologic monitoring with the IWSM efforts and the project supported BoARD, TaSBO, BoWIED, and local watershed communities to build their capacity to carry out the hydrologic monitoring and also measure sediment in the watershed areas.** TaSBO, BoARD, and BoWIED worked jointly on sediment analysis using in-house capacity built through the project. A unique effort at strengthening community-based watershed monitoring was instituted. The TBIWRDP's hydrologic monitoring (soil erosion M&E system/network) has been initially designed for evaluating the outputs of the TaSBO IWSM intervention. This network is used to measure the sedimentation load by taking samples regularly. According to the micro-watersheds hydrological M&E and evaluation report, the analysis on targeted project and control areas and results portray that the sediment load has been decreasing with a range of 14–70 percent in monitoring stations since the start of the watershed management program; the total average was reported as 50 percent sediment load reduction. The capacity of these institutions will be crucial in future WRM of these and other sub-basins. It would be widely used as the fundamental center of experience sharing and forefront of watershed management projects as the first unique project integrating the hydrologic monitoring with the IWSM efforts.

67. **Different studies were carried out to create an adequate knowledge base for integrated water resources planning, management, and development in the Tana and Beles sub-basins (the list of studies is in the output analysis in annex 2).** The TBIWRDP supported a number of studies to build the knowledge base of the sub-basins; for example, bathymetric survey was carried out after 23 years covering the whole of Lake Tana to obtain accurate and up-to-date data on the elevation-area-storage characteristics of Lake Tana and to draw conclusions on dynamic changes on the hydrological characteristics. Before this study, available data on the subject were fragmented and inadequate in intensity as earlier studies lacked clear reference to their topographic as well as bathymetric surveys. The sub-basins have also built their capacity through undertaking research and special studies. For example, sector assessments were done to identify sectors that have direct and/or indirect bearing on the water consumption of the sub-basins currently and for future use.

**Achievement of sub-objective 2: Develop enabling investments for integrated planning, management, and development in the Tana and Beles sub-basins**
Rating: Substantial

Sub-rating (against original PDO and associated outcome targets): Modest
Sub-rating (against revised PDO and associated outcome targets): Substantial

68. **The project has contributed to develop an enabling investment environment for current and future investments in the Tana and Beles sub-basins.** The project has created the enabling investment foundation through establishing and strengthening the SBOs and basin stakeholder networks. It has also strengthened other institutions, to establish systems and create an adequate knowledge base, which would give information to make investment decisions in the Tana and Beles sub-basins. The establishment of TaSBO and BeSBO with adequate capacity has enabled the sub-basins to develop their own IWRD and management plan using in-house capacity and through stakeholder consultation at different levels. Scenarios were identified based on previous studies and considered to assess and propose the optimum utilization of the sub-basins' water resources in various sector development interventions. These scenarios are time-bound as base case up to the end of the GTP I (2015); medium level up to 2030; and the high level up to the year 2045. The capacity of the sub-basins and the systems and knowledge base created would enable them to provide information on water resource availability and proper planning of the resource for different uses and for potential investment in the area.

69. **The investment in the IWSM contributed to introduce sustainable land management practices and bring positive impact at the sub-watershed and micro-watershed levels that would help investment and scaling up of such watershed investment in other sub-basins in the country.** Watershed management investment was supported in about 83,000 ha of watershed area. SWC measures including land treatment were implemented on 79,288 ha of watershed and more than 44,300 households adopted improved soil and water management practices. The investment in the IWSM improved natural resources management and SWC that resulted in improved livelihood of the rural community living in the targeted sub-watersheds. Furthermore, a hydrological monitoring network was established in the watersheds and, as indicated earlier, sedimentation load is analyzed regularly. The watershed activities contributed significantly to reduce soil erosion and sedimentation load in the targeted area and also from targeted micro-watersheds to downstream communities. The capacity created at the regional, woreda, kebele, and community levels, the unique practice in an integrated approach to watershed management and the results achieved, has laid the foundation for learning as well as replication and scaling up of watershed investment within the Abbay basin/sub-basins and other basins.

70. **The project, through its Flood Management subcomponent, has positively contributed to improve flood management, protection, and mitigation measure in the targeted flood-prone areas.** The project supported in developing flood management plans that are adopted by relevant institutions and targeted communities. The project also supported establishment of Woreda Flood Management Groups (WFMGs); capacity-building training and awareness creation to zone and woreda-level officials and experts; and office equipment, machines, and materials (vehicles, dredger machie, motor boats, motorcycles, mobile phones, and so on) provision to facilitate disaster preparedness, follow-up, monitoring, information sharing, and service provision in the targeted flood-prone areas. Flood risk maps are produced to plan for early warning, flood preparedness, and response and to reduce future destruction. A Flood Management Information System (FMIS) is also developed, though full operationalization of the FMIS will happen when the links have been automated. The project also supported structural measures such as construction/upgrading of escape routes and emergency shelters, with water and sanitation facility, solar panel house, and siren houses that are functional. The sirens were installed and made operational during the ICR preparation, after project closure. According to the FSCDPO report, the trend shows that the number of people and their assets affected by flood is decreasing. Though the result is not only attributed to this project as there are other institutions involved in supporting flood management in the targeted areas, there were no displaced households and no loss of asset recorded during the last rainy season. The real-time monitoring with gauges and weather radar and improvement in knowledge base, tools, shelters, equipment, and training for preparedness should help reduce flood damages in the future.

71. **The experience and lessons learned from the project will benefit the planned investment to be made in the country.** The project, through its WRIS development subcomponent, has improved the hydro-metrological network and systems. The project has also provided a C-band weather radar to the country, which is the first of its kind, for metrological data collection and the real-time hydromet monitoring with gauges. The data from the weather radar will help Ethiopia provide information on weather forecasting for the northwest part of the country. The flood forecasting system is linked with the HIS/BIS, and real-time data are being collected from the radar by the NMA. As Ethiopia, in its GTP II plan, has included installation of 12 weather radars in different basins, which is also part of the NMA plan, the country will definitely benefit from the experience and lessons learned from the project and capacity of the NMA to lead the process. The availability of this information through accessing the real-time data creates the enabling condition for investment decision around the area.

72. **The overall efficacy against the PDO is rated as Substantial on balance.** The project has significantly contributed to develop and strengthen the enabling institutions and investments for integrated water resources development and management. Unique contributions of the TBIWRDP are as follows: the establishment of the first two SBOs, TaSBO and BeSBO, with the necessary capacity and development of their initial sub-basin plans; the first C-band weather radar in the country and establishment of a modern monitoring system, integrating the hydrologic monitoring with IWSM efforts as a unique approach; and M&E system/MIS, for watershed-supported planning, data storing, and reporting. The M&E system/MIS, supported through the GoF bilateral and cost-sharing financing, facilitated quality data collection and reporting as well as fast information exchange for watershed management, being one of the first World Bank-financed projects that has financed a good M&E system of project interventions and impacts (also monitored through communities).

### 3.3 Efficiency

Rating: Substantial
Sub-rating (against original PDO and associated outcome targets): Substantial
Sub-rating (against revised PDO and associated outcome targets): Substantial

73. **The efficiency of the project is assessed as Substantial, based on the rate of return calculated for the watershed management and flood components.** The ex post financial and economic analysis was done only for the watershed and flood management sub-components. The combined financial and economic analysis conducted during appraisal for the sub-basin resources planning and management (Component A) and growth oriented investment facilitation (Component C) are not covered under the ex post analysis. This is mainly because the growth-related component was significantly scaled down in the course of project implementation and the difficulties to net out the final returns of sub-basins' resources planning and management component. The ex post economic and financial returns are estimated following the same methodology used at appraisal for both the Watershed Development and Flood Management subcomponents (please see annex 3). A separate ex-post analysis has not been conducted for pre-restructuring since the growth-related component was significantly scaled down in the course of the project.

74. **The ex post economic internal rate of return (EIRR) for the watershed subcomponent is estimated at 17 percent with the economic net present value (ENPV) of ETB 221.4 million (at 10 percent discount rate).** As shown in annex 3, both the economic and financial returns estimated at ICR are lower than the estimates at appraisal. The positive economic and financial net present value (NPV) and internal rate of return (IRR) greater than the discount rate estimated at completion confirmed that the subcomponent is still economically and financially viable. However, examining the factors contributing for the lower returns at ICR compared to estimates at appraisal is very important to take lessons for future project design and preparation. On the other hand, the NPV and IRR of the investment for the Flood Management subcomponent, at appraisal, were estimated for average, less than average, and greater than

average loss years based on 10 percent, 15 percent, and 20 percent damage recovery loss years. The subcomponent was found to be economically viable, with the NPV ranging from US$8.7 million to US$20.3 million and the IRR ranging from 12 percent to 41 percent. Ex post financial IRR for the flood management subcomponent based on average loss scenario and assuming 10 percent, 15 percent, and 20 percent loss avoided is estimated at 21 percent, 24 percent, and 25 percent, respectively. While the subcomponent is still economically viable, the estimated economic returns are slightly lower than 19 percent, 25 percent, and 28 percent estimated at appraisal, respectively, for 10 percent, 15 percent, and 20 percent damage recovery loss. In addition, operating cost was high from what has been anticipated at appraisal that required reallocation of resources among components and with extension of project closing date, additional operating cost was also required.

75. **The results of the financial and economic analysis demonstrate in several ways that there is a clear economic rationale for investing in improved WRM and related development in Ethiopia.** The benefits to the nation in general, particularly to the region in which this project is implemented, derive primarily from losses avoided due to the impacts of floods and droughts and economic gains from maintenance of water quality and watershed environments. The positive NPV and IRR greater than the discount rate estimated at ICR both for the Watershed Development and Flood Management subcomponents reveal that the subcomponents are still financially and economically viable. Given these are the key subcomponents contributing towards the PDO, a rating of Substantial has been given for both pre- and post-restructuring.

### 3.4 Justification of Overall Outcome Rating

Rating: Moderately Satisfactory

76. **The overall outcome is rated on balance against achievement of both the original and revised PDO, sub-objectives, and respective indictors and targets that resulted in the achievement of the PDO outcomes to be rated Moderately Satisfactory.** The evaluation is conducted considering the original and revised PDO elements, indicators, and targets achievement. A split evaluation is done on the aggregate achievement of the PDO, based on the separate ratings against original and revised project objectives and elements of the PDO weighted in proportion of the share of actual disbursement made in the periods before and after approval of the revision (38 percent and 62 percent, respectively), which is presented in table 1.

77. Achievement of the original objective is rated **Moderately Unsatisfactory** based on the weighted achievement of modest relevance and modest efficacy, which considered a growth investment that was significantly scaled down and substantial efficiency. The efficacy of the revised PDO is rated substantial supported by the substantial rating for the attainment of results in developing the enabling institutions and enabling investments for integrated planning, management, and development in the Tana and Beles sub-basins. The revised PDO was substantially relevant with substantial efficiency, and the achievement of the revised PDO outcome is rated **Satisfactory**. In addition, the project has delivered its objective using 100 percent of its resource in all the components including revised allocation through restructuring. Component C, which accounted for only 13 percent of the original project cost, as indicated in annex 1 table (C), was scaled down to 2 percent. The watershed intervention that comprised more than 50 percent of the project cost was satisfactory and remained the success story of the project, while the remaining components were also satisfactory with moderate shortcomings. In total, the project has broadly achieved its objective and delivered 100 percent of its original and revised allocated resources. The overall outcome is rated on balance **Moderately Satisfactory.**

**Table 1. Split Evaluation of Project Outcomes**

| | Against Original PDO Indicators | Against Revised PDO Indicators | Overall |
|---|---|---|---|
| Relevance of Objectives | Modest | Substantial | |
| Relevance of Design/Implementation | Modest | Substantial | |
| Achievement of sub-objective 1: Develop enabling institutions | Substantial | Substantial | |
| Achievement of sub-objective 2: Develop enabling investments | Modest | Substantial | |
| Efficiency | Substantial | Substantial | |
| Rating | Moderately Unsatisfactory | Satisfactory | |
| Rating value | 3 | 5 | |
| Weight (% disbursed before/after PDO change) | 38% | 62% | 100% |
| Weighted value | 1.14 | 3.10 | 4.24 |
| Final rating | — | — | Moderately Satisfactory |

### 3.5 Overarching Themes, Other Outcomes and Impacts

#### (a) Poverty Impacts, Gender Aspects, and Social Development

78. **Poverty impacts.** The TBIWRDP has had positive impacts on poverty reduction mainly through production and productivity increase, income generation, and access to basic services provided through the watershed intervention. The findings of the three surveys (2010 baseline survey, 2013 follow-up survey, and the 2016 impact survey) revealed that there has been a 12 percent decline in the proportion of poor households in the past six years.

79. **Impact on women (gender).** Though the PAD did not specifically address expected gender impact of the project and no gender sensitive indicator was included at appraisal, the project had positive impacts on women. The RF was also later revised to include women beneficiary target, which was 50 percent of the total watershed beneficiaries. In addition, there were a number of capacity-building programs and income-generating activities (such as bee keeping, weaving, tailoring, cutting and carrying grass for fodder) that benefited women. 26,066 people in the targeted watershed intervention areas benefited from the capacity building programs of which women comprise 30 to 40 percent. The project also supported tree seedling nurseries that were used mainly to develop forestry and agro forestry in the project micro watersheds. Forest nursery sites have created jobs for more than 500 people annually from the onset of project implementation in 2010 of which 30-35 percent were female farmers. In addition, the project benefited women through the water supply schemes that reduced the time of fetching water from far away and use the time for other agricultural activities. According to the impact assessment done, the average time taken to fetch water has decreased from 26.5 minutes to 19 minutes in the last six years.

80**.** **Social development.** The project has had a positive impact on improving access to basic services, with more than 143,000 people having benefited from improved access to water in the 35 watershed kebeles.

(a) Potable water: 740 water points and 6 water supply schemes were constructed.

(b) Sanitation: improved sanitation facilities were constructed in the watershed areas including 8 latrines in the flood shelter areas.

(c) Flour mill: 10 flour meals were installed in the 35 targeted watershed kebeles.

(d) Health**:** 15 health posts were rehabilitated and 36 health posts provided with facilities that improved the health service in the targeted kebeles. According to the impact assessment, access to health posts in project intervention areas is reported as 95 percent.

(e) Education: 79,390 students in the watershed kebeles benefited from the rehabilitated/strengthened primary school facilities.

(f) Road access: 67 km and 89.70 km internal access paths were constructed and maintained, respectively; 56 foot bridges were maintained and 70 fords, 7 culverts, and 27 foot bridges were constructed.

**(b) Institutional Change/Strengthening**

81. The project has had significant impact on longer-term capacity and institutional development.

(a) The NMA had no experience on radar; the project provided this experience to the NMA through full participation in the weather radar installation process. Installation of radars in all basins is included in the Ethiopia Master Plan, where the NMA has developed knowledge and experience to lead the installation process in the future.

(b) As one of the major objectives of the project, TaSBO and BeSBO were established. Capacity of both these sub-basins and ARBA was strengthened with modern institutional infrastructure (including buildings and equipment) and multidisciplinary professionals for IWRD.

(c) The capacity of research institutions and academia such as universities and agricultural research institutions was strengthened through the project**.** The project provided various trainings and opportunities to conduct assessments with TaSBO to the Bahir Dar University that helped strengthen capacity of the university and the sub-basin. TaSBO and BeSBO started internship programs to tap the talent of young professionals and build stronger partnerships with academia. The Amhara Regional Agricultural Research Institute also did lots of training and demonstrations on improved crop varieties and livelihood improvement that resulted in improved capacity of the institution.

**(c) Other Unintended Outcomes and Impacts (positive or negative)**

The project did not have any significant unintended outcomes and impacts.

**3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops**

82. Natural Resource and Socioeconomic Impact Assessment Survey for the watershed subcomponent of the TBIWRDP, which accounts for 50 percent of the total project cost, was conducted from February to July 2016, by Bahir Dar University. The socioeconomic survey was carried out in 16 project community watersheds. Both qualitative and quantitative data collection methods were applied to generate data (an

elaborated summary of the full report is included in annex 5). The following impacts have been observed in the project watersheds.

(a) Hillside closure, plantation on degraded communal lands, and gully treatment contributed to environmental rehabilitation in sampled watersheds. Farmers revealed that natural regeneration in the closure sites has allowed new shrubs and grass species to grow, which were not present in the past. Positive environmental impact as explained by the farmers is reduction of the excessive runoff from the surrounding hillsides.

(b) The inhabitants of the watershed revealed that the reclaimed gullies are made productive and used for forage, fuel, and construction wood sources. Many watershed inhabitants, who were working with the project as laborers during the initial stage of implementation, started cultivating their own land. The closed area management was environmentally a success.

(c) Natural resource conservation measures undertaken on farmlands addressed soil erosion problems, improved soil fertility, and enhanced the cereal crops yield.

(d) Water point developments solved the problem of shortage of clean water for humans and livestock in project intervention watersheds.

(e) Dependence on single livelihood activity has declined, and a large number of the households derived two or more livelihood strategies through the combination of farming activities and nonfarm and/or off-farm activities that enabled them to generate income from different sources.

(f) The yield of livestock products has improved in the project watersheds in the last six years of the project period. The distribution of improved breeds, especially chicken, introduction of improved beehives, and the use of improved forage as livestock feed contributed to such enhancement of livestock and income generation.

**4. Assessment of Risk to Development Outcome**
Rating: Substantial[8]

83. **The ICR considers that the overall risk that development outcomes from the project will not be maintained is Substantial.**

84. **The project focused on capacity building to create the enabling institutional and investment environment for integrated planning, management, and development in the Tana and Beles sub-basins**. The project has established and strengthened the SBOs with adequate knowledge base and systems. The sub-basins have developed their respective long-term IWRMPs. To sustain this investment, the Government has allocated resource from its treasury and extended the project, retaining its trained staff for one year. It has also approved a five-year staffing plan for ARBA and the two sub-basins.

85. **The project made significant effort to ensure sustainability of watershed development (community watersheds) through participatory process and local ownership.** The project adopted the Government's community-based participatory watershed development approach to planning, implementation, and monitoring. The project also considered the concepts and guiding principles described in the Ethiopian Strategic Framework for Sustainable Land Management. The provision of various trainings and support on entry point activities contributed to develop interest of the community and bring attitudinal

[8] This indicator is rated on a four-point scale: (a) negligible; (b) moderate; (c) substantial; and (d) high.

change to be able to continue the NRM techniques in a sustainable manner and benefit from the improved NRM practices.

86. **The project has made arrangements to hand over the radar site to the NMA after the necessary capacity has been put in place.** An MoU has been signed between the project and the NMA while process is under way for actual handover. A unit has been established at the NMA, under the meteorological data and climatology directorate, to process and analyze the data from the radar and share to the internal and external users. To sustain this investment and benefit from the full operationalization, the NMA has started to look into different opportunities to provide further training, including working with universities to open new programs. Strengthened capacity and proper management of the radar site will be important for technical and physical sustainability of the investment.

87. **The project has contributed to the procurement of a dredger machine, excavator, and dump truck.** It has also established linkage with Tana Transport to construct a tugboat, which is important to move the dredger around Lake Tana. The dredger is expected to help in managing the sedimentation load, which is critical for efficient transport on Lake Tana as well as reducing flood caused by backflow from the lake. However, the dredger machine needs a trained operator immediately to operationalize the machine. For the longer term also, the operationalization of the dredger is closely dependent on sound management of the machine including its operations and management. The process is under way to bring expertise from abroad and train local experts to initiate operationalization of the machine. Such action of the Government will ensure operationalization of systems in place and likely ensure sustainability.

## 5. Assessment of Bank and Borrower Performance

### 5.1 Bank Performance

**(a) Bank Performance in Ensuring Quality at Entry**
Rating: Moderately Unsatisfactory

88. The World Bank's performance during preparation (pre-appraisal) and appraisal was demonstrated through (a) aligning with the development priorities of the Government and the World Bank CAS and Water CAS; (b) designing an IWRM project that was highly relevant for the water and land resource management in Ethiopia and Tana and Beles sub-basins that is in line with guiding principles of the Ethiopia Strategic Framework for Sustainable Land Management; (c) ensuring the project was well prepared and drew on lessons from international experiences, such as the NBI and ENTRO; (d) conducting a well-documented economic and financial analysis of the components; (e) ensuring fiduciary and safeguards arrangements were well prepared by carrying out a sound assessment of environmental and social impacts and guiding the project coordination units in preparing acceptable Environmental Impact Assessments and associated Environmental Management Plans as well as Resettlement Action Plans for Component B; (f) ensuring that project implementation arrangements were appropriate and used the available structure of the Government; (g) conducting extensive preparation studies that assisted the project design; (g) addressing a significant capacity constraint in the country through capacity-building programs; and (h) assigning a competent task team to take the project to approval in a reasonable time. However, as indicated under section 2.1, though significant preparation efforts were put in place, the inclusion of the growth component resulted in an ambitious, multi-sectoral approach that attempted to balance investment with institutional development in a longer-term framework. The resulting project was more complex with components and sub-components containing a large range of planned outputs. The PDO was overly ambitious given the prevailing capacity because of the inclusion of acceleration of sustainable growth with related indicators, and targets; therefore, they had to be amended during implementation as part of multiple project restructurings. The World Bank's performance in ensuring quality at entry is therefore rated Moderately Unsatisfactory.

**(b) Quality of Supervision**
Rating: Satisfactory

89. The World Bank deployed important efforts to supervise the project during its eight years of implementation. Implementation was initially delayed due to the project's staffing and complexity as well as the limited capacity and experience in managing such IWRM activities. However, the World Bank undertook substantial efforts to turnaround the project. Though five Task Team Leaders were successively in charge, supervision missions were regular and 16 ISRs were produced. The quality of the World Bank's performance during supervision has been demonstrated through (a) focusing on technical aspects and project management to ensure good-quality technical implementation that produced the outputs necessary to achieve the desired outcomes; (b) working with partners such as ENTRO and the Government of Finland; (c) follow-up on training with suppliers for the HIS/BIS and radar; (d) supporting the Government technically and to build capacity such as bringing in expertise to assist in preparing term of reference for consultancies (such as HIS/BIS) and specifications for large procurements where there is no experience in the country (such as radar); (e) paying specific attention to procurement, financial management, and safeguards issues by assigning specialists to join implementation supervision missions to review progress and resolve implementation issues; (f) responding proactively to issues affecting the project, including the need for time extensions and additional financing by assisting the Government in advancing project restructurings and strict adherence to agreed milestones before approving next steps; (g) supporting institutional and financial aspects of implementation with sound advice; and (h) supervising the project and conducting discussions with relevant ministries at regular intervals and providing candid assessments in the ISRs. The World Bank has also carefully monitored and proactively restructured the project to facilitate a phased adaptive management process to ensure delivery against the PDO.

**(c) Justification of Rating for Overall Bank Performance**
Rating: Moderately Satisfactory

90. Given the Moderately Unsatisfactory rating at quality at entry and Satisfactory rating at quality of supervision, the overall Bank Performance is rated Moderately Satisfactory.

**5.2 Borrower Performance**
**(a) Government Performance**
Rating: Moderately Satisfactory

91. The MoWIE and MoFEC at the federal level and BoWIED at the regional level played a strong supporting role throughout the life of the project and provided appropriate guidance and support during all stages of the project. The Government also ensured timely provision of counterpart funds. The MoWIE demonstrated strong leadership in managing and implementing the project through (a) working closely with the World Bank during project preparation and generating timely feasibility reports and design documents; (b) establishing implementation arrangement to provide project management and coordination; (c) establishing PCUs at the federal and regional levels; (d) appointing the Director General for ARBA and putting in place required staff; (e) taking immediate action to process staffing arrangement of TaSBO and BeSBO; (f) establishing the National Project Steering Committee (NPSC) and Regional Project Steering Committee (RPSC) to provide oversight of project implementation; (g) ensuring timely preparation and delivery of audit reports and IFRs, except for some delays; (h) presenting, when Component C had to be scaled down, a comprehensive proposal for restructuring to achieve the PDO and fully utilize the IDA resources; (i) meeting agreed milestones to allow for a phased restructuring after mid-term; (j) working on required adjustment to improve implementation performance and ensure achievement of project objective such as assigning a full-time NPCU coordinator; and (k) allocating, at the closure of the project, resource to ensure continuation and sustainability of the project. Shortcomings were related to the delayed submission of a proposal for a Level 1 restructuring. Though the 2011 MTR recommended a Level 1

restructuring to revise the PDO for more realism and also to drop remaining activities under Component C, the Government preferred to commit itself to improve implementation through a Level 2 restructuring and scaling down Component C. This resulted in continued delayed implementation of the project until 2013. The Government Performance is therefore rated Moderately Satisfactory.

**(b) Implementing Agency or Agencies Performance**
Rating: Moderately Satisfactory

92. **IA performance is rated Moderately Satisfactory as there were some shortcomings in the implementation of the project.** The project had the NPCU at the federal level and RPCUs at the regional level and TaSBO and BeSBO conducted their work program until completion, and even after completion, according to the one-year extension approved using the Government's own resource. All PIUs completed most of the planned works, with some shortcoming, by proper sequencing of activities within the project period. They developed skills in project management and other core fiduciary and safeguards functions, while maintaining active relations with the World Bank, meeting all financial covenants, keeping close track of project monitoring indicators, and making sure that most of the targets were achieved.

93. Weaknesses/shortcomings were noted during implementation mostly due to capacity gap and staff turnover at the PCU as there was a lack of a full-time dedicated team with enough time and skills. Delays occurred in bringing onboard the full-time NPC, procurement specialist and M&E specialist that had its own shortcomings in the project implementation, processing major procurements, and contract management and timely follow-up and monitoring. However, there was no major deviation from the World Bank requirement and they sometimes had to cope with factors beyond their full control.

**(c) Justification of Rating for Overall Borrower Performance**
Rating: Moderately Satisfactory

94. Given the Moderately Satisfactory rating of the Government Performance and Moderately Satisfactory rating of IA performance, the overall Borrower Performance is rated Moderately Satisfactory.

## 6. Lessons Learned

95. **Capacity building.** While integrating project implementation and management within existing government institutions/systems promotes institutional capacity and ownership, it also presents implementation capacity challenges that need to be addressed up front during the project design period. This challenge could be more pronounced for projects that are multi-sectoral and involve multi-stakeholders such as multiple institutions and implementing bodies at different levels. The following key lessons could be drawn from the TBIWRDP experience:

- **The scale and scope of projects need to be matched with the existing implementation capacity.** The project was designed to integrate several areas of interventions including providing support to the creation of the first two SBOs with necessary capacity: the NRM including community-based watershed management and flood management and Growth-Oriented Investment Facilitation. Given the capacity gap and lack of institutional experience, such type of growth corridor components should have not been integrated to a largely sectoral project unless separate arrangements are made to closely supervise and facilitate timely implementation.

- **Project time frame should be examined carefully for projects that are required to address potential institutional capacity gaps and simultaneously expected to conduct**

**other development/investment activities.** The project was expected to deliver multiple outputs and outcomes engaging several implementation institutions that were not sufficiently developed and capacitated. Given this situation, and with insufficient time to facilitate preparation works, it was quite challenging for the project to deal with the multiple operational activities in parallel with capacity building.

96. **Collaboration between organizations/initiatives that have common interest and are engaged in similar activities benefits both initiatives.** An MoU was signed between ARBA and ENTRO. This MoU enabled TaSBO and BeSBO to work closely with ENTRO and to benefit from ENTRO's experience and knowledge in developing their capacity, enhancing their knowledge bases, and planning modeling tools. On the other hand, ENTRO has benefited from the model development and planning processes of the two SBOs, including various stakeholder consultations. Furthermore, while the initial design of the project required development of a DSS by the SBOs, utilization of the existing DSS of the NBI Secretariat, through ENTRO's TA, saved both TaSBO and BeSBO from developing a new one from scratch that could have incurred significant time and resources.

97. **Integrating livelihood development activities (entry points, off-farm income generating) within natural resources management is tested and demonstrated by the project, which promotes participation, trust, and ownership by the community.** Among other areas, linking farm land treatment with animal forage development, degraded land treatment and area closure with bee keeping and animal fattening, gully treatment with forage, and fruit and tree development have promoted the community livelihood and reduced watershed degradation. Integrating the livelihood social and economic needs with the watershed management and development activities has fostered positive incentives to the communities to be fully engaged and promote sustainable watershed management.

98. **Integrating the hydrologic monitoring with IWSM efforts as a unique approach benefited the project.** The TBIWRDP is the first unique project integrating the hydrologic monitoring with IWSM efforts in the country as well as in the Nile Basin, which is done jointly by BoWIED, BoARD, and TaSBO. These institutions' capacity will be crucial in future WRM of Lake Tana. It would be widely used as the fundamental center of experience sharing and forefront of watershed management projects as the first unique project integrating the hydrologic monitoring with the IWSM efforts.

99. **Post-project transition arrangement is critical for sustainability of project outcomes.** The Government made post-project transition arrangement for continuation of project activities that will likely ensure full operationalization of investments made and systems established and subsequently sustainability of the project: (a) the Government allocated one-year budget and continued operationalization of the project retaining the skilled capacity or staff; (b) the Prime Minister's Office approved the five-year staffing plan of the SBOs; and (c) the exit strategy and the subsequent exit plans for the watershed component were prepared with the active participation of the community and implementing partners at the woreda level that should enable the sustainability of results and creation of long-term impacts in the watersheds and resident communities.

## 7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

### (a) Borrower/implementing agencies

100. Annex 7 provides a summary of the borrower's ICR, called Project Completion Report (PCR). The report is well prepared and draws on strong evidence-based facts at the ICR stage. The borrower's ICR was shared with the World Bank in November 2016. It provides a large amount of details on processes, activities and outputs. It also contained the relevance of the project and its effectiveness. It has also stated the support the World Bank has been providing through regular implementation review and support mission

on biannual bases throughout the project period, the support provided to conduct a midterm review and subsequent restructurings and how the restructurings have paved the ground for improved implementation efficiency. The report, according to various studies conducted, stated that the project has shown a clear positive change in terms of achieving the set of goals and objectives in creating the enabling institutions and investments for integrated water resources management and livelihood improvement. The major contribution of the project to the country, good practices and list of lessons are clearly articulated in the report (please see annex 7).

**(b) Cofinanciers**

101. Government of Finland as co-financier of the Watershed component commented the need of linking the project results with the current World Bank financed Sustainable Land Management Project Phase II (SLMP II) to make best use of the lessons learnt and manuals produced in the project.

**(c) Other partners and stakeholders**
*(e.g. NGOs/private sector/civil society)*

Not applicable

## Annex 1. Project Costs and Financing

1. Out of SDR 27.4 million original allocation from IDA, which is equivalent to US$45 million (IDA Credit 44570-ET), the GoF grant (TF 095045) US$3.48 million, and AF SDR 3.7 million (equivalent to US$5.1 million), at project closure, the project had disbursed US$46.32 million or 92.46 percent of the revised allocation resulting from AF. In total, after the grace period, the project disbursed 100 percent of the total SDR 31.1 million allocation from IDA and 100 percent of the US$3.48 million allocation from the GoF.[9]

### (a) Project Cost by Component (in US$, Million Equivalent)

| Components | Appraisal Estimate (US$, millions) | Actual/Latest Estimate (US$, millions) | Percentage of Appraisal |
|---|---|---|---|
| **Component A. Sub-basin Resources Planning and Management** | | | |
| Subcomponent A1: Water Resources Information System Development | 11.66 | 13.09 | 112 |
| Subcomponent A2: Resource Planning and Management Capacity Building | 5.95 | 10.02 | 168 |
| **Component B. Natural Resources Management Investments** | | | |
| Subcomponent B1: Watershed Development | 35.08 | 39.00 | 111 |
| Subcomponent B2: Flood Management | 5.75 | 4.78 | 83 |
| **Component C. Growth-Oriented Investment Facilitation** | | | |
| Subcomponent C1: Development Agency Support | 1.43 | 0.66 | 46 |
| Subcomponent C2: Growth-Oriented Investment Preparation | 7.74 | 0.90 | 12 |
| **Component D. Project Management** | 2.24 | 2.20 | 98 |
| **Total Baseline Cost** | 69.85 | 70.65 | 101 |
| Physical Contingencies | | | |
| Price Contingencies | | | |
| **Total Project Costs** | 69.85 | 70.65* | 101 |

*Note*: Total costs at appraisal include physical contingencies (US$6.05 million) and price contingencies (US$3.3 million).

* Actual latest estimate figure is calculated using 7 years' last quarter IFRs that are prepared using local currency and converted to U.S. dollar using average exchange rates of the previous and current year for each IFR, which may not reflect actual latest disbursements. The average exchange rates used range from US$1 = ETB10.35 in 2009 to ETB 20.71 in 2016.

[9] The total of US$3.48 million from the GoF after the remaining of the GoF contribution, which originally totaled US$8 million, was transferred directly to the GoE through a bilateral agreement.

## (b) Financing (in US$, Million Equivalent)

| Source of Funds | Type of Cofinancing | Appraisal Estimate (US$, millions) | Actual/Latest Estimate (US$, millions) | Percentage of Appraisal |
|---|---|---|---|---|
| Borrower | — | 5.38 | 5.38 | 100.00 |
| IDA | — | 45.00 | 50.10 | 100.00 |
| GoF | — | 8.00 | 8.00 | 100.00 |
| Community | — | 11.47 | 11.47 | 100.00 |

## (C) Financing by Component and Its Percentage Allocation against the Total Project Cost

| Component | Project Costs (US$, millions) | | % of Component Allocation against Total Project Cost | |
|---|---|---|---|---|
| | **Original** | **Revised** | **Original** | **Revised** |
| Component A: Sub-basin Resources Planning and Management | 17.61 | 23.10 | 25 | 33 |
| Component B: Natural Resources Management Investments | 40.83 | 43.77 | 58 | 62 |
| Component C: Growth-Oriented Investment Facilitation | 9.17 | 1.56 | 13 | 2 |
| Component D: Project Management | 2.24 | 2.20 | 3 | 3 |
| **Total** | **69.85** | **70.65** | **100** | **100** |

## Annex 2. Outputs by Component[10]

### Project Activities and Outputs

1. The project had four components and six subcomponents. The main components were Component A: Sub-basin Resources Panning and Management; Component B: Natural Resources Management Investments; Component C: Growth-Oriented Investment Facilitation; and Component D: Project Management. The six sub-components under Components A, B, and C were the following: Sub-component A1: Water Resources Information System Development; Sub-component A2: Resource Planning and Management Capacity Building; Sub-component B1: Watershed Development; Subcomponent B2: Flood Management; Sub-component C1: Development Agency Support; and Sub-component C2: Growth-oriented Investment Preparation. Component C was scaled down, and all activities under the component were dropped except Endowment and Growth Study, stakeholder consultation, and implementation agency capacity building support that was completed at the time of the restructuring. Implementation and overall achievement of actual revised outputs were generally satisfactory for all components, with moderate shortcomings. Further details on the achievement of revised outputs by components and subcomponents are provided in this annex.

2. **Component A: Sub-basin Resources Planning and Management.** The objective was to develop the enabling institutional infrastructure and capacity necessary for stimulating and managing sustainable investments in the Tana and Beles sub-basins.

**Table 2.1. Component A**

| Subcomponents | Achievement of Outputs |
|---|---|
| **A1: Water Resources Information System Development**<br><br>This subcomponent's aim was to establish a reliable and an up-to-date hydro-meteorological database and information system for proper basin planning in the Tana and Beles sub-basins.<br><br>Output Indicators<br><br>• Comprehensive knowledge base and analytical tools for the Tana and Beles sub-basins planning and management developed.<br><br>• Flood Management Information System (FMIS) Fully Operational | (a) HIS/BIS establishment and operationalization::<br>• 30 hydrometric stations were upgraded/modernized and hydrometric network established/strengthened (25 in Tana and 5 in Beles), (23 upgraded, 7 new).<br>• 33 meteorological stations were modernized through rehabilitation of existing ones in the Tana and Beles sub-basins (16 in Tana and 17 in Beles).<br>• 20 modern networks of groundwater monitoring stations (12 Tana and 8 Beles) were established for future groundwater development and management; monitoring equipment installed in 4 of the stations and partially operational.<br>• Hydrological information systems for flood management were developed, 19 flood early warning monitoring stations established, and rain gauge installed at the Tana sub-basin.<br>• Different types of equipment were procured and installed for hydrology, metrology, and groundwater monitoring, and the water quality and ecology equipment was procured but is yet to be installed (annex 6 has the major list of procurements).<br><br>(b) Weather radar to improve the quality of weather monitoring<br>• Weather radar, the first of its kind in the country, procured and installed at Shawra Hill (west of Lake Tana) to improve the quality |

[10] This annex also includes detailed assessment of higher-level results, PDO and intermediate-level results, and the RF analysis considering the various revisions made during the restructurings.

| Subcomponents | Achievement of Outputs |
|---|---|
| | of weather monitoring; training provided to the NMA, ARBA, and TaSBO; and the operationalization is initiated.<br>• Guest house of the radar site was constructed and furnished.<br>• Trainings were conducted to facilitate the use of the WRIS.<br><br>(c) Water Resources Planning and Management models developed and made functional using the Nile DSS and the tools developed by ENTRO and the weather, hydrological, and flood forecasting tools developed.<br><br>(d) The FMIS was established; flood forecasting and early warning System is in place but full operationalization of FMIS is yet to happen for flood-forecasting models to fully take advantage of the real-time monitoring. The flood forecasting system is also being linked with the Radar to utilize real-time weather data<br><br>(e) Establishment of a well-functioning water quality monitoring network<br>• Lake Tana water quality assessment was conducted (taking 150 samples from 25 sites) and river water quality assessment was conducted (taking 96 samples from 16 sites of major rivers of the Tana sub-basin); yet to be operational.<br>• Numerical weather prediction, consultancy work, and procurement of equipment were completed, but the water quality monitoring network is not yet functional.<br><br>(f) Number of special studies carried out to create adequate knowledge base:<br>• Design, Development, and Support in the implementation and operationalization of the water information system.<br>• Ground Water Potential Investigation and Monitoring on Tana and Beles sub-basins<br>• Bathymetric Survey of Lake Tana<br>• Detailed Topographic Survey of Lake Tana Flood Plane was conducted and flood risk maps were produced. |
| **A2: Resource Planning and Management Capacity Building**<br><br>This subcomponent's aim was to put in place fully functioning Tana and Beles SBOs and strengthen capacity to develop integrated water resources development plan.<br><br>**Output Indicators**<br>• Integrated Water Resources Development and Management Plans prepared for Tana and Beles sub-basin | • TaSBO and BeSBO were established, equipped, and staffed with the necessary capacity (water resource development, socioeconomic, environment, administration, Geographic Information Systems (GIS) expertise, communication etc. specialists); staff were trained on different areas to strengthen their capacity and ensure sustainability of the SBOs (list of major trainings are found in annex 9).<br>• Capacity of the ARBA was strengthened through provision of office facility, furniture, and office machines and various trainings.<br>• Construction works for TaSBO/ARBA and BeSBO office buildings, including the guest houses, were completed. The offices and guest houses were equipped/furnished and started operations.<br>• The SBOs built appropriate knowledge base and analytical capacity through conducting various research and studies in-house, built some analytical/modelling expertise, and developed tools for the development of the sub-basin plan.<br>• Analytical models had been incorporated and used for sub-basin planning, assessment on the state of the respective sub-basins, strategic |

| Subcomponents | Achievement of Outputs |
|---|---|
| • Structured stakeholder consultations conducted<br>• Tana and Beles Sub-basin Organizations (TaSBO and BeSBO established and fully staffed) | social and environmental study, water resource availability study, and sector assessment on water use and demand.<br>• Basin atlas/GIS were produced for both the Tana and Beles sub-basins.<br>• 14 structured stakeholder consultations (10 in TaSBO and 4 in BeSBO), from a target of 6, were conducted at different levels (kebele, woreda, region, federal); draft plan of the sub-basin discussed and identified investment potential and options of the sub-basins.<br>• IWRD and management plans were prepared for TaSBO and BeSBO. These plans have been presented to and approved by the Abbay River Basin High Council. |

3. **Component B: Natural Resources Management Investments.** The objective was to undertake critical investments to improve natural resources management in the Tana sub-basin. Subcomponent B1 had three interdependent themes, that is, the NRM, livelihood improvement, and institutional strengthening to support sustainable watershed development investments.

**Table 2.2. Component B**

| Subcomponents | Achievement of Outputs |
|---|---|
| **B1: Watershed Development**<br><br>This subcomponent's aim was the improvement of livelihoods of rural community living in the upper catchments of Ribb, Gumera, and Jema through enhanced productivity and promotion of sustainable land use practices.<br><br>**Output indicators**<br><br>• Increased crop production and improved livestock productivity<br>• Number of households adopting improved soil and water management practices<br>• Watershed teams (WWT, KWT, and CWT) established, trained, and ready to execute their duties in a timely manner through trainings in all necessary subjects including all aspects of participatory integrated management<br>• Subject matter specialists, DAs, and woreda officials trained and their offices and | **1) Natural resource management**<br>• 163 community watersheds were identified and plans were prepared for all community watersheds (each community watershed prepared their own comprehensive, multiyear, watershed development plans).<br>• Watershed teams: WWT, KWT, and CWT were established and their capacity strengthened including participatory integrated planning management.<br>• Integrated watershed baseline, follow-up, and impact assessment surveys were conducted to identify indicators, evaluate implementation, and measure intermediate results and final achievements.<br>• 5275 farmers were trained on watershed planning (1801 women).<br>• 44,355 households adopted improved soil and water management practices out of the targeted 30,000 (147% achievement).<br>• The SWC for sustainable watershed development investment and land treatment was conducted on 79,288 ha of the targeted watershed out of a revised target of 63,355 ha (99% of original target of 80,000 ha and 121% of revised target) in general, out of which (i) 54,159 ha of cultivated land was treated from a revised target of 44,355 ha (105% of the original target of 51,408 ha and 122% from the revised target); (ii) 19,717 ha of degraded land was treated out of the revised target of 16,000 ha that includes degraded grazing land, hillsides, and bush lands and mixed-land use (63% of the original target of 30,977 ha and 123% of the revised target); and (iii) 1089 ha gully land treated and rehabilitated out of a 1000 ha revised target (79% of the original target of 1370 ha and 109% of the revised target).<br>• Forest development: 7671 ha was covered with new plantation out of the revised target of 4000 ha (2842 ha community forest, |

| Subcomponents | Achievement of Outputs |
|---|---|
| farmer training centers (FTCs) provided with equipment<br>• Capacity of watershed communities, experts, and leaders improved on watershed management and planning increased<br>• Increased women participation in all stages of watershed development<br>• Increase in community infrastructure (small-scale irrigation, access roads, foot bridges, telecom, rural water supply, and flourmills) provided in targeted kebeles | 1767 ha household woodlot, and 1322 ha backyard plantation); 5506 ha existing community forest was protected; and 180,300 hand tools were supplied to the watershed community for SWC activities.<br><br>2) **Livelihood improvement**<br>(i) Livestock development<br>• 9 new animal health posts were constructed, 3 upgraded, and 8 provided with equipment and materials.<br>• 129,300 animals have been vaccinated and 164,850 animals received medical treatment.<br><br>(ii) Crop development and agricultural extension demonstrations in FTCs and individual farm plots[11]<br>• 22 FTCs (9 new) were constructed/upgraded, and 33 FTCs were provided with improved facilities.<br>• Crop demonstrations in 14 FTCs were conducted (farmer fields were conducted at different crop development states and farmers, woreda and kebele experts, and research centers participated).<br>• Crop production increased in the demonstration sites (FTCs); (according to the impact assessment) production increase was teff at 21.5%, barley at 21.7%, maize at 18.9%, wheat and finger millet at 28.5%, and potato at 88%.<br><br>(iii) Irrigation infrastructure development<br>• 14 SSI schemes on a command area of about 1000 ha have been rehabilitated and are benefiting 3300 households (12 of the schemes are handed over to the community).<br>• 14 irrigation cooperatives were established and provided with capacity-building support (office facilities, furniture training, and exposure visits).<br><br>(iv) Entry point activities<br>• 18 primary schools were renovated, 91 primary schools were provided with facilities (15,024 combined desks, 114 office chairs, 73 tables, 328 blackboards, 820 conference chairs, 138 bookshelves, 2160 reference books)—79,390 students have benefited from this service.<br>• 15 health posts were rehabilitated and 36 health posts were provided with facilities (furniture, microscopes, thermometers, photo scopes, maternity beds, stretchers, and so on). Access to health posts reported at 95%.<br>• 5 DA residences and 4 offices were newly constructed, 29 motorcycles were procured and provided to the DAs.<br>• Community bylaw in all community watersheds was prepared, discussed, and finalized. |

[11] The impact of demonstrations was evaluated and details are provided in the Impact Assessment Report, which is summarized and provided under annex 5.

| Subcomponents | Achievement of Outputs |
|---|---|
| | • 6 village water supply schemes were constructed; 740 water points (rural water supply) to all 163 community watersheds (including hand-dug wells and springs) were constructed out of the targeted 657 water points (111.7%).<br>• Water supply scheme management guideline was prepared and made available at the woreda and watershed levels.<br>• 8536 farmers (2250 female) were trained on water management.<br>• 67 km internal access paths and 89.70 km internal access paths were constructed and maintained respectively; 56 foot bridges were maintained, 70 fords constructed, 7 culverts, and 27 foot bridges were constructed.<br>• Treated grazing and hillside degraded lands were closed from free intervention of animals (70–75% grazing lands closed).<br>• 2850 households participated in enhancing production through using improved technology and varieties (animal fattening) and milk, egg, honey production.<br>• Self-help groups with 500 members were established and engaged in income-generating activities (bee keeping, weaving, tannery, tailoring, forestry, seedling production); about 189 members were trained in business management and booking skills.(30 – 35% are women)<br>• 10 flourmills were established in the 35 targeted kebeles.<br><br>(c) **Capacity building and training**<br>• 26,066 farmers, 2726 experts, and management team members were trained in improved agricultural extension services on natural resources management, livelihood development, and project planning, and M&E.<br>• Exposure visits were organized to project stakeholders at different levels—region to community watershed members.<br>• 26 technicians were trained for one month on animal breed improvement activities.<br>• The watershed MIS/M&E and geo-databases systems were developed (the systems are the stand-alone and web-based MIS/M&E systems).<br>• 17 hydrological monitoring stations were established (2 are control stations, 10 stations were at the community watershed level, and 5 at sub-watershed level).<br>• Hydrological and sedimentation M&E system was installed and about 34,910 station gauge data, 83,310 rainfall, and 10,521 sediment samples were collected, analyzed, and in use for different studies.<br>• Stand-alone database application was developed and installed in each Project woreda and at the region level to collect information related to integrated watershed activities at the community watershed level and monitor project status (fully functional).<br>• 22 woreda, zonal, and regional experts were trained on 10 days practical GIS. |

| Subcomponents | Achievement of Outputs |
|---|---|
| | • 21 woreda and zonal experts were trained on database management.<br>• 613 Water and Sanitation Committee members (195 women) benefited from 3 days of training on water and sanitation. |
| **B2: Flood Management**<br><br>This subcomponent's aim was to support community-based flood management and adaptation around the flood-prone areas around Lake Tana.<br><br>• Flood management system established and functional | • The WFMGs were established, trained, and flood management plans developed.<br>• 8 solar panel houses were constructed; installation of 11 flood warning sirens was completed.<br>• 8 community flood protection shelters (including latrines and hand-dug wells) were constructed in 8 woredas.<br>• 4 monitoring boats were procured for monitoring and service provision in the flood season.<br>• Dredging machine was procured and tug boat was constructed—training is to be organized to operationalize the dredging machine.<br>• Excavator and dump truck was procured<br>• Office equipment (desktop, laptop, photo copier, fax machines, scanner, printer) were provided to the FSCDPO and communication accessories (mobile phone cells) were provided to the communities.<br>• Early warning indicators were installed (colored wooden poles for flood hazard severity level and local safe route indication, solar panel to direct people to temporary shelters during the night).<br>• 77 km evacuation route road design and drawing study for flood hazard skipping to dry and safe areas was conducted.<br>• Community training on flood hazard preparedness was provided and community awareness increased. |

4. **Component C: Growth-Oriented Investment Facilitation.** The objective was to support the institutional capacity-building and investment facilitation required for the sustainable development of the Tana and Beles sub-basins to realize the growth vision for the region. This component was scaled down, and all the activities under the component, except the Endowment and Growth study and related activities that were completed during the restructurings, were dropped.

**Table 2.3. Component C**

| Component C | Achievement of Outputs |
|---|---|
| **Output indicator**<br>Comprehensive knowledge base, including hydrologic information, endowments, constraints, and opportunities for growth established and the analytical tools for sub-basin planning and management developed | Endowment and Growth Study (endowments, constraints, and opportunities for growth) for Tana and Beles was completed; stakeholder consultation was also undertaken, and capacity-building support was provided to the IA. |

5. **Component D: Project Management.** The objective of this component was to support the efficient management of the project including the PCUs at the federal and regional levels and overall project planning, coordination, management, quality oversight, technical supervision, procurement, and financial management, and monitoring and reporting of project activities.

**Table 2.4. Component D**

| Component D | Achievement of Outputs |
|---|---|
| **Output indicator**<br>PCUs and key implementing agencies at national and regional levels adequately staffed and equipped | • Procurement Plan was prepared and continuously updated; procurement conducted as planned (procurement list is in annex 6) including contract award for different works and consultancy services.<br>• Quarterly newsletter was prepared, though not regularly, for TaSBO and BeSBO to disseminate information.<br>• Progress reports on physical and financial performance were prepared and submitted.<br>• A number of trainings were coordinated/facilitated.<br>• A mid-term evaluation was conducted.<br>• The component facilitated and supported implementation of various activities, especially until TaSBO and BeSBO were established and took over responsibilities. |

**Table 2.5. PDO Achievement against Original PAD Indicators**

| PDO Indicator | Target | Achievement |
|---|---|---|
| **Indicator 1:** % reduction in sediment loads from targeted watersheds **Dropped** | 10% | 50% (target exceeded, 500% of the target)<br>Average sedimentation load in the targeted watershed was 50%. Soil Erosion M&E system/network was established and fully operational. Capacity of the regional institutions (BoWIED, BoARD, and TaSBO) was strengthened to analyze the data and show trends in sedimentation load; the investment in the watershed and the impact it brought provides evidence for future investment decision. |
| **Indicator 2:** Period that the lake level is not within agreed limits (days per year) **Dropped** | <10 days | Target was fairly achieved. The lake levels have not shown the really low levels that were experienced in 2003 that impacted navigation and fisheries, nor the very high levels of 1997. http://www.pecad.fas.usda.gov/cropexplorer/global_reservoir/gr_regional_chart.aspx?regionid=metu&reservoir_name=Tana. The project supported improved monitoring, studies (for example, hydrology, bathymetry, and so on) and modeling to improve lake level management. |
| **Indicator 3:** %increase in private sector investments in the Tana and Beles sub-basins (US$ million/year) **Dropped** | 30% | The country has seen a dramatic rise in private sector outlays (http://data.worldbank.org/indicator/NE.GDI.FPRV.CN?locations=ET) and foreign direct investment (see http://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?locations=ET ) in recent years, but it is unclear how much domestic and foreign private sector investment was in these sub-basins. |
| **Indicator 4:** % reduction in average loss of assets due to flooding around Lake Tana (ETB/year relative to flood return period) **Dropped** | 30% | It was not possible to quantitatively measure this indicator because the baseline and impact assessment to measure reduction in average loss was not done. But the project has positively contributed and supported flood management, protection, and mitigation measures in the targeted area that contributed to asset protection. The project supported asset protection through establishing the WFMG, developing flood management plans, and capacity building (construction of 8 shelter houses, solar panel housing, and procurement of machineries and equipment). The capacity created at the local level for preparing the flood management plan and early warning system contributed to the protection of the assets of people living in the flood-prone areas. According to the report from the FSCDPO, the trend of asset loss was reducing and there was no reported loss during the last rainy season. |

*Note*: All PAD PDO indicators and targets were dropped and revised indicators and targets were introduced during the 2011 restructuring.

## Detailed Assessment of Achievement of Higher-level and PDO-level Results

### Figure 2.1. TBIWRDP Logical Chain

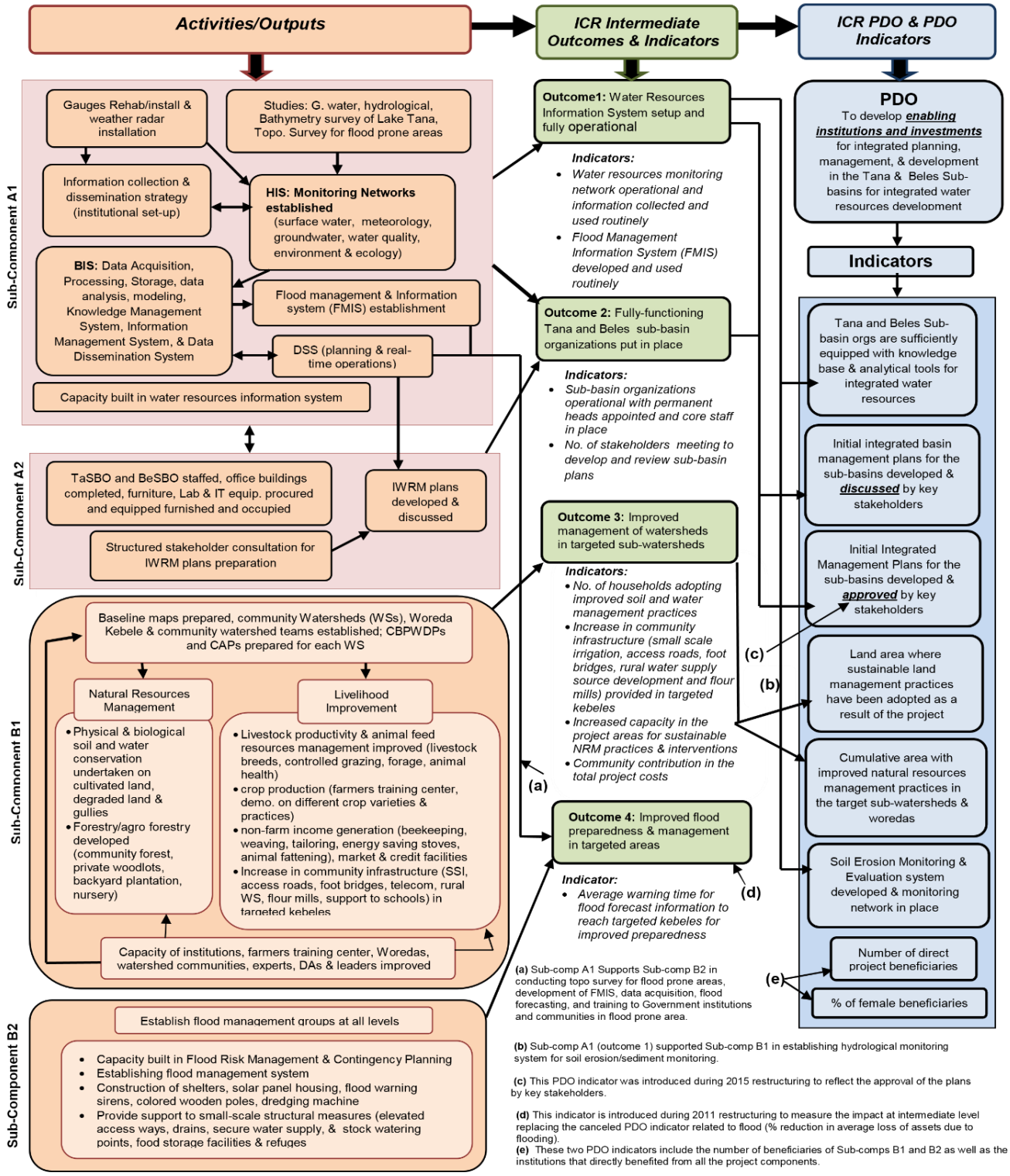


**Table 2.6 PDO Achievement Against Revised Indicators**

| DO Indicator | Target | Achievement |
|---|---|---|
| **Indicator 5:** Tana and Beles sub-basin organizations are sufficiently equipped with knowledge base and analytical tools for integrated water resources management | Interactive knowledge base products launched; knowledge base and analytical tools support sub-basin plan development for Tana and Beles sub basins | **Fully Achieved.**<br>The TaSBO and BeSBO were established with the necessary capacity to develop the sub-basins' IWRD and management plans.<br>HIS/BIS and hydrological information networks were upgraded for the Tana and Beles sub-basins with modern monitoring equipment and software.<br>TaSBO and BeSBO have used a range of modeling/analytical tools to support basin planning.<br>The establishment of the SBO with adequate capacity and knowledge will provide information on the sub-basin resources plan that also deals with the analysis of water use and water demand to make water-related investment decision. |
| **Indicator 6:** Land area where sustainable land management practices have been adopted as a result of the project | 65,335 ha: a hillside degraded land area - 16,000 ha; cultivated farmland area - 44,355 ha; and treated, eroded gully area - 1000 ha | **Fully achieved (exceeded target).**<br>The SWC for sustainable watershed development investment and land treatment was conducted on 79,288 ha out of a revised 65,335 ha of the targeted watershed (121% of target) in general, out of which (i) 54,159 ha of cultivated land was from targeted 44,355 ha (122%); (ii) 19,717 ha of degraded land was from targeted 16,000 ha that includes degraded grazing land, hillsides, and bush lands and mixed-land use (123%); and (iii) 1022 ha gully land was from the targeted 1000 ha (102%) that includes treated/rehabilitated areas. Experience and learning from the sustainable land management practices can be used to scale up the intervention and undertake watershed investment in other areas. |
| **Indicator 7:** Initial integrated basin management plans for Tana and Beles sub-basins developed and discussed by key stakeholders (regional bureaus and authorities, basin organizations, civil society organizations, and community representatives) | Sub-basin plans for Tana and Beles developed and discussed with key stakeholders | **Fully achieved.**<br>The initial IWRM Plans of the Tana and Beles sub-basins were developed through using the different models adapted to the needs of the sub-basins, using in-house capacity and approved by Abbay River Basin High Council (ARBHC).<br>From a total of 6 planned stakeholder consultations, 14 stakeholder consultations, more than double, were conducted at different, levels both in the TaSBO and the BeSBO. The TaSBO and the BeSBO are in a position to serve as institutional focal points for water resource allocation and management in the sub-basins for current and planned investment. |

| | | |
|---|---|---|
| **Indicator 8:** Soil Erosion Monitoring and Evaluation system developed and monitoring network in place | The M&E system and network for soil erosion M&E operational by Bureaus of Water Resource, Amhara Region (for micro-watersheds), and TaSBO (for sub-watersheds | **Fully achieved.**<br>The M&E network and MIS were designed; hydrological gauging stations at the sub-watershed level were installed; the M&E system and network for soil erosion M&E made operational by the BoWIED, BoARD and TaSBO; sedimentation and hydrological data of treated and control micro-watersheds were collected and analyzed.<br>Based on the studies conducted (baseline, follow-up, and impact assessment), result shows significant reduction in sedimentation load in the targeted watershed (50% reduction from targeted 10% reduction)**.** |
| **Indicator 9**: Cumulative area with improved natural resources management practices (soil conservation, afforestation, rain-fed agriculture improvement, and so on) in the Ribb, Gumera, and Jemma sub-watersheds in the Farta, Dera, Esite, Merawi, and Sekala Woredas | 83,000 ha | **Achieved.**<br>The SWC for sustainable watershed development investment and land treatment was conducted on 79,288 ha in the sub-watershed of Ribb, Gumera, and Jema. |
| **Indicator 10**: Initial integrated basin management plans for Tana and Beles sub-basins developed and approved by key stakeholders (regional bureaus and authorities, basin organizations, civil society organizations, and community representatives) | 2 plans | **Fully achieved.**<br>Both the sub-basin plans were developed. The final integrated basin management plans have been presented to and approved by the Abbay River Basin High Council. |
| **Indicator 11:** Number of direct project beneficiaries | 219,200* (number) | **Fully achieved** |
| **Indicator 12:** % of female beneficiaries | 50% | **Fully achieved** |

*Note*: * The number of direct project beneficiaries refers only to the watershed development beneficiaries who are identified after appraisal based on the baseline survey done in 2010 (which was 180,189) and calculated based on the average population growth of the country. The project also supported 93,597 flood management beneficiaries.

### Intermediate Results by Component

6. The revised intermediate result indicators and targets (in 2013 and 2015 restructurings) are considered to analyze results achievement by component.

**Table 2.7. Component A: Sub-Basin Resources Planning and Management**

| Intermediate Outcomes | Indicator | Target | Achievement |
|---|---|---|---|
| **i) Water Resources Information System set up and fully operational**<br><br>**(ii) Fully functioning Tana and Beles Sub-Basin Organizations put in place** | **Indicator A1:** Sub-basin organizations operational with permanent heads appointed and core staff in place | Office buildings with adequate knowledge base, analytical tools, and capacity for sub-basin planning and management | **Achieved.**<br>TaSBO and BeSBO were established and operational with permanent heads appointed and core staff in place. Modern office building and facilities are also in place with adequate knowledge base and systems created, operational; some of the expertise put in place were water resource development, socioeconomic, environment, GIS, and communication.<br>Capacity of staff for sub-basin planning and management strengthened through various trainings (list of trainings is in annex 9). |
| | **Indicator A2:** Water resources monitoring network operational and information collected and used routinely | Enhanced HIS/BIS water resources monitoring network (including radar, gauging, and earth observation products) for the Tana and Beles sub-basins operational; comprehensive basin knowledge base and supporting analytical/modeling tools used to support planning and operational decisions | **Achieved.**<br>HIS/BIS and hydrological information network was upgraded, gauging stations were established, and the water resources monitoring network has also become operational.<br>Different models were used to support the sub-basin planning process using the ENTRO developed DSS. Other developed models are being further tested. Operationalization has also started. |
| | **Indicator A3:** Flood Management Information System (FMIS) developed and used routinely | Flood forecasting and early warning system in place and used for the flood-prone areas around Lake Tana | **Partially achieved.**<br>• The FMIS was established but full operationalization is yet to happen, because it needs to automate the link. Flood risk maps were produced to plan for early warning, preparedness, and response.<br>• Planning and management models, including the DSS of Nile Basin, modified to adapt to Tana and Beles and has become functional.<br>A C-band radar has been installed on the western side of Lake Tana at Shawra Hill. This will be used for rainfall and flood forecasting in the sub-basin. This technology is intended to integrate with the BIS. This activity is successfully completed and operationalization is initiated. |
| | **Indicator A4:** No. of stakeholder meetings conducted to develop and review sub-basin plans | Stakeholder consultations on draft basin water resources plan: 6 broad-based stakeholder meetings held (3 by TaSBO and 3 by BeSBO) to support sub-basin planning | **Achieved.**<br>• 14 stakeholder meetings and consultations (10 by TaSBO and 4 by BeSBO) conducted at woreda, regional and federal levels. The sub-basin plans were discussed, awareness created, and comments incorporated to finalize the plans. The plans have been formally approved by ARBHC. . |

**Table 2.8. Component B: Natural Resource Management Investments**

| Intermediate Outcomes | Indicator | Target | Achievements |
|---|---|---|---|
| **(**i) Improved management of watersheds in targeted sub-watersheds | **Indicator B1:** No. of households (including female beneficiaries) adopting improved soil and water management practices | 30,000 households | **Substantially achieved.**<br>44,355 households adopted improved soil and water management practices, which is 147% of the revised target. |
| (ii) Improved flood preparedness and management in targeted areas | **Indicator B2:** Increase in community infrastructure (small-scale irrigation, access roads, foot bridges, rural water supply source development, and flourmills) provided in targeted kebeles | • 1225 ha irrigation land (SSI 1000 ha - 14 schemes)<br>• 80 km community access path<br>• 29 km internal access paths upgraded<br>• 8 foot bridges constructed<br>• 432 springs developed for improved water supply (432 community water supply points)<br>• 12 community flourmills established<br>• 5 forage nurseries<br>• 35 FTCs | **Partially achieved.**<br>• 14 SSI schemes were rehabilitated in about 1000 ha, benefiting more than 3300 households.<br>• 66.79 km access roads and 139.52 km internal access paths were constructed/upgraded, and 84 foot bridges, 70 fords, and 7 culverts were also constructed.<br>• 6 village water supply schemes and 740 water points (rural water supply) constructed targeted to all 163 community watersheds and benefited more than 143,000 beneficiaries. Water supply scheme management guidelines were prepared and made available at the woreda and watershed levels.<br>• 22 FTCs, DAs' residences, and offices were constructed/upgraded, and 33 FTC were provided with facilities.<br>• 10 flourmills were established in the 35 targeted kebeles, creating 50 jobs.<br>• 20 forage nurseries (seedling multiplication sites) were established. |
| | **Indicator B3:** Average warning time for flood forecast information to reach targeted kebeles for improved preparedness | 2 hours advance warning for targeted communities using improved forecasting tools and early warning system | **Partially achieved.**<br>• Flood Forecasting and Early Warning System was put in place. The Flood Forecasting System is also being linked with the radar to get real-time data on flood forecasting and monitoring. Average warning time has not been measured as the sirens are not yet functional.<br>• Flood management plans were adopted by relevant institutions and targeted communities. Capacity-building training and awareness creation was given for zonal and woreda-level experts and officials, for kebele leaders, DAs, and Community Flood Committee; mobile phones were provided for communication; and early warning indicators were installed. |

| Intermediate Outcomes | Indicator | Target | Achievements |
|---|---|---|---|
| | **Indicator B4:** Increased capacity in the project areas for sustainable NRM practices and interventions | Demonstrated capacity to sustain improved NRM practices and interventions | **Achieved.**<br>• 163 micro-watersheds (community watersheds) were identified and each community watershed prepared comprehensive (multiyear) watershed development plans of their own.<br>• Capacity of the watershed community strengthened through different training and demonstrations and SWC measures implemented in more than 79,000 ha of watershed area. |
| | **Indicator B5:** Community contribution in the total project costs (US$) | US$11.47 | **Fully achieved.**<br>Communities contributed 100% of the target which is 15% of the total project cost. |

**Table 2.9. Component C: Growth-Oriented Investment Facilitation**

| Intermediate Outcome | Indicator | Target | Achievement |
|---|---|---|---|
| (i) Enhanced capacity to plan, prepare, and facilitate a pipeline of critical sustainable growth-oriented investments | **Indicator C1:** Endowment and growth potential and constraints in the Tana-Beles area analyzed and discussed | Study findings reflected in the Tana and Beles sub-basin planning process | **Partially achieved.**<br>Endowment and growth study for Tana and Beles completed and discussed at a stakeholder workshop. The study findings were reflected in the Tana and Beles sub-basin planning process. |

**Table 2.10. Component D: Project Management**

| Intermediate Outcome | Indicator | Target | Achievement |
|---|---|---|---|
| (i) Satisfactory management performance: planning, procurement, and evidence-based decision making | **Indicator D1:** Procurement conducted per procurement plan | Procurement per plan; reports of adequate quality on time | **Partially achieved.**<br>Some of the procurement were delayed and some items are yet to be delivered to the site and got fixed. |
| | **Indicator D2:** Reports prepared biannual (project physical and financial progress); annual (audit, training, monitoring); midterm and final (evaluation) | Reports of adequate quality on time including midterm and final project evaluation | **Partially achieved with some delays** |
| | **Indicator D3:** A full-time National Project Coordinator (NPC) and full-time Procurement Specialist (PS) in place at the National Project Coordination Unit (NPCU) continually to effectively manage the project and its procurements | A full-time NPC and full-time PS in place at the NPCU | **Achieved** |

## Annex 3. Economic and Financial Analysis

### Post-implementation Economic Analysis

### Background

1. The revised development objectives of the Tana and Beles Water Resource Development Project is "to develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles sub-basins for integrated water resources development." Originally, the project was estimated to cost US$69.85 million, to be disbursed in five years. However, later an AF of SDR 3.7 million (equivalent to US$5.1 million) was approved in 2015 to make up for a US$3.8 million shortfall in project financing due to depreciation of SDR and to cover additional operating and training costs resulting from a one-year extension of the project closing date. The project financed the following components and subcomponents and disbursed 100 percent of its revised allocated resource: (a) Component A: Sub-basin Resources Planning and Management (US$23.10 million) consisting of WRIS development (US$13.09 million) and Resource Planning and Management Capacity-building (US$10.02 million) subcomponents; (b) Component B: Natural Resource Management Investments (US$43.77 million) with Watershed Development (US$39 million) and Flood Management (US$4.783 million) subcomponents; (c) Component C: Growth-oriented Investment Facilitation (US$1.56 million) with Development Agency Support (US$0.66 million) and Growth-oriented Investment Preparation (US$0.90 million); and Component D: Project Management (US$2.20 million).

2. At appraisal, three separate financial and economic analyses were conducted for the Watershed Development subcomponent, which accounts for more than 50 percent of the project's expenditure, mainly financing SWC improvement and livelihood system strengthening activities. A change of productivity approach (emphasizing benefits compared to costs) based mainly on yield and cropping pattern changes resulting from the SWC interventions during the first five years of the project are evaluated over a 30-year period. Very conservative yield changes of 1 percent per year are assumed over the full period. The analysis was also conducted for the Flood Management subcomponent, which is characterized by community-level response strengthening based on improved water and early warning information systems. The financial and economic analysis is completed through a damages-avoided approach (emphasizing benefits of avoided losses and savings on rehabilitation/repairs/replacement in relation to costs of the flood mitigation measures to be introduced) in the two most flood-prone areas of Lake Tana. The flood mitigation economic analysis was conducted for floods of different intensities with their respective probabilities and damages. There was a combined analysis for the Institutional Strengthening Component A and Growth-oriented Investment Component C. A combination of market and opportunity cost analysis (value of opportunities and resources lost from inaction) and an evaluation of the capacity to cover additional fiscal costs associated with improved water management institutions are used to demonstrate the importance of implementing improved institutional coordination and management systems and promoting sustainable growth in the region.

3. The results of the financial and economic analysis demonstrate in several ways that there is a clear economic rationale for investing in improved WRM and related development in Ethiopia. The benefits to the nation generally, and in particular, to the region in which this project is implemented, derive primarily from losses avoided because of the impacts of floods and droughts and economic gains from the maintenance of water quality and watershed environments. The project will provide the information and institutional base needed to prepare and support a long-term investment program rooted in improved WRM.

4. While the project has gone through six restructurings, including an AF of US$5.1 million, the extension of the project closing date by cumulative of three years, reallocation of project resource among different components, reduction in the scope of the project, dropping of some targets and part of the project components, and so on, no revision was done to the financial and economic analysis.

## Ex Post Economic Analysis

5. This ex post economic analysis covers only the Watershed Development and Flood Management subcomponents of the Natural Resources Management Component (Component B). The combined financial and economic analysis, conducted during appraisal for the Sub-basin Resources Planning and Management (Component A) and Growth-oriented Investment Facilitation (Component C), is not covered under the ex post analysis. This is mainly because the growth corridor component was scaled down in the course of project implementation and the difficulties to net out the final returns of institutional strengthening subcomponents.

6. The ex post economic analysis will check whether the assumptions and parameters used and the conclusions of the evaluation during appraisal are still valid. The analysis is mainly based on Government-ICR called Project Completion Report (PCR) and subsequent baseline and impact assessment survey conducted for the Watershed Development sub-component in 2016 as well as consultation and data collection from major stakeholders.

7. The ex post economic and financial returns are estimated following the same methodology used at appraisal for both the Watershed Development and Flood Management subcomponents. As availability of data permits, financial and economic returns are recalculated by replacing values used at appraisal (yield per hectare, livestock productivity, cropping patterns, price of agricultural products and inputs, project duration, disbursement, and so on) with actual values at completion.

## Watershed Development

8. The Watershed Development subcomponent supported sustainable watershed development investments covering about 83,000 ha in the Ribb, Gumara, and Jemma sub-watersheds in the Lake Tana sub-basin that was estimated at 80,000 ha at appraisal. Local livelihoods in the targeted woredas were expected to improve through higher crop and livestock productivity and better marketing. With the project scenario, it was assumed that productivity will improve at an annual average rate of 1 percent, resulting from improved SWC measures, livelihood strengthening interventions, and modification of crop and livestock production systems.[12]

9. Net farm household return on the basis of one typical representative hectare covered with combination of 10 types of crops mixed with livestock production was estimated. The per hectare marginal return for each crop was recalculated based on factor inputs and product prices in 2007 constant price. As shown in table 3.1, net marginal return per hectare at the ICR is estimated to be ETB 6172.16 which is about 14 percent lower than the net marginal return estimated at appraisal (ETB 7280.14). The estimated per hectare marginal return is used to develop the economic and financial cost and benefits of the subcomponent.

**Table 3.1. Financial Gross Margin per Hectare in ETB 2007 (Constant Price)**

| Description | Estimated at Appraisal | Estimated at ICR |
|---|---|---|
| Gross return from crop production | 4609.92 | 3897.36 |

[12] The socioeconomic survey has revealed that in the targeted watershed intervention areas (a) soil erosion has significantly reduced, especially on gully and degraded lands, and these types of lands have changed to productive land; (b) the practice of free grazing has been changed and 70 percent of grazing lands of the watershed are closed and become fields for useful biomass collection and vegetation cover of the project areas have increased; (c) animals are stall fed through cut and carry; (d) soil fertility has improved and as a result, crop and forage productivity increased; and (e) production increased in major crops in the demonstration sites.

| | | |
|---|---|---|
| Gross return from livestock production | 2670.23 | 2431.55 |
| Gross farm return | 7280.14 | 6328.90 |
| Less fixed costs | | |
| Land tax | 30.00 | 33.00 |
| Farm tools | 100.00 | 123.74 |
| **Net farm return/hectare** | **7150.14** | **6172.16** |

10. The ex post economic IRR for the Watershed Development subcomponent is estimated at 17.1 percent with economic NPV of ETB 221.4 million (at 10 percent discount rate). As shown on table 3.2, both the economic and financial returns estimated at ICR are lower than the estimates at appraisal. The positive economic and financial NPV and IRR greater than the discount rate estimated at completion confirmed that the subcomponent is still economically and financially viable. However, examining the factors contributing to the lower returns at ICR compared to estimates at appraisal is very important to take lessons for future project design and preparation.

**Table 3.2. Summary of Financial and Economic Returns (ex post and ex ante)**

| Description | Financial | | Economic | |
|---|---|---|---|---|
| | NPV (ETB, millions) | IRR (%) | NPV (ETB, millions) | IRR (%) |
| Watershed Development | | | | |
| Estimation at appraisal | 434.20 | 23.6 | 374.70 | 24.2 |
| Estimation at ICR | 386.39 | 20.5 | 221.42 | 17.1 |

## Factors Affecting the Financial and Economic Returns

11. The project has gone through multiple restructurings in the course of implementation, which has resulted in reduction of scope, increase in additional resource, reallocation among components, and extension of project closing date, among others. Because of these restructurings, construction of 14.7 km access roads to hydrological monitoring stations planned under the Watershed Development subcomponent was dropped. While it is difficult to measure the impact of omitting this activity on the economic and financial returns, there is no doubt that it will have a negative impact. In future, cost estimates have to be based on adequate and reliable information to avoid shortage of resources in the course of implementation.

12. **Productivity of crops (yield/hectare).** Per the assumptions at appraisal, productivity of major crops will increase at an annual rate of 1 percent with the implementation of the project. However, when the productivity reported at completion is compared to the 'with project scenario', mixed results are obtained. While the productivity target was over achieved for teff (11 percent), wheat (13 percent), and pulses (24 percent), it is underachieved for oilseeds (−27 percent), maize (−10 percent), finger millet and potato (−6 percent), and vegetables (−11 percent).

13. Similarly, at appraisal, it was assumed that the project will increase milk yield (liter per cow per year) from 400 liters to 1200 liters and egg production from 140 eggs per hen per year and reach 200 eggs per hen per year. As shown in table 3.3, the livestock productivity status in 2016 is better in project areas when compared with the control areas. However, when compared with the expected results at appraisal, the performance is 35 percent lower for eggs and 52 percent lower for milk production. This implies that future intervention in the livestock subsector has to thoroughly examine and consider the factors affecting productivity in the subsector.

**Table 3.3. Comparison of Livestock Yield**

| No. | Livestock Yield | Without Project at Appraisal | With Project Assumption | Actual in 2016 | Actual Control Area | Performance (%) |
|---|---|---|---|---|---|---|
| 1 | Egg/hen/year | 40 | 200 | 69.0 | 63.0 | 35 |
| 2 | Liter/cow/year | 400 | 1200 | 620.5 | 569.4 | 52 |

14. **Cropping patterns.** The project, through its crop diversification program, is expected to promote the production of potatoes, vegetables, and temperate fruits. In addition, expansion of the cultivated area covered by pulses (as part of the crop rotation) is assumed to play an important role in enhancing soil fertility. As shown in table 3.4, the cropping pattern changes assumed at appraisal have not been fully realized. While the share of cultivated area by pulses and oilseeds were projected to reach 13 percent for pulses and 9 percent for oilseeds, the share of both crops fail to reach the assumed targets. On the other hand, the share of potato and barley have significantly increased by 7 and 8 percentage points over the targets, respectively. These results might have constrained soil fertility but households in the project area have been using various fertility enhancement measures, including use of compost (83 percent of farmers use compost on their farm though the amount used varies from 3 to 120 quintals per ha) and chemical fertilizers (1.52 quintals per ha), afforestation. Hence, missing the cropping pattern targets may not have significant effect on the household income.

**Table 3.4. Cropping Pattern as Percentage of Cultivated Area**

| Crop type | Share of Cultivated Land | | |
|---|---|---|---|
| | At Appraisal (%) | At ICR (%) | Difference (%) |
| Teff | 24 | 18.0 | −7 |
| Wheat | 13 | 14.0 | 1 |
| Barley | 10 | 18.0 | 8 |
| Maize | 16 | 19.0 | 3 |
| Finger millet | 7 | 8.0 | 1 |
| Pulses | 13 | 6.0 | −7 |
| Oil seeds | 9 | 0.4 | −8.6 |
| Vegetables (Onion) | 4 | 3.0 | −1 |
| Potato | 7 | 14.0 | 8 |
| Temperate fruit | 2 | — | — |
| Total | 105 | 100.0 | −5 |

15. **Price of agricultural inputs and products.** Since the project was initiated in 2008, the prices of factor inputs and agricultural products have increased significantly. Table 3.5 shows that considering 2008 as constant price, the overall agricultural price index has increased to 224.8 which shows that the agricultural product price has more than doubled during the project period. On the other hand, the price of fertilizer per kg has increased from ETB 4 per kg to ETB 13.33 per kg for DAP and from ETB 4.2 per kg to ETB 9.61 per kg for urea. During appraisal, fertilizers (urea, DAP, and manure) are estimated to account about 40 percent of the variable cost of agricultural production.

**Table 3.5. Price Index for Agricultural Products December 2006=100 and June 2008=100**

| No. | Agricultural Products | Price Index | | | | |
|---|---|---|---|---|---|---|
| | | Dec-06 | Jun-08 | Dec-15 | Jun-08 | Dec-15 |
| 1 | Cereals | 100 | 181.9 | 336.8 | 100 | 185.16 |
| 2 | Pulses | 100 | 142.2 | 426.9 | 100 | 300.21 |

| No. | Agricultural Products | Price Index | | | | |
|---|---|---|---|---|---|---|
| | | Dec-06 | Jun-08 | Dec-15 | Jun-08 | Dec-15 |
| 3 | Oil seeds | 100 | 219.1 | 353.4 | 100 | 161.30 |
| 4 | Vegetables | 100 | 150.3 | 446.6 | 100 | 297.14 |
| 5 | Fruits | 100 | 128.5 | 447.3 | 100 | 348.09 |
| 6 | Potatoes | 100 | 150.7 | 340.0 | 100 | 225.61 |
| 7 | Spices | 100 | 314.3 | 625.7 | 100 | 199.08 |
| 8 | Livestock | 100 | 121.0 | 379.7 | 100 | 313.80 |
| 9 | Dairy | 100 | 148.9 | 457.9 | 100 | 307.52 |
| 10 | Overall | 100 | 168.2 | 378.1 | 100 | 224.79 |

*Source:* CSA Producers Price Index, December 2015.

16. The cumulative effects of underachievement on some targets have been compensated by overachievement in other targets. Similarly, the increase in the prices of agricultural inputs have been compensated by increase in price of agricultural products resulting in positive NPV and IRR above the discount rate.

**Flood Management**

17. The Flood Management subcomponent aims to support community-based flood management and adaptation in the flood-prone areas around Lake Tana and overall flood preparedness at the regional, local, and community levels. Flooding occurs in this area every year from Lake Tana backflow or from flows of the Ribb, Gumera, and Megech Rivers that are tributaries into the lake. Dembiya, Libo Kemkem, Fogera, and Dera Woredas and the City of Bahir Dar, all adjoining Lake Tana, are the main flood-risk areas. This subcomponent has strong linkages with the WRIS developed under Component A, which seeks to improve the gauging, data acquisition, and processing for real-time flood forecasting and communication, training at various government levels, and conducting special studies to enable the sub-basin to be better be prepared for frequent floods.

18. The analysis conducted at appraisal estimated the probability of floods of different intensities based on actual rainfall data over the past 45 years before the project, and on the basis of the results, uses three flood intensities with different probabilities to assess the value of damages over a 30-year period. These results indicate three different flood intensities and probabilities: floods with average-loss years (84 percent probability), greater-than-average loss years (9 percent probability), and less-than-average loss years (7 percent probability).

19. At appraisal, the NPV and IRR of the investment for the Flood Management subcomponent were estimated for average-, less-than-average, and greater-than-average loss years based on 10 percent, 15 percent, and 20 percent damage recovery loss years. The subcomponent was found to be economically viable, with NPV ranging from US$8.7 million to US$20.3 million and IRR ranging from 12 percent to 41 percent.

20. Ex post financial IRR for the Flood Management subcomponent based on average loss scenario and assuming 10 percent, 15 percent, and 20 percent loss avoided is estimated at 21 percent, 24 percent, and 25 percent, respectively. While the subcomponent is still economically viable, the estimated economic returns are slightly lower than 19 percent, 25 percent, and 28 percent estimated at appraisal respectively, for 10 percent, 15 percent, and 20 percent damage recovery loss.

21. While most of the planned activities under the Flood Management subcomponent were fully completed before project closure, installation and operationalization of early warning sirens were conducted after project closure. The Flood Forecasting and Early Warning System is in place but full operationalization of the FMIS is yet to take place; the dredging machine procured to clean silt from Lake Tana is not yet operational. Furthermore, important activities required to improve response to flood incidents and reduce damage such as construction of 77 km of escape route was dropped after the detailed design was completed because of large estimated cost, safeguard requirements, and time constraints. In addition, major PDO indicators for tracking the realization of expected project benefits like reduction in average loss of assets because of flooding and so on are also dropped. Hence, ex post economic and financial returns are not reestimated in the current analysis, rather qualitative descriptions are used to assess ex post economic returns.

22. The number of people displaced because of flood is reducing from time to time as the awareness creation and flood contingency plan at different levels contribute to the timely preparation of the administration and community to encounter annual floods. For example, according to the FSCDPO, out of the 93,597 beneficiaries around flood-prone areas, 40,690 people were affected by flood and displaced in 2012. In 2016, the contingency plan was prepared with expected displacement of about 26,588 people, but there was no displacement reported. Though this could partly be attributed to the intensity of flood during the year, the contribution of the project in reducing the impact needs to be recognized. The discussion with the FSCDPO revealed that the targeted communities benefited from reduced vulnerability and damages of crops and assets through implementing disaster prevention measures. In addition, temporary plastic shelters that were not able to provide full protection to the community were replaced by permanent shelters with water and sanitation facility. Solar panels were also installed for these shelters to provide light to the community, while sirens' installation was completed after project closure. A total of 104 mobile apparatus were provided at different levels (kebele, woreda, and zone) that facilitated communication in the flood season. Four motor boats provided by the project facilitated monitoring and service provision by the different woreda offices during the inaccessible flood season. Overall, the discussion with woredas and beneficiaries revealed that prevention work supported by the project has significantly reduced the negative flood effects in the targeted area.

23. The positive NPV and IRR greater than the discount rate estimated at ICR both for the Watershed Development and Flood Management subcomponents reveals that the subcomponents are still financially and economically viable.

## Annex 4. Bank Lending and Implementation Support/Supervision Processes

### (a) Task Team Members

| Names | Title | Unit | Responsibility/ Specialty |
|---|---|---|---|
| **Lending** | | | |
| Eduardo Brito | Senior Counsel | LEGAF-HIS | |
| Roxanne Hakim | Senior Social Development Specialist | GSU02 | |
| Nagaraja Rao Harshadeep | Lead Environment Specialist | GENGE | Co-Task Team Leader/Environment |
| Laketch Mikael Imru | Senior Rural Development Specialist | GFADR | |
| Samuel Haileselassie Kebede | Senior Procurement Specialist | OPSPF | |
| Paul Moreno-Lopez | Program Leader | MNC05 | |
| Anders Risberg | Financial Specialist | AFTNL-HIS | Financial management |
| Ashok K. Subramanian | Adviser | PA9SS | |
| Menbere Taye Tesfa | Senior Private Sector Development | AFTFE - HIS | Private sector |
| Yitbarek Tessema | Lead Water and Sanitation Specialist | GWA01 | |
| Eshetu Yimer | Senior Financial Management Specialist | AFTME - HIS | Financial management |
| **Supervision/ICR** | | | |
| John Bryant Collier | Senior Environmental Specialist | GEN01 | Task Team Leader |
| Rahel Wogayehu | Operations Analyst | GWA08 | ICR author |
| Wendwosen Feleke | Operations Officer | GWA08 | Financial and economic analysis |
| Tesfaye Ayele | Senior Procurement Specialist | GGO01 | Procurement |
| Asferachew Abate | Senior Environmental Specialist | GEN01 | Environmental safeguards |
| Chukwudi H. Okafor | Senior Social Development Specialist | GSU02 | Social safeguards |
| Nagaraja Rao Harshadeep | Lead Environment Specialist | GENDR | Former Co-TTL |
| Hayalsew Yilma | Irrigation Specialist | GFA13 | Irrigation |
| Yalemzewd Simachew | Social Development Specialist (Consultant) | | Social safeguards |
| Meron Tadesse Techane | Senior Financial Management Specialist | GGO25 | Financial Management |
| Hamere Wondimu | Consultant | | M&E |
| Tesfahiwot Dilnessa | Program Assistant | AFCE3 | Administrative Support |
| Dawit Tadesse | Program Assistant | GWA01 | Administrative Support |

## (b) Staff Cost

| Stage of Project Cycle | Staff Cost (Bank Budget Only)<br>US$ thousands (including travel and consultant costs) |
|---|---|
| **Lending** | |
| FY06 | 145.77 |
| FY07 | 124.84 |
| FY08 | 530.38 |
| **Total:** | 800.99 |
| **Supervision/ICR** | |
| FY09 | 115.56 |
| FY10 | 173.90 |
| FY11 | 85.80 |
| FY12 | 124.60 |
| FY13 | 147.58 |
| FY14 | 192.96 |
| FY15 | 133.33 |
| FY16 | 123.70 |
| FY17 | 52.50 |
| **Total:** | 1149.93 |

## Annex 5. Beneficiary Survey Results

### Executive Summary

### 1. Background

1. The Natural Resource and Socioeconomic Impact Assessment Survey for Subcomponent B1 of the TBIWRDP was conducted by Bahir Dar University. The project contracted Bahir Dar University to conduct natural resources and socioeconomic baseline, follow-up, and impact assessment study specifically for the Watershed Development subcomponent of the project in 2010, 2013, and 2016, respectively. The study was confined to the Lake Tana Basin within the Ribb, Gumera, and Jemma watersheds and included five sub-watersheds (Baskura, Enguli, Enkulal, Kentai, and Zefie). The baseline study report provided a summary of key indicators and their values and quantities at the time to be used as a benchmark for the TBIWRDP. The follow-up survey was conducted from March to September 2013 to establish reliable information that will be helpful to measure the achievements of the subcomponent and to provide a basis for 'before-after' and 'with-without' evaluation that are important in tracing the impact over time as a result of the Watershed Development subcomponent implementation. From February to July 2016, the Impact Assessment Survey was conducted in the same project areas.

### 2. Objectives of the Impact Assessment Survey

2. The overall objectives of the Natural Resource and Socioeconomic Impact Assessment Survey was to evaluate the impacts and trace the tangible changes over the past six years as the result of project intervention by comparing the past socioeconomic and natural resource status of the sub-watersheds in comparison with the results of baseline.

### 3. Methodology

3. The methodologies followed for the natural resources survey include (a) pre-field preparation, including the collection and assessment of secondary data; (b) intensive GPS-based inventory to all the land management practices (the SWC and forestry/agroforestry measures) by the type and their aerial extent according to the different land uses; (c) use Normalized Difference Vegetation Index analysis of land satellite imagery and run change detection model for the forest and woody biomass coverage in the project watershed.

4. Experienced experts from the woreda were selected as the main supervisors and kebele DAs who were trained in GPS usage and other methods of data collection participated in the study. A total of 120 data collectors—75 percent of whom were DAs and 25 percent fresh university graduates—and five supervisors (agricultural experts) were involved in the whole work of intensive tracking of the whole community watersheds.

5. The Socioeconomic Survey was carried out in 16 project community watersheds located in Rib, Gumara, and Jemma watersheds in Farta, Este, Mecha, and Sekela Districts of the Amhara Region. Both qualitative and quantitative data collection methods were applied to generate data. Quantitative data were collected through household surveys using structured questionnaires. Respondent households of the Impact Assessment Survey were those households interviewed during the baseline survey conducted in 2010. Qualitative data were also collected through focus group discussions, key informant interviews, and transect walks to substantiate the data collected through household surveys. Different methods of data analysis were employed to achieve the objectives of the impact assessment. The data collected through qualitative techniques were analyzed through content analysis to substantiate and augment the findings from statistical analysis.

## 4. Areas Covered

6. The survey was based on the key output indicators established by the Watershed Monitoring and Evaluation Framework of Subcomponent B1 which were used for the follow-up survey. The Natural Resources Survey includes gullies rehabilitated, SWC measures implemented on cultivated land, user groups and management plans established for forest conservation, new tree nurseries established, new community forests planted, and new household woodlots planted. The infrastructure development includes additional access roads constructed or upgraded, additional internal access paths constructed or upgraded, and additional footbridges/culverts constructed. In addition to providing quantities and values to the key indicators, other detailed natural resource inventories were conducted. The Socioeconomic Survey collected information on several factors, including socio-demographic characteristics of households, crops production, livestock ownership and production, household food security, household income and expenditure, access to social services and infrastructure, sources of energy, and so on.

## 5. Results

### 5.1. Natural Resources Management

7. **SWC practices.** The TBIWRD project has supported various types of SWC practices to protect badly degraded areas using different approaches on grazing land, farmland, degraded land, forestland, and mixed land use systems of the sub-watersheds. The main types of SWC measures undertaken were physical SWC structures (normal bunds, check dams, and cutoff drains); water harvesting structures; and plantation of multipurpose trees on physical conservation structures.

8. The results of the descriptive analysis show that farmers have practiced different NRM practices to control soil erosion and enhance soil fertility. The survey results show that 92.8 percent of interviewed households have constructed bunds on their farmlands, which was by far larger than the baseline year. The farmland area treated with bunds was also higher than the baseline year. The survey data reports that check dams were constructed on at least 44.6 percent of interviewed households' land in contrast to 15.7 percent during the baseline year. Integrating cutoff drains with bunds and terraces was also one of the conservation activities aiming at the sustainability of bunds and terraces and preventing soil erosion. The results of household surveys reveal that about 30 percent of households have implemented cutoff drains. The proportion of farmers who carried out this conservation structure has increased in the past six years.

9. **Gully prevention and controlling measures.** Different kinds of gully prevention and controlling measures have been implemented to reduce impacts and increase production and productivity of the project area. The prevention measures included property development (such as locate and construct roads, fences, and laneways so that they cause minimal concentration and diversion of runoff); grazing management (such as fence off and exclude livestock from land vulnerable to gully erosion); and cropping management (such as control erosion on slopping cultivated land by stubble retention and the construction and maintenance of contour banks and waterways). Gully erosion control measures include use of vegetation, gully reshaping and filling, controlling gully heads, and gully floor stabilization. Both prevention and control measures have been implemented in all five sub-watersheds since 2008.

10. **Forestry and agroforestry.** New community forests and household woodlots are planted, and backyard plantation has been enhanced through the project support. In the past six years, plantation of trees aiming at income generation, enrichment of soil fertility, and control of soil erosion and production of livestock fodder was widely practiced. The results showed that about 94.9 percent of household respondents have planted tree/shrub species on their landholding in the past six years. The efforts made in the establishment of nurseries and distribution of seedlings by the support of TBIWRP has contributed to such changes. In general, the size of area under the agroforestry system has increased in the past six years in the

project watersheds, indicating that the efforts made by the project so far has contributed to adoption of natural resource conservation practices.

### 5.2. Livelihood Improvement

#### Soil Fertility Management Practices and Crop Production

11. The percentage of farmers using chemical fertilizers, compost, and animal manure reached 93.2 percent, 83.7 percent, and 55 percent, respectively. These figures were higher than the proportion of users during the baseline year. Furthermore, the farmland area treated with chemical fertilizers in the 2015–16 cropping year was more than the area fertilized during the baseline year. The increment of the area applied with chemical fertilizers and the mean amount of fertilizers applied per hectare are because of the purchasing capacity of households due to crops' yield improvement and engagement of households in different off- and nonfarm livelihood activities.

12. Cereal crops such as barley, wheat, teff, maize, and finger millet; pulses such as faba beans and field pea; and tuber crops such as potato are dominant crops. On average, households in project areas harvested 13.12, 16.43, 26.1, 21.8, 16.3, and 106.3 quintals of teff, barley, maize, wheat, finger millet, and potato per hectare, respectively in the 2015–16 cropping year. These figures were relatively higher by 21.5, 21.7, 18.9, 28.5, 27.6, and 88.4 percent compared to the 2009–10 cropping years. Time-wise analysis also showed that the yields of horticultural crops produced per unit of area in the project areas were higher compared with the base cropping year (2009–10). Most of the respondents felt that SWC structures, use of improved seed varieties and chemical fertilizers, and compost and animal manure application in the past six years have played a role in reducing soil erosion and enhancing soil fertility and thereby, resulting in the rising of yield.

#### Livestock Ownership, Yield, Breed Improvement, and Feed Availability

13. Nearly 90 percent of the farmers were the owners of one or more types of livestock in 2016. The livestock types kept by farmers are cattle, goats, sheep, donkeys, horses, mules, and chickens. Livestock holders own, on average, 3.63 tropical livestock unit (TLU), varying from 0.03 to 8.5 heads in TLU. This figure was higher than the corresponding livestock holding size of the baseline year (2.72 TLU). This may be because of the rise in household income from crops yield increment and increasing access of credit.

14. In spite of the lower performance, the mean daily milk yield of the cows has increased. Relatively higher mean daily milk yield per cow per day (1.7 liters per cow per day) was produced in 2016 as compared to the baseline year (2009–10). Similarly, increment of the number of eggs laid per hen per year was observed. This might be because of the dissemination of the crossbreeds and exotic chicken species in the past six years. Honey yield from both traditional and modern hives was markedly increased in the past six years. The beekeepers have harvested 14.6 kg of honey per traditional hive and 30 kg of honey per modern hive in 2015–16. On average, this is an increase of about 9.4 kg per hive and 7.4 k per hive from the traditional and modern hives, respectively, in 2016 compared with the baseline year.

15. The number of exotic and hybrid chicken and improved cow breeds have increased in the past six years. Generally, close to 6000 farmers have adopted hybrid and exotic breeds of chickens and cows. The availability of improved feed supply and genetic improvement might be the factors for the improvement of livestock products. Despite the increasing trend, the percentage of farmers who kept improved breeds and the number of improved breeds per farm household is still limited.

16. The efforts made so far in the introduction and dissemination of improved animal feed has also brought change in the supply of animal feed. The survey results indicated that significant number of the

households used fodder trees (50.6 percent) and forage crops (18 percent) as the source of animal feed in the project areas in 2015–16. The adoption rate of improved forage such as forage crops cultivation, backyard plantation, and plantation of trees and over-sowing grasses on physical structures and alley cropping was found to be increased in the past six years. It was observed that the proportion of forage trees and fodder crops users was higher by 49.9 percent and 15.5 percent, respectively, in 2016 as compared to the baseline year. The use of agro-industrial by-products was also improved in 2016 compared with the baseline year. About 9.6 percent of livestock holders used agro-industrial by-products. In spite of the increasing use of improved forage and industrial by-products, livestock holders relied heavily on crop residue.

17. **SSI.** The TBIWRD project has been providing financial, technical, and advisory support to the farmers of the project sub-watersheds to practice the SSI system in their farmlands at the individual or community level. The rate of adoption of irrigation agriculture has increased in the past six years though at a lower level. Nearly 40 percent of (38.4 percent) of the households are involved in irrigation agriculture. The mean irrigated area per irrigator household is about 0.26 ha. Based on the analytical results of the surveys carried out in 2009, 2013, and 2016, the proportion of irrigators and the area irrigated have increased in the past six years. This implies that the investment undertaken by the TBIWRDP contributed to the expansion of irrigation agriculture.

18. **Access to pure water supply and sanitation.** About 72 percent of households have access to safe and clean drinking water in 2015–16 compared to the 59.4 percent of the baseline survey. The construction of water points within the community watersheds and development of springs have enabled most of the households to have easy access to clean water and also saved time needed for other productive activities by reducing the time spent on fetching water. As the survey results indicate, the percentage of households spending less than one hour to fetch water per day was 97.6 percent in 2015–16, which was higher by nearly 30 percent compared to the baseline year.

19. **Access to social services.** The percentage of households that have access to health posts, primary schools, and veterinary services has increased from the baseline year by 17.7 percent, 31.1 percent, and 28.8 percent, respectively with the final access being 95.5 percent, 100 percent, and 100 percent respectively. Accessibility of farm households to the nearest roads has improved in the last six years. The findings of the survey revealed that the average time taken by households to the nearest road was 23 minutes. The average distance to reach the nearest veterinary clinics has declined from two hours to 50 minutes. More than 80 percent of livestock holders could walk to the nearest veterinary clinic in less than an hour. The project has successfully achieved its target as well in access to education by reducing the distance/travel time to primary school. The average travel time to primary schools in project areas was 29 minutes, which was reduced from 65 minutes compared with the baseline year.

20. **Source of energy.** In spite of the heavy reliance on traditional energy, there is a significant progress in use of fuel-saving stoves in the lifespan of the project. Based on the results of the Impact Assessment Survey, close to two-third (64.6 percent) of interviewed households were using improved fuel-saving stoves. The corresponding figure during the baseline year (2009–10) was 33.2 percent.

### 5.3. Capacity Building

21. To improve farmers' ability in using their land more effectively and efficiently, strengthening farming skills through adequate training was one of the main outputs of the component. The realization of training activities in the project watersheds was assessed based on the response obtained from the respondents. The results of the survey reported that during the last six years, close to 85 percent of respondent households received training associated with improved seeds management, integrated pest

management, post-harvest loss management, integrated soil fertility management, SWC structures, water harvesting structure, fruit production, agroforestry, livestock development, and water institute management.

**6. Impacts in the Project Watersheds**

22. The following impacts have been observed in the project watersheds:

- Hillside closure, plantation on degraded communal lands, and gully treatment accelerated environmental rehabilitation in sampled watersheds. Farmers revealed that natural regeneration in the closure sites has allowed new shrubs and grass species to grow, which were not present in the past. The other positive environmental impact as explained by the farmers is the reduction of the excessive runoff from the surrounding hillsides. They understood the need for conservation measures as they realized the ill effect based on their own experiences.
- The inhabitants of the watershed revealed that the reclaimed gullies are made productive and used for forage, fuel, and construction wood sources. Many watershed inhabitants, who were working with the project as laborers during the initial stage of implementation, started cultivating their own land. The closed area management was environmentally a success.
- Natural resource conservation measures undertaken on farmlands addressed soil erosion problems, improved soil fertility, and enhanced the cereal crops yield.
- Water point development solved the problem of shortage of clean water for humans and livestock in project intervention watersheds.
- The efforts made in provision of social services and infrastructure has increased the accessibility by farm households and decreased the distance travelled to these basic services.
- Dependence on a single livelihood activity has declined and a large number of the households derived two or more livelihood strategies through the combination of farming activities and nonfarm and/or off-farm activities. Their engagement, hence, enabled them to generate income from different sources.
- In spite of lower performance, the yield of livestock products has improved in the project watersheds in the last six years of the project period. The distribution of improved breeds (chicken, cattle, sheep, donkeys); introduction of improved beehives; and the use of improved forage as livestock feed contributed to such enhancement of livestock production.
- Promotion of irrigation agriculture by constructing small irrigation schemes has encouraged a number of farm households to produce horticultural crops and some cereal crops, and the gap between crops produced using rain-fed and irrigation agriculture has narrowed as compared to the baseline year.
- Soil loss rate has been significantly reduced from the intervention area because of the integration of SWC interventions with improved livestock management and forest developments.

**7. Sustainability of the project activities**

23. According to the results of quantitative data (household survey), most of the interviewed households perceived that SWC measures carried out in their farm plots in the last six years are still sustained and will be sustained in the future. Likewise, the water points constructed through the support of the project are still operating during the Impact Assessment Survey. The other encouraging and sustainable outcomes obtained are the natural resources conservation measures under degraded communal lands.

According to the focus groups discussions and the report from the District Office of Agriculture, plantation of different tree species was done from 2 ha to 5 ha of degraded hillside area and closed in each community watershed. In addition, trees are planted on the rehabilitated gullies' banks and are protected from animal and livestock intervention.

24. To sustain the rehabilitated hillsides and gullies, the Kebele Administrative Council, in consultation with the residents of the project community watersheds, has decided that landless individuals or those with small landholdings (often youth-headed households) should be eligible users of the closed areas. User groups have developed their own bylaw and once the bylaw is signed by members and approved by the kebele administration, each user group member has the privilege of harvesting grass under the cut-and-carry system and generating income through selling grass. Members in the user groups started to fence gullies to reduce free grazing and hiring a watchman. This shows that they have realized the need and necessity to conserve the common property resources on which they depend for their livelihood.

25. Maintaining the constructed SWC measures in communal and farmlands was also done by the farmers at the individual level as well as the community level. The offices of agriculture in the five woredas confirmed that they will take the responsibility for maintaining the development activities implemented by the project. The Community Watershed Committees and Kebele Administrative Councils will also mobilize the communities for the sustainability of the constructed SWC measures in communal and farmlands.

26. The nurseries established by the project have contributed to expansion of tree plantation for agroforestry, firewood, and construction. To supply the seedlings of different tree species, the project has transferred the nurseries to youth self-help groups; religious institutions (for example, Ethiopian Orthodox Church); and the Office of Woreda Agriculture. The findings of focus group discussions and key informant interviews reported that the nurseries are still functional after the project closure.

## 8. Recommendations

27. The following action points are recommended to be considered:

- The TBIWRDP project placed particular emphasis on rehabilitation of degraded communal lands and promotion of IWSM measures on the individual farm plots by establishing nurseries and distributing different multipurpose tree species. Such measures have contributed to the rehabilitation of degraded communal lands, reduction of soil erosion, and improvement of soil fertility. As a result, crop productivity as well as animal feed availability has improved. The direct engagement of the community in all project processes have played a role in bringing about such changes. Hence, the Community Watershed Committees can potentially serve as focal points for mobilizing communities for collective and individual development actions. Therefore, woreda and kebele administrations should play a major role in further strengthening Community Watershed Committees in all watersheds.

- The TBIWRD project has been working to bring about a paradigm shift in the perception as well as practice of IWSM. Although there are some positive and earnest changes in the direction, there are still problems to fully internalize the notion of IWSM as a pathway to agricultural development of the project woredas (districts).

- Focus on scaling up of technologies in natural resources with proven performance such as closed area management, gully rehabilitation and development, water harvesting and development, multipurpose tree planting, and so on have to be continued by the office of agriculture and Community Watershed Committees.

- Distributing treated closed areas to landless households is the best and sustainable practice, provided that it is done in a participatory manner. Such an approach should continuously be evaluated and needs to be further expanded to other watersheds in the region.

- The participatory planning, implementation, and monitoring of IWSM activities introduced by the project have to be continued at the woreda and watershed levels. The Woreda Office of Agriculture and Woreda Chief Administrative Office should lead this effort.

- While the project has provided support to technical trainings, building of shelters, and supplying of working machines, the number of farm households engaged in alternative livelihood activities, such as fuel-saving stoves, handicrafts, honey production with modern bee hives, seed production, fattening, and so on, was small. The problems in the organization of self-help groups and lack of the accessibility of credits were the challenges in the promotion of such alternative livelihood activities. The woreda micro- and small-scale enterprise promotion office and other responsible bodies should gather the trained farm households, strengthen self-help groups, and make sure that they have credit access.

## Annex 6. Stakeholder Workshop Report and Results

No stakeholder workshop was held.

## Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR

1. The Government submitted the borrower's ICR called Project Completion Report (PCR) in November 2016. The report provides a large amount of details on processes, activities, and outputs. The report did not rate the performance of the Borrower and the World Bank, however, the report provides key information on the project performance which is summarized and presented as follows.

### 1. Project Description

### 1.1. Project Development Objective

2. The original PDO was "to develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basins to accelerate sustainable growth." However, during the restructuring made in May 2013, the remaining activities of Component C: Growth-Oriented Investment Preparation, except those completed at the time of the restructuring were dropped. Due to this, the PDO was revised as "to develop enabling institutions and investments for integrated planning, management, and development in the Tana and Beles Sub-basins for integrated water resources development."

### 1.2. Key Indicators for the Success of the Project

3. The key indicators for the success of the project included in the PAD are as follows:

- Tana and Beles SBOs established and fully operational
- WRIS developed for Tana and Beles sub-basins
- An initial integrated Tana Sub-basin Plan developed and presented to the Abbay River Basin High Council.
- Lake level has been maintained within the agreed limits.
- At least 80,000 ha of vulnerable Tana sub-basin micro-watersheds have been rehabilitated.
- Sediment loads from targeted watersheds have been reduced.
- Flood management plans have been adopted by relevant institutions and targeted communities around Lake Tana.
- Growth-oriented investments in the Tana and Beles sub-basins have been finalized and ready to be implemented (this indicator was cancelled during the restructuring mission of May 2013).

### 1.3. Project Components and Subcomponents

4. In accordance with the original design, the TBIWRDP consisted of four components and six subcomponents as follows.

5. **Component A: Sub-basin Resources Planning and Management (US$17.61 million**). This component aims to develop the enabling institutional infrastructure and capacity necessary for stimulating and managing sustainable investments in the Tana and Beles sub-basins. It incorporates two subcomponents, namely, Subcomponent A1: Water Resources Information System Development and Subcomponent A2: Resource Planning and Management Capacity Building.

6. **Component B: Natural Resource Management Investments (US$40.83 million).** This component aims to undertake critical investments to improve the natural resources management in the Tana

sub-basin. It incorporates two subcomponents, namely, Subcomponent B1: Watershed Development and Subcomponent B2: Flood Management.

7. **Component C: Growth-Oriented Investment Facilitation (US$9.17 million**). This component aims to support the institutional capacity building and investment facilitation required for the sustainable development of the Tana and Beles sub-basins to realize the growth vision for the region. It incorporates two subcomponents, namely, Subcomponent C1: Development Agency Support and Subcomponent C2: Growth-Oriented Investment Preparation.

8. **Component D: Project Management ($2.24 million).** This component aims to support overall project planning, coordination, management, quality oversight, technical supervision, effective procurement and financial management, as well as consolidated monitoring and reporting of project activities.

## 2. Project Implementation

### 2.1. Role and Involvement of the Government

9. The TBIWRDP utilized the existing government institutions and structures for the implementation as described in the PAD.

10. **National level.** The MoWIE was the overall executing agency of the TBIWRDP. A NPCU under Basin Administration Directorate of the MoWIE has been coordinating the overall project implementation. An NPSC chaired by the Minister of MoWIE has been working to ensure pertinent government water sector policies and the project objectives have been adhered to: review and approve annual programs, work plans, and budget; monitor and evaluate the progress of the project; and provide guidance and advice to the Project Management Team.

11. In addition, the NMA as the agency responsible for coordinating meteorological information at the national and subnational levels including dissemination of information has been involved in the establishment of the meteorological network including the weather radar. Similarly, the Hydrological and Water Quality Directorate, responsible for the hydrometric networks and water quality administration throughout the country, has been involved in the establishment of the hydrological networks.

12. **Regional level.** The focal coordinating institution for the project at the regional level in both Amhara and Benishangul Gumuz Regions was BoWIED. A Steering Committee has been established at the regional level (RPSC) chaired by the regional Vice Presidents of both regions with similar objectives as for the NPSC. Implementation at the regional level involved various bureaus such as BoWIED, BoARD, Bureau of Finance and Economic Development, FSDPCO, and Environment Protection Land Administration and Use Agency, which were coordinated by the RPCU housed by BoWIED. The RPCU has been responsible to ensure synergy and coordination among the various bureaus at regional, woreda, and kebele levels and effective implementation.

13. Subcomponents A1 and A2 were implemented by the two newly established organizations, TaSBO and BeSBO, and ARBA and were coordinated by BoWRD in both Amhara and Benishangul Gumuz Regions.

14. The implementation and monitoring of Subcomponent B1 was managed by the Amhara BoARD except the small-scale irrigation and water supply development activities that were implemented under the responsibility of the BoWIED in close collaboration with BoARD. The watershed management activities were implemented at woreda and kebele levels using the existing mechanisms. A coordination unit at the

regional level was established specifically to this subcomponent that worked with its subordinate woreda agriculture offices. The woreda offices of agriculture were responsible for overall project implementation through the WWT, kebele DAs, and other relevant staff. The Project Steering Committees have been established at the woreda level involving different stakeholder offices and agriculture office. The community-based flood-related activities of Sub-component B2 of the project have been handled by the regional FSCDPO through its Early Warning and Disaster Prevention Department and associated zonal office and woreda desks.

15. Component C was coordinated by the MWIE at the national level, and by the Bureau of Finance and Economic Development at the regional level.

### 2.2. Involvement of the World Bank

16. In addition to financial support, the World Bank has been providing a regular implementation review and support mission on biannual bases throughout the project period. The World Bank has also supported a midterm evaluation in 2011. The project restructurings made have paved the ground for improved implementation efficiency.

### 2.3. Monitoring and Evaluation

17. The NPCU was responsible for the overall coordination and M&E activities. It received regular reports for all the project components through the RPCU and the WSCU at the regional level.

18. A web-based M&E system/MIS and geo-databases systems were established for the Watershed Management sub-component. The database application has been installed in each project woreda and at the Regional Watershed Coordination Unit of Subcomponent B1. This system was effectively used for the watershed development activities to collect information, exchange monthly, quarterly, and yearly reports, monitor the status of performance indicators, and build the capacity of involved institutions at different levels in the use of database application. The M&E system/MIS was supported by three consecutive natural resources and socioeconomic surveys conducted for the watershed subcomponent by the Bahir Dar University, namely, a baseline survey, follow-up survey, and impact assessment conducted in 2010, 2013, and 2016, respectively. Figure 7.1 shows information flow and quality control.

19. A hydrology and sediment load monitoring system has also been established to monitor the impacts of the watershed activities, particularly the changes in sediment load from the project-targeted watersheds. Samples were taken and analyzed since 2010 and trends of sediment average concentrations are documented.

### 2.4. Implementation Challenges

20. The project had passed through various challenges/problems, especially during the initial three years' period.

- The project was complex with components and subcomponents that have different objectives and outputs, with numerous activities, some of which could have been a stand-alone project. Even though there is interrelationship between the various components of the project, there was loose link between the components. Regardless of these challenges, the project directly started implementation without having sufficient time to internalize and to introduce the project to different stakeholders.

- The involvement of the stakeholders in the design of the project particularly at the regional level did not go beyond frequent consultation and remained short of creating sufficient awareness and ownership. This situation put immense pressure on the project in the form of continuous awareness creation, which in turn resulted in delayed initiation of many activities.

- The implementation schedule of the project was heavy at the start and did not take into account the project management and implementation capacity of the implementers. Sufficient time was not allowed for capacity building before embarking on major activities of the project. Capacity building for the implementers was not given sufficient emphasis. Awareness creation at all levels, watershed planning, and materials mobilization were found critical and time taking. Thus, the first two years' time was simply invested only for preparations.

- Absence of full-time project coordinator at the NPCU at the initial stage, high staff turnover (seeking for better payment), and the lengthy process of procurement mostly owing to the significant delay from suppliers and manufacturers' side aggravated the problem.

## 3. Project Achievements by Subcomponents and Outcomes

21. The project performed well in the face of the many challenges described earlier. It has carried out several activities and delivered outputs that contributed to the achievement of the outcomes and the respective targets.

### 3.1. Subcomponent A1: Water Resources Information System Development

**Outcome: WRIS set up and fully operational**

- The sub-basins' WRIS (HIS/BIS) has been installed and operational.
- Different studies were conducted that supported the development of the WRIS, namely, hydrological study, groundwater investigation and monitoring, topographic survey of floodplain areas, and Lake Tana bathymetry survey.
- Modern hydro-meteorological networks have been established; data are being collected and analyzed.
- Weather radar has been installed and utilized.
- Groundwater monitoring stations have been established and partially operational.
- Flood early warning monitoring stations have been installed but not yet fully operational.
- Water quality monitoring network stations have been established and data are collected from major rivers and Lake Tana and analyzed since 2011.

### 3.2. Subcomponent A2: Resource Planning and Management Capacity Building

**Outcome: Fully functioning Tana and Beles sub-basin organization in place**

- TaSBO and BeSBO are established and functional with the necessary staff and equipment. The office buildings for the two organizations are completed. TaSBO and ABA are on preparation to move to the building while BeSBO has moved.
- Both organizations have taken responsibility of the sub-basin planning and coordination activities from the MoWIE/NPC and are in the position to serve as institutional focal points for water resources allocation and management in the sub-basins

- Key stakeholders of the sub-basin identified and structured stakeholder's consultation conducted at different levels for the preparation of the sub-basins' integrated water resources development plans. The final plans are finalized to be presented to the Abbay River Basin High Council.
- TaSBO and TaSBO have identified areas of modeling for hydrologic system and developed different modeling tools for the sub-basin planning. They have developed Atlas and State of the Sub-Basins that are used as baseline for the plans.
- Capacity gaps of the ABA, TaSBO, BeSBO, and relevant institutions have been identified and several targeted training programs have been conducted.

### 3.3. Subcomponent B1: Integrated Watershed Development in Tana Sub Basin

**Outcome 1: Enhanced sustainability of future agricultural development due to mitigation of land degradation and improved soil fertility and stabilized landscapes with greater fuel wood production**

- 163 community watersheds were established, and community-based participatory watershed developments plans and community action plans have been prepared for each watershed.
- Land treatment and management has been conducted on 79,288 ha of land within the targeted watershed. Out of this, 54,159 ha of cultivated land; 19,717 ha of degraded land that includes degraded grazing land, hillsides, and bush lands and mixed land use; and 1089 ha gully land have been treated/rehabilitated. Land treatment, especially physical SWC supported with biological conservation, had been applied through community participation. Treated lands have been protected from free grazing (70–75 percent of total treated area) and being integrated with livelihood development such as forage development, fruit development, bee keeping, and others.
- 5931.6 ha of land has been covered with new plantation, which includes 2842 ha community forest, 1767.6 woodlots, and 1322 ha backyard plantation. In addition, 42 project nursery sites and 121 private/group nursery sites have been established.

**Outcome 2: Increased crop productivity, production and marketing of agricultural product, and improved pasture management, livestock productivity, and veterinary services**

- Crop productivity has increased during the past six years of the project interventions. FTCs have been strengthened and services improved. Demonstrations on different crop varieties and agronomic practices have been conducted, tested, and evaluated. Promising results have been observed both in adoption rates of these practices and in livelihood improvements among the farming communities. Regional agricultural research institute, woreda relevant experts, and DAs participated in conducting demonstrations in the FTCs and individual farm plots. The impact survey conducted by the Bahir Dar University in 2016 has indicated that there is improvement in crop productivity compared to the 2010 baseline survey.
- Livestock production has improved through improved animal health facilities and services, improved livestock breeds, forage development, and adoption of enhanced livestock management systems. The project, in collaboration with the community, has integrated the NRM (land treatment) with activities that could support livelihood improvement such as animal fattening, apiary farm, improved animal breed entry to farmers, and the like. The treated degraded lands that are now being endowed with rich biomass have been used for livestock feed supply to meet community fodder demand. Livestock management practice in

the project intervention areas, which was totally based on free grazing, has been now changed to controlled grazing system. Majority of farmers are now confidently explaining that they are zero grazers. Stall feeding through cut and carry is highly applied.

**Outcome 3: Increased off-farm and agricultural incomes**

- The project supported off-farm income generation activities by providing training, limited materials, and technical supports to start-up the businesses. Enterprises were established with 2850 household beneficiaries. The organized business groups, especially the landless youth and the female households, were strengthened and developed their skills on off-farm activities such as weaving, spinning, tannery, tailoring, animal fattening, apiculture, and forestry. Most group members have enhanced their skills that enabled them to create their own jobs and improve livelihoods.

**Outcome 4: Enhanced human and capital resources from improved water supply and economic and social infrastructures**

- Access to potable water supply has been improved through the construction of 740 water points. Each water point is managed by a water and sanitation committee (with 5 members, 3–4 are women) and has a community water use bylaw. A total of 67 km internal access paths and 89.70 km internal access paths were constructed and maintained, respectively; 56 foot bridges maintained, 70 fords constructed, 7 culverts on small streams and gully crossings, and 27 foot bridges had been constructed. Construction of access roads and internal access paths were fully community labor based except the design, selected materials, and machinery that were provided by the project. 18 primary schools were renovated and 91 schools provided with school materials. In addition, since the start of project implementation 18 health posts were renovated/constructed and 36 health posts provided with medical equipment and other facilities.

### 3.4. Subcomponent B2: Flood Management

22. Flood preparedness and community early warning activities were conducted within Dera, Fogera, Libo kemkem, and Dembia Woredas and as a pilot in some selected kebeles. Eight shelters (with toilet and hand-dug wells) are constructed to reside flood victim households during flood. These shelters are constructed in school compounds hence used for students' classrooms in most cases. Equipment such as dredger machine, motor boats, vehicles, motor bicycles excavator, dump truck, and mobile phones as well as other communication equipment has been provided. Early warning indicators (colored wooden poles for flood hazard severity level and local safe route indication, solar panel to direct flood victims to temporary shelters during the night are installed. The project has provided training on flood hazard and preparedness including assessment, follow-up, and monitoring of the flood hazard before, during, and after the disaster.

### 3.5. Component C: Growth-Oriented Investment Facilitation

23. This component did not progress following the cancelation of Component C activities and the only output delivered under this component is the Endowment and Growth Study.

### Gender Inclusiveness

24. Women participation in development activities within the project areas was not greater than 10 percent as compared to men participation before the TBIWRDP commenced. The project had considered gender equality from the onset of its implementation. In coordination with the community, it has assigned

appropriate ratio for women involvement in the trainings, exposure visits, and different awareness creation workshops and women are encouraged to participate in watershed management activities. Besides, attention was given to ensure that women involve themselves in all aspects of watershed management such as watershed committee leadership, nursery site management and seedling raising, water supply and sanitation committees, physical SWC field activities, equitable benefit sharing, and other similar activities. Through time, women involvement ratio has significantly improved.

**Sustainability**

25. The Government has approved/allocated ETB 58 million from its local budget for one-year project operation to ensure that project outputs and outcomes are consolidated and sustained, to retain the already gained human resource capacity and to bridge the gap between the current and the expected second phase of the project.

26. In the actual one-year extension period, it is intended to prepare a proposal for the follow-on project, to scale out the project experience to the Awash basin and Didessa sub-basin, to conduct capacity building, to hand over the project activities and outputs to the relevant institutions, to ensure the functionality of the already established systems in both sub-basins, to revise the sub-basin plans as necessary, and to finalize some unfinished activities.

27. The TBIWRDP has laid the foundation for effective sub-basin management and development in the country. As an initial measure, the ministry's interest in the second phase project is to scale out the experience of the project to the most problematic basins such as Awash and Rift Valley basins while consolidating the actual project outputs in the Tana and Beles sub-basins. In this regard, the commitment and involvement of the MoWIE, MoFEC, other relevant institutions, as well as the World Bank is basically important to make the second phase project a reality and to support the Government's vision in establishing a modern Integrated Water Resource Management System in the country.

**Lessons Learned**

- Involving local communities and community empowerment in planning and implementation of NRM interventions improves outcomes by enhancing ownership, accessing inclusive local knowledge and information, and better integrating the conservation outcomes with local livelihood concerns. Community contribution in this project as the result of community empowerment was significant.

- Since many conservation measures in watershed projects typically benefit landowners, it is important to have pro-poor interventions targeting the weaker and marginal segments of the community to increase their stake in the project including resources sharing on communal lands.

- For projects with a demand-driven planning and implementation modality and with multiple conservation and productivity objectives, it is essential to have a well-planned and well-executed M&E framework. The project developed management decision tools, M&E and MIS for Subcomponent B1, was able to track effectiveness, efficiency, and final results and benefits.

- The project approach in conducting SWC activities systematically, by organizing the community, delineating the watershed, identifying erosion hotspots for priority activities, participatory planning, and selecting appropriate technologies are good practices to be scaled up.

- In addition to the trainings provided, the project focused on organizing experience sharing inside and outside the project area and sharing best practices in other woredas and other parts in the region. This approach has laid foundations for future integration watershed management scaling up plans and implementation.

- Entry point activities were introduced for the first time to compensate community free labor. While the community provided free labor for land development activities, the project provided materials, hand tools, and improvement of infrastructures (roads, bridge/culvert on gully crossings, primary schools, health posts, and so on), which were beyond the capacity of the local community.

- Integrating livelihood activities with watershed management were good practices for success to obtain sustainable results.

**Recommendation**

- Successful achievements and experiences of the project outcomes have to be scaled up into the larger areas of Lake Tana sub-basin and eventually throughout Abbay basin.

- The remaining land treatment activities and the already achieved activities should be continued with livelihood development until social, economic, and environmental benefits create strong development foundation.

- Community participation has to be strengthened more through trainings, experience sharing visits, and day-to-day technical and managerial supports from local governments and experts in the community front.

- Good governance and wise use of resources specific to watershed management have to be strongly monitored/watched and supported by the community bylaws and local government leadership. Communal land certification, implementation of community bylaws, as well as arresting conflicts, effective resource utilization, and resource share based on the bylaws are key ingredients for success.

## Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Below is the comment from the Government of Finland (GoF) as a co-financier of the Watershed component.

The comment stated that the ICR was reviewed against the Finnish Manual for Bilateral Program Quality Requirements.

The results framework is clearly articulated and gives quickly an overview of the project life cycle and the level of achievement of the agreed upon targets. It was noted that the project has achieved most of its qualitative and quantitative targets either completely or to an acceptable extent. However, the project has been restructured and extended several times while procurement is stated to be one of the delaying factors. In this regard, the GoF would like to prompt the World Bank to take further action to develop more user-friendly procurement systems.

The GoF also appreciate linking the project results with the current SLMP II Land Management Project to make best use of the lessons learnt and manuals produced in the project

## Annex 9: List of Key Trainings Supported by the Project

**Table 9.1.List of Trainings for Component A**

| Item | Description of Training | Beneficiaries | | | |
|---|---|---|---|---|---|
| | | Beneficiary Institutions | No. of Beneficiaries | | |
| | | | Male | Female | Total |
| **Component A: Water Resources Information System Development** | | | | | |
| 1 | Hydrology and Water Resource System modeling (principles and concepts, use of different models | TaSBO, ABA, BeSBO, NPCU, EPLUA | 17 | — | 17 |
| 2 | Strategic Social and Environmental Assessment | TaSBO, BeSBO, ABA, BoWIED, BoARD, MoWIE | 18 | 2 | 20 |
| 3 | Water quality - on-the-job training | TaSBO, BeSBO, ABA | 3 | — | 3 |
| 4 | Usage and mastering software for HIS release no. 1 | TaSBO, ABA, BoWIED | 13 | 1 | 14 |
| 5 | Hydrometric - (on-the-job training) | TaSBO, ABA, BeSBO, MoWIE, NMA (branch offices of Bahir Bar and Mekele) | 22 | 2 | 24 |
| 6 | Mike hydro and Nile DSS including time series and GIS, scenario manager, scripts and indicators, multicriteria analysis, DSS management, cost-benefit analysis | TaSBO | 7 | — | 7 |
| 7 | Use of GeoNetCast | TaSBO, BeSBO, ABA | 15 | — | 15 |
| 8 | Usage and mastering for HIS tools to manage data collected | TaSBO, ABA, BeSBO, MoWIE | 18 | — | 18 |
| 9 | • Hydrology and hydraulics: software<br>• Hydrological design aids (HAD) | TaSBO, ABA, BeSBO, MoWIE | 18 | — | 18 |
| 10 | River Ware modeling tool and Eastern Nile River Ware modeling | TaSBO, ABA | 3 | — | 3 |
| 11 | Modeling and analytical tools from ENTRO's experience focusing on Eastern Nile - River Basin Simulation (RIBASIM) Model and Eastern Nile Information Management System, interactive pdf, and Excel-based mapping system. | TaSBO, BeSBO, NPCU, ABA, and Bahir Dar University | 13 | — | 13 |
| 12 | Different models and tools: SWAT water resources optimization model; General Algebraic Modeling System, | TaSBO, BeSBO, ABA, Bahir Dar University | 12 | — | 12 |
| 13 | IWRM Planning: Basin planning by considering international experiences from Mekong, Palar, Niger, Murray-Darling, and Delware basins | TaSBO, BeSBO, MoWIE, and ENTRO | 17 | 1 | 18 |
| 14 | Water quality monitoring process (about the equipment, sampling, data entry, analysis, and so on, on-the-job training) | TaSBO, BeSBO, ABA | 5 | 1 | 6 |
| 15 | Environment on terrestrial ecology, aquatic ecology, land resources (including practical field exercises) | TaSBO, ABA, BeSBO | 19 | 1 | 20 |

| Item | Description of Training | Beneficiaries | | | |
|---|---|---|---|---|---|
| | | Beneficiary Institutions | No. of Beneficiaries | | |
| | | | Male | Female | Total |
| 16 | GIS and remote sensing | TaSBO, ABA, BeSBO, MoWIE | 23 | 1 | 24 |
| 17 | Use and maintenance of HIS gauging stations equipment; usage of front-end and computer software; general description of supplied equipment for HIS/BIS | TaSBO, BeSBO, ABA, MoWIE | 7 | 1 | 8 |
| 18 | Data center equipment; data center software (Arc-GIS basic, Arc-GIS Advanced, ) | TaSBO, BeSBO, ABA, MoWIE | 7 | 1 | 8 |
| 19 | On-site capacity-building training on radar equipment installation, use, and maintenance for hydrologists and meteorologists | TaSBO, ABA, Bahir Dar University, NMA | 12 | — | 12 |
| 20 | Central user training related to radar for hydrologists and meteorologists | NMA, Bahir Dar University | 12 | 1 | 13 |

**Table 9.2. List of Trainings for Component B**

| Item | Description of Training | No. of Beneficiaries | | |
|---|---|---|---|---|
| | | Male | Female | Total |
| **Component B: Natural Resources Management Investments** | | | | |
| 1 | Environmental and Social Management Framework | 19 | 1 | 20 |
| 2 | Environmental protection | 57 | 8 | 65 |
| 3 | IWSM and GPS usage | 48 | 7 | 55 |
| 4 | Agroforestry and nursery management | 27 | 2 | 29 |
| 5 | Gully treatment | 26 | 2 | 28 |
| 6 | Drainage management | 28 | 2 | 30 |
| 7 | Practical training on design and construction of water harvesting structures | 27 | 1 | 28 |
| 8 | SWC with particular emphasis on watershed planning, implementation, M&E | 29 | 1 | 30 |
| 9 | Irrigation crop-water management and sustainability | 37 | 4 | 41 |
| 10 | GIS | 18 | 4 | 22 |
| 11 | Database management | 18 | 2 | 20 |
| 12 | Fruit and vegetable production | 243 | 58 | 301 |
| 13 | Financial management | 6 | 1 | 7 |
| 14 | Training on animal health care and management | 20 | 5 | 25 |
| 15 | Training on artificial incrimination | 22 | 4 | 26 |
| 16 | Community development facilitation | 28 | 1 | 29 |

*Note:* Regarding Component B, the beneficiary institutions and individuals from the trainings conducted are experts from BoARD, woreda, and kebele watershed planning teams; experts from Woreda Sector Offices of Agriculture, Education, Health and Water; Das; Community Micro-watershed Teams; and farmers.

## Annex 10. List of Supporting Documents

1. TBIWRDP, Project Appraisal Document, World Bank, Report No: 43400-ET, May 2008

2. TBIWRDP, Mid-Term Review Mission (April 25–May 6, 2011) Report, August 2011

3. World Bank, Restructuring Paper of Tana & Beles Integrated Water Resources Development Project (TBIWRDP), September 2011

4. World Bank, Report No: 75842-ET, Restructuring Paper of TBIWRDP, March 2013

5. World Bank, Report No. 71887-ET, International Development Association, International finance Corporation, and Multilateral Investment Guarantee Agency, Country Partnership Strategy (CPS) 2013–16 for the Federal Democratic Republic of Ethiopia, August 29, 2012

6. Ethiopia: Building on Progress, A Plan for Accelerated and Sustained Development to End Poverty (PASDEP), (2005/06–2009/10), Ministry of Finance and Economic Development, September 2006, Addis Ababa

7. Federal Democratic Republic of Ethiopia Growth and Transformation Plan I (GTP I) 2010/11–2014/15, Ministry of Finance and Economic Development, November 2010, Addis Ababa

8. Federal Democratic Republic of Ethiopia Growth and Transformation Plan II (GTP II) 2015/16–2019/20, National Planning Commission, May 2016, Addis Ababa

9. World Bank, Report No. PAD1435: Project Paper, Additional Credit for the TBIWRDP, July 2015

10. World Bank, 2016: Ethiopia, Priorities for Ending Extreme Poverty and Promoting Shared Prosperity, Systematic Country Diagnostic Report No: 100592-ET, March 30, 2016

11. Project Supervision Documents: ISR and Aide Memoires

12. Borrower's Completion Report, November 2016

13. Borrower's Watershed Impact Assessment Report, July 2016

## Annex 11. Project Pictures

| Instruments, Machineries, Buildings, and Systems | |
|---|---|
|  |  |
| Metrological instruments | Metrological instruments |
|  |  |
| The first weather radar in the country | The weather radar site and guest house |
|  |  |
| Dredger machine for sediments removal | Excavator for sediment removal |

**BeSBO office building**

**BeSBO guest house**

**TaSBO office building**

**TaSBO guest house and laboratory**

**Soil and Water Conservation Work and Livelihood Improvement in the Targeted Watersheds**

**Watershed areas before intervention**

**Planted and protected three years after intervention**

| | |
|---|---|
|  |   |
| **Bund stabilization at the start** | **Bund stabilization, after** |
|  |  |
| **Degraded land protection through area closure and plantation (at the start)** | **Degraded land protected through area closure, after** |
|   |  |
| **Degraded land, before** | **Land treated through soil and water conservation, after** |

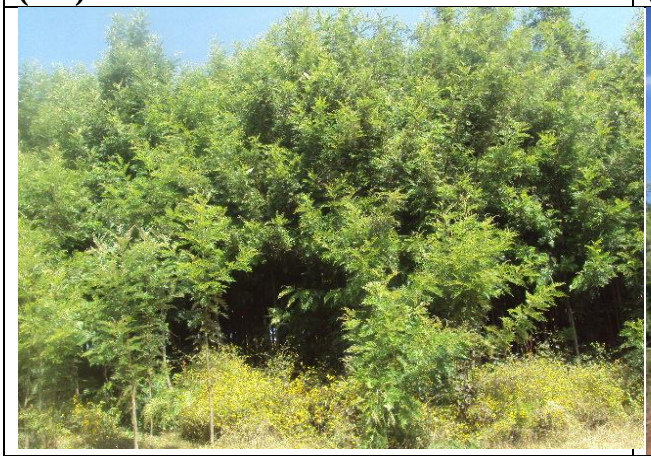
| | |
|---|---|
|  |  |
| **Degraded land and gully, before** | **Land treated with SWC, after** |
|  |  |
| **Gully land treatment (at the start)** | **Gully land treated, after three years** |
|  |  |
| **Reshaped, planted, and protected area (at early stage)** | **Reshaped, planted, and protected area after three years** |

**Demonstration in FTCs**


**Crop improvement demonstration in FTCs (wheat)**

**Crop improvement demonstration in FTCs (teff)**

**Crop improvement demonstration in FTCs (potato)**



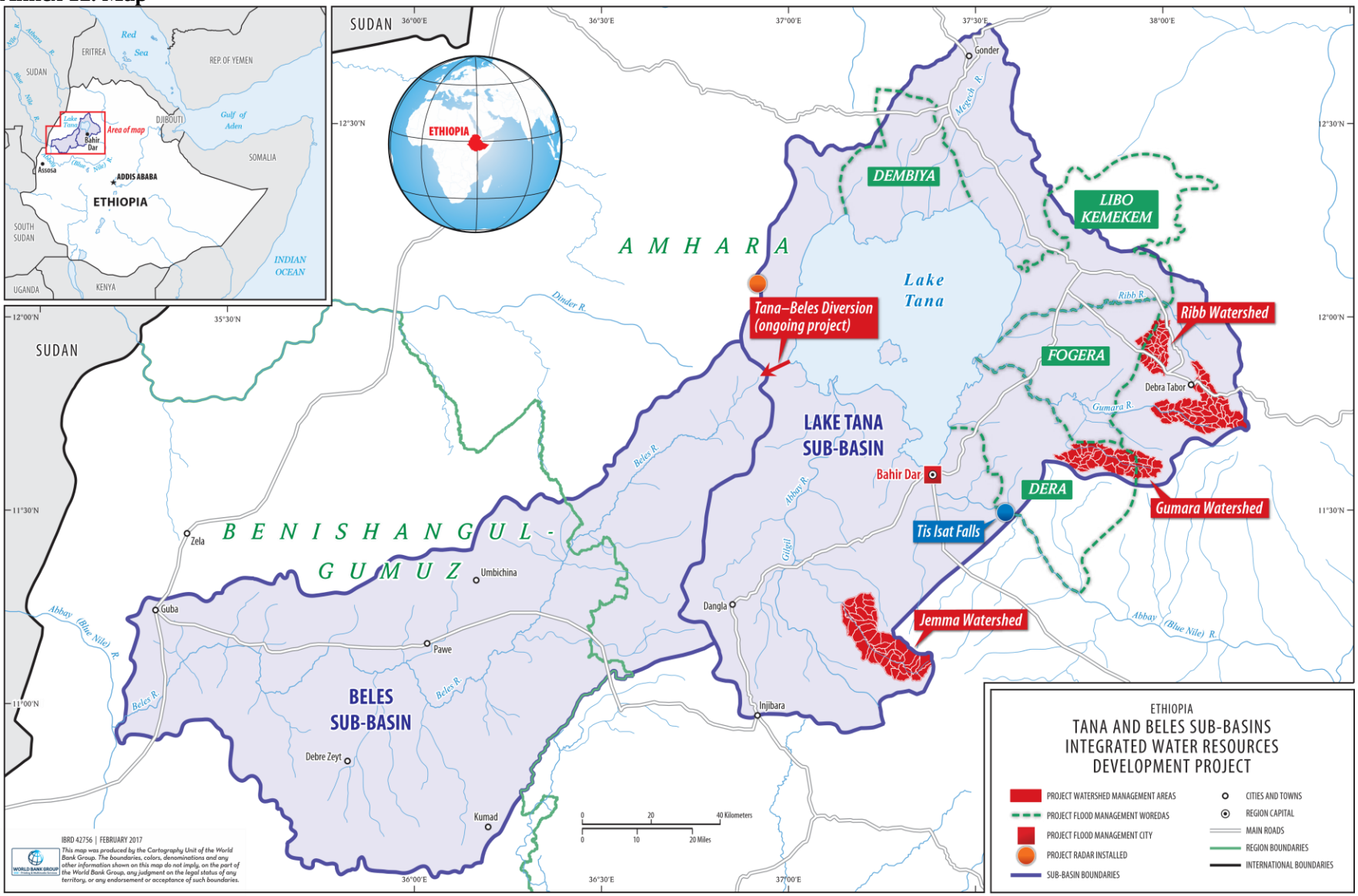
**Plantation on communal land (community forest established)**

**Plantation on communal land (community forest established)**

| | |
|---|---|
|  |  |
| **Over-grazing and land degradation before** | **Free grazing controlled, after** |
|  |  |
| **Over-grazing and landslide, before** | **Free grazing controlled, after** |
|  |  |
| **SSI** | **SSI** |

| | |
|---|---|
|  |  |
| **SSI upper catchment SWC** | **Irrigation canals protected by plantation** |
| **Flood Management in the Targeted Flood-Prone Areas** | |
|  |  |
| **Temporary plastic shelters for flood-affected beneficiaries, before** | **Shelters constructed by the project in school compounds for flood affected communities, after** |
|  |  |
| **Boats for monitoring flood affected areas** | **Flood warning sirens** |

## Annex 12. Map


SUDAN
ETHIOPIA
AMHARA
Lake Tana
Tana–Beles Diversion (ongoing project)
DEMBIYA
LIBO KEMEKEM
FOGERA
DERA
Ribb Watershed
Gumara Watershed
Jemma Watershed
Tis Isat Falls
LAKE TANA SUB-BASIN
BELES SUB-BASIN
BENISHANGUL-GUMUZ
Bahir Dar
Gonder
Debra Tabor
Dangla
Injibara
Zela
Umbichina
Guba
Pawe
Debre Zeyt
Kumad
Dinder R.
Beles R.
Abbay (Blue Nile) R.
Gilgel
Ribb R.
Gumara R.
Megech R.
ERITREA
REP. OF YEMEN
DJIBOUTI
SOMALIA
SOUTH SUDAN
UGANDA
KENYA
Red Sea
Gulf of Aden
INDIAN OCEAN
Area of map
Assosa
ADDIS ABABA
IBRD 42756 | FEBRUARY 2017
ETHIOPIA
TANA AND BELES SUB-BASINS INTEGRATED WATER RESOURCES DEVELOPMENT PROJECT
PROJECT WATERSHED MANAGEMENT AREAS
PROJECT FLOOD MANAGEMENT WOREDAS
PROJECT FLOOD MANAGEMENT CITY
PROJECT RADAR INSTALLED
SUB-BASIN BOUNDARIES
CITIES AND TOWNS
REGION CAPITAL
MAIN ROADS
REGION BOUNDARIES
INTERNATIONAL BOUNDARIES
40 Kilometers
20 Miles