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IMPLEMENTATION COMPLETION AND RESULTS REPORT

(IDA-45300, IDA-56410, IDA-45310, IDA-45320, IDA-56340, TF-95196, TF-94205, IDA-D0560)

ON

CREDITS FROM THE INTERNATIONAL DEVELOPMENT ASSOCIATION IN THE AMOUNT OF SDR 20.7 MILLION (US$32.5 MILLION EQUIVALENT) AND SDR 7.3 MILLION (US$10 MILLION EQUIVALENT) TO THE UNITED REPUBLIC OF TANZANIA, SDR 17.6 MILLION (US$27.5 MILLION EQUIVALENT) TO THE REPUBLIC OF UGANDA, AND SDR 19.1 MILLION (US$30.0 MILLION EQUIVALENT) AND SDR 7.3 MILLION (US$10 MILLION EQUIVALENT) TO THE REPUBLIC OF KENYA

AND

GRANTS FROM THE INTERNATIONAL DEVELOPMENT ASSOCIATION IN THE AMOUNT OF SDR 1.5 MILLION (US$2 MILLION EQUIVALENT)

AND

FROM THE GLOBAL ENVIRONMENT FACILITY IN THE AMOUNT OF US$7 MILLION

AND

FROM THE SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY IN THE AMOUNT OF US$11 MILLION

TO THE EAST AFRICAN COMMUNITY

FOR THE

LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT II APL1 (P100406 and P103298)

December 13, 2018

Environment and Natural Resources Global Practice
Africa Region

CURRENCY EQUIVALENTS

Exchange Rate Effective December 31, 2017

Currency Units: Special Drawing Rights (SDR)

SDR 1 = US$1.417

FISCAL YEAR
July 1 - June 30

ABBREVIATIONS AND ACRONYMS

AF	Additional Financing
AfDB	African Development Bank
APL	Adaptable Program Loan
BMU	Beach Management Unit
B/C	Benefit/Cost
BOD	Biological Oxygen Demand
CAS	Country Assistance Strategy
CBA	Cost-Benefit Analysis
CDD	Community-Driven Development
CEA	Cost-Effectiveness Analysis
CIDP	County Integrated Development Plans
CMI	Community Management Initiative
COD	Chemical Oxygen Demand
CPF	Country Partnership Framework
CPS	Country Partnership Strategy
EA	Environmental Assessment
EAC	East African Community
ENRM	Environmental and Natural Resources Management
ESIA	Environmental and Social Impact Assessment
ESMF	Environment and Social Management Framework
FLTF	Fish Levy Trust Fund
FM	Financial Management
FMP	Fisheries Management Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEO	Global Environmental Objective
GIS	Geographic Information System
ICR	Implementation Completion and Results Report
IEG	Independent Evaluation Group
IRR	Internal Rate of Return

ISR	Implementation Status and Results Report
KCCA	Kampala Capital City Authority
KNCPC	Kenya National Cleaner Production Centre
LIU	Leather Industries of Uganda
LGA	Local Government Authority
LVB	Lake Victoria Basin
LVB-SECOM	Sectoral Council of Ministers for Lake Victoria Basin
LVBC	Lake Victoria Basin Commission
LVEMP-I	First Lake Victoria Environmental Management Project
LVEMP-II	Second Lake Victoria Environmental Management Project
LVFO	Lake Victoria Fisheries Organization
M&E	Monitoring and Evaluation
MIS	Management Information System
MTR	Midterm Review
NDF	Nordic Development Fund
NPCT	National Project Coordination Team
NPV	Net Present Value
NPSC	National Policy Steering Committee
NTSC	National Technical Steering Committee
O&M	Operation and Maintenance
PAD	Project Appraisal Document
PDO	Project Development Objective
RAP	Resettlement Action Plan
RECP	Resource Efficient and Cleaner Production
RF	Results Framework
RPCT	Regional Project Coordination Team
RPSC	Regional Policy Steering Committee
SDG	Sustainable Development Goal
Sida	Swedish International Development Cooperation Agency
SLM	Sustainable Land Management
SOP	Standard Operating Protocol
SIP	Strategic Investment Program
SWM	Solid Waste Management
TDA	Transboundary Diagnostic Analysis
ToR	Terms of Reference
TTL	Task Team Leader
WRMP	Water Resources Management Plan
WUA	Water User Association

Regional Vice President:	Hafez M. H. Ghanem
Country Director:	Paul Noumba Um
Senior Global Practice Director:	Karin Kemper
Practice Manager:	Iain G. Shuker
Task Team Leader(s):	Jian Xie, Jane A. N. Kibbassa, Herbert Oule
ICR Main Contributor:	Guoping Zhang

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P100406	Lake Victoria Environmental Management Project II APL-1
Country	**Financing Instrument**
Africa	Investment Project Financing
Original EA Category	**Revised EA Category**
Full Assessment (A)	Full Assessment (A)

Related Projects

Relationship	Project	Approval	Product Line
Additional Financing	P153466-AFFC2/RI-Lake Victoria Environmental Management Project APL-1 AF	26-May-2015	IBRD/IDA
Supplement	P103298-AFCC2/RI-Lake Victoria Environmental Management Project II	03-Mar-2009	Global Environment Project

Organizations

Borrower	Implementing Agency
East African Community, The United Republic of Tanzania, The Republic of Uganda, and The Republic of Kenya	Tanzania Ministry of Water and Irrigation, Uganda Ministry of Water and Environment, Kenya Ministry of Environment and Mineral Resources, Lake Victoria Basin Commission (LVBC)

Project Development Objective (PDO)

Original PDO

The Project Development/Global Environmental Objectives (PDO/GEO) are to (i) improve collaborative management of the transboundary natural resources of Lake Victoria basin for the shared benefits of the Partner States; and (ii) reduce environmental stress in targetted pollution hotspots and selected degraded sub-catchments to improve the livelihoods of communities, who depend on the natural resources of LVB.

Revised PDO

The objectives of the project are to contribute to (i) the improvement of the collaborative management of thetrans-boundarynatural resources of the LVB among the Partner States; and (ii) the improvement of environmental management oftargeted pollutionhotspots and selected degraded sub-catchments for the benefit of communities who depend on the natural resourcesof LVB.

PDO as stated in the legal agreement

Original: The Project Development/Global Environmental Objectives (PDO/GEO) are to (i) improve collaborative management of the transboundary natural resources of Lake Victoria basin for the shared benefits of the Partner States; and (ii) reduce environmental stress in targetted pollution hotspots and selected degraded sub-catchments to improve the livelihoods of communities, who depend on the natural resources of LVB.

Revised: The objectives of the project are to contribute to (i) the improvement of the collaborative management of the trans-boundary natural resources of the LVB among the Partner States; and (ii) the improvement of environmental management of targeted pollution hotspots and selected degraded sub-catchments for the benefit of communities who depend on the natural resources of the LVB.

FINANCING[1]

		Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing				
P100406	TF-56812	360,522	128,161	128,161
P100406	TF-56814	408,091	289,574	289,574
P100406	TF-56813	1,410,844	503,979	503,979
P100406	TF-90883	783,510	169,179	169,179
Bridge Financing TFs[2]		**2,962,967**	**1,090,893**	**1,090,893**
P100406	IDA-45300	32,500,000	32,460,682	31,549,588
P100406	IDA-45310	27,500,000	27,304,912	25,414,530
P100406	IDA-45320	30,000,000	30,000,000	28,813,655
P100406	TF-95196[3]	11,083,090	11,083,090	11,083,090
P100406	IDA-D0560	2,000,000	1,999,720	2,094,514
P100406	IDA-56410	10,000,000	9,992,728	10,170,348
P100406	IDA-56340	10,000,000	10,000,000	8,562,394
P103298	TF-94205	7,000,000	7,000,000	7,000,000
Total		**133,046,057**	**130,932,025**	**125,779,012**
Non-World Bank Financing				
Borrower		7,800,000	7,800,000	7,800,000
Total		**7,800,000**	**7,800,000**	**7,800,000**
Total Project Cost		**140,846,057**	**138,732,025**	**133,579,012**

[1] The original system-generated datasheet was showing incorrect borrower contributions and was double-counting the Sida grant (see footnote 3). This version of the financing data has been updated to reflect the correct amounts and references.

[2] A Multi-Donor Trust Fund was set up during project preparation for bridging the activities between LVEMP-I and LVEMP-II.

[3] The Swedish International Development Cooperation Agency (Sida) provided SEK 80 million equivalent which was disbursed in several tranches over time. The initial transfer was US$ 8,655,071. The total amount disbursed was US$ 11,083,090. The PAD refers to US$10 million since the exact amount was not known at the time when the project was presented to the World Bank's Board of Executive Directors. The Sida Trust Fund Agreement was signed after the project was approved, applying the SEK/US$ exchange rate at the time of signing and each subsequent transfer.

KEY DATES

Project	Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
P100406	03-Mar-2009	30-Jul-2009	14-Sep-2011	30-Jun-2013	31-Dec-2017
P103298	03-Mar-2009	25-Sep-2009	14-Sep-2011	30-Jun-2013	30-Jun-2015
P153466	26-May-2015	06-Aug-2015	n/a	31-Dec-2017	31-Dec-2017

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$, millions)	Key Revisions
20-Jun-2012	24.15	Change in Project Development Objectives Change in Results Framework Change in Components and Cost Change in Loan Closing Date(s) Change in Legal Covenants Change in Implementation Schedule
03-Jun-2014	50.32	Reallocation between Disbursement Categories
04-May-2015	77.92	Additional Financing Change in Components and Cost Change in Loan Closing Date(s)

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Moderately Unsatisfactory	Moderately Unsatisfactory	Modest

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$, millions)
01	12-Dec-2009	Moderately Satisfactory	Moderately Satisfactory	4.86
02	12-Jun-2010	Moderately Satisfactory	Moderately Satisfactory	10.38
03	26-Mar-2011	Moderately Satisfactory	Moderately Unsatisfactory	11.10
04	29-Nov-2011	Moderately Satisfactory	Moderately Unsatisfactory	15.95

05	05-Jun-2012	Moderately Satisfactory	Moderately Unsatisfactory	20.95
06	14-Jan-2013	Moderately Satisfactory	Moderately Satisfactory	31.05
07	15-Sep-2013	Moderately Satisfactory	Moderately Satisfactory	39.08
08	29-Apr-2014	Moderately Satisfactory	Moderately Satisfactory	47.74
09	22-Nov-2014	Satisfactory	Satisfactory	68.19
10	03-Jun-2015	Satisfactory	Satisfactory	77.92
11	18-Dec-2015	Satisfactory	Satisfactory	85.02
12	27-Jun-2016	Satisfactory	Satisfactory	90.06
13	29-Dec-2016	Satisfactory	Satisfactory	98.77
14	29-Jun-2017	Satisfactory	Satisfactory	105.33

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Agriculture, Fishing and Forestry	**21**
Forestry	21
Water, Sanitation and Waste Management	**79**
Sanitation	32
Public Administration - Water, Sanitation and Waste Management	18
Other Water Supply, Sanitation and Waste Management	29

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)

Urban and Rural Development	**35**
Urban Development	15
Urban Infrastructure and Service Delivery	15
Rural Development	20
Land Administration and Management	20
Environment and Natural Resource Management	**65**
Environmental Health and Pollution Management	15
Air quality management	5
Water Pollution	5
Soil Pollution	5
Renewable Natural Resources Asset Management	10
Biodiversity	5
Landscape Management	5
Water Resource Management	40
Water Institutions, Policies and Reform	40
Private Sector Development	**100**
Jobs	100

ADM STAFF

Role	At Approval	At ICR
Regional Vice President:	Obiageli Katryn Ezekwesili	Hafez M. H. Ghanem
Country Director:	Richard G. Scobey	Paul Noumba Um
Senior Global Practice Director:	Inger Andersen	Karin Erika Kemper
Practice Manager:	Marjory-Anne Bromhead	Iain G. Shuker
Task Team Leader(s):	Ladisy Komba Chengula	Jian Xie, Jane A. N. Kibbassa, Herbert Oule
ICR Contributing Author:		Guoping Zhang

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

1. The Lake Victoria Environmental Management Program II (LVEMP-II) was comprised of two regional Adaptable Program Loans (APL, now replaced by a series of projects). The first of them, LVEMP-II APL-1[4] covering the three riparian states (Kenya, Tanzania, and Uganda) and a regional coordination and policy component through the Lake Victoria Basin Commission (LVBC) of the East African Community (EAC), was implemented from 2009 to 2017 and is the subject of this Implementation Completion and Results Report (ICR). LVEMP II APL-2 (P118316, covering Rwanda and Burundi), was implemented from 2012 to 2017 and is discussed in a separate ICR.[5] The APL lending instrument was selected at the time to enable Burundi and Rwanda to join the program once they met the eligibility criteria and policy and project triggers and to allow for a phased approach to implement the longer-term program.[6]

Major Economic and Ecological Importance of Lake Victoria at Appraisal

2. **Lake Victoria and its basin are of major economic and ecological significance**. The Lake Victoria Basin (LVB)[7] is home to around 47 million inhabitants, with an estimated population density of 300 persons per km^2, one of the highest in the continent. Poverty is pervasive in the basin, at about 49 percent of the population of the LVB.[8] Most of the poor in the basin rely on natural resources for their livelihoods; for example, the income generated from fisheries provided food security and supported the livelihoods of approximately 3 million people.[9] Agriculture generates 30–40 percent of the regional gross domestic product (GDP). Over 80 percent of the LVB's population rely on agricultural and livestock activities for their livelihoods and more than 60 percent depend on rain-fed agriculture. Large rural poor populations are dependent on the degraded lands in the upper basin, particularly in Burundi, Rwanda, and the Kenya highlands.

3. **The lake provides significant commercial fishing.** According to the LVEMP-II APL1 PAD, the fisheries industry provided employment for about 197,000 fishers and approximately 600,000 fish traders around the lakeshore towns and cities. The fish resources provide foreign exchange earnings with an annual landed value of about US$300–400 million and combined export value of Nile perch estimated at

[4] The Project Appraisal Document (PAD) title page simultaneously refers to "Phase I of the Adaptable Program Loan (APL)" and "Lake Victoria Environmental Management Project II" which initially created some confusion over the correct name of the project and the words "phase" and "APL" seem to have been used interchangeably in various project documents. For the purposes of this document, the project will be referred to as LVEMP-II APL-1.
[5] Report No: ICR00004335.
[6] According to the documents in the project files, the original project design envisaged LVEMP-II as a 10-15 year investment, consisting of three APLs: APL1 was to be up to 6 years, followed by a second APL that would include Rwanda and Burundi, and then a third APL, still as part of LVEMP II, which was only outlined in broad terms in earlier versions of the PAD. The shorter duration of the initial APL1 was only 4 years, anticipating more financing to become available through the IDA replenishment cycle.
[7] The LVB is roughly defined as the area within a 100-km radius from the lake shore. It covers a draining area of 194,200 Km^2 (LVBC 2007). Its population at the time of project appraisal was about 35 million inhabitants. In each country, the lake basin population density was higher than its national average (Project Information Document, Report No.: AB3561).
[8] FAO 2008.
[9] LVEMP-II APL-1 PAD, World Bank 2009.

US$250 million. The lake fishery contributions to the GDP of the riparian countries were 2 percent for Kenya, 2.8 percent for Tanzania, and 3 percent for Uganda.

4. **Lake Victoria has been an important source of domestic industrial and irrigation water supply and a source of drinking water to major urban centers.** At the time of project appraisal, approximately 5 million people living in the major cities and towns around the lake, such as Kampala, Entebbe, and Jinja (Uganda); Kisumu, Homa Bay, and Migori (Kenya); and Mwanza, Musoma, Bukoba, Shinyanga, and Kahama (Tanzania), depended on Lake Victoria for their domestic and industrial water supply.

5. **The lake is also important to marine transport.** Lake Victoria is navigable, providing a viable and cheap shipping and transportation route between and within the riparian countries. The main transport routes include Mwanza - Port Bell/Jinja, Mwanza - Bukoba, Mwanza - Musoma, Port Bell/Jinja - Bukoba, and Kisumu - Bukoba, as well as numerous local networks. These marine routes are very important for the LVB countries' trade and economic development in general.

6. **Lake Victoria is a rapidly deteriorating important shared resource.** The lake itself is a large transboundary natural resource jointly owned by three riparian countries: Kenya, Tanzania, and Uganda. Rwanda and Burundi are a part of the upper watershed draining into Lake Victoria through the Kagera River.[10] The lake is the headwater of the White Nile. With the increasing urbanization, population growth and industrialization around the lake, disease vectors and oxygen-depleting nutrients in untreated wastewater discharged into the lake by one nation affect water quality for all countries that share it. Soil and nutrient erosion occurs extensively in all five countries. Sediment and nutrient transport, coupled with untreated wastewater, causes eutrophication throughout the lake and provides a fertile environment for nuisance invasive weeds, such as water hyacinth. The depletion of fish stocks is the joint outcome of poor water quality and overfishing/illegal fishing, driven by all riparian countries. Because of the shared nature of the lake, environmental problems in the LVB are shared by all countries and are inherently regional problems.

Main Environmental Challenges Facing the LVB Ecosystem at Appraisal

7. At the time of appraisal, the lake's status and environmental trends had reached alarming levels. Key environmental concerns described in the PAD were as follows:

(a) **Deteriorating water quality.** Lake Victoria water quality had deteriorated significantly since the 1970s, largely from the discharge of untreated municipal and industrial waste and high sediment load by unchecked erosion in the upper catchments, caused largely by the dense population centers and rural subsistence livelihoods (such as from large urban centers like Mwanza, Kisumu, and Kampala/Entebbe which discharge the most Biological Oxygen Demand [BOD][11] loads into the lake).[12] As a result, the lake experienced widespread eutrophication and oxygen depletion and

[10] The Kagera River is an East African river, forming part of the upper headwaters of the Nile and carrying water from its most distant source. The section of river named Kagera begins in Burundi, flowing out from Lake Rweru. From the lake, it flows east along the Rwanda-Burundi and Rwanda-Tanzania borders to a confluence with the Ruvubu River. The waters of the Kagera are thus provided by two major tributaries, the Nyabarongo of Rwanda, which feeds Lake Rweru, and the Ruvubu of Burundi.
[11] BOD is the amount of dissolved oxygen needed (that is, demanded) by aerobic biological organisms to break down organic material present in a given water sample at a certain temperature over a specific period.
[12] LVEMP-II APL-1 PAD, World Bank 2009.

spurred growth of harmful algae and aquatic weeds, which further depleted oxygen and inhibited navigation and caused the depletion of fish stocks. Water in the lake was a human health hazard. Nearly the entire perimeter of the lake experienced hyper-eutrophication, or extremely poor water quality, whereas the rest of the lake had poor or fair water quality, and there were no zones of good water quality detected in the lake.

(b) **Declining lake levels.** The water levels of Lake Victoria fluctuate naturally but had declined sharply between 2000 and 2006, causing serious economic and environmental impacts on the riparian and downstream countries. Since 2000, the lake level had dropped by about 1.6 m, bringing it to a level of 1,133.26 m above sea level in October 2006, which was very close to the lowest ever recorded level in March 1923. This fall was partially attributed to a three-year drought period (2004–2006) and partially to over-abstraction of water, beyond the Agreed Curve,[13] by Uganda for hydropower production. The main economic and environmental impacts of declining lake levels included reduced water consumption; increased number of sunk investments (with respect to jetties, piers, water points, and fish landing infrastructure); destruction of fish breeding and nursery habitats; and reduced hydropower generation. Shipping companies suffered huge financial losses due to increased maintenance costs, reduced cargo to ensure safe anchoring, and relocation of jetties and piers. However, the lake levels increased to approximately 1,134 m above sea level in March 2007 due to the above-normal rainfalls received in the lake basin. The riparian countries recognized that lake water management is crucial for the economy of the region, protection of biodiversity and wetlands, and maintaining of the environmental integrity of the LVB.[14]

(c) **Resurgence of water hyacinth.** Water hyacinth *(Eichhornia crassipes)* had become a major invasive weed in Lake Victoria and its tributaries since the late 1980s and a serious threat to aquatic ecosystems, affecting fish stocks and water quality.[15] The Kagera River system was a major source of the invasive weed due to extensive runoff from adjacent agricultural land. In 1998, water hyacinth weed was estimated to cover approximately 17,000 ha (about the size of Washington, DC, the United States) of waters of Lake Victoria. By February 2000, this weed infestation had been reduced by about 80 percent, to approximately 3,400 ha, mainly through

[13] The Agreed Curve (AC) functions as an operating rule for water discharge, such water releases are a function of the lake levels at any given time. The AC can be approximated with the following equation: Outflow (m^3/s) = $132.923 \times (H - 8.486)^{1.686}$; where H = lake level on the Jinja gauge, with a zero level of 1,122.88 m above sea level. The Agreed Curve describes a water discharge rating curve that emulates the natural relationship between Lake Victoria levels and the flow of the Nile River through the Nalubaale and Kiira hydropower dams. It depicts the management of the Nalubaale and Kiira dams in which the volume of releases will remain consistent with what will have occurred under the natural conditions, thereby ensuring no change in downstream discharges.

[14] LVEMP-II APL-1 PAD, World Bank 2009.

[15] Extensive, tightly packed water hyacinth mats along the shoreline impair biodiversity, fish breeding grounds, nurseries of young fish, inshore feeding zones, and refugia for fish. The interior of these extensive mats is normally deoxygenated or has low levels of light and oxygen and produces poisonous gases like ammonia and hydrogen sulphide. Water hyacinth contaminates watering points for domestic supply, livestock and game. Mobile mats obstruct access to landing beaches, fishing grounds, and transport routes. Water hyacinth increases the cost of water treatment. It also increases the cost of hydropower generation at Nalubaale and Kiira dams in Uganda.

biological control using two weevils—*Neochetina eichhorniae* and *Neochetina bruchi.*[16] Limited mechanical harvesting and disposal of water hyacinth was done by hydropower and water supply companies. Lake shore communities were involved in biological control, as well as manual removal of water hyacinth at landing sites. Until 2005, the coverage of water hyacinth remained stable in the range of 10–20 percent of the 1998 coverage, which was considered to be an ecologically optimal level. After 2005, it was estimated that water hyacinth infestation was about 30 percent of the 1998 coverage, or approximately 5,100 ha, an increase from the 1998 levels. Unsustainable agricultural practices on hills have led to land degradation and increased nutrient and sediment runoff into the lake and adjacent river systems, which, in turn, has led to an increase in water hyacinth infestation in some hotspots. Infested small water bodies and satellite lakes were also sources of the weed entering the main lake.

(d) **Loss of habitats and biodiversity, and declining fish stocks.** The problem of unsustainable fishing in Lake Victoria has had adverse impacts on fish species diversity and the stocks of Nile perch (*Lates niloticus*), the most commercially important fish species. Until the 1970s, Lake Victoria had supported a multispecies fishery dominated by tilapia and haplochromine cichlids. It is thought that some 200 endemic haplochromine species, which previously made up about 90 percent of the fish biomass, had become extinct from the lake due, in part, to predation by the Nile perch that was introduced in the lake in the late 1950s and early 1960s. According to the Lake Victoria Fisheries Frame Survey (2006), the Nile perch fishery catch per unit effort, which is an index of stock abundance, declined from 22.9 tons per boat per year in 1989 to about 4.5 in 2006, exhibiting characteristics typically observed with heavily exploited fisheries. During the same period, the fishing efforts increased tremendously, for example, number of fishermen by 52 percent, fishing crafts by 63 percent, boats with outboard engines by over 200 percent, number of gillnets by 88 percent, and longline hooks by 160 percent.

(e) **Wetlands destruction.** Fringing wetlands and the littoral zones are closely connected to the ecological health of Lake Victoria. Development around the littoral zone of the lake had resulted in the destruction and/or degradation of fringing wetlands that are refugia and sites for fish breeding. Wetlands are also involved in the exchange of nutrients with the lake and act as filters, trapping incoming sediments and pollutants. Extensive wetlands around the lake were destroyed or degraded through conversion to agricultural land, excavation for sand and clay, and the use as disposal sites. It was estimated that about 75 percent of Lake Victoria's wetlands area had been affected significantly by human activity, and about 13 percent had been severely damaged.[17]

(f) **Forest degradation and deforestation.** This was caused by encroachment of agriculture and increasing demands of the growing population for fuelwood, charcoal, timber, and construction purposes. Deforestation had been severe over the last few decades, including loss of high-altitude forests, riverine forests, and lowland forest/woodlands in national parks and reserves. The loss in permanent vegetation cover had accelerated runoff and had increased exposure of soils to sheet and gully erosion. The remaining forests, woodlands, and trees in savanna systems and on-farm

[16] Two species of water hyacinth weevils. These are a species of beetles that have been introduced as a biological pest control herbivore agent to waterways and lakes in countries worldwide to control the spread of invasive weed species, such as the water hyacinth.
[17] LVEMP-II APL-1 PAD, World Bank 2009.

across the basin were facing severe pressures. Valuable indigenous trees (for example, *Podocarpus spp.* and *Markhamia lutea* for timber, Fito, emitongole, eminyinya, enkukuru, obukagati, used for making local products), wildlife, and non-wood forest products, including diverse medicinal plants, were threatened.

(g) **Climate change.** The LVB is located in a transition zone between the high rainfall Congo Basin and the dry Eastern Africa region, which explains the high annual variability of rainfall and lake inflows, making it vulnerable to climate change. Therefore, forecasts of both temperature and precipitation increases in the LVB are useful to assess how these changes are likely to affect river flows and the water balance of Lake Victoria, especially in terms of assessing lake water levels (relevant for wetlands, fisheries, Lake transport, and biodiversity), and potential outflows for hydropower generation on the Victoria Nile.

Rationale for Bank Involvement

8. **Slowing environmental degradation of the lake requires a multifaceted, long-term approach.** The environmental challenges described earlier, being numerous and varied, necessitated a multifaceted, multiphased, long-term response. With a water retention time of about 23 years, environmental degradation—once it occurs in the lake—is hard to reverse and has a lasting impact on the people and economy of LVB countries. It could take 15–20 years or even longer for the environmental status of the LVB to exhibit measurable improvement after introducing stress reduction interventions. Addressing these challenges requires both local and national efforts in all countries, jointly undertaken and coordinated at the regional level, which include adequate regional and national planning, coordinated and harmonized regulation, monitoring and information transparency as well as technical knowledge sharing, and long-term, sustained support. Deferring action would exacerbate an already dire situation.

9. The Lake Victoria Environmental Management Program[18] was designed to be a long-term comprehensive effort to rehabilitate the lake ecosystem for the benefit of the people who live in the catchment, the national economies of which they are a part, and the global community. The long-term approach to slowing down the environmental degradation of the lake was recognized from the outset of the first Lake Victoria Environmental Management Project[19], which included the three riparian countries and was implemented from 1996 to 2005. The project was the first substantial investment in the environment sector for the World Bank in the LVB region. The rationale and the decision to tackle environmental degradation of the lake was that, at the time, the World Bank was the only institution that had the standing to mobilize scientific resources from across the globe to support the initiative of unprecedented interest to the global scientific community.

[18] See Lake Victoria Environmental Management Project, Staff Appraisal Report, World Bank, 1996. *http://documents.worldbank.org/curated/en/628581468779154794/pdf/multi0page.pdf*.

[19] Referred to as "LVEMP-I" throughout this document. (Uganda P046836, Tanzania P046837, Kenya P046838, US$91.8 million from the Global Environment Facility [GEF] and IDA).

10. At the closing of LVEMP-I, both the Independent Evaluation Group (IEG) and the ICRs[20] acknowledged that LVEMP-I greatly improved the understanding of the environmental challenges faced by the lake. It helped upgrade technical and research skills in fisheries at the national level, piloted community-based catchment rehabilitation, and had established Beach Management Units (BMUs) to control illegal fishing at the community level. The project implemented biological controls to reduce water hyacinth infestation. LVEMP-I also helped establish the Lake Victoria Fisheries Organization (LVFO), which in turn contributed to establishing the LVBC in 2005. After LVEMP-I ended, much still remained to be completed: harmonization of policies, translation of research results into strategic resources management plans, pollution and erosion control, and further investments to improve water quality. These remaining activities were therefore addressed in the design of LVEMP-II APL-1.

11. At the time the project was prepared, the World Bank was (and is still) a global convener on knowledge and best practices on management of transboundary water bodies and other shared natural resources. Knowledge and understanding of environmental issues in the lake was still limited and institutional arrangements were significantly weak; hence, collaborative management of transboundary natural resource was virtually nonexistent. LVEMP-II APL-1 was designed to enhance the collaborative management of the shared transboundary water resources to ensure the long-term sustainability of the lake and associated economic development activities and to address the above key environmental issues facing the LVB, including water use for small-scale irrigation, domestic and industrial water supply, point and nonpoint pollution control, fisheries management, and watershed management. It built on feasibility studies on environmental issues and on pilot interventions to address water pollution and land degradation conducted under LVEMP-I. In view of this, LVEMP-II APL-1 was regarded as an instrument aiming to (a) enhance collaborative management of the transboundary natural resources through harmonizing policies and regulations, (b) achieve stress reduction outcomes in priority hotspots, and (c) lay a foundation for the long-term program for sustainable improvement in the environmental status and water quality.[21]

12. **Existing regional strategies adopted in recognition of common agenda.** As mentioned earlier, the Partner States of the LVB recognized that addressing environmental and natural resources management (ENRM) issues affecting the lake required cooperation across borders. As a result, a Protocol for Sustainable Development of the Lake Victoria Basin[22] was signed by the EAC Partner States (Kenya, Tanzania, and Uganda) in 2003 and ratified in 2004. The protocol addressed environmental concerns in and around the lake and laid down the principle that “partner states shall utilize water resources of the basin in their respective territories in an equitable and reasonable manner”. Under the same protocol, the LVBC was established in 2005, as a permanent apex institution to the EAC, to provide a regional coordination framework for sustainable development of the LVB.

[20] Separate ICRs were prepared for each country and were evaluated separately by IEG. The ratings for LVEMP-I achievement of development objectives were Moderately Satisfactory for Tanzania and Uganda, and Unsatisfactory for Kenya, the latter because the country was apparently unable to overcome chronic management weaknesses and was lagging behind the other two participating countries.

[21] See PAD.

[22] www.internationalwaterlaw.org/documents/regionaldocs/Lake_Victoria_Basin_2003.pdf.

13. In 2003, Kenya, Tanzania, and Uganda adopted 'The Vision and Strategy Framework for Management and Development of the Lake Victoria Basin'[23] within the context of the EAC's 1997–2000 Development Strategy, which designated the LVB as an economic growth zone. The LVB Vision and Strategy was aimed at achieving "a prosperous population living in a healthy and sustainably managed environment providing equitable opportunities and benefits". It was also consistent with the EAC's 2006–2010 Development Strategy, which emphasized political and socioeconomic development and deepening and accelerating regional integration. The LVBC had also developed its Operational Strategy for 2007–2010 to implement its mandates stipulated in the EAC Development Strategy and the protocol on the LVB.

14. **The importance of sustainable management of Lake Victoria was also highlighted in the national development strategies of the LVB countries.** They included the Vision 2030[24] and the Economic Recovery Strategy for Wealth and Employment Creation,[25] Kenya; Vision 2025[26] and the National Strategy for Growth and Reduction of Poverty,[27] Tanzania; and Vision 2025[28] and the Poverty Eradication Action Plan,[29] Uganda. These documents emphasized healthy ecosystems, poverty reduction, and sustainable economic growth and identified degradation of natural resources as a key impediment to attainment of results and improved livelihoods.

15. **Higher-level objectives to which the project contributed.** LVEMP-II APL-1 objectives were consistent with the EAC's Vision and Strategy Framework for Management and Development of the Lake Victoria Basin, as well as with the World Bank's regional and national assistance strategies at the time, including the Africa Action Plan,[30] that is, improving governance, strengthening drivers of growth, enhancing participation, and building partnerships. They were also in line with the World Bank's Regional Integration Assistance Strategy's (Report No. 43022-AFR) priority of strengthening the management of regional commons and cooperation on regional public goods. LVEMP-II APL-1 had also been identified as a priority in the World Bank's Country Assistance Strategies (CAS) for Kenya (Report No. 29038-KE) (2004) and Joint Assistance Strategies for Tanzania (Report No. 38625-TZ) and Uganda (Report No. 34310-UG) (2006).

Theory of Change (Results Chain)

16. LVEMP-II APL-1 objectives were consistent with the priorities set out in the GEF-financed Transboundary Diagnostic Analysis (TDA).[31] The TDA was undertaken in all five riparian countries to help identify priority environmental issues in the LVB and coalesced into a regional TDA, through a systematic consensus-based process, considering the large geographical area and many potential entry points for

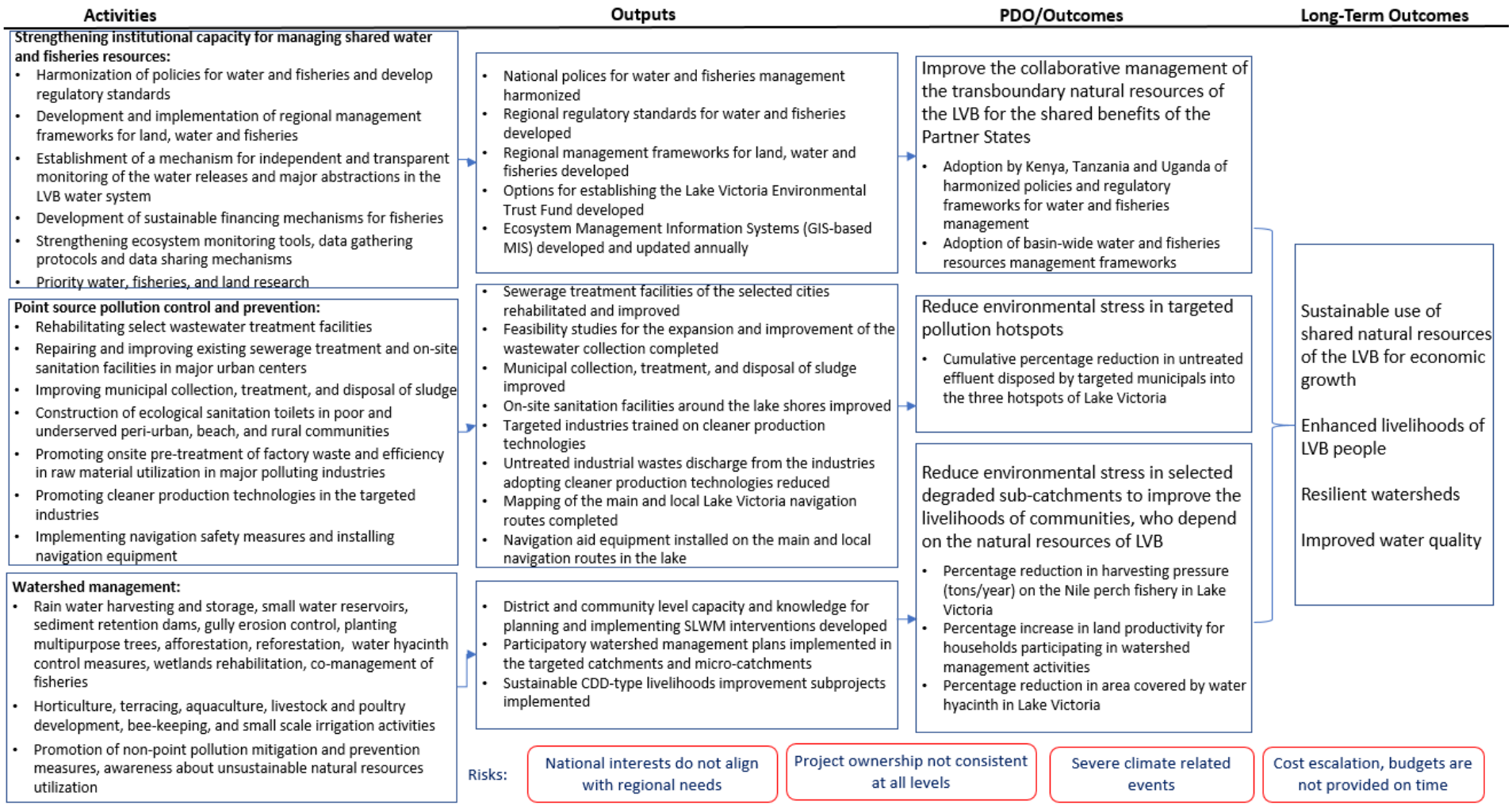
[23] http://repository.eac.int/handle/11671/721.
[24] https://www.researchictafrica.net/countries/kenya/Kenya_Vision_2030_-_2007.pdf.
[25] http://siteresources.worldbank.org/KENYAEXTN/Resources/ERS.pdf.
[26] http://www.mipango.go.tz/index.php?option=com_docman&task=cat_view&gid=45&Itemid=62.
[27]http://www.international.gc.ca/development-developpement/assets/pdfs/countries-pays/NATIONAL-STRATEGY-FOR-GROWTH-AND-REDUCTION-OF-POVERTY-TANZANIA.PDF.
[28] http://www.nzdl.org/gsdlmod?e=d-00000-00---off-0unescoen--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&a=d&cl=CL2.4.5&d=HASH01764a65cbb34accace85105.9.
[29] http://siteresources.worldbank.org/INTPRS1/Resources/Country-Papers-and-JSAs/Uganda_IPRSP.pdf.
[30] http://siteresources.worldbank.org/EXTOED/Resources/AfricaActPlan.pdf.
[31] See also https://www.thegef.org/project/transboundary-diagnostic-analysis-and-strategic-action-program-development-lake-victoria.

interventions. The key issues and related mitigation actions were subsequently prioritized in the regional Strategic Action Program. The following emerged as the five prioritized transboundary issues: (a) land, wetland, and forest degradation; (b) weak governance, policy, and institutional framework; (c) declining fish stocks and loss of habitats and biodiversity; (d) increasing pollution and eutrophication; and (e) unsustainable water resources management, declining water levels, and climate change[32]. To achieve the intended Project Development Objective (PDO) outcomes and, subsequently, long-term outcomes, LVEMP-II APL-1 financed a series of activities in three areas of project intervention: (a) improve the collaborative management of the transboundary natural resources of the LVB for the shared benefits of the Partner States, (b) reduce environmental stress in targeted pollution hotspots, and (c) reduce environmental stress in selected degraded sub-catchments to improve the livelihoods of communities, who depend on the natural resources of LVB. The project's theory of change is illustrated in figure 1. The first area of intervention would help address the gap identified in the IEG ICR review of LVEMP-I on policy harmonization, whereas the second and third areas of intervention would help address the identified environmental concerns.

17. The map in annex 7 shows the main LVEMP-II APL-1 and APL-2 project intervention areas. The sub basins that were the focus of LVEMP-II APL-1, and subsequently APL-2 investments were selected on the basis of the estimates of the total pollution loads from both domestic and industrial sources (for example, BOD) from each of the main tributaries of Lake Victoria that were made during LVEMP-I. The wastewater treatment investments were focused primarily on the largest urban centers or those close to the lake shore. For the watershed rehabilitation work, the major degraded sub-catchments selected were the Nyando, Simiyu, and Katonga basins, on the basis of estimates of nutrient inflows from the major tributaries of Lake Victoria from LVEMP-I. Catchment management plans were prepared for these basins on the basis of identifying degradation hotspots with local authorities, as well as intervention options for their restoration. Additional considerations in target area selection were manageable environmental and social issues, available financing, and local buy-in.

[32] LVEMP-II APL1 PAD, para 22.

Figure 1: Theory of Change: LAKE VICTORIA ENVIRONMENTAL MANAGEMENT PROJECT II APL 1



Note: CDD = Community-driven development; GIS = Geographic information system.

Project Development Objectives (PDOs)

18. The Project Development/Global Environmental Objective (PDO/GEO) was to (i) improve collaborative management of the transboundary natural resources of Lake Victoria basin for the shared benefits of the Partner States; and (ii) reduce environmental stress in targeted pollution hotspots and selected degraded sub-catchments to improve the livelihoods of communities, who depend on the natural resources LVB.[33]

Key Expected Outcomes and Outcome Indicators

19. LVEMP-II APL-1 intended to achieve the following outcomes: (a) improved collaborative management of the transboundary natural resources of the LVB, (b) reduced environmental stress in targeted pollution hotspots, and (c) reduced environmental stress in selected degraded sub-catchments, as well as improved livelihoods of communities who depend on the LVB's natural resources (the latter being a parallel outcome of the watershed activities by design).

20. The following six indicators were used to assess the project's outcomes:

(a) Adoption by Kenya, Tanzania, and Uganda of harmonized policies and regulatory frameworks for water and fisheries management

(b) Adoption of basin-wide water and fisheries resources management frameworks

(c) Cumulative percentage reduction in untreated effluent disposed by targeted municipalities[34] into three hotspots of Lake Victoria

(d) Percentage reduction in harvesting pressure (tons/year) on the Nile perch fishery in Lake Victoria

(e) Percentage increase in land productivity for households participating in watershed management activities

(f) Percentage reduction in area covered by water hyacinth in Lake Victoria

Components

21. The project had four components, as summarized below. Annex 3 contains details on the estimated and actual costs by component and by sources of financing.

[33] The PDO in all Financing Agreements is the same as that in the LVEMP-II APL-1 PAD.
[34] There was a typo in the PAD, and the word read "municipals".

Component 1: Strengthening institutional capacity for managing shared water and fisheries resources (US$22.4 million at appraisal; US$31.8 million actual)

22. This component focused on strengthening the existing institutions to improve the cooperative management of the LVB's shared transboundary natural resources. It had two subcomponents: (a) harmonization of policies and regulatory standards and (b) ecosystem monitoring and applied research. Activities covered capacity building through long- and short-term training, technical assistance, provision of office and laboratory equipment, marine vessels for research, monitoring, and enforcement in each country, developing options for sustainable financing of natural resources management interventions, and developing regional frameworks for the management of key transboundary natural resources—both water and fisheries.

Component 2: Point source pollution control and prevention (US$37.2 million at appraisal; US$35.3 million actual)

23. This component addressed environmental stresses within the lake and littoral zone through the implementation of mitigation and prevention measures. It was to finance investments aimed at reducing point sources of pollution in priority hotspots identified during LVEMP-I. The investments were to complement ongoing activities supported by other World Bank-funded projects in water and sanitation. There were three subcomponents: (a) rehabilitation and improvement of wastewater treatment facilities, (b) promotion of cleaner production technologies, and (c) pollution risk management and safety of navigation.

Component 3: Watershed management (US$43.6 million at appraisal; US$36.3 million actual)

24. This component sought to reduce the lake basin's environmental stresses by implementing nonpoint sources pollution mitigation and prevention measures. The reduction of the nonpoint sources of pollution (sediment loads, nutrients, and agro-chemicals) by scaling up successful models of watershed management practices piloted under LVEMP-I and other related national projects was expected to improve water use efficiency and generate positive downstream externalities. This component had two subcomponents: (a) natural resources conservation and livelihoods improvement and (b) community capacity building and participation.

Component 4: Project coordination and management (US$11.6 million at appraisal; US$27.4 million actual)

25. This component provided the resources necessary for the effective coordination, communication, and monitoring and evaluation (M&E) of the project activities. At the regional level, these tasks were carried out by the Regional Project Coordination Team (RPCT) mainstreamed in the LVBC, while at the national level they were the responsibility of the National Project Coordination Teams (NPCTs). The component had two subcomponents: (a) project coordination and communication and (b) monitoring and evaluation.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION

Revised PDOs and Outcome Targets

26. The PDOs were revised through a Board approved restructuring in June 2012.[35] The level of ambition was lowered, with the word 'contribute' added to the original PDO; 'reduction in environmental stress' in pollution hotspots and degraded sub-catchments replaced with their 'improved management'; and 'improve the livelihood of communities' was modified to 'for the benefit of". The PDO was modified to read "*to contribute to: (i) the improvement of the collaborative management of the trans-boundary natural resources of the LVB among the Partner States; and (ii) the improvement of environmental management of targeted pollution hotspots and selected degraded sub-catchments for the benefit of communities, who depend on the natural resources of LVB*".

Revised PDO Indicators

27. The PDO-level indicator changes are summarized in table 1. Further to the first restructuring, an additional financing (AF) was approved in 2015 for Kenya, Tanzania, and the EAC. The PDOs and indicators remained unchanged, but the targets were revised upwards to reflect the additional investment: (a) the number of urban pollution hotspots addressed increased from 6 to 9 and (b) the area of land brought under sustainable land management (SLM) from 6,150 ha to 8,000 ha. The number of project beneficiaries also increased to 450,000. It should be highlighted that the extension of targets was in most cases much larger than the proportionate increase in financing.

Table 1. Revised PDO Indicators as per the First Restructuring in June 2012

Original PDO Indicator	Revised PDO Indicator	Rationale for Change
Adoption by Kenya, Tanzania and Uganda of harmonized policies and regulatory frameworks for water and fisheries management	A draft harmonized policy on water management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers. A draft harmonized policy on fisheries management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers.	Adoption of policies is a political process that requires legislative/parliamentary approval in each country, whose timing is outside the control of the project and likely to be longer than the period of project implementation. Also, the achievements related to water and fisheries policies were separated in two different indicators to allow for better monitoring of results as this was a compound indicator.
Adoption of basin-wide water and fisheries resources management frameworks	(Dropped)	The 'basin-wide' collaborative management aspect was already covered in the above two revised indicators.

[35] http://documents.worldbank.org/curated/en/228481468209674320/pdf/682870CORRIGENDUM0IDA0R20120017901.pdf

Original PDO Indicator	Revised PDO Indicator	Rationale for Change
Cumulative percentage reduction in untreated effluent disposed by targeted municipalities[36] into three hotspots of Lake Victoria	Number of urban pollution hotspots addressed through investments to control wastewater pollution	The new indicator is realistic to achieve and measure within the project time frame, because it would have been very difficult given the amount of financing and implementation period required to accurately monitor the effluent disposed into the lake; therefore, the indicator was replaced.
Percentage reduction in harvesting pressure (tons/year) on the Nile perch fishery in Lake Victoria	(Dropped)	The project did not include activities that contribute directly to achieving this indicator.
Percentage increase in land productivity for households participating in watershed management activities	Number of hectares under sustainable land management practices in the targeted sub-catchments	Increase in land productivity is a longer-term outcome—hard to achieve and measure in the given time frame. Revised indicator sums up results in adoption of SLM.
Percentage reduction in area covered by water hyacinth in Lake Victoria	A regional strategy on water hyacinth control, submitted by LVBC to the Council of Ministers for endorsement Number of identified water hyacinth hotspots with active monitoring and removal activities[37]	The original indicator was not attributable to the project since the project activities did not cover the entire lake. The indicator was split into two indicators, the first to reflect improved regional policy for water hyacinth control and the second to monitor hotspots treatment in each country.
	Direct Project Beneficiaries (number), of which female (%)	Added a new mandatory core indicator.

Revised Components

28. The main structure of project components remained unchanged throughout and only some subcomponent activities were adapted to achieve sensible positive impacts within the given time frame. This included, during the June 2012 restructuring, simplifying Component 2 by removing the support to research grants (as that would be taken care of by the Swedish International Development Cooperation Agency [Sida] grant) and simplifying Component 3 by introducing the possibility of implementation through community management initiatives (CMIs) between the implementing agency and local governments or communities. The overall costs of the components were not changed during this restructuring, but with the May 2015 AF of US$22 million, the component costs increased, as per table 2.

[36] There was a typo in the PAD, and the word read “municipals”.

[37] There was an inconsistency in the Restructuring Paper, which stated the indicator as “Reduction in area covered by water hyacinth in identified hotspots” in the summary table (Annex 1A), and as “Number of identified water hyacinth hotspots with active monitoring and removal activities” in the revised RF that was officially recorded (Annex 1B).

Table 2. LVEMP-II APL-1 Component Cost Change after May 2015 AF

Components	Component Costs (in US$, millions)		Changes to Component Activities After May 2015 AF
	Original	After May 2015 AF	
Component 1	22.4	27.9	No change
Component 2	37.2	45.7	Removing support to research grants
Component 3	43.6	47.6	Introduced implementation through CMIs
Component 4	11.6	15.6	No change
Total	**114.8**	**136.8**	

Note: The AF Project Paper envisaged a parallel financing of US$0.5 million from the Cooperation in International Waters in Africa (CIWA) program which did not become available.

Other Changes

29. The remaining changes to the project design that were introduced with restructuring in June 2012 are listed below:

(a) Clarified the implementation arrangements at the national level;

(b) Clarified the coordination roles and responsibilities between the regional and the national project coordination teams;

(c) Modified the disbursement categories and reallocated the proceeds according to the new categories;

(d) Increased the disbursement percentages by categories in line with agreed upon Financing Parameters that allow up to 100% financing. Counterpart contributions were no longer mandatory and pro-rated for each payment request.

(e) Eliminated the project dated covenants (see below);

(f) Extended the closing date by 24 months, from June 30, 2013 to June 30, 2015; and

(g) Modified most of the remaining intermediate indicators and introduced new ones to adapt to the new PDO.

30. The covenants that were dropped in 2012 are as follows:

IDA Financing Agreements

(h) Kenya, Tanzania, and Uganda shall, by not later than December 31, 2009, implement the independent and transparent mechanism for monitoring water releases and major abstractions from the Lake Victoria basin water system, established by the EAC under Part I(a)(ii) of the EAC Project.

(i) Kenya, Tanzania, and Uganda shall, by not later than June 30, 2012, take all measures necessary on their part to adopt and implement the WRMP[38] developed by the EAC, in a manner satisfactory to the Association.

(j) Kenya, Tanzania, and Uganda shall, by not later than June 30, 2012, take all measures on their part to implement the recommendations made by the EAC to harmonize their water and fisheries policies and regulatory standards, in a manner acceptable to the Association.

(k) Kenya, Tanzania, and Uganda shall, by not later than March 31, 2012, (i) review their policies and regulations in order to identify any legal impediments to the operationalization of the Fish Levy Trust Fund (FLTF) and (i) carry out all measures necessary on their part to operationalize the FLTF, in a manner satisfactory to the Association.

GEF Grant Agreement

(a) By not later than September 30, 2009, the EAC shall establish an independent and transparent mechanism for monitoring water releases and major abstractions from the Lake Victoria basin water system under which the releases and abstractions can be measured at all times by the Partner States.

(b) By not later than June 30, 2011, the EAC shall, following consultations with the LVB countries, and in accordance with terms of reference acceptable to the World Bank, develop the Water Resources Management Plan (WRMP) for the LVB, satisfactory to the World Bank, and submit the said plan to the LVB Countries for its adoption.

(c) The EAC shall, by not later than March 31, 2012, following consultations with the LVB Countries, develop recommendations for harmonization of the water and fisheries policies and regulatory standards, in accordance with terms of reference acceptable to the World Bank, and submit the said recommendations to the LVB Countries for implementation.

31. There was a second (level 2) restructuring in June 2014 involving minor revisions to the Legal Agreements to reflect the final amount of funding available from Sweden (US$11,083,089.74) and a simplified set of eligible expenditure tables, reflecting the need to increase allocation to the rapidly expanding set of CDD subprojects.

32. The May 2015 AF also extended the project closing date by another 2.5 years, to December 2017.

Rationale for Changes and Their Implication on the Original Theory of Change

33. The PDO revision in the 2012 restructuring was done on the realization that the original PDO referred to the LVEMP as a holistic and long-term program, instead of the more realistic and attainable incremental objective and outcomes within the purview of the project. This translated into significant changes to the results indicators so that they were less ambitious, would better support the monitoring of results that were attributable to the activities supported by the project and could be achieved during the life of the project. As detailed in table 1, the changes largely shifted focus (a) from the full implementation of new regional policies to the achievement of key milestones in their adoption and (b)

[38] WRMP = Water Resources Management Plan.

from changes in direct metrics of environmental health in the basin to evidence of incremental on-the-ground environmental management activities that were expected to contribute to those changes.

34. With respect to the reallocation of funds in 2014, the first restructuring had moved much of the budget for watershed management activities from CDDs to CMIs in response to the slow initiation of the CDDs. However, significant preparatory work for the CDDs had already been completed by that time, which then led to a rapid expansion of CDD activities once the initial engagement, training, and planning phases had been completed. The reallocation under the first restructuring did not take account of how many CDD subprojects were close to starting implementation, and therefore there was a need to rebalance the allocation back toward CDDs as these came into effect, although CMIs remained an important and complementary delivery mechanism.

35. The removal of the mandatory counterpart funding stemmed from the difficulties experienced by the national project teams in obtaining the approval of requests for disbursement when the counterpart contribution was not fully available at the time of submission of the withdrawal applications, and therefore the mandatory 10 percent counterpart contribution for the category of goods, works, and incremental operating costs in the Financing Agreements was removed.

36. The seven dated covenants in the IDA Financing Agreements and GEF Grant Agreement with the three LVEMP-II APL-1 countries and EAC, respectively, relating to policy reforms and their implementation, were dropped at the 2012 restructuring despite significant progress already made, as the project could not guarantee the timing of formal adoption of the policies or their operationalization due to the delayed start-up of project implementation, among other factors. However, the achievements toward the targets set in the results framework (RF) (see section II.B) show that elimination of most of the covenants had insignificant impact on implementing the regional activities and the national and local-level physical investment activities as some of the covenants, such as establishment of a mechanism for monitoring water release, development of a water resources management plan, and harmonization of the water and fisheries policies and regulations, were already covered in the RF.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating
Rating: High

37. LVEMP-II APL-1 objectives continue to be consistent with priorities of the World Bank's regional and national assistance strategies. The project featured prominently in the World Bank’s FY18–23 Regional Integration and Cooperation Assistance Strategy for Africa (Report No. 121912-AFR), as one of the high-priority regional projects under IDA-18 aiming to strengthen the management of regional commons and cooperation on regional public goods. The Regional Integration and Cooperation Assistance Strategy for Africa recognized that engagement in transboundary river and lake basins is complex and requires long-term support to deliver results. The regional coordination and collaboration promoted through LVEMP-II APL-1 for the management of Lake Victoria could also potentially strengthen the capacity of the EAC to better integrate as a regional bloc.

38. The original and revised PDOs are highly relevant to the World Bank's current Country Partnership Frameworks (CPFs) and Country Partnership Strategies (CPS). The project contributes to the three engagement domains in the Kenya FY14–18 CPS (Report No. 87024-KE): (a) Competitiveness and Sustainability - Growth to Eradicate Poverty and (b) Protection and Potential - Human Resource Development for Shared Prosperity. LVEMP-II APL-1 objectives would be particularly relevant in making contributions to achieving the following outcomes under this strategy: Outcome 2 - Strengthened Planning and Management of Urban Growth (through transboundary collaboration); Outcome 4 - Greater Agricultural Productivity (through CDD and CMI activities); Outcome 5 - Improved Social Service Delivery for Vulnerable Groups, Particularly Women (by making sure women fully participate in community development activities); Outcome 6 - Improved Capacity to Manage Risks from Climate Change (by promoting sustainable watershed and fisheries management practices); and Outcome 8 - Better Provision of Health and Sanitation Services by Counties (through better pollution control).

39. The project objective aligns well with the three focal areas identified in the World Bank's FY18–22 Tanzania CPF (Report No. 121790-TZ): (a) Enhance Productivity and Accelerate Diversified and Equitable Growth, (b) Boost Human Capital and Social Inclusion - A Lifecycle Approach to Tanzania's Human Development Challenges, and (c) Modernize and Improve Efficiency of Public Institutions. More relevantly, LVEMP-II APL-1 would directly contribute to achieving one of the objectives under this CPF: Natural Resource Management for Equitable Growth (through improved transboundary management of the lake and its basin).

40. Likewise, the project has a strong link to the World Bank's FY16–21 Uganda CPF (Report No. 101173-UG) Objective 4: Enhanced Resilience of the Poor and Vulnerable with special focus on the environment and climate change (through CDD and CMI activities and promoting sustainable watershed and fisheries management practices).

41. The project objectives have become even more relevant today in light of the Sustainable Development Goals (SDGs), adopted through Resolution No. A/70/L.1 of the General Assembly of the United Nations on September 25, 2015. Goal 6 of the SDGs relates to clean water and sanitation and defines targets on improving water quality by reducing pollution; eliminating dumping and minimizing release of hazardous chemicals and materials; halving the proportion of untreated wastewater; implementing integrated water resources management at all levels, including through transboundary cooperation; protecting and restoring water-related ecosystems; and supporting and strengthening the participation of local communities in improving water and sanitation management.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

Assessment against Original PDO (before Restructuring)
Rating: Modest

42. The original PDO was to (i) improve the collaborative management of the transboundary natural resources of the LVB for the shared benefits of the Partner States; and (ii) reduce environmental stress in targeted pollution hotspots and selected degraded sub-catchments to improve the livelihoods of communities, who depend on the natural resources of LVB. The PDO can be broken down into three main

outcomes, as follows: (a) improve the collaborative management of the transboundary natural resources of the LVB, with a qualifying objective "for the shared benefits of the Partner States;" (b) reduce environmental stress in targeted pollution hotspots; and (c) reduce environmental stress in selected degraded sub-catchments, with a parallel objective "to improve the livelihoods of communities who depend on the natural resources of the LVB."

43. **The first outcome to "*improve the collaborative management of the transboundary natural resources of the LVB for the shared benefits of the Partner States*" was to be measured by the following outcome indicators:**

- *Adoption by Kenya, Tanzania, and Uganda of harmonized policies and regulatory frameworks for water and fisheries management in Lake Victoria* (partially achieved)

44. The original PDO indicator was measured as progress toward adoption of an unidentified number of sector policies. The PAD stated that the review of the necessary policies had started under LVEMP-I but it is not clear if it was finalized. The water and fisheries policies, the harmonized effluent standards and the Fisheries Management Plan (FMP) were adopted or are being uniformly implemented as a result of the project (see below and the discussion on post-restructuring efficacy for details). Given the absence of a finite baseline, the indicator is considered partially achieved.

- *Adoption of basin-wide water and fisheries resources management frameworks* (substantially achieved)

45. This indicator was defined as "cumulative percentage completion of preparation of the WRMP and updating the IFMP[39] for Lake Victoria Basin". The Water Resources Management Policy (based on the draft plan) was submitted in 2010 and was approved and adopted by the 10th meeting of LVB-SECOM in 2012. The Water Resources Bill has been drafted but is not yet approved, which is the reason why the target is considered "substantially" and not "fully" achieved. The FMP was effectively updated to FMP III, validated by stakeholders, and approved by the LVFO Council of Ministers on January 29, 2016 (see the comments in the RF for more details).

46. The following intermediate indicators applied:

- *Number of countries that have adopted and are implementing harmonized water and fisheries policy, legal, and regulatory standards* (partially achieved). This indicator essentially repeats the PDO indicators but includes "implementation". As reported in this document, the regulatory framework for fisheries is in place and is being implemented, while the water resources framework is still being developed and implementation is limited.

- *Number of countries implementing the regional WRMP, Updated FMP, SLMS[40] and FLTFs* (substantially achieved)

[39] IFMP = Integrated Fisheries Management Plan, also referred to as FMP.

[40] FMP = Fisheries Management Plan; SLMS = Sustainable Land Management Strategy;

47. In addition to the WRMP and FMP (see above), the LVB Sustainable Land Management Strategy was adopted in 2012 and has since informed the development of the Kenya Strategic Investment Framework for Sustainable Land Management 2017–2027, and County Integrated Development Plans (CIDP) and Integrated Wetland Management Plans for four wetlands in the Kenyan part of the basin were prepared and provided the basis for investments made under the project. Tanzania and Uganda have mainstreamed this strategy in their respective CIDPs.

48. Proposals for development of an FLTF were developed in each of the countries, but there has not been success in persuading Treasuries to ring-fence revenue from the fisheries industry. In Tanzania, an 'FLTF' has been legally established with an interim Board, and office space provided by the Ministry of Water and Irrigation, but the fund does not actually receive fisheries revenues, and hence financing is being sought. A consultancy was also conducted to develop options for establishing a Lake Victoria Environmental Trust Fund, including sources of financing and legal and institutional models. The Sectoral Council of Ministers approved an option to develop the fund as a vehicle to mobilize and consolidate funds from different interested donors to support the LVBC's mandates on environment and natural resources management. Terms of reference (ToRs) are being developed to operationalize the fund, and the findings of the consultancy have informed the LVBC's resources mobilization strategy, including successfully accessing US$5 million from the Climate Adaptation Fund for LVBC countries to build their capacity for implementing the Climate Change Adaptation Strategy and Action Plan 2018–2023.

- *Number of functional LVBC and countries' Lake Victoria Ecosystem Management Information Systems (GIS-based MIS) that are available for public access and updated on an annual basis* (partially achieved)

49. The PAD was somewhat ambiguous regarding the GIS-based MIS, at times referring to the basin level and, at others, to the project level. The intent was to be able to provide technical information and data with regards to land use, water allocations, fish stocks management, and common environmental and/or effluent discharge standards, floods and water hyacinths. The target for the indicator was "4" but no further details were provided. At project closure, the system was established at the project level (see also the discussion under "Enhanced monitoring capacity" and section IV.A), and today the basin-wide GIS-based MIS is functional in some areas, such as fisheries and water resources, and is improving in the area of water hyacinth monitoring, while water quality monitoring is yet to improve. The discussion of the achievement of the revised outcomes below provides further details.

50. Achievement under this outcome is rated Modest because it was much more ambitious for the project life and financing, leading to partial results by project end compared to the original targets. Some of the terminology was unclear, for example policy and plan vs. management framework, therefore the assessment considered the substance and significance of the documents that were adopted and the follow-up actions taken by each country.

51. **The second outcome to "*reduce environmental stress in targeted pollution hotspots*" was measured by the outcome indicator**:

- *Cumulative percentage reduction in untreated effluent disposed by targeted municipalities*[41] *into three hotspots of Lake Victoria* (partial data only and estimates done; partially achieved).

52. The three hotspots were Winam Gulf in Kenya, Mwanza Gulf in Tanzania and Murchinson Bay, Uganda. The baseline for BOD was 9,235 tons/yr with a targeted 10 percent reduction by end of project, that is, 923 tons/yr. The project supported a number of smaller pollution hotspots within these three large areas and measured the effluent reduction from some of these smaller hotspots only. Therefore, the possible cumulative effect on a larger scale could only be estimated. The major project investments across the three countries in wastewater treatment facilities and sewer connections are estimated to have reduced BOD pollution loads by around 600 tons/yr (see table 3) and have cleared drainage channels in Kampala, Uganda, of a similar weight of silt. Because the locations used for the baseline and what was eventually measured during the project differ, the project can at best claim partial achievement for this indicator.

53. The following intermediate indicators applied:

- *Cumulative percent reduction of pollutants in effluent discharges from rehabilitated and improved wastewater treatment facilities* (partially achieved). The target for the indicator above was 30 percent, but since there was no baseline established, this result cannot be expressed as a percentage. However, as shown in table 3, some level of success can be attributed to the project activities.

- *Cumulative percent of target industries in the LVB adopting Cleaner Production Technologies and adhering to the harmonized effluent standards* (achieved). A much larger number of industries than targeted were trained in cleaner production technologies, and about half of them implemented various approaches. Based on the Resource Efficient and Cleaner Production (RECP) report, about half of the industries that implemented RECP appear to be adhering to effluent standards.

- *Number of marine/fishing vessels accidents leading to oil spills and/or loss of lives* (not monitored). The project provided some navigation safety and emergency response equipment. However, there were no marine vessel accidents and oil spills during the project and the available information does not offer a complete picture on the level of navigation safety and emergency response at the basin level.

54. The achievements under this outcome are considered Modest due to incomplete data on two indicators and attribution/data issues.

[41] There was a typo in the PAD, and the word read "municipals".

55. **The third outcome to "*reduce environmental stress in selected degraded sub-catchments" with a parallel objective "to improve the livelihoods of communities who depend on the natural resources of the LVB*" was measured by the following outcome indicators:**

- *Percentage reduction in harvesting pressure (tons/year) on the Nile perch fishery in Lake Victoria* (no data). There were no project activities that directly supported this outcome, other than through the FMP. The indicator was subsequently dropped.

- *Percentage increase in land productivity for households participating in watershed management activities* (no data). This indicator could not be entirely attributed to the project and was subsequently dropped.

- *Percentage reduction in area covered by water hyacinth in Lake Victoria* (partially achieved). The target was 30 percent reduction of 5,100 ha. Refer to the discussion in the post-restructuring efficacy paragraphs.

56. The following intermediate indicators applied:

- *Cumulative number of hectares under improved land use and range land management practices in the targeted catchments* (partially achieved). The indicator was too broadly defined, and the original target was 45,000 ha. Based on the reporting under the revised indicators, at least 15,000 ha were brought under SLM practices or were restored/rehabilitated degraded wetlands.

- *Cumulative number of hectares under afforestation and reforestation activities in targeted sub-catchments* (not achieved). The target was 100,000 ha which was too ambitious by any measure at the project level. See the discussion in the post-restructuring efficacy section for achievements supported through the project.

- *Cumulative hectares of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments* (partially achieved). The original target was 7,000 ha, and it was revised downwards to 1,450 ha at the 2012 restructuring. By project end, 2,272 ha of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments.

- *Percent of community natural resource management subprojects whose implementation is rated satisfactory or better in the targeted sub-catchments* (not measured since the indicator was dropped at the 2012 restructuring). There is anecdotal feedback from community members reflecting satisfaction with the CDD and CMI activities, despite some distrust in the very beginning.

57. The achievements under this outcome are rated Modest, because the PDO-level indicators were not attributable to the project and had to be dropped or modified (see table 1), and the original intermediate level targets associated with reducing environmental stress were too ambitious and impossible to reach under the project. The revised intermediate indicators provided a better measure of improved SLM practices related to the CDD and CMI activities and they were all achieved or exceeded

(see below for further information on the above activities and outcomes and the extent to which they were continued or modified in the post-restructuring period). It is therefore safe to conclude that the outcome, "to reduce environmental stress in selected degraded sub-catchments," was achieved to some degree only.

Assessment against Revised PDO (Post-restructuring, 2012)
Rating: Modest

58. The rest of this section assesses achievement of the revised PDO through its three outcomes: (a) contribution to the collaborative management of transboundary natural resources, (b) contribution to improvement in the environmental management of targeted pollution hotspots, and (c) contribution to environmental management of select degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB.

Revised Outcome 1: Contribution to improvement of collaborative management of transboundary natural resources of the LVB among the Partner States

59. The revised outcome was achieved. To address the first outcome, the project focused on the harmonization of policies for management of basin resources, particularly the shared resources of lake waters and fisheries, management of aquatic weed infestation (which moves across international boundaries), and extension of the knowledge agenda. The revised indicators reduced the level of ambition to preparation of regional documents through a collaborative process, leaving implementation of various policies outside the scope of the revised indicators. It should be noted though, that, although not specifically captured in the RF, all the project activities contributed to the collaborative management of transboundary natural resources, as investments in point source pollution reduction and watershed rehabilitation are ultimately designed to improve the quality of the shared lake resources and were undertaken under the project in a collaborative framework that included reciprocal commitments to action and coordination and knowledge exchange between the countries.

60. The PDO indicators used to measure achievement of the first outcome are as follows:

- *A draft harmonized policy on water management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers* (Yes/No) (Achieved). The EAC/Lake Victoria Basin Water Resources Management Policy was submitted in 2010 and was approved and adopted by the 10th meeting of LVB-SECOM in 2012. This was based on a consultancy to provide background analysis and draft a Water Resources Management Plan.

61. The Water Resources Management Policy remains a broad framework document. The 'EAC Lake Victoria Basin Water Resources Management Bill' was prepared in 2014 to enhance the legal provisions but has since been under discussion and legal review. A core obstacle is to reach agreement on a water release and abstraction policy. As only one country presently makes releases from the lake, it has little incentive to accelerate frameworks under which others could also begin large-scale withdrawals. Nevertheless, the road map to be followed for the approval and adoption of the bill has been agreed upon and budget has been set aside to ensure the process is completed by June 2019.

- *A draft harmonized policy on fisheries management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers* (Yes/No) (Achieved). The fisheries policy was prepared and endorsed by the Regional Policy Steering Committee and approved by the EAC Sectoral Council in early March 2018.

62. Around the same time that the fisheries policy was approved, the EAC Fisheries and Aquaculture Sectoral Council of Ministers approved a series of fisheries policy documents related to it and which strengthen the supporting policy environment, including (a) Fisheries and Aquaculture Policy for East African Community, (b) Guidelines for Establishment and Operation of Cage Fish Farming in EAC, (c) Harmonized Fisheries and Aquaculture Border Inspection Manual for the EAC, and (d) Regional Fisheries Guideline for Species Specific Licensing for Lake Victoria. The new fisheries policy frameworks are already being mainstreamed at the national level in the three countries, and notably in Kenya, where they are being incorporated into guidelines to operationalize the Fisheries Management and Development Act No. 35 (2016), and new Integrated Development Plans in riparian counties (for example, for Homa Bay and Busia) have mainstreamed the Lake Victoria Fisheries Management Plan (FMP) III.

- *A regional strategy on water hyacinth monitoring and control, submitted by LVBC and approved by the Council of Ministers* (Yes/No) (Achieved). The strategy was submitted in March 2012 and approved and adopted by the 10th meeting of LVB-SECOM in 2012. Awareness raising of the Regional Strategy on Water Hyacinth Monitoring and Control was conducted with the public and private sector stakeholders following its approval. A variety of manual, mechanical, and biological control activities have also been put in place by the project as discussed under the third revised outcome below.

63. The intermediate indicators contributing to the first outcome were as follows:

- *Regional standards for industrial and municipal effluent discharges for adoption by participating countries in place* (Yes/No) (Achieved). The harmonized EAC Regional Standards for Industrial and Municipal Effluent Discharges into Sewerage and River Systems was adopted and gazetted in 2016 (ISSN 0000211, Vol. AT1-No 1, Legal Notice No. EAC/4/2016) and is now the binding standard used by the five EAC Partner States. LVB-SECOM has also urged the Partner States to mainstream Regional Industrial Effluent Standards into their national policy frameworks. Kenya has prepared an action plan while Tanzania is mainstreaming the standards and has conducted stakeholders' dissemination workshops. The standards are currently in use by the LVBC as benchmarks for monitoring and under both regional and national RECP activities.

- *Fisheries Management Plan (FMP) updated* (Yes/No) (Achieved). The updated FMP III in 2016 to guide collaborative management of the shared fisheries resources over the next five years was updated based on the harmonized policy on fisheries management.

- *GIS-based database and WRIS developed and available for public access* (Yes/No) (Achieved). The system was established and contains some publicly accessible data to facilitate data submission from each of the countries, and a data-sharing protocol was first developed and adopted by the Sectoral Council of Ministers, to clarify the requirements for sharing of

national data. This is an important step toward regional basin monitoring, which can then properly inform future interventions (see also below, “enhanced monitoring capacity”).

- *Harmonized monitoring protocols and schedules in place* (Yes/No) (Achieved). Standard operating protocols (SOPs) were updated and put in place for fisheries monitoring and used to conduct the 2010, 2012, 2014, and 2016 surveys. SOPs were also developed and adopted for water quality monitoring. The next step would be to ensure the adherence to the protocols and schedules.

64. Enhanced monitoring capacity. At the regional and national levels, the project made considerable investments in enhancing monitoring facilities including renovating and equipping water quality labs, including accreditation of Mwanza laboratory, and patrol and monitoring boats. Basic spatial point source pollution and erosion models were prepared for the basin as a precursor for preparation of a more comprehensive pollution source and transport model. A demonstration activity on the use of remote sensing for monitoring of aquatic weeds was developed, which has thus far been taken up in some academic analysis of water hyacinth within the Winam Gulf (in Kenya) and could potentially be replicated and used in other countries. Project financing enabled the continuation of biennial fisheries surveys after the closure of an European Union fisheries project and supported a number of water quality monitoring activities, although a joint lake water quality survey did not take place before the end of the project.

65. The continuation of structured and standardized fisheries monitoring under the project has provided more certainty around the ongoing trends in the fishery. Overall catch is relatively stable, but fishing effort continues to grow and so is fishing down the value chain; that is, high-value Nile perch and tilapia species are being replaced with lower-value species. The fisheries monitoring has attracted follow-up support over the next two years from the German Agency for International Cooperation (*Deutsche Gesellschaft für Internationale Zusammenarbeit*). Water hyacinth monitoring under the project was informative and is becoming more sophisticated, although standardized and comprehensive systems are not yet in place across the lake.

66. Monitoring of water quality has however been weakest in terms of implementation. The Water Resources Information System (WRIS, see also Section IV.A) was developed under LVEMP-II APL-1 to monitor surface water and groundwater and water quality. The system is available online and publicly accessible at http://lvbc.wris.info. The WRIS is built on a GIS-based data management platform, and the system allows for simple manipulation, such as filtering data by location or type. The WRIS does have value as a spatial database for historical observations, although data are limited, and its functionality for monitoring could be significantly strengthened. Building blocks were put in place (increased lab and sampling capacity, WRIS, standardized protocols), and data have been collected that confirm gross spatial patterns of worsening quality near the shore and particularly in sheltered bays with polluted inlets. But the intensity and coordination of water quality monitoring across the lake are not sufficient to show clear temporal trends, and the collation of data under the WRIS has started to reveal the size of the challenge in ensuring quality control. There was a Subcomponent 1.2 on ‘ecosystem monitoring,’ which should have monitored key variables such as water quality in the lake and so on, but very little work was done. Neither a joint open water survey nor a systematic analysis of the data in the WRIS were completed before the end of the project, and water quality labs provided have been underutilized. Providing a full picture of how basin processes affect water quality will require further investments in modelling and a scientifically designed water quality sampling regime to ground-truth it and monitor changes.

67. Although not captured in the RF, the project supported a host of knowledge management work which builds local expertise beyond the immediate project implementing teams. In Uganda, the project supported research projects on topics relevant to the environmental management of the basin by students from Makerere University. The LVBC also supported a Lake Victoria Scientific Research conference in early 2017, partly from project funds to promote shared understanding of the issues necessary for shared management of resources. In addition, a program of Knowledge Sharing Training of Trainers, supported by the World Bank Institute, took place between community groups and local practitioners to strengthen peer learning for CDD groups. The exchange between project teams, local government officials, and CDD group members increased awareness of specific challenges and the value of peer-learning networks to enhance their performance.

Revised Outcome 2: Contribution to improvement of environmental management of targeted pollution hotspots

68. The revised outcome was achieved. To address the second outcome, the project focused primarily on addressing pollution hotspots within major urban centers or close to the lakeshore, which have been shown to contribute the main point source pollution loads (for example, BOD) to the lake, from both domestic and industrial sources. Hotspots were identified in the form of urban centers with inadequate domestic sewerage and wastewater treatment provision and additional public sites, such as markets, schools, and fish landing sites identified with municipal authorities as posing particular sanitation challenges. The project also aimed to tackle industrial pollution exacerbating urban pollution hotspots through an RECP program to raise awareness and provide training and on-site assessments for local industries. Finally, the project also invested in navigation safety and spill response on the lake, which has been the site of a significant number of shipping accidents in the past. The primary aim of these activities was to reduce the risk of a shipping accident releasing pollutants into the lake, but the secondary benefit would be to improve safety for lake users and communities.

69. One PDO outcome indicator and six intermediate indicators were used to monitor the achievements toward this outcome. The targets for all these indicators were exceeded, and most had been significantly increased at the time of the AF:

- *Number of urban pollution hotspots addressed through investments to control wastewater pollution* (PDO indicator, achieved). A total of 13 urban pollution hotspots were addressed through investments to control wastewater pollution, exceeding the target of 9 (increased from 6 at AF) by more than 40 percent.

- *Number of preliminary technical designs for wastewater treatment facilities* (Achieved). A total of 16 preliminary technical designs for wastewater treatment facilities were prepared, against a target of 15 (increased from 10 at AF).

70. The major investments in sewerage and wastewater treatment facilities across the three countries are estimated to have reduced BOD pollution loads by around 600 tons per year (see table 3) and have cleared drainage channels in Kampala, Uganda, of a similar weight of silt. In general, the wastewater treatment technologies designed and financed by the project were cost-effective, requiring low O&M costs. Although institutional assessment and strengthening for the sustainability of facilities was not built into the project approach from the outset, World Bank implementation support teams discussed

financial sustainability with the local operators, who reported a reasonable level of confidence that they could be run in a financially sustainable way with revenues collected from sewerage discharge fees.

Table 3. Pollution Reduction Resulting from Interventions in Urban Pollution Hotspots

Town	Intervention	Treatment Capacity (m^3 per day)[42]	Actual Volume of Wastewater Treated (m^3 per day)	BOD5 Loading Reduction (tons per year)
Kenya				
Kisumu	Expansion of the wastewater treatment plant	8,000	5,600	110
Homa Bay	Rehabilitation and expansion of the wastewater plant and sewer line	5,650	2,376	165
Bomet	Construction of a new wastewater treatment plant and sewer line	735	634	149
7 towns (Kisumu, Homa Bay, Bomet, Siaya, Kericho (2), Nandi, and Migori)	12 exhausters		1,356 m^3 per month	32
Uganda				
Jinja	Rehabilitation of Kirinya Wastewater Treatment Plant and new connections	12,500	7,050	108
Kampala	Drainage maintenance equipment		72,000 tons of garbage per year 742,000 m^3 of silt by June 2017	
Tanzania				
Mwanza abattoir	Wastewater treatment plant for abattoir	130	115	49
Mwanza	Household connections to existing wastewater treatment plant[43]			0.6
Bukoba	Sludge treatment plant	27	6	2

Source: Project data and reports from the national project teams.

71. In Kenya, investments focused on rehabilitation and/or expansion of wastewater treatment facilities and linked sewerage systems in the three major towns of Kisumu, Homa Bay, and Bomet. The number of sewer connections in Homa Bay increased from 150 in 2015 to 600 in 2017. Within the same period, revenue generated by the facility increased from US$250 to US$8,000, sufficient to cover the operator's O&M costs. In both Homa Bay and Kisumu, the rehabilitation has led to a marked decline in the BOD concentration of effluent, despite the greatly increased volume of wastewater being handled; in the case of Homa Bay, however, this remains above the World Health Organization standard of BOD

[42] The capacity of the treatment plants is based on the design horizon/ future population projection; therefore, they are of a higher capacity than the current volume.
[43] It is not metered but estimated at 75 percent of water consumption of the connected households. It serves 1,450 persons.

concentration (30 mg per L). In addition, the project promoted the adoption of bio-toilets that are designed to generate biogas, thereby addressing both sanitation and local energy needs and increasing the incentives to maintain them. Thirty of these toilets were installed at fish landing sites, markets, and schools.

Figure 1. Bomet Sewerage Facility Newly Constructed by LVEMP-II APL-1 - Kenya Funds[44]

72. Kampala City is one of the major sources of municipal pollution into Lake Victoria through Murchison Bay, as it generated about 730,000 tons of solid waste per year, of which only 50 percent was collected and properly disposed. In Uganda, the main investments focused on solid waste and wastewater in Kampala, including (a) rehabilitating the Kirinya (on the outskirts of Kampala) wastewater treatment facility, whose capacity was expanded by 25 percent, serving an estimated population of 12,700; (b) supplying equipment to Kampala Capital City Authority (KCCA) to clear drainage channels in Kampala of waste and silt that would otherwise pose a flood risk and end up in the lake; and (c) constructing a waste recycling plant that processes yearly 3,600 tons of plastics and 12,000 tons of market waste (therefore treating about 0.5 percent of the total solid waste generated per year). Left untreated, plastic waste in Kampala would have ended up in the drainage channel that leads to Murchison Bay in Lake Victoria. The project provided solid waste management (SWM) and drainage equipment to KCCA. As a result, the amount of silt removed from channels draining into Lake Victoria increased from 21,000 to 44,000 tons per year. KCCA saves US$417,000 per year by using the removed silt to cover waste at the Kitenzi landfill, instead of purchasing laterite. These savings are being used to meet the O&M costs of the equipment and

[44] The pictures in the ICR are taken from project progress reports, newsletters, and archives from implementation support missions.

drainage infrastructure, and part is being put toward funding US$5.1 million of additional drainage construction.

73. In Tanzania, larger investments included (a) constructing a sludge disposal facility to serve around 25,000 people in and around Bukoba (that is, reducing the BOD amounts entering the lake from 4,000 kg to 2,000 kg (about 2 tons), according to the Lake Pollution Model developed by the World Bank task team); (b) rehabilitating the Mwanza City abattoir, including constructing a biodigester facility and artificial wetland for treatment of wastewater; (c) adding 8.16 km to the sewerage network in Mwanza, connecting an additional 290 households or about 6 percent of the population of Mwanza City. The biodigester for the Mwanza abattoir produces over 535.5 kWh per day of clean energy. It should be noted that Bukoba and Mwanza towns are on the shores of Lake Victoria and therefore any waste would directly end up in the lake. Removed waste/pollution figures are provided in table 3.

- *Number of sanitation facilities (public/schools) constructed/provided* (Achieved). A total of 187 sanitation facilities were constructed at public spaces/schools, more than double the target of 67 (increased from 44 at AF).

- *Number of people provided with access to improved sanitation facilities under the project* (Achieved). As a result of the project, more than 330,000 people (based on the estimates of the populations served by the various investments) were estimated to have been provided with access to improved sanitation facilities, more than double the target of 150,000 (increased from 28,000 at AF).

74. According to the Pollution Model developed by the World Bank team, waste per capita from the LVB is estimated at 16 kg per year. Without a sewerage treatment facility, the BOD will flow directly into the river, whereas with sanitation services, the estimated BOD that goes into the lake is approximately halved. Therefore, in one year, the waste going into the lake should be reduced from 5.6 million kg to about 2.6 million kg with sanitation services provided to over 330,000 people.

75. Health benefits from the improved sanitation facilities were not estimated but are expected to accrue to a third of a million people directly benefiting (from access to improved sanitation facilities through the 187 sanitation facilities constructed at public spaces/schools) and to a lesser extent to the general population living in and around the hotspots.

- *Number of targeted industries trained on Cleaner Production Technologies* (Achieved). A total of 422 targeted industries were trained on cleaner production technologies, exceeding the target of 280 (increased from 233 at AF).

- *Percentage of targeted industries adopting cleaner production in-plant assessments and/or generated cleaner production options* (Achieved). In the AF, as the number of targeted industries increased, the target percentage was increased from 15% to 35%. Kenya: 47% adopted; Tanzania: 51% adopted; Uganda: 30% adopted. Technical assistance provided by the project directly led to adoption and investment in cleaner production technologies by 289 (out of the 422 trained) industries, by far exceeding the target of 35 percent.

76. Interventions through RECP have also contributed to reduction of point source pollution from industries. A 2014 survey of the first round of participating companies revealed significant resource savings (that is, typically of raw material by 30–35 percent, water by 45–50 percent, energy by 20–25 percent), as well as reductions in pollution (that is, BOD, chemical oxygen demand [COD], TN, TP) loads in effluents ranging from around 20 percent to over 90 percent. On average, the BOD load from three beverage industries in Tanzania decreased by 84 percent from 848.6 tons per year in 2010 to 132.7 tons per year in 2014, and the load from 10 fish processing industries decreased by 77 percent from 3,189.5 tons per year to 745.4 tons per year. One particularly successful company, Kibos Sugar and Allied Industries, achieved a reduction in water use from 125,000 m^3 to 75,000 m^3 per year, in average BOD levels from 112 to 32mg per L, in average COD levels from 242 to 67 mg per L in the final effluents, and in greenhouse gas emissions by 16 percent.

77. Despite early skepticism, many participating companies have become very enthusiastic about RECP, and the sustainability of impacts is expected to be high. The 58 companies who provided figures recorded a total of over US$40 million of investment in RECP technologies and an average annual return on those investments of around 40 percent (see table 4). Moreover, the perceived success of the RECP activities led to a much higher degree of Government support. The initial RECP activities were financed exclusively from regional grants to the LVBC due to a reluctance to use national financing to support private sector entities. By the end of the project, however, Kenya had provided significant financing from its project funds. An additional grant of around US$4 million has been provided by the Nordic Development Fund (NDF) to continue and expand the RECP program.

Table 4. Investment and Savings of 58 (out of 289) Industries Adopting RECP

	Number of Companies Implementing RECP	Number of Factories Reporting on Their Investment Costs	Total Investment in RECP (US$, millions)	Annual Savings (US$, millions)
Kenya	65	11	16.5	5.8
Tanzania	94	11	11.3	4.3
Uganda[a]	52	16	16.0	7.7
Rwanda	66	15	3.1	3.3
Burundi	12	5	0.2	0.2
Subtotal	289	58	47.2	21.3

Source: 'End of Project Report - Results Achieved on Promotion of Cleaner Production for Industries in the Lake Victoria Basin 2010–2017', Kenya National Cleaner Production Centre.
Note: a. Uganda Kakira Sugar Factory reported to invest US$54 million in installing new boilers to reduce air emissions, which is treated as an outlier and not included in the table.

78. In addition to these results, the project developed a range of sector-specific RECP manuals and conducted award events covered by local media to further publicize the benefits of cleaner production

- *Number of locations equipped with aids to navigation* (Achieved). A total of 37 locations were equipped with aids to navigation, in line with the target. These covered eight major shipping routes identified as posing a particular navigation risk. The project also provided training and basic equipment for responding to oil spills for the maritime authorities of each of the three countries.

79. There is no quantitative data on maritime accidents with which to assess the impact of the safety of navigation activities and those resulting in oil spills, contributing to pollution in the lake, but there have also been no major oil spills from accidents during the project. The initial investments by LVEMP-II APL-1 in navigation safety and emergency response will also be expanded under new projects from the World Bank[45] and AfDB, respectively.

Revised Outcome 3: Contribution to improvement of environmental management of selected degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB

80. The third revised outcome was achieved. To address it, the project worked with local communities to implement more SLM practices to reduce the soil loss and its transport and deposition to the lake. The major degraded sub-catchments selected were the Nyando, Simiyu, and Katonga basins, based on estimates of nutrient inflows from the major tributaries of Lake Victoria from LVEMP-I. Given the limited financing from the project, the selection and prioritization criteria of project sites and interventions were determined based on higher impact on the lake and basin resources in ways that could optimize environmental benefits. Catchment management plans were prepared for these basins by identifying degradation hotspots with local authorities, as well as intervention options for their restoration. During the first part of the project (that is, through the midterm review (MTR) in 2011 and first restructuring), project investments were planned and executed entirely through a CDD approach. CDD subprojects were selected and implemented by communities within the identified hotspot areas, with support from project staff and local (that is, district) government teams. CDD subprojects were also developed directly on the shoreline of the lake to restore riparian habitats and remediate polluted fish landing sites.

81. At the 2012 restructuring, an additional modality for watershed management interventions was introduced—CMIs, also called “strategic initiatives” in Uganda. CMIs were to be implemented by project and district teams in collaboration with local communities, rather than directly through them, and were introduced to simplify and accelerate implementation (especially where larger works contracts were required) and to ensure a strong environmental focus to the investments, given a preference for CDDs that provided direct and immediate livelihood benefits. In the period after restructuring, the World Bank team also emphasized the risk that CDDs alone would result in a patchwork of scattered and small initiatives lacking the scale and concentration to deliver significant environmental impact. CMIs were therefore seen as a step toward larger-scale and systematic land management interventions, and project teams were encouraged to exploit complementarities between CMIs and CDDs. Selection of interventions was informed by regional experience as well as community preferences to ensure ownership while also involving some experimentation, particularly in developing packages of complementary land management and livelihood interventions that offered potential for future scale-up, such as:

[45] AfDB have a project that just established a rescue service in all three riparian countries, and the world Bank will be putting in more Aids to Navigation and looking at the inspection regime for vessels more generally under the Lake Victoria Transport Program, series of projects. The first project (Rwanda, P160488) is under implementation. The Lake Victoria Transport Program will conduct bathymetric surveys for navigation, which were originally intended for inclusion under LVEMP-II APL-1 but were found to be prohibitively expensive.

- Protection of riparian buffer zones along rivers with support for beekeeping within them (the beekeeping provided an alternative livelihood for individuals who had previously been using the riverbanks for other purposes), an incentive to maintain trees within the buffer, and a measure of direct protection from overuse by people and livestock;

- Combination of terracing investments with training on improved cropping and soil and nutrient management; and

- Combining support for stall-feeding of cattle with small biodigesters to make use of the concentrated source of manure and reduce demand for firewood and preventing uncontrolled grazing.

82. One PDO outcome indicator and four intermediate indicators were used to monitor the achievements toward this outcome. The targets for all these indicators were exceeded, except one for which the achievement was 95 percent, though most had been significantly increased at the time of the AF:

- *Number of hectares under sustainable land management practices in the targeted sub-catchments* (PDO indicator, achieved). 12,337 ha was brought under new SLM practices, exceeding the (PDO indicator) target of 8,000 ha (increased from 6,150 ha at AF) by almost 60 percent.

- *Number of individuals trained in improved sustainable land management (SLM) practices* (achieved). 24,573 individuals were trained in improved SLM, more than double the target of 12,000 (increased from 7,000 at AF).

- *Number of individuals adopting improved SLM under the project* (achieved). Of those trained on SLM, over 12,000 adopted improved SLM, in comparison to a target of 10,000 (increased from 2,400 at AF).

- *Cumulative hectares of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments* (achieved). 2,272 ha of degraded wetlands were restored or rehabilitated, in comparison to a target of 1,450 ha.

- *Number of CDD sub-projects implemented under the project* (95 percent achieved). A total of 630 CDD subprojects were implemented, in comparison to a target of 660 (increased from 590 at AF).

83. SLM interventions, whether through CDDs, CMIs, or a combination thereof, were designed to reduce land degradation and therefore nutrient loading on the lake through, for example, protecting slopes and restoring gullies with reforestation and anti-erosion structures (terraces, ditches, vegetation strips) and restoring degraded riparian and wetland habitats as a barrier to the movement of sediments. They also aimed to enhance soil and wetland productivity, increase water harvesting, and improve agronomic and livestock management practices to help stabilize or improve farmer incomes. SLM was introduced through new primary or secondary (value addition) livelihood activities that at the same time reduce pressure on and incentivize protection of natural resources.

84. Reviews of livelihood-related CDDs have demonstrated a considerable degree of success. LVEMP-II APL-1 created new alternative livelihood opportunities to help reduce pressure on natural resources such as fish, soil, wetlands and forest resources, and secure livelihoods. In carrying out the livelihood activities, LVEMP-II APL-1 supported the management of these degraded sub-catchments, preserving the natural resources of these sub-catchments and helping communities maximize the benefits from these existing resources and ways to conserve them. In Kenya, horticulture groups were generally successful with one group having generated revenue of around US$18,000 from four greenhouses and a mango orchard, although issues on initial tomato-growing subprojects revealed a need for better soil sampling before investments. Early aquaculture and beekeeping groups also had challenges related to the need for additional training on O&M; for instance, modern beehives require regular cleaning to achieve their potential for higher production over their traditional analogues. A gross margin analysis of CDDs in Tanzania showed that two-thirds of subprojects were providing positive gross margins for their initial turnover (which could reasonably be expected to improve over time as experience grows). Success of livelihood activities was also evidenced by demands for follow-on support for value chain development: for example, the project financed a sunflower oil processing facility following the success of several sunflower cultivation CDDs and a fingerling hatchery unit after provision of 100 fish ponds led to private investment of another 171 others. Promoting the above livelihood alternatives helps alleviate pressure on the land, thus avoiding further degradation.

Figure 3. A Modern Fish Banda Constructed with Support from LVEMP-II APL-1 - Kenya

Note: The new fish banda improved hygiene in fish handling and proper disposal of fish wastes. This has helped with preventing pollution entering the lake. The construction of the modern banda has a component of proper waste disposal.

Figure 4. SLM Practices – Contour/ terrace making in progress in Mwabasabi village, Tanzania

85. **Indirect effects of project interventions on productivity were also evidenced**. For example, farmer records in Kenya suggested significant increases in crop yields associated with introduction of SLM technologies, including an estimated 0.4 tons per ha increase in maize yields due to the establishment of napier grass strips. In Tanzania, fish catch was estimated to have increased by 10 kg per boat per day where lakeshore restoration activities, including removal of water hyacinth, was conducted. Large increases in crop yields from introduction of SLM practices were also suggested in Tanzania, based on district data. Box 1 summarizes an assessment of social benefits suggested from a survey of project participants in Uganda by a team from Makerere University. The CDD approach also reflected a significant investment in community organization and training, including on basic financial management (FM), planning, and proposal preparation. Technical learning was supported through direct assistance to groups, as well as intergroup visits and knowledge exchange.

86. Assessment of impacts from watershed management interventions has been hampered by the fact that these often take years to come to fruition, whereas many of the CDDs and CMIs were only fully implemented toward the end of the project. Hence, while most CDDs have started to yield incomes for participants, their profitability and sustainability will become more evident over the coming seasons. In the case of environmental benefits, the challenges are even greater due to not only the time needed for vegetation to mature but also the decadal timescales over which sediment moves across the landscape and along waterways from source areas to the lake. This is compounded by the distributed nature of the investments, meaning that in many cases critical mass was probably not reached to see significant changes at the mesoscale, let alone at the catchment or lake basin scale. In addition to the significant demonstration and constituency-building impact, the widespread application of interventions which are known to have positive environmental effects provides confidence that a direct physical contribution to the environmental management of the sub basins has been made. This is locally observable in many cases, alongside associated benefits to communities, even if the overall scale of impact is difficult to quantify directly. Spatial models of erosion risk, however, did demonstrate that the scale of LVEMP-II APL-1 interventions remains a fraction of the needs at the basin-wide level, which are by far beyond what the project financing alone could cover. The total area of land over which more sustainable management

practices were introduced is small compared to the land rated at the highest risk of erosion throughout the basin.

Box 1: Findings from the Report on Impact of LVEMP-II Project Activities on Socioeconomic Status of LVB Stakeholders, Uganda.

- Incomes among project communities have been enhanced over the project period so far, as respondents' incomes have increased on average by 102.7 percent, partly attributed to the LVEMP-II interventions. The highest increases have been in fishing (303.3 percent), mukene (that is, dried silver fish) processing (265.4 percent), and fish farming (225.3 percent).
- LVEMP-II created new alternative livelihood opportunities, helping to reduce pressure on fish, wetland, and forest resources and secure their livelihoods. Fish farming (13.6 percent) and fruit tree growing (13.6 percent) were leading new activities while others included poultry, beekeeping, other tree planting, and pig rearing. However, the scale of adoption was still constrained by inadequate capital, inadequate inputs, and small markets for the products. Income increases resulting from the project enabled 66.7 percent of respondents to improve their housing conditions by adopting the use of cement and iron sheets and/or by moving from rented to owned houses.
- The project carried out sensitization on water quality and sanitation and provided water harvesting technologies. Solar has been adopted for lighting the homes by 30.7 percent, energy saving cooking mechanisms by 87.1 percent, improved sources of drinking water involving borehole and rain water harvesting tanks (67.5 percent), use of bath shelters (45.0 percent), and improved latrines (55.2%).
- Health improvements were associated by participants with improved water supply, nutrition, and incomes to obtain better treatment in case of disease. As a result, respondents experienced reduction in incidences of water-related diseases, namely, typhoid (28.7 percent), malaria (26.8 percent), cholera (15.3 percent), bilharzias (15.3 percent), and dysentery (10.2 percent), among others (3.2 percent).
- Capacity for natural resource management has been built through training. About 51.6 percent considered that they had changed the way they made use of the LVB natural resources, mainly in the use of soils (62.5 percent), wetlands (58.8 percent), and water (56.1 percent).
- Improved access and utilization of financial services was promoted through sensitization, training on FM, and increasing incomes, thus strengthening the saving and borrowing power among communities, with 61.8 percent reporting that they were using financial services. The main services utilized were savings (81.1 percent), loans (9.4 percent), and financial information (9.4 percent), obtained mostly from savings and credit cooperatives (SACCOs) (36.4 percent), village savings groups (20.4 percent), and microfinance institutions (19.2 percent). The average savings were Shs 75,369 per month and average standing loan was Shs 1,283,125.

Source: University of Makerere, May 2016.
Note on Methodology: Primary data were collected between April and June 2015 and covered nine districts, namely, Kalangala, Masaka, Kalungu, Mityana, Mpigi, Rakai, Mubende, Gomba, and Namayingo. The data were obtained from beneficiaries of LVEMP-II APL-1 in 22 sampled Strategic Initiative and CDD subprojects located in the selected districts. The subprojects had been grouped into five categories, from which at least a quarter of each category was sampled for the assessment. These categories and sample sizes were fisheries (44), alternative livelihoods (58), aquaculture (37), catchment management (38), and water hyacinth management (6).

- *Number of identified water hyacinth hotspots with active monitoring and removal activities* (achieved).[46] Removal and monitoring of water hyacinth was being carried out in 47 hotspots by the end of the project, exceeding the target of 41 (which was increased from 21 at AF).

87. Water hyacinth removal has been carried out by manual and biological means, mostly as a community-based activity organized through BMUs. In total, 2,075 community members were trained, and 60 weevil rearing stations (for biological control) were established and operational. In Uganda, mechanical removal was used in combination with biological control at the mouth of the Kagera (where equipment had earlier been installed). In Kenya, in addition to other water hyacinth removal efforts, the client requested the purchase of a costly specialized harvester vessel to keep the key maritime transport corridors open around the port of Kisumu. Arrangements were made for this to be shared between key infrastructure sites under the overall management of the Maritime Authority. However, as of date, the harvester is not yet operational due to a dispute between the government and the supplier, which remains unresolved to date.[47] It should be noted that the harvesting equipment alone would not have resolved the water hyacinth infestation problem and is complementary to a combination of manual removal and biological control (weevil rearing). Changes in coverage of water hyacinth were monitored nationally in the identified hotspots; however, monitoring is not yet standardized among the countries. A step toward standardization was taken when Tanzania shared its experience in managing biological control at the community level with Kenya.

Figure 5. Members of Victoria Theatre Group and Kigoto BMU Removing Water Hyacinth from Shores of Lake Victoria at Nera, Ilemela Mwanza

[46] This indicator was incorrectly presented at the PDO level when the RF was revised in 2012. The activities supporting this outcome were financed under Component 3 at the community level and in part contribute to the second and third PDO outcomes (environmental management of targeted pollution hotspots and selected degraded sub-catchments).
[47] See section IV.B, FM and Procurement Management.

88. A survey conducted by the LVBC in November 2010 found that the total area with water hyacinth was 520 ha regionally. The monitoring and removal activities continued and the data in May 2017 showed the area with water hyacinth was 106 ha regionally. The work is still going on but the problem noted in Kenya is that many water hyacinth mats are coming from dams, lakes, and rivers.[48] A more comprehensive assessment based on remote sensing for the Winam Gulf (probably the most severely affected part of the lake) shows a decrease from highs of around 16,000 ha in 2013 (which was the end of a period of heavy infestation) to a steady level of around 3,000–4,000 ha, before a smaller and shorter spike of around 10,000 ha in the second half of 2016. Although attribution at the larger scale is challenging, LVEMP-II APL-1 is certainly considered to have helped maintain water hyacinth at tolerable levels within the hotspots where the project has been most active. This facilitates transportation to fishing grounds, landing sites, and beaches as well as easier navigation even for larger vessels. Data from the Port Authority in Kisumu showed the port was unused when thick mats of water hyacinths were present, but two to four vessels visited a month immediately after their removal. Vessel owners have also reported a smaller number of accidents. A study by the Kenya Marine and Fisheries Institute[49] shows Nile perch catches increase following reduction in water hyacinth, and data from Uganda[50] also show a reduction in fishing costs. A 27 percent reduction in water hyacinth in the Mwanza Gulf (Tanzania) hotspot has been associated with a roughly 10 percent operation and maintenance (O&M) cost reduction for water supply in Mwanza, and large increases in activity are recorded from fish landing sites that have been cleared. Water hyacinth removal has helped increase transportation on the lake. Cruise time from Mwanza Port to Kisumu shortened from 36 hours in 2008 to 18 hours in 2018 and the number of cargo vessels operating from Jinja in Uganda to Mwanza Port increased from one in 2014 to eight in 2018.[51] The success of biological control (where maintained) in suppressing growth of water hyacinth in the lake means that attention is turning to the need to address water hyacinth in upstream water bodies, which are now acting as sources.

Justification of Overall Efficacy Rating

89. The project has helped reduce the environmental degradation trend in the LVB. Building on the results of LVEMP-I, LVEMP-II APL-1 prioritized the environmental threats in the lake, tested a variety of interventions in pollution and watershed management, and strengthened regional cooperation for an improved and collaborative management of the LVB. Without this support, the water quality and ecosystems in the lake would likely have declined more rapidly, watersheds would be more seriously denuded, and the spread of waterborne disease would be more rampant. As indicated in this *2016 feature story and video* (see link), donor support and country commitment have put in place important institutional structures needed to safeguard the lake's resources, including the capacity for coordinated action and awareness of the need to reduce the rapid pace of water quality degradation. LVEMP-II APL-1 has added to this momentum toward improved coordination and management. There is good evidence that investments in sanitation, cleaner production, and water hyacinth control have impacted the management of point source pollutants and the symptoms of eutrophication, albeit still modest at the basin-wide level. The impact of watershed management has been smaller in relation to the size of the challenge, but positive local outcomes are being seen and the project's contributions widely appreciated.

[48] LVBC reports.
[49] Spatial-temporal dynamics of water hyacinth, *Eichhornia* 1 *crassipes* (Mart.), other macrophytes, and their impact on fisheries in 2 Lake Victoria, Kenya. 2107. Review manuscript.
[50] Socioeconomic Impacts of Water Hyacinth Removal in the Lake: *A Case of Mwanza Gulf.* Uganda NPCT.
[51] LVBC input to this ICR.

Although substantial problems persist due to the enormity of the basin area and the amount of financing and time needed to address challenges, they would have been more severe without these efforts. Comparable examples worldwide where World Bank and other national and donor environmental management interventions are showing success in slowing down the rate of degradation include the Black Sea and the Caspian Sea in Europe, Lake Erie in the United States, Lake Naivasha in Kenya, Lake Bhopal in India, and Lake Dal in Kashmir. All these efforts have taken decades of continuous efforts.

90. The achievements before the first restructuring were limited because they were measured against very ambitious outcomes. For this reason, efficacy before the 2012 restructuring is rated Modest. The revised outcomes were achieved and their related indicators at times exceeded, and there is considerable evidence of positive results. Despite these results, the broader long-term impacts could not be assessed, and therefore the efficacy post-restructuring is also rated Modest.

C. EFFICIENCY

Rating: Modest

Assessment of Efficiency

91. **Economic analysis.** The efficiency analysis in the ICR is benchmarked against what would be expected in the operation's sector. The economic analysis of the PAD generated positive results for the overall project—a net present value (NPV) of US$31.9 million and an economic internal rate of return (IRR) of 15 percent—and for different clusters of activities, such as fishery management, watershed management, rehabilitation of sewerage facilities, and introduction of cleaner industrial production technologies.[52] However, several assumptions used to arrive at these results were not realistic (for example, considering a 25 percent decline of waterborne illnesses as a result of improving sewerage systems and a tenfold increase of agricultural yield due to SLM practices[53]) while other assumptions were not explained.[54] Therefore, it is not possible to repeat the same analysis to provide direct comparisons with the PAD results.

92. It is important to note that the analysis in this ICR was subject to data limitations, partly due to the cost of carrying out comprehensive monitoring, which the project could not cover: (a) data related to reduced erosion from watershed measures, waste discharge in rivers, and treated wastewater quantity were not available; (b) the additional data collected at project completion often relied on sampling and interviews (for example, a sample of farmers to quantify the average changes in crop yields) and (c) the completion of some activities toward the end of the project did not allow for actual data reflecting the project results to be collected, rather reasonable assumptions were made based on future expected benefits. For instance, rehabilitation of the abattoir in the city of Mwanza, Tanzania, was finalized in 2017,

[52] These are NPV = US$7.1 million, IRR = 14 percent for fishery management; NPV = US$13.9 million, IRR = 16 percent for watershed management; NPV = US$8.3 million, IRR = 15 percent for rehabilitation of sewerage facilities; and NPV = US$2.6 million, IRR = 15 percent for introduction of cleaner industrial technologies.
[53] The calculations used a benefit increase from US$141 per ha (year 1) to US$1,391 per ha (year 25) for cultivation of high-value forage and from US$217 per ha (year 1) to US$2,139 per ha (year 25) for cultivation of high-value forage intercropped with other cultivations.
[54] For example, for fishery-related activities, it was assumed that 'without the project', fisheries exports would decline by 8 percent by year, whereas 'with project', they would decline by 7.95 percent in year 1; 7.85 percent in year 2; 7.7 percent in year 3; 7.5 percent in year 4; and 7.25 percent in year 5 onward.

just as the project was closing, making it impossible to collect data related to its actual impacts (for example, increased meat production, reduction in wastewater, savings in water use before the end of the project. However, realistic assumptions are made on the expected benefits of the interventions, which are expected to lead to savings in water use and reduction in wastewater.

93. The economic analysis of this ICR is based on cost-benefit analysis (CBA) or cost-effectiveness analysis (CEA) and uses a collection of six case studies to show some of the economic benefits of selected project activities, for which data were available or where realistic assumptions could be made. The results of these analyses, summarized in table 5, show that these activities were economically beneficial or cost-effective. However, as these case studies are only partial analyses, their results cannot be extrapolated to the project or country level. The results of the economic analysis should be viewed as conservative lower-bound values.

Table 5. Economic Analysis of Selected Project Activities

Activities	Method	Results
Component 2		
Rehabilitating abattoir and constructing biodigester (Tanzania)	CBA	IRR = 13%, B/C = 1.3
Connecting households to the main sewer line (Tanzania)	CEA	Unit cost = US$31/capita/year
Introduction of RECP in leather industries (Uganda) Municipal waste collection and drainage maintenance (Uganda)	CBA Qualitative analysis	B/C = 1.3 Additional silt removed = 23,000 tons/year
Component 3		
Water hyacinth control (Tanzania)	CBA	IRR = 11%, B/C = 1.2
Establishing napier grass strips on maize farms (Kenya)	CBA	IRR = 10%, B/C = 1.3
Planting bamboo on riparian lands (Kenya)	CBA	IRR = 15%, B/C = 1.9

Note: See annex 4 for all details related to types of costs and benefits, as well as their calculation. B/C = Benefit/cost ratio.

94. The paragraphs that follow briefly summarize the results of these analyses, while annex 4 provides a more detailed description of each case study as well as an ex post incremental analysis for the GEF funds.

95. Within Component 2, the following activities were analyzed:

- Rehabilitating the abattoir in Mwanza City (Tanzania) is socially beneficial, primarily due to increased slaughtering capacity, electricity benefits generated by a biodigester, and positive externalities related to cleaner environment (for example, reduced smoke, bad odors).

- Connecting households to the main sewer line in the same city is cost-effective, with a unit cost of US$31 per capita, which appears in line with the range of unit costs found for other developing cities in Africa and Asia (US$19–59 per capita[55]).

[55] Daudey, L. 2017. Review Paper. "The Cost of Urban Sanitation Solutions." *Journal of Water, Sanitation and Hygiene for Development.* doi: 10.2166/washdev.2017.058

- Introduction of RECP technologies in leather industries of Uganda is beneficial, due to large cost savings in the consumption of raw materials, energy, and water and reduced discharge of untreated wastewater (B/C = 1.3).

96. Within Component 3, three selected analyzed activities were also beneficial:

- Clearing water hyacinth in Katunguru-Sengerema District (Tanzania) of Lake Victoria generated additional income from fish catch, conserving fish stock and improved navigation, thereby reducing potential oil spills from accidents (IRR = 11 percent).

- Establishing napier grass strips on maize farms (Kenya) led to increased net returns from maize and napier grass (as feed for livestock) and reduced sedimentation downstream[56] (IRR = 10 percent). Other benefits—such as reduced erosion and ultimately the sedimentation of Lake Victoria—could not be estimated due to lack of data, partly due to the time it takes for sediment to move across the landscape and along waterways from source areas to the lake.

- Planting bamboo on riparian lands is expected to generate both global benefits (for example, carbon sequestration) as well as national/local benefits (for example, wood, reduced sedimentation in rivers (IRR = 15 percent).

97. Other indicators estimated at a larger scale (project/component) also point to some aspects of the project's cost-effectiveness. For example, the overall project generated a unit cost (US$154 per direct beneficiary[57] in Tanzania, Uganda, and Kenya) which is in the same range as that obtained in the Alexandria Coastal Zone Management Project[58] (P095925) (US$104 per direct beneficiary[59] in Egypt). For Component 3, available results indicate an average cost for watershed management activities (for example, banks rehabilitation, progressive terraces) of about US$2,000 per treated hectare for Tanzania, Uganda, and Kenya.[60] This is in the same cost range as similar activities in other neighboring countries, such as Rwanda (lying between US$680 per hectare of progressive terraces in the Yanze and Kadahokwa watersheds and US$2,300 per hectare of riverbank rehabilitation in the Yanze watershed[61]). In general, it was noted that although no systematic project monitoring was done, the selected interventions were proven effective in East Africa, both in terms of soil conservation and increased crop yield (win-win).[62]

[56] The benefit that could not be quantitatively measured but assumed is from reduced sedimentation.
[57] Estimated as total disbursements (US$130.75 million - based on annex 3 of this ICR) divided by the number of direct beneficiaries (846,673 - based on annex 1 of this ICR).
[58] Which sought to reduce land-based pollution to the Mediterranean Sea by adopting similar activities, for example, pollution reduction measures for wastewater treatment plant.
[59] Estimated as total disbursements (US$6,950,000) divided by the number of direct beneficiaries (66,613), based on the ICR for this project.
[60] Estimated as total disbursements for Subcomponent 3.1. Natural resources conservation and livelihood improvement (US$26,159,586, disbursement table prepared for this ICR) and the number of hectares under SLM (12,337 ha; see this ICR). The cost includes capital and maintenance cost during the project lifetime only.
[61] Based on: The Rehabilitation of Yanze and Kadahokwa Sub-projects. Government of Rwanda.
[62] WOCAT (World Overview of Conservation Approaches and Technologies). 2007. *Where the Land is Greener: Case Studies and Analysis of Soil and Water Conservation Initiatives Worldwide*. Berne, Switzerland.

98. **Implementation efficiency.** The project had a slow start and there were initial delays in achieving project effectiveness, for example, 10 months between Board approval and the effectiveness for Uganda and a year between Board approval and the official regional 'launch'. Implementation of a number of activities, such as municipal sewerage treatment facilities, took a much longer period than was originally planned. The physical interventions that were led by LVBC were implemented well – the cleaner production program and the navigation safety activities. As mentioned, the former was contracted out to the Kenya National Cleaner Production Centre (KNCPC). The latter mostly involved identifying and implementing a set of physical investments in navigation markers. The restructuring about three years after Board approval helped improve implementation, as discussed earlier. The national project teams did well on delivering a range of very diverse activities and investments which were met with a large degree of satisfaction from project communities and local leaders.

Project management costs were clearly underestimated at appraisal, with only about 10 percent of project funds (US$11.6 million) meant to support RPCT and three NPCTs, systems development, M&E, communication and outreach and other capacity-building. The high cost at completion (US$ 27.4 million) also reflects the AF and extended implementation period, as well as numerous knowledge management activities and conferences which should have been reported under Component 1, "Strengthening institutional capacity for managing shared water and fishery resources". As seen in the key outputs by component table in Annex 1, several activities were carried out under this component which produced a sizeable amount of tangible outputs, including regional and national ecosystem monitoring studies and equipment that had been planned under Component 1.2, "Ecosystem monitoring and applied research". At the same time, as mentioned earlier, the AF financing was not proportionate to the increased targets under components 2 and 3, suggesting that there were some efficiency gains made during project implementation.

99. Implementing the harmonization agenda and collaborative management also involved significant operational expenditures, higher than originally budgeted. Regional projects tend to have higher operational costs because of the numerous travel and mutual events. The emphasis that the project placed on coordination and knowledge exchange between the teams led to high transaction costs in travel and meetings (in this case, Tanzania, Uganda), which were exacerbated by the high per diems paid for travel. These were in line with agreed government and EAC frameworks for donor projects and were therefore difficult to change at the level of an individual project. The LVBC's coordination activities partly duplicated the World Bank's implementation support functions and could have been more narrowly focused on policy coordination and collation of standardized monitoring data. As noted in LVBC audit reports, the size and composition of teams that travelled for meetings was not always well justified and their corresponding benefits to the project objectives were not always self-evident.

100. Based on the modest economic analysis and implementation efficiency, the project's efficiency is assessed as Modest.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

Rating: Moderately Unsatisfactory

101. The PDO is highly relevant to the current World Bank's CPF/CAS/CPS of the participating countries and Africa region. The efficacy before and after the restructuring is rated Modest. Project efficiency is

rated Modest. Therefore, the overall outcome of LVEMP-II APL-1 is rated Moderately Unsatisfactory, as shown in table 6.

Table 6. Derivation of Overall Outcome Rating for LVEMP-II APL-1 Applying the Split Rating Methodology

	Before Restructuring	After Restructuring
Relevance of the Objective	High	
Efficacy (PDO)	Modest	Modest
Outcome 1	Modest	Modest
Outcome 2	Modest	Modest
Outcome 3	Modest	Modest
Efficiency	Modest	
1. Outcome rating	Moderately Unsatisfactory	Moderately Unsatisfactory
2. Numerical value of the outcome ratings	3	3
3. Disbursement	US$24.15 million	US$112.65 million
4. Share of disbursement	18%	82%
5. Weighted value of the outcome rating	0.54	2.46
6. Final outcome rating	Moderately Unsatisfactory (3.0) (0.54 + 2.46 = 3.00)	

E. OTHER OUTCOMES AND IMPACTS

Gender

102. Gender equity was mainstreamed at various levels in the watershed management activities through the CDD approach. Some activities gave higher priority to women. This was particularly evident in activities such as (a) zero-grazing of cattle, where dairy cows are kept in stalls and fed fodder grasses, which in turn protects the land; (b) planting bamboo along rivers for protection against erosion of the banks, from which mature bamboo is a resource used in handicrafts, a source of income for women; (c) the management of tree nurseries mostly by women; and (d) rainwater harvesting, which reduces the distance women have to travel for domestic water supplies. The PDO indicator on direct project beneficiaries measures both the total beneficiary number and percentage of females. The project achieved 51 percent female beneficiaries against a target of 30 percent of the total direct beneficiaries.

Institutional Strengthening

103. The project has helped deepen regional integration of the EAC and strengthen the institutions involved in the management of the LVB. Institutions were strengthened through capacity enhancement; staff training to gain knowledge and skills acquired for the LVBC, LVFO, RCPT, NPCTs, District LVEMP Facilitation Team (DLFTs), and Water User Associations (WUAs); provision of equipment; building office space; installation of laboratories; and so on.

104. **Deepening EAC integration.** Through many coordination meetings that involved the five EAC Partner States, the project played a critical role in enhancing the quality of EAC integration, making it more substantive by facilitating collaborative management of transboundary resources, thereby helping countries overcome cultural, economic, and social barriers to integration.

105. **Institutional capacity enhancement.** LVBC and LVFO received material resources, financing, staffing, technical assistance, and equipment from the project funds. For instance, it was through this project that the LVBC first hired critical staff for some of its core functions including water resources management and environment and natural resources management that have now been mainstreamed into the LVBC as was required in the Financing Agreement.

106. **Equipment provision.** Various equipment was provided, which the recipient agencies used to carry out natural resources conservation in the LVB. Such equipment included water quality laboratory equipment, trucks for SWM, and specialized boats and aids to navigation.

107. **Office space and labs.** Office space for project operation, data collection, and analysis was newly built or rehabilitated. Examples include the construction of the Uganda Water Environment Information and Knowledge Centre and installed information and communication technology infrastructure and construction of water quality laboratories for Tanzania in Bukoba, Musoma, and Mwanza. Facilitation of the accreditation process for the Mwanza Zonal Water Quality Laboratory has strengthened its capacity and raised its status in Tanzania as well as in the Southern African Development Community region.

108. Institutional networks and partnerships were expanded through various fora such as scientific research conferences and joint publicity events, among others, which brought the institutions in close working contact with a range of stakeholders and helped the LVBC better deliver on its mandate. This was evident as the project staff were involved in the development of the harmonized policies, legislation, and regulatory standards that were adopted. Many individual staff at the LVBC, the national teams, and implementing institutions have benefitted from training. In Tanzania, the project supported strengthening water resources management through the formation of five WUAs in the LVB area, four of which were newly established in Simiyu catchment.

109. The project managed to build synergies with other LVBC projects including Lake Victoria Water Supply and Sanitation through reducing pollution in the lake, planning for resilience in East Africa through Policy Adaptation Research and economic development through providing climate data and increased national prediction capacity where LVEMP-II areas were working. (See also footnote 45).

Mobilizing Private Sector Financing

110. Private companies, particularly those in polluting industries, were involved in RECP activities supported by the project. In the three LVEMP-II APL-1 countries, investment from the private sector resulted in cost savings along with environmental and social positive impacts. According to a project progress report prepared by the KNCPC (which coordinates RECP in all five countries) on RECP activities, LVEMP-II APL-1 provided a grant of US$4 million and successfully leveraged the total private sector investment of US$26 million in all five LVEMP countries (including Rwanda and Burundi). Based on the national project completion reports done by NPCTs, investments of over US$16.5 million from 12 Kenya enterprises resulted in US$8.8 million cost savings in one year. In Tanzania, US$11 million investments made by 11 Tanzanian enterprises led to US$4 million cost savings/yr., whereas US$16 million investments in 18 Uganda enterprises led to over US$8 million in cost savings/yr.

Poverty Reduction and Shared Prosperity

111. Most of the activities implemented under the watershed management component were pro-poor. Income-generating activities, including beekeeping, aquaculture, dairy, and poultry production, among others, were supported through CMIs and CDD subprojects. The project supported 630 CDD subprojects for beneficiary communities to improve their livelihoods and conserve water and soil. This community approach allowed project beneficiaries access to finance through grants, savings, and credit cooperatives.

112. In Kenya, farmers who participated in CDDs have reported an increase in maize productivity between 50 and 100 percent. This enabled farmers whose productivity was way below their potential to increase productivity by 100 percent. The activities provided improved supplementary livelihoods to the poor communities to contribute to poverty alleviation while helping reduce pressure on wetland resources, forestry, and lake fisheries resources.

113. In Uganda, under the livelihood improvement category, the investments were implemented in cage fish farming, pond fish farming, poultry, piggery, cattle rearing, goat rearing, choker kilns, bakery, coffee growing, fast growing tree species, and apiary. The benefiting members who received grants for enterprises such as poultry, piggery, cage fish, fish ponds, and apiary were able to continue restocking and provide feeds from their own proceeds, and some of them expanded their investments. Such enterprises helped diversify sources of income for the subproject group members, ensuring continued income rather than just depending on natural resources.

114. In Tanzania, the CDD subprojects were aimed at improving beneficiaries' incomes through various interventions, similar to those implemented in the other project countries. It is reported that yield increased from 300 kg to 1,300 kg of maize per acre and from 200 kg to 1,200 kg per acre for cotton. This shows that the project has contributed to poverty reduction for the assessed cases. Supporting small-scale irrigation and constructing boreholes under other interventions has improved water availability and sanitation in the villages. Power tillers that the project provided to farmers have been used for diverse activities, such as engines for the milling machines, facilitating transport in horticulture farming, transporting people during medical emergencies, and other social services such as transporting construction materials, which was reported to have helped reduce transportation costs by almost 60 percent.

Other Unintended Outcomes and Impacts

115. There are other broader outcomes and impacts generated by the project:

- **Scholarly contribution.** Through various activities of the project, scholarly contribution was made where several students acquired their degrees at master's and PhD levels by studying the interventions of the project as their theses. In Uganda, the project supported master students of Makerere University to carry out various research related to the project outcomes. During the environmental research and scientific conference held in Mwanza in February 2017, the project brought researchers and scientists together to share and exchange knowledge with the papers presented being published in various journals.

- **Collaborative partnerships on SWM in Uganda were formed.** KCCA went into collaborative agreements with Coca-Cola in plastic recycling and another collaborative agreement with Buganda Kingdom to implement bulungi bwansi, a voluntary work for cleaning up the communities in the kingdom.

116. The project also triggered (a) initiation of small and medium enterprises at community levels such as oil extraction, milling, and fish processing; (b) self-employment activities; (c) spillover effect of fish farming activities where approximately 171 fish ponds have been made through individual initiatives after learning from project interventions in the Simiyu basin; (d) improved mobility through easy access of transport by utilization of project-supplied boats, tractors, and power tillers; and (e) increased biodiversity in the restored riverbanks and other conserved areas in the catchment.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

117. **The following lessons from LVEMP-I were incorporated into the design of LVEMP-II APL-1:**

(a) **A basin-wide perspective is critical to addressing the key environmental issues of Lake Victoria.** LVEMP-II APL-1 addressed environmental concerns by using the Integrated Lake Basin Management approach, which is focused on the lake and its entire watershed, using sub-catchments as the sub basins management planning units.

(b) **On- and off-site consequences of land degradation can only be systematically addressed through upscaling of watershed management in the specific countries and ecosystems.** LVEMP-II APL-1 was to upscale successful soil and water conservation interventions piloted in specific countries and ecosystems during LVEMP-I.

(c) **Environmental benefits must be strongly linked to improved livelihoods for local people and communities.** The CDD watershed management subprojects under LVEMP-II APL-1 included natural resources conservation interventions, which predominantly generate public goods or benefits and livelihood improvement activities that are largely household based and provide substantial private benefits.

(d) **Raising awareness and ensuring the public and parliamentarians' participation are critical for long-term financial sustainability.** The project design incorporated public awareness and participation activities, which aim at improving regional and national outreach and community awareness and participation.

118. **Selectivity and prioritization.** As discussed earlier, project preparation relied on a comprehensive Transboundary Diagnostic Study and regional consultative approach. Hotspots were also selected by level of severity and optimal environmental impact.

119. **Preparation inputs.** A multi-donor trust fund was set up in 2006 that was used for new studies and to update earlier ones and conduct other preparatory activities to bridge the time elapsed between

LVEMP-I and LVEMP-II APL-1. This was an important complement to project preparation funds provided by the World Bank. Project preparation started already in late 2005, shortly after the end of LVEMP-I, and took about 3.5 years. The long preparation time was mostly due to the need to carry out necessary research, stakeholder consultation workshops, consensus building, site selection, and political developments and processes at the country level.[63] Project preparation benefited from having one TTL lead the process from the beginning through project effectiveness, which provided consistency in World Bank engagement and support. At the national level, delays happened essentially because the selection of targeted hotspots took time, and, at the regional level, the LVBC was still in the initial stages of setting up its institutional structure.

120. **Objectives and the RF.** At the time of preparation, the original objectives, as mentioned earlier, were more suitable for the programmatic level and were beyond the purview of the project. The original results indicators measured long-term outcomes, and some of them could not be accurately measured or could not be attributed to project activities.

121. **Monitoring plan.** There were weaknesses regarding collection of supporting data as the project had difficulty documenting and measuring the impact of the project on environmental stress and livelihood improvement. See more details is section IV.A.

122. **Project design complexity.** The activities and focal areas of intervention were discussed and scaled down over the course of project preparation. Efforts to simplify the design were made. However, given the way environmental issues related to Lake Victoria are entwined, it would have been difficult, if not impossible, to design a comprehensive approach that was simple at the same time.

123. **Consultations with stakeholders.** Project stakeholders, which included national line ministries and related ongoing projects, were deemed appropriate and essential to project achievement. The same can be said for the selection of target beneficiaries, which consisted of rural subsistence farmers, herders, and fishermen, with special attention to women, youth, and other vulnerable groups. Project design and implementation relied on consultation with and the participation of local communities, including farmer associations and the private sector. The commitment and active participation of local communities and stakeholders was essential to the success of implementing project interventions at the community level in LVEMP-II APL-1.

124. **Project readiness.** At the national level, countries had appointed the national focal point officers, prepared ToRs for the core members of the NPCT, developed satisfactory national Project Implementation Manuals, prepared satisfactory Procurement Plans, and initiated appointments of the National Policy Steering Committee (NPSC) members. Specialized staff were not yet in place, which in part accounts for the delays experienced in the beginning of project implementation.

125. **Risk identification.** The High risk rating was also deemed to have been appropriately identified, especially with regard to the complex regional and national institutional arrangements in the countries, the delicate balance between the national development objectives and a shared regional vision/strategy for sustainable management of the LVB, and the failure to enforce harmonized standards and implement

[63] There was political unrest in Kenya in 2007/2008, for example.

the adopted Lake Victoria WRMP and FMP (the latter two rated High). The risks regarding complexity and institutions were to be mitigated through standard measures, that is, budget, training, intensive initial supervision, and communication. While those measures admittedly reduced the risks, the capacity issues persisted, and in the end not everything was implemented as planned nor was it modified through restructuring. Despite these measures, there were effectiveness delays, fiduciary non-compliance in Uganda, shortcomings in procurement processes and contract administration. The other risks mentioned here relied on consensus building and declarations issued by the Governments, some of which were done during project preparation (for example, joint development of the RF), but the clients would also appear to have been too optimistic at the time. Overall, the risks in the PAD were well-defined and there was a genuine effort to mitigate them though the project design, for example, anticipating frequent changes, reporting delays, and so on. One risk that materialized but could not have been anticipated in the design was the Kenyan Government's move to devolve authority to the local level. However, that risk was well mitigated during implementation through engagement with the new county governors.

B. KEY FACTORS DURING IMPLEMENTATION

Factors Subject to Government and/or Implementing Entities' Control

126. Delays in meeting effectiveness conditions by Uganda and the LVBC (January 2010) led to nearly one year of delay of implementation start after Board approval. Furthermore, fiduciary noncompliance in Uganda led to a 10-month suspension of disbursements, which further delayed implementation nationally.

127. Weakness in coordination of the regional work by the regional coordination body affected the harmonization agenda. Some regional project activities were not implemented effectively due to lack of funds budgeted by some countries. Good examples are regional water quality and fisheries monitoring where all countries were required to have budget to implement joint monitoring, but this was not the case. LVBC/LVFO would have been better positioned to hold the funds and implement regional monitoring but, as mentioned earlier, the LVBC was a relatively new institution and took time to gain momentum to effectively discharge its regional coordination mandate. To further collaboration and cooperation with regard to data sharing among the Partner States, a data sharing protocol was prepared and adopted in 2012.

128. For the national work, given there were many new staff appointed at the start of the project, the lead ministries managing the project were challenged with implementation, particularly the activities in the various subsectors outside of the lead ministries. Commitment and ownership of some regional and local activities by the lead ministries were limited. This in part explains the limited progress in the initial stage of implementation.

129. Because of the multi-sectoral nature of project interventions, numerous other ministries and local government authorities (LGAs) had to be asked to implement activities (for example, municipal waste management by local government units and their water and sanitation companies) in areas of their responsibility under the Memoranda of Understanding, which needed to be prepared and negotiated. However, technical expertise in the lead ministries was often lacking, particularly in identifying investments with a clearly demonstrated value added that fit into overall subsector strategies.

130. Because of the gap during the transition from the end of the LVEMP-I to LVEMP-II APL-1, the need to update documents such as feasibility studies, technical designs, and ToRs that had been prepared during the bridging/preparatory phase delayed the actual implementation of many activities.

131. Significant shortcomings in government procurement processes and contract administration added to delays in the implementation of the project.

132. The project involved a large CDD component conducted by local governments and communities (about 50 percent of the project), which required substantial up-front capacity building and other preparatory activities before significant disbursements could take place. Also, the use of the CDD approach to implement watershed activities required community groups to be identified and trained on various aspects of subprojects management, including financial, procurement, group dynamics, conflict resolution, book/record keeping, and monitoring, thereby delaying the start-up and actual implementation of the CDD subprojects. However, once the abovementioned activities were done, CDD implementation sped up and was completed based on the budget availability.

133. Traditional land tenure systems and land use practices, particularly the strong attachment to land as a means of production, influenced the success of land-based interventions such as wetlands and riverbank buffer zones where communities resisted vacating plots for conservation.

134. Low disbursement and poor performance in Uganda between 2012 and 2013 were due to a 10-month freeze on project implementation from November 2012 to September 2013, following the discovery of FM irregularities. All ineligible expenditures were refunded to the World Bank as of December 2014.

135. Staff changes in different implementing ministries and agencies and membership to various project organizations at various levels including RPCTs, NPCTs, NPSCs, and National Technical Steering Committees (NTSCs) affected the project's implementation. Many NPCT staff who were implementing the project had not fully participated in its preparation, which led to internal delays for orientation and building understanding of the project.

Factors Subject to World Bank Control

136. Frequent change of TTLs in the initial stage of the project slowed down the pace of implementation in the beginning; subsequently a TTL was put in place for four years, which allowed a steady and consistent course of implementation to be maintained. The timely restructurings and putting in place country TTLs are a good example of adaptive management, where the World Bank proactively helped find resolutions to implementation bottlenecks. As discussed earlier, the World Bank provided a US$22 million AF for Kenya, Tanzania, and LVBC.

137. The World Bank played a pivotal role in cultivating functioning relations between national and regional tiers of the project and managed to balance regional and national outlooks when resolving issues of project implementation. Regular implementation support missions provided the RPCT and NPCTs with consistent support from the World Bank. The World Bank provided guidance and organized targeted procurement clinics that effectively built the project implementing teams' capacity in procurement. Issues

for management attention were raised with candor in the Implementation Status and Results Reports (ISR) on a regular basis.

Factors Outside the Control of the Government and/or Implementing Entities

138. Extreme weather conditions and other natural calamities including prolonged dry spells, flooding, and wildfires affected the implementation of season-based interventions such as riverbank protection and tree planting on degraded sites.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

139. The project's M&E focused on three aspects: (a) monitoring physical implementation, project management aspects and delivery of outputs; (b) project impact and sustainability, focusing mainly on quantifying outcomes; and (c) evaluating the project's impacts resulting from its interventions. The project design had a subcomponent (Subcomponent 1.2) to build capacity for the NPCTs for project M&E but it did not anticipate the challenges presented by monitoring a complex project with five national partners (including Rwanda and Burundi under LVEMP-II APL-2) and a regional body. The RF indicators were part of each country's MIS that was set up.

140. The original RF had a number of flaws, for example, overlapping indicators and unclear baseline (indicators related to harmonized policies and management frameworks), overly ambitious targets ('Cumulative number of hectares [100,000] under afforestation and reforestation activities in targeted sub-catchments'), and intermediate indicators that were more ambitious than the ones at PDO level (adoption and implementation vs. adoption only of harmonized policies). As mentioned earlier, some indicators could not be attributed to project activities, such as 'Percentage reduction in harvesting pressure (tons/year) on the Nile perch fishery in Lake Victoria' and 'Percentage increase in land productivity for households participating in watershed management activities'. The indicators did not always monitor the quality or completeness of various interventions. For example, in cases where the response to some indicator was binary (for example, whether harmonized monitoring protocols and schedules were in place under LVEMP-II APL-1 or whether a strategic wetland management plan was developed under LVEMP-II APL-2), the RF could not capture the quality of these plans or protocols.

141. Another difficulty with the RF indicators was agreeing on key definitions. For example, defining direct beneficiaries, and therefore counting them, was not straightforward. The country M&E specialists were sometimes unclear whether households or individuals should be counted, and this made it difficult to compare numbers between countries and over time. The RF also had some difficulty in measuring gender aspects, in part because households were usually headed by men and the women in the household were not counted. While indicators that purported to count the percentage of female beneficiaries were included, the necessary surveys did not appear to be sufficiently extensive, resulting in some uncertainty over the final figures.

142. At the community level, it was planned that community-based M&E would regularly track the performance and impact of CDD-type watershed rehabilitation subprojects. There were also plans to strengthen the existing M&E capacity of the water resources departments and/or lake basin authorities, LVFO and fisheries departments, departments responsible for use of agrochemicals and land use, LGAs for managing municipal discharges and solid wastes, and national environmental management authorities for environmental standards.

143. The project also set out to develop monitoring capacity at the basin level that measured the health of the LVB, such as surface and ground water quality, fisheries performance and water hyacinth levels.

M&E Implementation

144. M&E was supported under the project's Subcomponent 4.2. The regional GIS-based MIS/M&E system was developed and installed on the LVBC server. It focused on clearly defined output indicators at the regional and national levels. Potential users from Partner States were all trained on using the system.

145. Before the restructuring, the effort of systematically measuring, monitoring, and evaluating the results and impacts of project interventions (such as soil erosion, water quality) was very limited for various reasons (that is, a diverse and diffuse design of interventions in a vast project area, the amount of time needed for visible results, and so on). It should be noted that a comprehensive measuring of sediment load reduction would have been challenging given the available resources under the project, and the time it takes for sediment travel across the landscape and along waterways from source areas to the lake, but some information could still have been collected. For instance, the riparian habitat restoration included the construction of erosion trap ditches, so some structured observations on the rate that these were filling and needed to be maintained could have yielded some data on the volumes of sediment being intercepted. Likewise, for the sanitation investments, it should have been possible to make basic estimates of the volumes of waste managed in accordance with the rates of use.

146. After the 2012 restructuring, care was taken to make sure that the RF indicators were revised in line with the revised PDO. The RF indicators were also simplified to take into account the limited capacity of the project teams to report on these indicators and make sure that indicators could be reported on with relative ease. These changes resulted in more output-level indicators rather than outcome-level indicators. For example, under LVEMP-II APL-1 Component 2, the indicator measuring 'Cumulative percent reduction of pollutants in effluent discharges from rehabilitated and improved wastewater treatment facilities' was replaced by indicators to measure the number of preliminary designs and the number of sanitation facilities constructed. Similarly, under Component 1, 'Cumulative percentage reduction in untreated effluent disposed by targeted municipalities into three hotspots of Lake Victoria' was dropped and replaced with an indicator related to the number of urban pollution hotspots addressed through investments. An indicator related to the area covered with water hyacinth was replaced with the number of sites with active monitoring and removal activities. These modified indicators were generally easier to monitor, as they required reduced harmonized monitoring and reporting standards.

147. With regard to the web-based MIS, although national teams were trained in this system, by the time it was established, they had already developed their own MIS systems and continued to use them for their own purposes. Consideration was given to how each system could communicate with each other, but by this time, there was no budget available for the necessary IT services. Internal attempts to solve

this problem were not successful as the systems were too heterogenous. From then on, each NCPT reported their results to the RPCT (that is, the LVBC) for manual input (hence being prone to errors). However, monitoring of fisheries continued in a structured and largely standardized manner through the support of the project. Geo-referenced data were collected (using GPS) for all project interventions (CDDs, CMIs, and sanitation activities) in all countries. Additional monitoring tools developed to track progress in specific areas were also shared between NPCTs, including (a) an RF tracking matrix, (a) wastewater facilities including a public sanitation monitoring template, and (c) comprehensive CDDs and CMIs data matrix.

148. At the basin level, the monitoring of fisheries has continued in a structured and largely standardized manner through the support of the project. As for the WRIS, the system is available online and publicly accessible at http://lvbc.wris.info. The WRIS is built on a GIS-based data management platform, and the system allows for simple manipulation, such as filtering data by location or type. The system holds information on observations stations for measuring rainfall (88 stations), lake water quality (73), inland water quality (175 stations that are related to pollution hotspots and effluents or river flow), lake surface temperatures (14), and river discharge (95). There does not appear to be data on groundwater (quality or quantity). Some time series data (for example, rainfall and river flow) can be viewed graphically. Data from these stations are not collected in real time and it is not clear how frequently these observations are updated. For many stations, observed data are not available, and where they are available, the most recent observation may be several years old. Furthermore, in some cases, it is not clear what variable is being recorded. This is especially the case with water quality data. However, the WRIS does hold some useful information on 900 CDD projects, and records their location, name, and, in many cases, the number of households and individuals who are participating. Some additional data sets include location of shipping routes, wetlands and rivers, and socioeconomic data sets such as access to water. In summary, the WRIS does have value as a spatial database for historical observations, although data are limited, and its functionality for monitoring could be significantly strengthened.

149. The M&E specialists working on the project were fairly experienced, with clear responsibilities, and, to the extent possible, data were regularly collected and disseminated. The LVBC supported the M&E specialists through the M&E and communication thematic group that was set up. The thematic group was a good idea, but it might have been insufficient given that there was only one M&E specialist in each country, who had limited resources at his or her disposal.

M&E Utilization

150. M&E has focused primarily on producing indicators for the RF, on the one hand, while the outputs from the M&E system were variously used to support effective project management, implementation, and decision making, on the other hand. The information and evidence generated through M&E was instrumental during the project MTR and project restructuring. The M&E reports were prepared on a quarterly basis and were reviewed by the Project Steering Committees at the national level, at the regional LVBC level and by the World Bank.

151. The M&E output data, especially basin-wide ecosystem monitoring of fisheries resources, water hyacinth surveillance, and water quality and quantity monitoring, were used to inform the design of instruments and frameworks to support collaborative management of transboundary natural resources,

including FMP, WRMP, fisheries policy, water policy, and harmonized industrial and municipal effluent discharge standards, among others.

152. M&E output data were used to generate knowledge products, such as knowledge case studies; periodic project newsletters for each project team; brochures; project and ecosystem factsheets; and upgrading and equipping the LVBC resource center, project websites, and knowledge web portals. For example, investments in fisheries monitoring led directly to outputs in the form of monitoring reports. The M&E reports such as progress and annual reports were used to help strengthen fiduciary systems and efficiency in resource use.

153. Decisions and recommendations, based on the reports and other M&E outputs, were made once or twice a year by various project oversight committees, including NTSCs and NPSCs at the national level and Regional Policy Steering Committee (RPSC), LVB-SECOM, LVFO Council of Ministers, and EAC-Council of Ministers at the regional level. These included endorsements of various proposals for restructuring, additional financing, approval of instruments and framework for collaborative management, expanding or changing the scope and priorities in investments, and resource allocation among others.

Justification of Overall Rating of Quality of M&E

154. The overall quality of M&E is rated Modest. This is because some of the PDO and intermediate indicators had to be revised during project restructuring, and the project could not measure important impacts such as water quality improvement and sediment load reduction. Also, a harmonized monitoring system was not achieved at the regional level, as the time and resources needed for it turned out to be much higher than what the project could provide. Nevertheless, all the revised RF indicators for LVEMP-II APL-1 were measured and evaluated at the national level and aggregated manually by the LVBC.

B. ENVIRONMENTAL SAFEGUARD, SOCIAL SAFEGUARD, AND FIDUCIARY COMPLIANCE

Environment and Social Safeguards

155. The project was assigned an environmental risk Category A (full assessment). The applicable safeguard policies were (a) Environmental Assessment (OP/BP 4.01), (b) Natural Habitats (OP/BP 4.04), (c) Pest Management (OP 4.09), (d) Involuntary Resettlement (OP/BP 4.12), (e) Safety of Dams, (f) Indigenous Peoples (OP/BP 4.10) for Kenya only, and (g) Projects on International Waterways (OP/BP 7.50). The requisite environmental and social safeguard instruments were prepared: (a) Environmental and Social Management Frameworks (ESMF), (b) Resettlement Policy Frameworks, (c) Integrated Pest Management Plans, and (d) Indigenous Peoples Plan Framework for Kenya. These safeguard instruments were prepared with information specific to each of the three countries based on a general description of physical and social interventions and consultations with a broad range of stakeholders and were publicly disclosed both in-country and in the World Bank InfoShop in March 2008, before project appraisal. Interventions from LVEMP-II APL-1, which included rehabilitation or construction of small-scale sanitation and wastewater treatment facilities, watershed management, and CDD activities generated low to moderate construction-related impacts, such as erosion; noise; dust; vibrations; occupational health and safety hazards; pollution due to oil spills; and so on. These impacts were screened and mitigated at investment or subprojects level through appropriate instruments. Subproject-specific safeguard instruments, mostly preliminary or partial Environmental and Social Impact Assessments (ESIAs),

Environmental and Social Management Plans, Resettlement Action Plans (RAPs), and Environmental and Social Screening Forms were prepared as necessary during implementation and disclosed in-country in accordance with national regulations. In accordance with the project's ESMF, ESIAs were undertaken for all major interventions on wastewater and sanitation facilities, including two subprojects in Uganda (a) rehabilitation of Kirinya wastewater treatment plant in Jinja and (b) waste recycling plant in Kampala Capital City, two subprojects in Kenya (a) rehabilitation of Bomet sewerage system and (b) rehabilitation and augmentation of Homa Bay sewerage treatment system, and two projects in Tanzania (a) Bukoba sludge and disposal facility and (b) construction of a wastewater treatment facility of municipal abattoir in Mwanza.

156. Complemented by the applicable World Bank Operational Policies for Environment and Social Safeguards, the environmental management, water, fisheries, and land acts in each country were used to ensure mitigation of the project's possible negative environmental impacts. At the regional level, the Protocol on Environmental and Natural Resources Management and the Protocol for the Sustainable Management of LVB, which were signed and ratified by the Partner States, were used as the legal framework to facilitate sound environmental management in the LVB. Grievance redress mechanism systems were in place in all three countries, with documented grievances.

FM and Procurement Management

157. The World Bank conducted FM and procurement capacity assessments and action plans for each country and the LVBC, and recipient governments developed draft procurement plans highlighting procurement methods and time lines and FM manuals.

158. At the national level, the project management function was mainstreamed as much as possible in the national government structures and anchored in the relevant focal point ministries, with implementation supported through other line ministries, government agencies, research institutions, and local/county government and authorities in the Partner States. At the regional level, the project was mainstreamed under the EAC and implementation was anchored in the LVBC that provided the project's regional coordination function. The project operated under the existing fiduciary management frameworks of the Partner States' government and EAC. This was complemented by the World Bank's policy and procedures on financial reporting and accountability, as well as procurement oversight.

159. Despite challenges to undertake procurement in an efficient and timely manner because of limited capacities and familiarity with World Bank procurement procedures, procurement processes and contract management saw a marked improvement after close support from the World Bank team through prior and post procurement review, capacity building, and supervision missions. During the last implementation support mission of May 2017, procurement field visits were conducted, and no procurement-related complaints had been submitted to the project. However, it should be noted that in Kenya, a dispute arose with regard to the contract for the procurement of water hyacinth harvesting equipment amounting to approximately US$800,000, awarded to a foreign supplier. Although the equipment was delivered in May 2015, the contract could not be concluded following a disagreement between the parties on the performance and productivity requirements of the equipment supplied. An amicable settlement had not been reached by the time of project closure and it is therefore likely that the matter will be settled by arbitration in accordance with the provisions of the contract.

160. During a significant time period, FM generally operated at moderately satisfactory levels, since there were generally minor irregularities apart from the instances described in this section. Some FM and procurement management issues arose during the implementation, such as the following:

(a) For Uganda, the World Bank commissioned an independent audit from June 1, 2010, to June 30, 2012, and found unaccounted for funds and irregular transactions by staff at the NPCT and other implementing agencies amounting to US$939,305. As a result, disbursements were suspended for a 10-month period from November 2012 to September 2013. This ineligible expenditure was fully refunded to the World Bank by November 18, 2014. There were further signs of a weak control environment and occurrence of ineligible expenditures in 2016, albeit at a smaller scale, which were quickly resolved. Procurement and FM challenges remained, such as delays in accounting for advances by districts and communities. However, all advances were accounted for by the agreed date of April 30, 2018, and all FM issues were resolved satisfactorily in the end. The suspension affected project implementation. For example, an entirely new NPCT needed to be assembled, implying training needs to understand the project and its multiple subsectors and causing delays in project implementation, nationally and regionally.

(b) In Tanzania, FM was generally satisfactory as the audit reports were clean and delivered on time. No significant issues occurred in Kenya, either, in terms of FM.

(c) Audits were clean for the LVBC. However, there was an auditors' concern regarding the payment of US$632,939 to the KNCPC, from 2012 to 2013, which was lack of an appropriate workplan and budget as a basis for the advances and not a case of funds not being accounted for properly.

C. BANK PERFORMANCE

Quality at Entry

161. As highlighted in the key factors during preparation, the World Bank team applied due diligence in project preparation and design based on a solid diagnostic foundation of the LVB development priorities and ensured that the strategic relevance and approach matched those of the latest national strategic documents and the World Bank's regional integration strategy and respective country strategy documents. Fully acknowledging the regional and sectoral context in the LVB as well as the complexity of the project and its intended interventions, the project design was prepared with sufficient consultation with stakeholders along with well-considered implementation arrangements. However, as discussed in section IV.A, there were shortcomings in project design including M&E. Provisions for FM and safeguards were adequate at the preparation stage, though procurement and M&E capacity could have been further strengthened. Some costs, such as project management and M&E, were underestimated in the project design and later led to cost overruns, in the case of the former, and inability to expand the basin-wide monitoring, in the latter.

162. There was insufficient detailed preparation in terms of identifying specific investments. Where studies were indicated, there was not a lot of detail on what should go into the ToRs. In hindsight, there could have been more careful selectivity in the project design, because simplicity would have facilitated

implementation, given the countries' limited institutional capacities and challenging governance. More selectivity and more capacity diagnostics in the preparation work would have helped address such issues.

163. For the beneficiaries' assessment on World Bank performance, see annex 5, which includes a discussion on the fiduciary aspects.

Quality at Supervision

164. The World Bank's implementation support for LVEMP-II APL-1 has followed the World Bank's general guidelines and common good practices. The World Bank played a pivotal role in cultivating functioning relations between national and regional tiers of the project and managed to balance regional and national outlooks when resolving issues of project implementation.

165. The World Bank provided guidance and organized targeted procurement clinics that effectively built the project implementing teams' capacity in procurement. The World Bank staff had generally positive and supportive attitudes when working with RPCT and NPCTs. There were prompt and regular communications with the NPCTs, especially after the introduction of national TTLs, and there was increased close support and faster decision making, for example, regarding 'no-objections'.

166. Furthermore, the project teams benefitted from:

(a) Frequent close support from local co-TTLs or team members and regional missions with larger teams with specific expertise needed to provide support to the various sectors in the project;

(b) Basic pollution loading models that were developed by the World Bank team; and

(c) Proactive attempts from the World Bank team to mobilize additional trust fund resources to help secure project outcomes, including CIWA (which unfortunately did not materialize), European Space Agency (support received for demonstration of remote sensing for water hyacinth monitoring), the NDF (a large grant approved, but that only came through toward the end of the project), and the U.K. Department of International Development (through a transport project to do some analysis of fisheries value chains that provided for LVEMP-II APL-1).

167. However, frequent change of TTLs (three TTLs from April 2010 to January 2014) in the initial stage of the project had some impact on the pace of implementation. That said, there was one TTL for most of the implementation period, from 2014 to 2017, and TTL changes were done with proper handover and transitional period, in some cases with the outgoing and incoming TTLs co-leading implementation support to allow for continuity. Efforts were made to proactively improve implementation, particularly after the restructuring. Sometimes, Aide Mémoires were quite descriptive yet not analytical enough and did not sufficiently flag the seriousness of the M&E challenges regarding measuring contributions to the PDOs, productivity enhancements, environmental stress reductions, or community benefits. ISRs were done regularly and reflected implementation issues at the time, though the performance ratings may have been somewhat optimistic and did not raise flags. The team benefited from regular guidance from World Bank management, and supervision budgets were allocated according to approved norms.

168. The World Bank team carried out extended adequate technical supervision and support. Missions reviewed the implementation status of the project to ensure that any outstanding issues or challenges, including safeguards and fiduciary compliance were identified, discussed, and action plans to address issues were developed. For example, to ensure orderly closure of the project, the last implementation support mission of May 2017 listed pre-closure procurement management activities to help national teams plan their respective six months before closure. Another example is when the World Bank safeguards team noted that, in Tanzania, lack of funds for land acquisition from beneficiary agencies led to the suspension of some subprojects. The World Bank team, therefore, guided the NPCT to immediately prepare a RAP, with its immediate implementation.

Justification of Overall Rating of Bank Performance

169. The World Bank's performance is rated Moderately Unsatisfactory because of the ambitious project design, which was only partially rectified with the 2012 restructuring, and the quality of supervision with respect to monitoring the impact of investments discussed above. The World Bank team made efforts to overcome project design deficiencies and proactively addressed institutional and technical challenges to the extent possible. Efforts to collect better data could have been made earlier and the team could have tried to secure financing for additional surveys, testing and monitoring. The World Bank worked closely with the NPCTs and RPCTs and provided timely responses with various technical expertise, as needed. Such commitment and coordination efforts contributed to the completion of the related activities.

D. RISK TO DEVELOPMENT OUTCOME

170. Harmonized policies on water and fisheries management have been endorsed and approved by the EAC, and the harmonized EAC Regional Standards for Industrial and Municipal Effluent Discharges into Sewerage and River Systems were adopted and gazetted. Implementation of these polices and regulations has started in the partner countries. Numerous physical interventions and capacity-building activities on the ground have addressed the targeted point source pollution hotspots and the selected diffuse pollution sources from the degraded watersheds. The continuation and sustenance of these outcomes, however, is largely dependent on various factors and risk levels such as the following:

171. **Changes in the prevailing management, legal, and policy context**. Outcomes that support collaborative management of transboundary natural resources largely depend on the willingness of EAC Partner States, as well as their political goodwill, to continue operating under and being bound by the harmonized policy and regulatory and institutional frameworks. Any change by one or more Partner States in commitment and participation in the collaborative processes will ultimately jeopardize the continuation of those outcomes. However, given that Partner States are aware of, and have seen, the benefits of collaborative management, it is unlikely that they will pull out of the collaboration.

172. **Adequacy of sustainability arrangements.** The fact that some interventions were completed toward the end of the project implied that there was not enough time to adequately test the sustainability of these measures, including assessing the functionality of the business plans for community-based investments and O&M plans for infrastructural and institutional investments, among other sustainability strategies. As such it would be difficult to guarantee that some measures will continue to be strictly implemented and produce the desired results. However, given that many communities have gained

ownership of the activities, and experienced the benefits firsthand, these are likely to continue. It is important for national teams to ensure that roles and responsibilities among the different stakeholders are clearly defined post-project.

173. **Climate change and variability.** The project implemented a bulk of watershed interventions that are season based and dependent on physical and climate conditions. These included tree planting on degraded hills and water catchments, riverbank/lake buffer zone protection, and wetland restoration, among others. The climate change and variability and land use changes being experienced within the LVB could pose a major risk to the outcomes these interventions address. However, if watershed physical interventions are complete, this should in fact improve the resilience of watersheds to climate change. For communities, livelihood diversification activities are also a sure way of building resilience to climate change.

174. **Design and funding for new development projects**. Based on the interventions and success made possible by the project, other donors became interested in financing related or new interventions whose feasibility/viability had been demonstrated by LVEMP-II APL-1 in the basin. These included the Multi-National Lake Victoria Communication and Transport Project funded by AfDB and inspired by the maritime safety of navigation subcomponent of LVEMP-II APL-1, the Green Growth Initiative inspired by the success of the Cleaner Production technologies promotion under the project and funded by the NDF, and the climate change initiative between the LVBC and United Nations Environment Programme, among others. LVEMP-II APL-1 investments were also coordinated with external sanitation investments, particularly from the Lake Victoria Region Water and Sanitation Initiative Project financed by the African Development Bank (AfDB). These interventions will go a long way in expanding and sustaining the project outcomes in the long term. A possible next phase of the LVEMP, proposed by five LVB countries and the EAC, will aim to focus on strengthening institutional capacity, cost-effectiveness and sustainability of selected interventions, innovations, and emerging issues such as climate resilience.

V. LESSONS LEARNED AND RECOMMENDATIONS

175. **The ambition regarding what can be achieved at the project level needs to be realistic.** The original RF for LVEMP-II APL-1 indicated that measurable and attributable changes at broad-scale environmental indicators should be achievable, without initially defining specific targets. This was judged to be overly ambitious at restructuring; for example, the expectation to see water quality improvement at the end of the project was unrealistic. It was acknowledged that the impact would be one of slowing the deterioration of the LVB, rather than trend reversal, although the conceptual basis for assessing project impact was not well clarified. Within this complex and long-term context, it is particularly important to provide a clear vision of how intrinsically limited project-level interventions contribute to the ultimate goals and how success in progressing toward them can practically be measured.

176. **Collective action requires strong regional and national institutions, whose evolution takes time. The LVBC is a relatively young organization, established only a few years before LVEMP-II APL-1.** The project devoted about a quarter of the funding to strengthening institutional capacity through training, equipment, office space, conferences, and public events, coupled with regular dialogue and support from the World Bank team and others. It is hard to tell whether that level of funding was adequate compared to the physical investments supported by the project, but it is safe to say that, with project support, the

LVBC grew from an infant to an established yet weak regional institution. External support would need to continue in a consistent and reliably way for the LVBC and others to reach a critical point when they can be effective on their own.

177. **Dated covenants did not effectively spur policy change.** The project initially relied on dated covenants to achieve policy actions. These dated covenants did not prove effective, in part because the project had no specific technical assistance envisaged for these policy actions and they were removed in the 2012 restructuring. Although most of them were 'partially' achieved, there were also practical reasons for which they were made redundant.[64] A more effective way of achieving the desired policy actions could have been through development policy financing, or perhaps disbursement-linked indicators for expenditures linked to the reforms, something which is yet to be tested. Further, the EAC could have been more effectively engaged through the project to support policy measures.

178. **Consensus building for some issues turned out to be more difficult than for others.** For example, Uganda did not show interest in agreeing to water abstraction and outflows regulations, but there was good cooperation among all countries on fisheries monitoring surveys, as shown through the agreed joint policy framework for this sector. Understanding the political economy involved and the incentives needed for reform can pave the way to agreement.

179. **Selectivity and sequencing are important to achieve demonstrable results.** Given both the size and breadth of the environmental challenges faced in the LVB and the limited time and resources available to tackle them at a basin scale, selectivity and concentration of effort are critical, both in terms of the number of issues to be addressed and the locations at which physical investments are made. LVEMP-II APL-1 intended to address a range of issues from water resources to fisheries' policies, sanitation, hyacinth control, and industrial pollution, among others. In addition, watershed management interventions were distributed across large sub basins, constraining the delivery of demonstrable impact. Effective selectivity does require a big-picture understanding of the problem at the system level and the definition of a limited, manageable, and mutually reinforcing set of priorities.

180. **Ownership of investments is critical to their sustainability.** LVEMP-II APL-1 did consider, for instance, involving local authorities in selecting relatively simple designs for wastewater treatment works and planning for the operation and maintenance of the water harvester. To effectively address the operating and sustainability issues, relevant stakeholders should be well consulted and involved throughout. An asset operator such as a local water and sanitation company may not necessarily own the asset, but its participation in project preparation to address operating issues would help the Government (the owner) sustain the operation of a facility. In retrospect, additional tools to strengthen the ownership of beneficiary institutions could have been employed, such as requiring formal (signed) agreements on parameters and commitments on operating budget at key stages of the design and procurement processes. The RECP program demonstrated that active private sector participation is likely to improve sustainability but must be based on tangible incentives.

181. **Leadership continuity assures that a consistent course of implementation is maintained.** There was staff turnover on the client side and five TTLs over the course of eight years to lead the project on the World Bank's side, as noted by the client feedback and in this ICR. This caused loss of momentum and

[64] See the 2012 Restructuring Project Paper for specifics.

direction, may have affected certain outcomes, such as some activities that were not implemented in the end. While staff turnover is often driven by personal circumstances and cannot be fully controlled, both the World Bank and the client countries should seek some extended commitment for key positions to ensure consistency in project design and implementation.

182. **Investing in basin-wide monitoring is necessary to maintain an understanding of system-wide processes. In this respect, the project correctly supported a broader M&E system that would provide awareness on the state of the lake.** As discussed in the efficacy section, this support to basin-wide monitoring systems had varying success. Continued fisheries monitoring provided useful data, and water hyacinth monitoring has been becoming more sophisticated, while water quality monitoring proved to be challenging, thus not yielding information on impacts from project (and other) interventions. The design of monitoring systems should be well linked with the project design to be able to measure meaningful results and demonstrate value within the lifespan of a project. Financial sustainability of long-term, multicountry monitoring programs will always be challenging, however, so parsimonious design, stakeholder and development partner support, and mainstreaming within routine duties are also important. Formal system models may eventually need to be developed to complement monitoring systems to assist in interpreting results and identifying critical parameters and sampling designs for monitoring.

183. **Community ownership and project impacts both need to be strong.** Community involvement is important to undertake watershed management interventions. These will not be successful unless they deliver improvements in livelihoods and welfare for local participants. CDD approaches can be effective in delivering livelihood support; however, CDD priorities may not always be the most effective in achieving environmental benefits. At the first restructuring, the project introduced CMIs to complement the CDD subprojects. The CMIs accelerated implementation and provided a stronger environmental focus to the investments. Because CDDs have limitations as a primary tool for SLM in terms of their ability to deliver coordinated environmental action at scale, they work better in conjunction with the CMI approach. Similar to other project-supported investments, the scale at which CDDs and CMIs were implemented began to show local impact, confirming the usefulness of such interventions, but was obviously not large enough to affect the LVB level. As discussed earlier, this type of interventions, if sustained, also need time to bear results. Therefore, they should be based on systematic and concentrated efforts to demonstrate tangible results.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: Contribute to the improvement of the collaborative management of the transboundary natural resources of the LVB among the Partner States

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
A draft harmonized policy on fisheries management and agreement on a strategy and timeframe for adoption, sumitted by LVBC and approved by the Council of Ministers	Yes/No	No 30-Jan-2011	Yes 30-Jun-2015	Yes 29-Dec-2017	No 29-Dec-2017

Comments (achievements against targets): The draft Fisheries and Aquaculture Policy for East Africa was finalized and validated by stakeholders during a validation workshop held in Arusha Tanzania on June 28, 2016. The comments provided during the validation were incorporated by the task force from June 29 to July 1, 2016. This paved the way for the submission of the draft policy to the LVFO Council and technical review was completed and endorsed by the EAC sectoral technical and advisory committee. The policy was approved at the council meeting held on March 2, 2018. Data source: Approved documents by Council.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
A draft harmonized policy on water management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers	Yes/No	No 31-Jan-2011	Yes 30-Jun-2015	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): The Consultancy Report detailing the water resources management policy with an agreed action plan as the strategy was approved by LVB-SECOM and subsequently adopted by the EAC. The accompanying bill (which is not a requirement of this indicator) was referred to Partner States for legal input by the respective state Law Offices. The bill was subsequently submitted to the Secretary General for further guidance and action. The bill has not yet been passed by the respective countries. Once the bill is endorsed it should provide clear guidance to countries on strategy and time frame of implementation. Data source: Approved documents by LVB-SECOM.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
A regional strategy on water hyacinth monitoring and control, submitted by LVBC and approved by the Council of Ministers	Yes/No	No 19-Jan-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): This target was achieved. The strategy was endorsed by 10th LVB-SECOM and national Action Plans for implementation prepared and are now under implementation in the Partner States through the CDD and CMI approaches. The strategy has also been shared with other stakeholders in the basin to guide their interventions programming and implementation. The LVBC is also

undertaking resource mobilization to support its long-term implementation. The World Bank team visited a few subprojects on water hyacinth removal and found them to be performing well, and navigation in the lake has improved, leading to less accidents and oil spills and reduced transportation costs. Data source: Approved documents by LVB-SECOM.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of identified water hyacinth hotspots with active monitoring and removal activities	Number	0.00 15-Sep-2011	15.00 30-Jun-2015	41.00 29-Dec-2017	47.00 29-Dec-2017

Comments (achievements against targets): This revised target was achieved. Following the AF, the target was increased from 15 to 41. Kenya: Eight (8) rearing units are active. The units are being revitalized; focusing on 15 of them that are sustainable. The BMU members have been retrained and a livelihoods component will be introduced as an incentive. The retraining has focused on the management of the units and surveillance and monitoring of the water hyacinth. Tanzania: 24 rearing units are active. Monitoring indicates reduction in hyacinth coverage from 520 ha in Oct 2010 to 104 ha in December 2015. But the survey conducted in April 2016 has indicated a slight increase in coverage to 121.47 ha (16.7%), possibly due to nutrients brought by rivers during the rainy season. Uganda: 15 active manual removal activities are ongoing. A water hyacinth training manual for extension workers and the communities was developed. As mentioned earlier, navigation and its related benefits have been reported to improve. Data source: Progress reports prepared by national project teams.

Objective/Outcome: Contribute to the improvement of environmental management of targeted pollution hotspots

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of urban pollution hotspots addressed through investment to control wastewater pollution	Number	0.00 19-Jan-2011	6.00 30-Jun-2015	9.00 29-Dec-2017	13.00 29-Dec-2017

Comments (achievements against targets): The revised target was achieved. Furthermore, given the AF in 2015, the target was adjusted from 6 to 9. Kenya: Construction works in all the three sewerage facilities (Kisumu, Homa bay, and Bomet) is 100% complete and operational. Expansion works are complete at Homa Bay and Bomet. Three additional hotspots addressed from provision of exhausters are also complete—Kericho, Migori, and Siaya. [8 hotspots] Tanzania: (a) Bukoba Sludge Disposal Facility completed (adjacent solid waste dump has also been fenced); (b) construction of Artificial Wetland in Mwanza City and Slaughter House rehab is complete; (c) house sewage connections in Mwanza are complete; construction of 3 markets and 21 waste collection points contribute to reducing urban pollution in Mwanza but are not counted as separate hotspots. [3 hotspots] Uganda: (a) Kirinya wastewater treatment facility complete; (b) solid waste collection and cleaning of Kampala channels (Nakivubo Channel, Nabisaalu channel, and Katwe channel) complete. [2 hotspots] It should be noted that there is no standard definition of 'hotspot' and different locations being addressed are on different scales. Evaluation of this indicator therefore summarizes all the contributing activities. Data source: Completion/handover reports for works.

Objective/Outcome: Contribute to the improvement of selected degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of hectares under sustainable land management practices in the targeted sub-catchments	Hectare (ha)	0.00 19-Jan-2011	6,150.00 30-Jun-2015	8,000.00 29-Dec-2017	12,337.3 29-Dec-2017

Comments (achievements against targets): The project overachieved its target. During the AF, the target was increased from 6,150 to 8,000 ha. Kenya: 904 ha degraded forest sites planted with trees, 2,058 ha afforestation through CDDs, 2,626 ha soil conservation interventions in CMIs, 179 SLM in CDDs, 304 ha of wetland rehabilitation. Beneficiaries of soil conservation interventions with CDD in the Kajulu catchment noted improvements of soil and water conservation on their farms, which has helped with increasing productivity of crops and trees. Tanzania: 1,363.8 ha has been treated through CDDs and 2,619.5 ha has been treated through CMIs (mainly riverbank restoration). In situ moisture conservation was noted during field visits. Uganda: 1,704 ha is from CMIs, 285 ha from CDDs under trees planted, and 294 ha from wetlands. Two valley dams in the Kalungu district have been constructed to provide water for surrounding communities; this has reduced

water diversion and extraction pressure on the Katonga River. Data source: Progress reports prepared by national project teams.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Direct project beneficiaries	Number	0.00 15-Sep-2011	35,000 30-Jun-2015	450,000 29-Dec-2017	846,673 29-Dec-2017
Female beneficiaries	Percentage	0.00 15-Sep-2011	20.00 30-Jun-2015	30.00 29-Dec-2017	51.00 29-Dec-2017

Comments (achievements against targets): The project achieved its target by 188%. This indicator was introduced as a core indicator in the 2012 restructuring. It was then increased significantly from 35,000 to 450,000 in the 2015 AF to reflect the progress made. The percentage of female beneficiaries was also achieved, although these figures were based on surveys. Regional: The 70,110 beneficiaries are those being served and benefiting from the aids to navigation installed on Lake Victoria as well as cleaner production technologies. Those who benefitted from the training on the oil spills and toxic chemical contingency plan, among other regional trainings, are also included. Kenya: 24,556 community members are benefitting from the ongoing CDD subprojects; 32,235 community members in the co-management sites and 873 BMU members have benefited from project funds. 81,910 people benefiting from the completed sewerage facilities, 5,800 from the completed bio-toilets, 3,900 water harvesting tanks, and 10,887 from training (8,889 SLM, 1,998 fishers). Tanzania: Total number of beneficiaries from CDD subprojects is 341,569. Beneficiaries from public toilets are 111,757 and beneficiaries from Bukoba sludge disposal facility are 128,800. Uganda: Latrines - 2,350, waste management - 2,025, students benefiting from rain water tanks, energy saving stoves - 17,502 and 67,440 – rain water tanks at community, household energy saving stoves, fruit trees, bees, poultry, piggery, cows, goats, silver fish (mukene), cage fish farming, fish ponds, and biogas. Data source: Progress reports prepared by national project teams.

A.2 Intermediate Results Indicators

Component: Strengthening institutional capacity for managing shared water and fisheries resources

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Regional standards for industrial and municipal effluent discharges for adoption by participating countries in place	Yes/No	No 15-Sep-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): This target was achieved. The standards were adopted by the 28th meeting of the EAC Council of Ministers meeting. The LVBC Secretariat developed a road map/rollout plan as recommended by 8th RPSC and shared it with Partner States for implementation. The road map includes sensitization of major actors such as industries, environment management authorities, and other such regulatory authorities on the requirements of the harmonized standards for enhanced adherence. The standards were gazetted in the EAC Gazette Legal Notice No. 004. Once the road map is implemented and enforced, it should lead to significant control of effluent discharge into the lake. Data source: Approved documents by LVB-SECOM.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Fisheries Management Plan (FMP) updated	Yes/No	No 15-Sep-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): The FMP was effectively updated to FMP III, validated by stakeholders, and approved by the LVFO Council of Ministers on January 29, 2016. The FMP was subsequently launched on June 28, 2016, in Arusha Tanzania. Around the same time that the FMP was approved, the EAC Fisheries and Aquaculture Sectoral Council of Ministers approved a series of fisheries policy documents related to it, which strengthen the supporting policy environment, including (a) Fisheries and Aquaculture Policy for the EAC, (b) Guidelines for Establishment and Operation of Cage Fish Farming in the EAC, (c) Harmonized Fisheries and Aquaculture Border Inspection Manual for the EAC, and (d) Regional Fisheries Guideline for Species Specific Licensing for Lake Victoria. The new fisheries policy frameworks are already

being mainstreamed at the national level, notably in Kenya, where they are being incorporated into guidelines to operationalize the Fisheries Management and Development Act No. 35 (2016), and new Integrated Development Plans in riparian counties (for example, for Homa Bay and Busia) have mainstreamed the Lake Victoria FMP III. Data source: Approved documents by the Council.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
GIS-based database and WRIS developed and available for public access	Yes/No	No 15-Sep-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): This target was achieved. The system development was finalized and is available for public access. The system has some publicly accessible data and information which will gradually be expanded to provide more information to the public after adequate data and information screening and verification. It is available at http://lvbc.wris.info/. WRIS data is geo-referenced, but collection of GIS basin data is a costlier, long-term effort. That should be established under the basin profiles. If it is successfully established, the WRIS would contribute significantly to basin-wide monitoring and be a good source of information for transboundary decision making. Data source: Progress reports prepared by national project teams.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Harmonized monitoring protocols and schedules in place	Yes/No	No 15-Sep-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): This target was achieved. Monitoring protocols and schedules used during LVEMP I were reviewed and updated and are currently being used for ecosystem monitoring, including water quality monitoring and fisheries and biodiversity assessments in the basin by various stakeholders. For fisheries frame survey, the SOPs were updated and used to conduct the 2010, 2012, 2014, and 2016 surveys. Monitoring of water hyacinth in the countries is also guided by a standardized procedure. Data source: Approved

documents by LVB-SECOM.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Communication notes, with summary reports on project achievements and progress on indicators, are made available to stakeholders at least on a quarterly basis.	Yes/No	No 15-Sep-2011	No 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): Achieved. Introduced target during the 2012 restructuring. **RPCT:** 3 editions of LVBC Digest, counting the gains booklet, and several publicity materials and 2 policy briefs have been produced. Additionally, progress reports, annual reports have been produced and disseminated. web posts have been undertaken on a regular basis. **Kenya:** In addition to the annual reports, the project has produced 2 editions of their e-newsletter, held 5 Radio talk shows, 3 documentaries on NRM, water and Water hyacinth, 4 newspaper printed material, 1 brochure and numerous website postings. 13 quarterly/semi-annual Progress reports have been prepared. **Tanzania:** Annual reports (4) including this results framework forms part of the quarterly and annual reports. Highlights are normally shared at workshops, seminars, NPSC, key Events settings. Also, quarterly newsletters have been produced. **Uganda:** All quarterly & annual reports to date made available. Data source: LVBC RF final report, 2018.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
M&E and MIS system implemented and updated according to schedule	Yes/No	No 15-Sep-2011	Yes 30-Jun-2013	Yes 29-Dec-2017	Yes 29-Dec-2017

Comments (achievements against targets): Achieved. This indicator was introduced in the 2012 restructuring, replacing 'Percent adherence to

approved annual work plans and budgets by participating countries'. This indicator was then two indicators, related to M&E systems and MIS. They were merged during the additional financing. The regional GIS-based M&E system/MIS was developed and installed on the LVBC server. Potential users from Partner States were trained on the usage of the system. The RPCT migrated data on this system and recruited a systems administrator to manage the system. A standardized M&E system/MIS was developed but was only completed recently, and population of the records with historical data is slow. National teams, however, do have their own MIS to collect project data, and these are being enhanced where necessary with a variety of shared tools, including (a) RF tracking matrix; (b) wastewater facilities including public sanitation monitoring template; (c) comprehensive CDDs' and CMIs' data matrix that even includes geographic coordinates; and (d) cleaner production, among others. Once it is fully established, the WRIS would contribute significantly to basin-wide monitoring and be a good source of information for transboundary decision making. Data source: Progress reports and end-of-project results reports.

Component: Point source pollution control and prevention

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of preliminary technical designs for wastewater treatment facilities	Number	0 15-Sep-2011	6 30-Jun-2015	15 29-Dec-2017	16 29-Dec-2017

Comments (achievements against targets): This target was achieved. This indicator was introduced during restructuring and increased from 6 to 15 as a result of the AF. Kenya: Feasibility studies; Environmental Impact Assessments; and designs for Kisumu, Homa Bay, and Bomet have been finalized. Designs for Homa Bay and Kisumu artificial wetlands and for special sewage lines for Homa Bay and Kisumu ports (will not be built under the project) completed. Feasibility studies completed for two more sewerage facilities in Londian and Oyugis. Tanzania: Designs completed for (a) Bukoba sludge disposal facility, (b) Mwanza abattoir and wetland, (c) updating of the Bukoba Sewerage system, (d) simplified sewerage system for Mabatini and Igogo, and (e) house connections in Mwanza. Feasibility study on wastewater treatment at Mwanza north and south ports and ESIA for Musoma sewerage system are completed but do not count as technical designs. Design also completed for Magu solid waste disposal facility but does not count as wastewater treatment facility. Uganda: Feasibility and technical designs for (a) Kirinya-Jinja and (b) Gaba-Kampala completed. Dimo model fishing village design completed but does not count as wastewater treatment facility. Data source: Completed design documents.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of sanitation facilities (public/schools) constructed/provided	Number	0 15-Sep-2011	27 30-Jun-2015	67 29-Dec-2017	187 29-Dec-2017

Comments (achievements against targets): The project exceeds its target. This target was introduced during the 2012 restructuring, as a World Bank core indicator, and increased from 27 to 67 as a result of the AF. Kenya: 80 sanitation facilities completed. Tanzania: 72 sanitation facilities completed. Uganda: 35 sanitation facilities completed. According to the Pollution Model developed by the World Bank team, sanitation facilities constructed under the project should halve the amount of per capita waste going into the lake. Data source: Contractor completion and handover reports.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of people provided with access to improved sanitation facilities under the project	Number	0 15-Sep-2011	28,000 30-Jun-2015	150,000 29-Dec-2017	332,595 29-Dec-2017

Comments (achievements against targets): The project achieved 222% of its target. The target was introduced during the restructuring and increased from 28,000 to 150,000 with AF. It includes school pupils and those in cities who have access to latrines but excludes those benefiting from wastewater treatment facilities. Kenya: Beneficiaries from public toilets are 134,439. Tanzania: Beneficiaries from public toilets are 136,300. Uganda: Beneficiaries from public toilets are 61,856. According to the Pollution Model developed by the World Bank team, waste per capita from the LVB is estimated at 16 kg per year. With the use of sanitation services, waste should be approximately halved. So, in one year, the waste going into the lake should be reduced from 5.6 million kg to about 2.6 million kg. Data source: Progress reports prepared by national project teams.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of targeted industries trained on Cleaner Production Technologies	Number	0 19-Jan-2011	90 30-Jun-2015	280 29-Dec-2017	422 29-Dec-2017

Comments (achievements against targets): This target was achieved at 151%. It was introduced during the restructuring, replacing 'Cumulative percent of target industries in the LVB adopting Cleaner Production Technologies and adhering to the harmonized effluent standards'. It was increased from 90 to 280 as a result of the AF. Kenya: 138 industries trained. Tanzania: 118 industries trained. Uganda: 166 industries trained. See more details in the Efficacy section in main text. Data source: KNCPC consolidated report.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Percentage of targeted industries adopting cleaner production in-plant assessments and/or generated cleaner production options	Percentage	0.00 19-Jan-2011	15.00 30-Jun-2015	35.00 29-Dec-2017	43.00 29-Dec-2017

Comments (achievements against targets): This target was achieved. In the AF, as the number of targeted industries increased, the target percentage was increased from 15% to 35%. Kenya: 47% adopted; Tanzania: 51% adopted; Uganda: 30% adopted. See more details in the Efficacy section in main text. Data source: KNCPC consolidated report.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Number of locations equipped with aids to navigation	Number	0 15-Sep-2011	6 30-Jun-2015	37 29-Jun-2017	37 29-Dec-2017

Comments (achievements against targets): This target was achieved. This target was introduced in the restructuring, replacing 'Number of marine/fishing vessels accidents leading to oil spills and/or loss of lives', which was thought to be too challenging to support with data, given that there was no reliable baseline for the lake. In the restructuring, the target was listed as 6, which was increased to 8 during the AF (these were routes not locations). However, the value of 37 refers to the number of sites, which cover 8 routes. See more details in the Efficacy section in main text. Data source: Contractor completion/handover report.

Component: Watershed management

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of individuals trained in improved sustainable land management (SLM) practices	Number	0 15-Sep-2011	7,000 30-Jun-2015	12,000 29-Dec-2017	24,573 29-Dec-2017

Comments (achievements against targets): Target achieved at 204%. Introduced in the restructuring to replace 'Cumulative number of hectares under improved land use and range land management practices in the targeted catchments'. The target was increased from 7,000 to 12,000 as a result of the AF. Kenya: 6,058 trained on soil and water conservation, 5,044 on afforestation—11,102—larger than earlier figure because it includes CDD beneficiaries. Tanzania: 10,319 members of CDDs, 573 village leaders, and 108 CMI committees. Uganda: 929 were trained in afforestation, 660 in soil and water conservation, 548 in wetland management, and 334 as water user committee members. See more details in the Efficacy section in main text. Data source: Progress reports prepared by national project teams.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Number of Individuals adopting improved SLM under the project	Number	0 15-Sep-2011	2,400 30-Jun-2015	10,000 29-Dec-2017	12,314 29-Dec-2017

Comments (achievements against targets): Achieved. Introducing during restructuring. The target was increased from 2,400 to 10,000 as a result of the AF. The actual achievement is 12,314. Kenya: 2,165 farmers adopting SLM and 330 people involved in afforestation. Tanzania: 8,320 farmers adopting SLM. Uganda: 1,526, which includes those who are practicing agro-forestry, soil and water conservation, wetland-friendly activities like fish ponds, bee keeping, and yam farming. In Kenya, it was observed that other farmers outside the project were also adopting SLM practices. Data source: LVBC RF final report, 2018.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Cumulative hectares of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments	Hectare (Ha)	0.00 15-Jan-2011	1,450.00 30-Jun-2013	1,450.00 29-Dec-2017	2,272.00 29-Dec-2017

Comments (achievements against targets): Original target was achieved at 157%. There was no change to this target during the AF or restructuring. Kenya: 604 ha; Tanzania: 490 ha; Uganda: 1,178 ha. Figures include areas of riverbank and lakeshore restored (documented under 'Area of SLM indicator'), as well as areas where a sustained reduction in water hyacinth coverage has been demonstrated by local monitoring. Data source: Verification reports from project field teams.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of CDD sub-projects	Number	0	590	660	630

implemented under the project		15-Sep-2011	30-Jun-2015	29-Dec-2017	29-Dec-2017

Comments (achievements against targets): Target 95% achieved. The indicator was increased from 590 to 660 during the AF. Kenya: 251 subprojects; Tanzania: 323 subprojects; Uganda: 56 subprojects. Repeater or additional grants to the same group for new activities can be counted as additional subprojects. Examples of CDD projects included activities to protect slopes and restore gullies with reforestation and anti-erosion structures, restoring degraded riparian and wetland habitats as a barrier to the movement of sediments, increasing water harvesting, and improving agronomic and livestock management practices and livelihood activities to reduce pressure on and incentivize protection of natural resources. See more details in the Efficacy section in main text. Data source: Verification reports from project field teams.

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1 of restructured PDO: "to contribute to the improvement of the collaborative management of the trans-boundary natural resources of the LVB among the Partner States"	
Outcome Indicators	1. A draft harmonized policy on water management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers 2. A draft harmonized policy on fisheries management and agreement on a strategy and timeframe for adoption, submitted by LVBC and approved by the Council of Ministers 3. A regional strategy on water hyacinth monitoring and control, submitted by LVBC and approved by the Council of Ministers 4. Number of identified water hyacinth hotspots with active monitoring and removal activities
Intermediate Results Indicators	1. Regional standards for industrial and municipal effluent discharges for adoption by participating countries in place 2. Fisheries Management Plan (FMP) updated 3. GIS-based database and WRIS developed and information available for public access 4. Harmonized monitoring protocols and schedules in place
Key Outputs of Component 1: Strengthening institutional capacity for managing shared water and fisheries resources (linked to the achievement of the Objective/Outcome 1)	1. Water and Fisheries policies as well as regional standards for industrial and municipal effluent discharges prepared and fisheries management plan updated (Subcomponent 1.1) 2. GIS-based database and WRIS developed (Subcomponent 1.2) 3. Harmonized monitoring protocols and schedules in place (Subcomponent 1.2) • Integrated Water Resources Management Plan (IWRMP) for the Lake Victoria Basin Part-I (Assessment Report); • The East African Community (EAC)/Lake Victoria Basin Water Resources Management Policy; • EAC Lake Victoria Basin Water Resources Management Bill prepared; • Lake Victoria Fisheries Management Plan III developed;

	• Harmonized policy on fisheries and aquaculture management and agreement on a strategy and timeframe; • Biennial Fisheries Frame Surveys in 2010, 2012, 2014 and 2016; fish stock assessments, Catch Assessments and Hydroacoustic Surveys conducted; consolidated reports for each of these produced; • Synthesis report on the state of dagaa in Lake Victoria released by Lake Victoria Fisheries Organization (LVFO) on quantity, quality, value addition, utilization and trade in the East African region for improved nutrition, food security and income; • Fisheries and Aquaculture Policy for EAC; • Guidelines for Establishment and Operation of Cage Fish Farming in EAC; • Harmonized Fisheries and Aquaculture Border Inspection Manual for the EAC; • Regional Fisheries Guideline for Species Specific Licensing for Lake Victoria; • Regional Strategy on Water Hyacinth Monitoring and Control; • Water Hyacinth Surveillance and Management Strategy for the Lake Victoria Basin; • Basin-Wide Sustainable Land Management Strategy developed; • Harmonized Standards for Industrial and Municipal Effluent Discharge into Water Bodies in the Lake Victoria Basin; • Options for Establishing the Lake Victoria Environmental Fund (LVEF) and Identification of Potential Sources of Financing developed; • GIS based database for the land use, hydrology and biodiversity, and Water Resources Information System (WRIS) for monitoring surface and ground water, and water quality developed; • GIS Based Regional M&E and Management Information System (MIS), including Website Feedback Mechanisms and an Internal Communication System to facilitate information sharing developed; • Guideline for sharing data, information and knowledge among and within countries and agencies in Lake Victoria Basin developed; • Harmonized monitoring protocols and schedules in place; • LVBC equipped with the Research Vessel “RV Jumuiya” with a Hydrolab and a Boat to support water and fisheries research;

- LVBC Resource Centre upgraded and strengthened with both physical and virtual resources and content including an institutional web-based repository and an online public catalogue.

Kenya

- Water hyacinth harvesting equipment and its auxiliaries for mechanical water hyacinth control procured;
- Water quality laboratory in Kisumu rehabilitated with state-of-the-art equipment
- Synthesis Report on monitoring of fishing grounds pollution undertaken from 2010 to 2016 produced;
- Silt-trap equipment to monitor nutrient and sediment losses from land use and covers in Nyando River Basin procured and installed;
- Heavy Utility Aluminium boats, 4 sets of outboard engines, and open Sesse Canoes to support fisheries research and management in Lake Victoria by relevant Kenya institutions procured.

Tanzania

- Water Laboratories in Mwanza, Musoma and Bukoba rehabilitated;
- Marine Rescue Coordination Centre (MRCC) in Mwanza strengthened with communication equipment including Radio System (2 VHF/DSC, 2 MF/HF) and office equipment;
- 3 Patrol Boats and its accessories acquired to strengthen fisheries surveillance in Lake Victoria;
- Monitoring report on water hyacinth coverage in the main lake, satellite lakes, rivers and dams in 2016 produced.

Uganda

- Report and technical report on monitoring and surveillance of water hyacinth and other invasive aquatic weeds with an updated geo-referenced map showing water hyacinths hotspots, cover abundance (ha) in the western zone of Lake Victoria and Ssesse Islands produced;
- The third edition Monograph on Pollution Levels in Lake Victoria and its Impact on Fish produced;

	• Training manuals and brochure on management of fish parasites in Uganda produced, based on: a) technical report on fish disease surveillance and control strategies in Uganda; (b) technical report on socio-economic aspects of fish diseases on the environment in Lake Victoria basin, Uganda; • Inner Murchison Bay (IMB) Pollution Management and Investment Strategy developed, including reports: a) pollution management and investment strategy for the IMB and its catchment; b) bankable project for pollution management and strategic investments in the IMB catchment; • Two water quality laboratories in Entebbe and Kampala upgraded; • Operational research reports for fisheries sector produced, including: a) characterization, identification and mapping of fish breeding and nursery grounds for gazettement and protection; b) identification and characterization of potential aquaculture sites and aqua parks where draft guidelines on the development, management and monitoring of cage culture on Lake Victoria and associated rivers; c) gazetting of fish breeding areas and monitoring of gazetted fish breeding and nursery grounds to ensure compliance to the guidelines; d) economic valuation of fish catches through Catch Assessment Surveys.
Objective/Outcome 2 of the restructured PDO: "to contribute to the improvement of environmental management of targeted pollution hotspots"	
Outcome Indicators	1. Number of urban pollution hotspots addressed through investments to control wastewater pollution
Intermediate Results Indicators	1. Number of preliminary technical designs for wastewater treatment facilities completed 2. Number of sanitation facilities (public/schools) constructed/provided 3. Number of people provided with access to improved sanitation facilities under the project 4. Number of targeted industries trained on Cleaner Production Technologies 5. Percentage of targeted industries adopting cleaner production in-plant assessments and/or generated cleaner production options 6. Number of locations equipped with aids to navigation
Key Outputs of Component 2: Point source pollution control and	• 16 preliminary technical designs for wastewater treatment facilities produced: Kenya 9, Tanzania 5, Uganda 2;

prevention (linked to the achievement of the Objective/Outcome 2)	• 187 sanitation facilities (public/schools) constructed /provided under the project: Kenya 82, Tanzania 72, Uganda 35; • 332,595 people provided with access to improved sanitation facilities under the project: Kenya 134,439, Tanzania: 136,330, Uganda 61,856; • 422 targeted industries trained on Cleaner Production Technologies: Kenya 138, Tanzania 118, Uganda 166. • 41% of targeted industries adopted cleaner production in-plant assessments and/or generated cleaner production options: Kenya 47%, Tanzania 51%, Uganda 30%; • 37 locations (Kenya 10, Tanzania 15, Uganda 12) and 8 routes equipped with aids to navigation. **LVBC** • Consolidated report on baseline measurements for industries pollution load and GIS mapping for RECP produced; • Capacity building provided 4 National Cleaner Production Centres (CPCs of Kenya, Rwanda, Tanzania and Uganda) and the Implementing Agency of Burundi including procurement of 3 vehicles for CPCs of Kenya, Tanzania and Uganda; • Design, supply, and installation of navigation aids finalized for 37 sites covering 8 navigation routes in and around Lake Victoria; • RECP sector specific manuals produced; • Equipment for training on response to oil spill and toxic chemicals incidents on Lake Victoria supplied and the trainings carried out for relevant actors such as Maritime and Ports Authorities, vessel operators, and BMUs; **Kenya** • Feasibility studies, designs EIA reports for sewerage treatment facilities in Kisumu, Homa Bay and Bomet produced; • Training provided to Homabay and Bomet ETPs Utility companies to strengthen their Operations and Maintenance capacity continuous effluent monitoring;

	• Procured and distributed twelve (12) exhausters to support on-site sanitation services in Kisumu - 2, Migori -1, Siaya - 2, Homabay -1, Kericho -2, Bomet – 1, Busia 2 & Nandi 1; • Feasibility studies and detailed designs prepared for additional 4 pollution hotspots: a) special sewer lines for Kisumu port and Homa-bay pier; b) artificial wetlands for Kisumu and Homa-bay Sewerage Treatment Plants; c) additional sewerage system for western part of Kisumu City; e) Oyugis and Londiani towns sewerage treatment facilities; • 80 toilets constructed (30 bio-toilets constructed under this component while 50 VIP & Eco-san toilets constructed through CDDs) serving a total of 134,439 people. **Tanzania** • detailed technical designs and ESIAs prepared for: a) Bukoba sludge disposal facility; b) Mwanza City abattoir and artificial wetland; c) design for households' connections in Mwanza City; d) design for simplified sewerage system for Mabatini & Igogo; • Feasibility study and detailed design prepared for: a) Bukoba sewerage system; b) wastewater treatment at Mwanza north and south ports; c) ESIA report for Musoma sewerage system; • Bukoba sludge disposal facility constructed; • Mwanza sewer-line connection extended to cover additional 300 households; • Mwanza City Abattoir rehabilitated and an artificial wetland to treat effluent from the abattoir constructed; • A bio-digester for Mwanza the City abattoir for production of biogas constructed; • 72 public sanitation toilets constructed (31 constructed under this component, while 50 were constructed through CMIs/CDDs) serving a total of 136,300 people. **Uganda** • Feasibility studies detailed designs prepared for Ggaba and Kirinya wastewater treatment facilities; • Kirinya sewerage treatment facility constructed; • Nakivubo Channel desilted;

	• 6 sets of solid waste collection equipment procured and delivered to enhance the capacity of solid waste collection and provision of efficient sanitation services for Kampala City; • 35 public sanitation toilets constructed serving a total of 61,856 people.
Objective/Outcome 3 of the restructured PDO: "to contribute to the improvement of environmental management of selected degraded sub-catchments for the benefit of communities who depend on the natural resources of LVB"	
Outcome Indicators	1. Number of hectares under sustainable land management practices in the targeted sub-catchments
Intermediate Results Indicators	1. Number of individuals trained in improved sustainable land management (SLM) practices 2. Number of individuals adopting improved SLM under the project 3. Cumulative hectares of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments 4. Number of CDD subprojects implemented under the project
Key outputs of Component 3: Watershed management (linked to the achievement of the Objective/Outcome 3)	• 24,573 individuals trained in improved sustainable land management (SLM) practices: Kenya 11,102, Tanzania 11,000, Uganda 2,471; • 12,341 individuals adopted improved SLM practices under the project: Kenya 2,495, Tanzania 8,320, Uganda 1,526; • 2,272 hectares of degraded wetlands restored and/or rehabilitated by communities in targeted sub-catchments: Kenya 604, Tanzania 490, Uganda 1,178; • 630 CDD livelihood improvement sub-projects implemented under the project: Kenya 251, Tanzania 323, Uganda 56; • 47 water hyacinth hotspots with active monitoring and removal activities: Kenya 8, Tanzania 24, Uganda 15. **Kenya** • Wetlands management plans for Ombeyi, Dienosiyoiet, Kingwal, and Koyo wetlands through CMIs prepared; • agriculture and livestock sub-catchment management plans in 9 CMI sites in Nyando River Basin prepared and implemented.

	Tanzania • 24 CMIs within Simiyu River Basin in public areas and for public good implemented; • Integrated Simiyu Wetlands Management Plan prepared the; • Sayaka Forest Reserve Management Plan prepared. **Uganda** • 28 CMIs sub-projects implemented; • Katonga Catchment Integrated Plan developed, and a 30-member catchment management committee formed and commissioned.
Project coordination and management	
Intermediate Results Indicators	1. Communication notes, with summary reports on project achievements and progress on indicators, are made available to stakeholders at least on a quarterly basis. 2. M&E and MIS system implemented and updated according to schedule.
Key outputs of Component 4: Project coordination and management	**LVBC** • Produced three editions of counting the gains and supported 3 editions of LVBC readers digest as well as 2 policy briefs have been produced that contained Communication notes, with summary reports on project achievements and progress on indicators and disseminated these to stakeholders. Further made regular update on project progress on the project Portal and LVBC website at least on a quarterly basis; • Supported and contributed to the production of the LVB Atlas of Our Changing Environment • Held a successful Environmental Research and Scientific Conference to facilitate sharing of experiences, data, information and knowledge on management of LVB; • Facilitated 14 ordinary meetings and 3 extra-ordinary meeting of the Regional Policy Steering Committee for LVEMP II (reports of deliberation available at LVBC Secretariat);

- Facilitated the consideration of LVEMP II issues by the Sectoral Council of Ministers for Lake Victoria Basin;
- Produced quarterly and annual reports from 2009 to 2017;
- Undertook and coordinated the mid-term review for the project in 2012 jointly with World Bank;
- Coordinated the Production of Project completion Reports for APL 1 and 2;
- Developed a regional M&E-MIS system for the project and which was enhance or complemented by a variety of shared M&E tools, including: (i) Results framework tracking matrix; (ii) wastewater facilities including public sanitation monitoring template; (iii) comprehensive CDDs and CMIs data matrix that even includes Geographic coordinates; (iv) Cleaner production among others.

Kenya

- The project has produced 2 editions of their e-newsletter, held 5 Radio talk shows, produced 3 documentaries on NRM, water and Water hyacinth, 4 newspaper printed material, 1 brochure and numerous website postings that were widely disseminated to stakeholders;
- Supported and contributed to the production of the LVB Atlas of Our Changing Environment
- Regularly convened the Meetings of the National Policy Steering Committee (NPSC);
- Strengthen the national coordination capacity of the Implementing Agency through the National Project Coordination Team (NPCT) through procurement of project vehicles, ICT equipment and infrastructure, financial and procurement management and support for incremental project operating costs;
- Supported the operations and meetings of project organs including the National Policy Steering Committee (NPSC); National Technical Advisory/Steering Committees (NTAC), District Project Coordination Teams (DPCTs), Community Subproject Management Committees;
- Developed a national M&E/MIS system and complemented the regional system through standardized M&E tools;
- Produced quarterly and eight (8) annual reports from 2009 to 2017.

Tanzania

- The project has produced quarterly editions of their e-newsletter, held Radio talk shows, produced project publicity materials such as brochures and numerous website postings that were widely disseminated to stakeholders;
- Supported and contributed to the production of the LVB Atlas of Our Changing Environment
- Regularly convened the meetings of the National Policy Steering Committee (NPSC);
- Strengthen the national coordination capacity of the Implementing Agency through the National Project Coordination Team (NPCT) through procurement of project vehicles, ICT equipment and infrastructure, financial and procurement management and support for incremental project operating costs;
- Supported the operations and meetings of project organs including the National Policy Steering Committee (NPSC); National Technical Advisory/Steering Committees (NTAC), District Project Coordination Teams (DPCTs), Community Subproject Management Committees;
- Developed a national M&E/MIS system and complemented the regional system through standardized M&E tools;
- Produced quarterly and eight (8) annual reports from 2009 to 2017.

Uganda

- Produced semi-annual editions their e-newsletter, held Radio talk shows, produced a documentary on NRM, water and Water hyacinth, made numerous website postings that were widely disseminated to stakeholders;
- Supported and contributed to the production of the LVB Atlas of Our Changing Environment
- Regularly convened the Meetings of the National Policy Steering Committee (NPSC) and reports of the deliberations are available;
- Strengthen the national coordination capacity of the Implementing Agency through the National Project Coordination Team (NPCT) including procurement of project vehicles, ICT equipment and infrastructure, financial and procurement management and support for incremental project operating costs;
- Supported the operations and meetings of project organs including the National Policy Steering Committee (NPSC); National Technical Advisory/Steering Committees (NTAC), District Project Coordination Teams (DPCTs), Community Subproject Management Committees;

	• Developed a national M&E/MIS system and complemented the regional system through standardized M&E tools; • Produced quarterly and eight (8) annual reports from 2009 to 2017.

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Ladisy Chengula	Task Team Leader
Jane A. N. Kibbassa	Environmental Specialist
Maria Isabel Junqueira Braga	Team Leader
Nagaraja Rao Hashadeep	Team Leader, Team Member
Rahmoue Essalhi	Procurement Analyst
Dahir Elmi Warsame	Procurement Specialist
Harriet E. N. Kiwanuka	Procurement Specialist
Joel Buku Munyori	Procurement Specialist
Mercy Mataro Sabai	Financial Management Specialist
Michael Eriu Okuny	Financial Management Specialist
Moses Sabuni Wasike	Financial Management Specialist
Berina Uwimbabazi	Water Resources Management Specialist
Christian Albert Peter	Natural Resources Management Specialist
Donald Paul Mneney	Team Member
Edwin Nyamasege Moguche	Team Member
Ernst Lutz	Economist
Evarist Baimu	Legal Counsel
Muthoni Kaniaru	Legal Counsel
Grant Milne	Natural Resources Management Specialist
Herbert Acquay	Natural Resources Management Specialist
John Virdin	Natural Resources Management Specialist
John A Boyle	Social Specialist
Johannes Grijsen	Water Resources Management Specialist
Luis M. Schwarz	Finance Officer

Martin Fodor	Environmental Specialist
Michael Wong	Private Sector Development Specialist
Mohammed Khatouri	Monitoring and Evaluation Specialist
Mary C. K. Bitekerezo	Social Development Specialist
Victor Bundi Mosoti	Legal Counsel
Satoru Ueda	Water Resources Management Specialist
Yasmin Tayyab	Social Specialist
Supervision/ICR	
Jian Xie	Task Team Leader
Jane A. N. Kibbassa	Co-Task Team Leader
Herbert Oule	Co-Task Team Leader
Guoping Zhang	ICR Author
Yasmina Oodally	ICR Author
Nevena Ilieva	ICR Author
Stephen Ling	ICR Author
Lelia Croitoru	Economic Analysis Consultant
Monica Gathoni Okwirry	Team Member
Salimata D. Follea	Team Member
Raima Oyeneyin	Team Member
Okindo Ben Miranga	Environment Specialist
Emmanuel Muligirwa	Environment Specialist
Mary C.K. Bitekerezo	Environmental Safeguards Specialist
Suiko Yoshijima	Sr. Environmental Specialist
Harriet Nattabi	Water and Sanitation Specialist
Jumaine Hussein	Natural Resource Management Specialist Consultant
Shaffik Hoossein	Natural Resources Management Specialist
William Critchley	Watershed Management Consultant
Randall Brummett	Senior Fisheries Management Specialist
Michael Hammond	DRM Consultant

Amos Omondi Kochiyo	Consultant
Jayne Angela Kwengwere	Team Member
Yesmeana N. Butler	Team Member
Satoru Ueda	Team Member
Christian Albert Peter	Team Member
John Virdin	Team Member
Harriet E. N. Kiwanuka	Team Member
Marjorie Mpundu	Legal Counsel
Faustina Chande	Team Member
Berina Uwimbabazi	Team Member
Junko Nishikawa	Team Member
Hope Nanshemeza	Team Member
Boyenge Isasi Dieng	Social Safeguards Specialist

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY06	34.237	157,870.19
FY07	47.377	264,587.53
FY08	67.553	514,022.80
FY09	31.452	174,889.79
FY16	0.000	144.07
Total	**180.620**	**1,111,514.38**
Supervision/ICR		
FY09	10.672	58,986.15
FY10	22.262	163,471.41
FY11	34.077	141,508.62

FY12	33.338	166,831.89
FY13	34.650	205,994.96
FY14	38.389	289,440.21
FY15	65.851	350,036.48
FY16	52.115	307,976.10
FY17	45.527	230,967.75
FY18	32.751	240,516.65
FY19	0.050	70.02
Total	**369.680**	**2,155,800.24**

ANNEX 3. PROJECT COST BY COMPONENT[65]

	Sources of Financing (US$, millions)														
	IDA				GEF		Sida		Borrower		All Sources				
Components	**Original**	**AF**	**Total**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Original + AF**	**Actual**	**Actual (by component, %)**	**Actual (% of total costs)**
Component 1: Strengthening institutional capacity for managing shared water and fishery resources	**12.7**	**5.5**	**18.2**	**22.1**	**6.3**	**5.1**	**1.2**	**3.1**	**2.2**	**1.5**	**22.4**	**27.9**	**31.8**	**114**	**24**
1.1: Harmonization of policies, legislations, and regulatory standards	1.0			8.6	2.3	2.9	1.0	1.2	0.5	1.0	4.8		13.6		
1.2: Ecosystem monitoring and applied research	11.7			13.5	4.0	2.2	0.2	2.0	1.7	0.5	17.6		18.2		
Component 2: Point source pollution control and prevention	**26.8**	**8.5**	**35.3**	**27.6**	**0.0**	**0.0**	**7.0**	**6.7**	**3.4**	**1.0**	**37.2**	**45.7**	**35.3**	**77**	**27**

[65] The difference between the original project amount at approval and the actuals is due to exchange rate fluctuations since the start of the project: the appreciation of the U.S. dollar against the SDR. The Sida amount is higher because the Swedish krona appreciated against the U.S. dollar. This and additional inflation due to the delayed start of many activities imposed a considerable budget constraint in the latter stages of the project. The second restructuring reduced the allocation for Component 1 to allow for a significant increase in the SDR allocation (although only a modest U.S. dollar increase) for Component 3 (Watershed management) while keeping the overall SDR allocation to Component 2 (Point source pollution control and prevention) close to the original amount.

	Sources of Financing (US$, millions)															
	IDA				GEF		Sida		Borrower		All Sources					
Components	**Original**	**AF**	**Total**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Original + AF**	**Actual**	**Actual (by component, %)**	**Actual (% of total costs)**
2.1: Rehabilitation of wastewater treatment facilities	25.8			25.6					2.6	0.9	28.4		26.5		
2.2: Promotion of cleaner production technologies				1.7			3.2	4.3	0.3	0.02	3.5		6.0		
2.3: Pollution risk management and safety of navigation	1.0			0.3			3.8	2.4	0.5	0.1	5.3		2.8		
Component 3: Watershed management	**42.3**	**4.0**	**46.3**	**35.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.3**	**1.2**	**43.6**	**47.6**	**36.3**	**76**	**28**
3.1: Natural resources conservation and livelihoods improvement	36.0			25.1						0.9	36		26.1		
3.2: Community capacity building and participation	6.3			9.9					1.3	0.3	7.6		10.2		
Component 4: Project coordination and management	**8.2**	**4.0**	**12.2**	**19.9**	**0.7**	**1.9**	**1.8**	**1.4**	**0.9**	**4.1**	**11.6**	**15.6**	**27.4**	**176**	**21**
4.1: Project coordination and communication	3.5			16.7	0.45	1.7	1.8	0.9	0.5	4.0	6.25		23.4		

	Sources of Financing (US$, millions)														
	IDA				GEF		Sida		Borrower		All Sources				
Components	**Original**	**AF**	**Total**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Actual**	**Original**	**Original + AF**	**Actual**	**Actual (by component, %)**	**Actual (% of total costs)**
4.2: Monitoring and Evaluation (M&E)	4.7			3.2	0.25	0.2		0.4	0.4	0.1	4.95		4.0		
TOTAL	**90.0**	**22.0**	**112.0**	**104.6**	**7.0**	**7.0**	**10.0**	**11.1**	**7.8**	**7.8**	**114.4**	**136.8**	**130.8**	**96**	**100**

Note: Breakdown by subcomponent was not available for the AF. Slight differences are due to rounding. The AF Project Paper mentioned a prospective parallel financing of US$0.5 million equivalent from CIWA which did not materialize and is not included in this annex.

ANNEX 4. EFFICIENCY ANALYSIS

1. **Economic analysis.** The efficiency analysis in the ICR is benchmarked against what would be expected in the operation's sector. The economic analysis of the PAD generated positive results for the overall project (NPV of US$31.9 million and an economic IRR of 15 percent) and for different clusters of activities such as fishery management, watershed management, rehabilitation of sewerage facilities, and introduction of cleaner industrial production technologies.[66] However, several assumptions used to arrive at these results were not realistic (for example, considering a 25 percent decline of waterborne illnesses as a result of improving sewerage systems and a tenfold increase of agricultural yield due to SLM practices[67]) while other assumptions were not explained.[68] Therefore, it is not possible to repeat the same analysis to provide direct comparisons with the PAD results. Thus, this section provides an economic analysis of selected project activities, for which data were available or realistic assumptions could be made (sections 1–5), and an ex post incremental cost analysis related to the GEF funds (section 6).

A. Scope and Limitations

2. It is important to note that the analysis in this ICR was subject to data limitations, partly due to the cost of carrying out comprehensive monitoring, which the project could not cover: (a) data related to reduced erosion from watershed measures, waste discharge in rivers, and treated wastewater quantity were not available; (b) the additional data collected at project completion often relied on sampling and interviews (for example, a sample of farmers to quantify the average changes in crop yields) and (c) the completion of some activities toward the end of the project did not allow for actual data reflecting the project results to be collected, rather reasonable assumptions were made based on future expected benefits. For instance, rehabilitation of the abattoir in the city of Mwanza,[69] Tanzania, was finalized in 2017, just as the project was closing, making it impossible to collect data on its operation and impacts (for example, increased meat production, reduction in wastewater, savings in water use) before the end of the project. However, realistic assumptions are made on the expected benefits of the interventions, which are expected to lead to savings in water use and reduction in wastewater. Ideally, if the above data had been available, the results of this economic analysis would have been representative for the overall project.

[66] These are NPV = US$7.1 million, IRR = 14 percent for fishery management; NPV = US$13.9 million, IRR = 16 percent for watershed management; NPV = US$8.3 million, IRR = 15 percent for rehabilitation of sewerage facilities; and NPV = US$2.6 million, IRR = 15 percent for introduction of cleaner industrial technologies.

[67] The calculations used a benefit increase from US$141 per ha (year 1) to US$1,391 per ha (year 25) for cultivation of high-value forage and from US$217 per ha (year 1) to US$2,139 per ha (year 25) for cultivation of high-value forage intercropped with other cultivations.

[68] For example, for fishery-related activities, it was assumed that 'without the project', fisheries exports would decline by 8 percent by year; whereas 'with project', they would decline by 7.95 percent in year 1, 7.85 percent in year 2, 7.7 percent in year 3, 7.5 percent in year 4, and 7.25 percent in year 5 and onward.

[69] It is very difficult to compare this cost with that in other countries, because (a) it is related to the rehabilitation of an existing abattoir through modernized equipment, which is different than the cost of constructing a new abattoir, and (b) it depends on specific factors such as capacity, types of animals, and their processing requirements.

3. However, given the abovementioned limitations, this economic analysis aims to show some of the economic benefits of selected project activities[70] for which data were available or realistic assumptions could be made. Within these limitations, every effort was made to analyze some representative activities for each country, to provide meaningful—albeit partial—estimates of the project's economic impacts.

B. Project Benefits

4. **The project generated several benefits, some of which are on-site benefits, that is, that occur (are produced) on the same site of the ecosystem (e.g. wood from forests; agricultural crops from agricultural land)**

(a) **Increased agricultural yields due to the adoption of SLM approaches,** for example, increased maize production by 0.4 tons per ha due to the establishment of napier grass strips on maize cultivation in Kenya; additional 10 kg per boat of fish catch due to removal of water hyacinth in Tanzania; production of sunflower oil (130 liters per year) as a result of building a sunflower oil processing facility in Tanzania;[71] about 66 percent of CDD subprojects in Tanzania provided positive gross margins for their initial turnover.

(b) **Increased forest production**, for example, through poles and timber from plantations of eucalyptus and bamboo in Kenya.

(c) **Health benefits resulting from water and sanitation improvements**, to which the project most likely contributed to, for example, by building household connections for 290 households to the main sewer line in Kirumba-Mwanza (Tanzania), by increasing the coverage of sewerage in Homa Bay town (Kenya), and by constructing toilet facilities on Lake Victoria's shore (Tanzania).

5. **The project also generated off-site benefits, that is, those that occur outside the ecosystem (externalities), e.g. forests help reduce sedimentation in reservoirs that are located far away from them.** These include reduced pollution and sedimentation of Lake Victoria due to rehabilitating existing sewer networks (for example, in Homa Bay, Kenya); connecting households to main sewer lines (for example, in Kirumba-Mwanza, Tanzania); clearing water hyacinth and building sanitation facilities along Lake Victoria's shore (for example, in Sengerema District, Tanzania); introducing cleaner technologies in industrial processes (for example, rehabilitation of Mwanza City abattoir in Tanzania); and silt removal from channels in Uganda.

6. Although no measurements are available to quantify the actual reduction of sediment load and pollution in Lake Victoria, the project contributed to this goal by reducing point source pollution, as mentioned earlier. A part of this contribution is reflected through the case studies analyzed in the

[70] The cost of the selected project activities varies significantly for each activity. For example, the cost of hyacinth control in Katunguru-Sengerema District (case study 3) represents less than 1 percent of the cost related to Component 3 in Tanzania, while the cost of rehabilitating the abattoir in Mwanza (case study 1) accounted for 25 percent of the cost related to Component 2 in Tanzania (based on data from the Tanzania Project Completion and Results Report).
[71] The objective of this investment was to protect 60 m buffer zone of Simiyu River and improve livelihood activities in Kisesa Village, Meatu District (Lake Victoria Environmental Management Project II. Economic Analysis of Subprojects).

following section. For activities for which both costs and benefits could be estimated, CBA was applied, using a discount rate of 6 percent and a time horizon equal to the investment lifetime. In cases where benefits could not be valued, CEA was used to ensure that the lowest-cost options were adopted during implementation to achieve the development goals. Thus, the economic analysis covers a mix of CBA and CEA for the selected activities. All analyses are based on project information—for example, related to investment and O&M costs of different activities—as well as monitored data and literature review.

C. Economic Analysis of Selected Activities within Component 2

Case study 1. Rehabilitating the abattoir and constructing a biodigester in the city of Mwanza (Tanzania)

7. Without the project, the abattoir of Mwanza would have continued to operate below the required standards, causing negative externalities: unpleasant odors, flies, smoke, and air and water pollution. The project rehabilitated the abattoir through the following activities: improving meat inspection and hygiene, constructing a biodigester to generate electricity, and building a wastewater treatment facility (artificial wetland).

8. **Costs.** Using the disbursed costs per year and the O&M cost for the life after the end of the project the present value of costs is estimated at US$2.1 million (table 4.1).

9. Benefits started in January 2018 and include (a) increased meat production due to greater slaughtering capacity, estimated at US$306,500 per year;[72] (b) electricity benefits, generated by the biodigester, estimated at about US$16,400 a year;[73] (c) savings in water use due to improved infrastructure, valued at about US$6,700 per year;[74] and (d) positive externalities due to a cleaner environment (that is, reduced smoke, bad odors, and so on), estimated roughly through the community's willingness to pay for a cleaner environment, totaling about US$9,400 per year.[75] These positive externalities include reduced quantity of untreated water discharged in rivers (by about 315 m^3 per day[76]), reduced smoke and bad odors, and so on. Thus, the present value of measurable benefits is estimated at US$2.7 million.

[72] The value added of the rehabilitated abattoir consists in greater capacity of meat cut and improved hygiene, leading to increased quantity and quality of the product. Not all these attributes could be estimated in monetary terms due to a lack of information. However, a conservative proxy would be the net additional income due to expected increase in the number of animals and fees (115 additional cows per day × US$10.25 per cow × 260 days per year = US$306,500).
[73] The net electricity benefits are valued as the difference between electricity generated by the plant (535 kWh per day) and the electricity consumption due to the project (140 − 50 = 90 kWh per day), leading to 345 kWh per day. Using an electricity price of US$0.13, the total electricity benefits are estimated at US$16,400 a year (345 kWh × US$0.13 × 365 days).
[74] Estimated as 50 percent (savings) × US$1,114 per month (without the project) × 12 months = US$6,700 per year.
[75] Estimated as 4,215 local people × US$2.23 per person per year = US$9,400 (Ministry of Water and Irrigation, Lake Victoria Environmental Management Project II. Economic Analysis of Sub-projects. March 2018).
[76] National Project Coordination Team. 2018. *Project Completion and Results Report for the United Republic of Tanzania*, p. 19.

10. In conclusion, rehabilitating the abattoir in Mwanza City appears to be economically beneficial, with an IRR of 13 percent and a B/C ratio of 1.3. It should be noted that the estimated benefits depend on the actual number of animals that will be slaughtered by the abattoir.[77]

Table 4.1. CBA for the Rehabilitation of Mwanza City Abattoir (US$)

	2009–2015	2016	2017	2018	2019	2020	2030	Present Value
Costs								
Abattoir, wetland, and biodigester	**0**	406,800	406,800	0	0	0	0	**745,900**
Biogas generators, machineries, and so on	**0**	0	0	757,900	0	0	0	**636,400**
O&M for abattoir	**0**	0	0	66,700	66,700	66,700	66,700	**525,100**
O&M for biodigester and wetland	**0**	0	0	23,800	23,800	23,800	23,800	**187,800**
Total costs	**0**	406,800	406,800	848,400	90,500	90,500	90,500	**2,095,200**
Benefits								
Increased meat production	**0**	0	0	306,500	306,500	306,500	306,500	**2,177,000**
Electricity production	**0**	0	0	16,400	16,400	16,400	16,400	**116,300**
Cleaner environment	**0**	0	0	9,400	9,400	9,400	9,400	**66,600**
Cost savings (water use)	**0**	0	0	6,700	6,700	6,700	6,700	**47,500**
Cost savings (wastewater discharge)		n.e.	n.e.	n.e.	n.e.			
Total benefits	**0**	0	0	338,900	338,900	338,900	338,900	**2,670,100**
Net benefits (2 – 1)	**0**	−406,800	−406,800	−509,500	248,400	248,400	248,400	**574,900**
IRR = 13%								

Source: Ministry of Water and Irrigation. 2018. Lake Victoria Environmental Management Project II. Analysis of Sub-projects. Tanzania.
Note: n.e. = not estimated due to lack of information. Totals might not add up exactly due to rounding.

Case study 2. Connecting households to the main sewer line project in Mwanza City (Tanzania)

11. This activity connected 290 households to the main sewer line, with the objective of addressing the sanitation problem in the city, controlling pollution on the lake, and improving health in Kirumba and Kitangiri wards of Mwanza City. The present value of investment and O&M costs are estimated at

[77] Before rehabilitation, 230 cows and 125 sheep or goats were slaughtered every day. It is expected that the project would lead to 50 percent increase in the number of slaughtered cows, or 345 cows per day (based on interviews). A sensitivity analysis shows that the investment would not be beneficial if less than 310 cows a day will be slaughtered in the future. It is assumed that due to the construction of the wastewater treatment plant and other infrastructure for reduced water use, a higher number of cows slaughtered would not lead to increased pollution load.

US$702,500.[78] Annualized over a period of 15 years (duration of the investment) and considering a population served of 2,320,[79] this corresponds to a unit cost of US$31 per capita per year.

12. Available information indicates similar unit costs for other countries in Africa. In a review of costs related to different urban sanitation options, Dauday (2017)[80] estimated an annual cost of US$19–59 per capita of centralized (conventional) sewerage in developing cities of Africa and Asia. In addition, Dodane et al. (2012) calculated the cost of household connection of about US$40 per capita per year. Based on this information, the investment in household connection in Mwanza City is cost-effective. A deeper insight into the specific types of costs included in each investment would be helpful to provide a more accurate conclusion.

Case study 3. Training for the introduction of RECP in Leather Industries of Uganda (LIU)

13. Before project implementation, LIU operated without the necessary permits and used an incomplete wastewater treatment plant, causing serious negative impacts: discharge of untreated effluents, generation of noxious odor, and poor management of the generated leather and solid waste. The implementation of the RECP program during 2011–2016 had strong positive impact on the ground, leading to economic benefits—for example, cost savings due to reductions in consumption of raw materials, energy, and water—and environmental benefits—for example, 80 percent reduction in BOD, 70 percent reduction in COD, and improved aesthetics. An overview of the performance of the RECP program indicates a total cost in the order of US$1.7 million and direct savings of US$2.2 million, leading to a B/C ratio of 1.3.[81] Although no detailed disaggregated information is available related to these values, the estimated benefits account only for the direct savings, without consideration of the environmental positive impacts.

14. **Other activities: municipal waste collection and drainage maintenance in Kampala City, Uganda.**[82.] The lack of information did not allow a CBA/CEA to be conducted for other activities. However, individual success stories of the implementation of such activities indicate positive results. In Uganda, for example, Kampala City is one of the major sources of municipal pollution into Lake Victoria through Murchinson Bay. Before project implementation, it generated about 730,000 tons of solid waste per year, of which only 50 percent was collected and properly disposed of. The project provided solid waste management and drainage equipment to the KCCA. As a result, the amount of silt removed from channels draining into Lake Victoria increased from 21,000 to 44,000 tons per year.

D. Economic Analysis of Selected Activities within Component 3

Case study 4. Water hyacinth control in Katunguru-Sengerema District (Tanzania)

[78] Based on a capital investment of US$729,700 (2016 and 2017), O&M cost of US$2,200 (in 2018, with an annual increase of 10 percent due to wearing and tearing) and a period of 15 years.
[79] Ministry of Water and Irrigation. 2018. Lake Victoria Environmental Management Project II. Analysis of Sub-projects.
[80] Daudey, L. 2017. "Review Paper. The Cost of Urban Sanitation Solutions." *Journal of Water, Sanitation and Hygiene for Development*. doi: 10.2166/washdev.2017.058.
[81] World Bank. 2018. *Case Study: Leather Industries of Uganda*. RECP Implementation Status 2010-2016.
[82] Lake Victoria Basin Commission. 2018. *Building Knowledge from Field Experience. Case Studies. 2009-2017*. Lake Victoria Environmental Management Project II.

15. This activity aims to reduce pollution in Lake Victoria by controlling the spread of water hyacinth (clearing 4 ha along the shore) and the discharge of untreated wastewater (building a public toilet facility at the site). Clearing the water has already improved navigation and fishing in the pilot area.

16. **Costs.** The present value of the investment cost and the O&M during the lifetime of the investment is estimated at US$44,000 (table 4.2). The activity generated several benefits starting in 2015 and gradually increasing till 2018: (a) additional net income from fishing due to the increased number of fishermen (from 50 to 280), as well as increased number of catch (from 30 kg per boat per day to 40 kg per boat per day), during the fishing period (170 days per year); this was estimated at about US$6,300 per year, after 2018;[83] (b) additional net income from boat trips, as a result of water clearing from hyacinth, valued at US$700 in 2018 and afterward;[84] (c) other environmental benefits, such as reduced waste discharged in the river due to construction of toilet facility, reduced bad odors, and so on, which were not estimated in monetary terms. Overall, the present value of the measurable benefits is estimated at US$53,600.

17. The investment appears economically beneficial, with an IRR of 11 percent and a B/C ratio of 1.2. This is a conservative estimate, when compared with results obtained in other studies: for example, Wise et al. (2007) estimated that biological methods of hyacinth control can bring B/C ratios of over 5 in Moussapoula River in Central African Republic and about 30 in Nseleni River in South Africa.[85] It should be noted that the estimated benefits greatly depend on the continuous control of water hyacinth in Lake Victoria.

Table 4.2. CBA of Water Hyacinth Control (US$)

	2009–2011	2012	2013	2014	2015	2016	2018	2031	Present Value
Costs									
Capital investment[a]	0	7,200	7,200	7,200	0	0	0	0	**19,300**
O&M costs[b]	0	0	0	0	2,000	2,000	2,300	4,300	**24,700**

[83] This was estimated as (a) increased income for existing fishermen: 50 fishermen × 2 kg per day × US$2.2 per kg × 170 days = US$37,400; (b) increased income for new fishermen: 230 fishermen × 2 kg per day × US$2.2 per kg × 170 days = US$172,000. Overall, the total additional income is US$209,400 (a + b). Considering that only 3 percent of this figure represents net revenues for fishermen, this is equivalent to US$6,300. (World Bank. 2017. *The Sunken Billions Revisited: Progress and Challenges in Global Marine Fisheries*. Washington, DC: World Bank).

[84] Without the project, the total income from boat trips would be: 1 boat × 5 trips per day × 20 passengers per trip × US$0.3 per passenger per trip × 170 days per year = US$5,400. With the project, the total income from boat trips is 5 boats × 5 trips per boat per day × 10 passengers per trip × US$0.67 per passenger per trip × 170 days per year = US$28,500. The income differential between the two situations would be US$23,000. Considering that only 3 percent of this revenue represents net revenues (World Bank 2017; see footnote 58), this is equivalent to about US$700 per year.

[85] The Central African Republic case study showed that water hyacinth reduced the income of people utilizing the aquatic ecosystem for fishing and palm wine collection. In this situation biological control offered a cost-effective and sustainable solution to the problem. Water hyacinth on the Nseleni River in KwaZulu-Natal Province posed a threat to industry, water abstraction, and biodiversity. In this case study, an integrated approach using herbicide application and mechanical and biological control reduced the water hyacinth cover from 100 percent to less than 10 percent of the surface area five years. (Wise, R. M., B. W. van Wilgen, M. P. Hill, F. Schultess, D. Tweddle, A. Chabi-Olay, and H. Z. Zimmermann. 2007. *The Economic Impact and Appropriate Management of Selected Invasive Alien Species on the African Continent*. Council for Scientific and Industrial Research, South Africa.)

	2009–2011	2012	2013	2014	2015	2016	2018	2031	Present Value
Total costs (1)	0	7,200	7,200	7,200	2,000	2,000	2,300	4,300	**44,000**
Benefits									
Additional income from fishing	0	0	0	0	1,600	3,100	6,300	6,300	**48,100**
Additional income from boat trips	0	0	0	0	200	500	700	700	**5,500**
Environmental benefits[c]	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	**n.e.**
Total benefits (2)	0	0	0	0	1,800	3,600	7,000	7,000	**53,600**
Net benefits (2 – 1)	**0**	**–7,200**	**–7,200**	**–7,200**	**-200**	**1,600**	**4,700**	**2,700**	**9,600**
IRR = 11%									

Source: Ministry of Water and Irrigation. 2018. Lake Victoria Environmental Management Project II. Analysis of sub-projects. Tanzania.
Note: Totals might not add up exactly due to rounding; n.e. = not estimated due to lack of information.
a. It covers purchase of boat to support operations of water hyacinth control, other tools and construction of public toilet; b. O&M costs increase by 5 percent annually, due to the easy wear and tear of the equipment; c. Such as reduced waste discharge in the river.

Case study 5. Establishing napier grass strips on maize cultivation (Kenya)

18. This activity establishes napier grass strips on 1,760 ha of maize farms located on slopes between 20 percent and 40 percent, with the aim of reducing downstream erosion and, ultimately, sedimentation of Lake Victoria. This example illustrates a CBA of an average hectare of maize with napier grass strips.

19. The costs include investments (for example, establishment of structures, cultivation of napier) and O&M costs, with a present value of US$424 per ha. It is important to note that the O&M costs for this structure are relatively high (20 percent of the investment cost per year).

20. The activity provides several benefits: (a) incremental net returns from maize, estimated as the difference between net returns of maize with napier strips and that of maize without strips;[86] (b) net returns from napier grass, which is a source of feed for livestock;[87] and (c) reduced downstream erosion, which has not been quantified monetarily. The present value of benefits is estimated at US$542 per ha.

21. Overall, establishing napier grass strips appears to be beneficial, with an IRR of 10 percent and a B/C ratio of 1.3 (table 4.3). These results are in line with other studies in Kenya,[88] which show a similar IRR

[86] The additional net returns from maize were estimated as the difference between: (a) net returns from maize 'with napier strips': 35 bags of maize per ha × US$30 per bag × 20% gross margin = US$208 per ha (starting in 2016); (b) net returns from maize 'without napier strips': 20 bags of maize per ha × US$30 per bag × 20% gross margin = US$119 per ha (starting in 2014). See table 4.3 for the flow of benefits over time.
[87] The net returns from napier are estimated at 40 tons per ha × 0.048 ha of napier × US$30 per ton × 20% gross margin = US$11 per year.
[88] Atampugre, G. 2011. *Cost Benefit Analysis of Soil and Water Conservation Technologies Applicable to Green Water Management in the Saba Sub-catchment of the Upper Tana Catchment in Kenya*.

for the same investment and much higher for other structures (IRR = 18 percent for establishing bench terraces on maize farms and 13 percent for establishing contour bunds on maize).

Table 4.3. CBA of Establishing Napier Grass Strips on Maize Farms (1 ha, US$)

	2013	2014	2015	2015	2016	2020	2028	Present Value
Costs								
Investment	**167**	**0**	**0**	**0**	**0**	**0**	**0**	**158**
O&M costs	**0**	**30**	**30**	**30**	**30**	**30**	**30**	**266**
Total costs	**167**	**30**	**30**	**30**	**30**	**30**	**30**	**424**
Benefits								
Additional maize benefits (a − b)	0	−119	−49	23	93	97	104	**471**
- net returns with napier (a)	0	0	69	139	208	208	208	**1,457**
- net returns without napier (b)	0	119	118	116	115	111	104	**986**
Napier benefits (c)	0	0	0	0	11	11	11	**71**
Total benefits (a − b + c)	0	−119	−49	23	104	108	115	**542**
Net benefits	−167	−149	−79	−7	74	78	85	**118**
IRR = 10%								

Source: Ministry of Environment and Natural Resources. 2018. Effectiveness Measure of Lake Victoria Environment Programme II. Kenya.
Note: Totals might not add up exactly due to rounding.

Case study 6. Planting bamboo on riparian lands in Kenya

22. Planting bamboo along riverbanks in Kenya provides a variety of benefits, including poles, non-wood products, carbon sequestration, waste filtration, and erosion reduction on the banks of the river. This case study focuses on the planting of 41 ha of bamboo along riverbanks through co-management initiatives. The valuation has been done as follows:

- The costs cover the investment cost of plantation (about US$1,400 per ha planted), which occurs during 2013 (15 ha), 2014 (20 ha), and 2015 (6 ha); the O&M cost is negligible. Thus, the present value of the plantation cost is estimated at about US$41,000.

- The benefits include (a) revenues from pole sales, with a present value of US$1,500; (b) carbon sequestration, estimated at about US$440 per ha per year for a 10-year period,[89] which corresponds to a present value of US$78,700; and (c) sediment retention and waste filtering capacity, which were not estimated in monetary terms. Overall, the present value of the measurable benefits is US$80,200.

[89] The quantity of carbon sequestered in bamboo in Kenya is not known. However, worldwide research indicates that annual carbon accumulation rates are in the order of 8–14 tC per ha of bamboo (Yuen, et al. 2017. "Carbon Stocks in Bamboo Ecosystems Worldwide: Estimates and Uncertainties." *Forest Ecology and Management* 393: 113–138). Conservatively assuming that bamboo plantations in Kenya sequester only about 3 tC per ha per year, this corresponds to about 11 tCO_2e per ha per year (= 3 × 3.67). Using a shadow price of carbon of US$40 per tCO_2 (based on the minimum estimate provided by: World Bank. 2017. *Shadow Price of Carbon in Economic Analysis*), this is equivalent to an annual value of US$440 per ha. It is assumed that carbon is sequestered only during 2018–2027, after which the tree growth is less substantial.

23. Overall, the investment appears to be beneficial, with an IRR of about 15 percent and a B/C ratio of 1.9.

E. General Considerations

24. The results of the economic analyses for the three countries show that the selected activities were either economically beneficial or cost-effective, under the assumption of maintaining their sustainability in the future. Being the result of only partial analyses, these values cannot be extrapolated at the project or country level but nevertheless demonstrate a positive economic impact.

25. Other indicators estimated at a larger scale (project/component) also point to the project's cost-effectiveness. For example, the overall project generated a unit cost (US$154 per direct beneficiary[90] in Tanzania, Uganda, and Kenya) which is lower than that obtained in the parallel project - APL-2 (US$565 per direct beneficiary in Rwanda and Burundi[91]) and in the same range as that obtained in the Alexandria Coastal Zone Management Project[92] (P095925) (US$104 per direct beneficiary[93] in Egypt).

26. For Component 3, available results indicate an average cost for watershed management activities (for example, banks rehabilitation, progressive terraces) of about US$2,000 per treated hectare for Tanzania, Uganda, and Kenya.[94] This is in the same cost range as similar activities in other neighboring countries, such as Rwanda (lying between US$680 per hectare of progressive terraces in the Yanze and Kadahokwa watersheds and US$2,300 per hectare of riverbank rehabilitation in the Yanze watershed[95]). In general, it was noted that although no systematic project monitoring was done, the selected interventions were proven effective in East Africa, both in terms of soil conservation and increased crop yield (win-win).[96]

F. Incremental Cost Analysis

27. The PAD's incremental cost analysis assumed a baseline scenario with a cost of US$107.8 million[97] and a GEF alternative with an estimated cost of US$7 million,[98] contributing to the focal areas 'land degradation' and 'international waters'. The analysis suggested that, without the GEF alternative, the regional coordination activities, management plans, monitoring systems and capacity building would be less effectively developed and implemented. The GEF alternative was expected to support regional

[90] Estimated as total disbursements (US$130.75 million - based on annex 3 of this ICR) divided by the number of direct beneficiaries (846,673 - based on annex 1 of this ICR).
[91] Estimated as total disbursements (US$25,670,000 - based on annex 3, ICR for APL-2) divided by the number of direct beneficiaries (45,427 - based on annex 1, ICR for APL-2).
[92] Which sought to reduce land-based pollution to the Mediterranean Sea by adopting similar activities, for example, pollution reduction measures for wastewater treatment plant.
[93] Estimated as total disbursements (US$6,950,000) divided by the number of direct beneficiaries (66,613), based on the ICR for this project.
[94] Estimated as total disbursements for Subcomponent 3.1. Natural resources conservation and livelihood improvement (US$26,159,586, disbursement table prepared for this ICR) and the number of hectares under SLM (12,337 ha; see this ICR). The cost includes capital and maintenance cost during the project lifetime only.
[95] Based on: The Rehabilitation of Yanze and Kadahokwa Sub-projects. Government of Rwanda.
[96] WOCAT (World Overview of Conservation Approaches and Technologies). 2007. *Where the Land is Greener: Case Studies and Analysis of Soil and Water Conservation Initiatives Worldwide*. Berne, Switzerland.
[97] The figure covered funds from IDA (US$90 million), Sida (US$10 million), and borrowers (US$7.8 million).
[98] GEF International Waters focal area - US$6 million and Land degradation focal area -U S$1 million.

multicountry activities, to assist the project's overall coordination and to catalyze thinking and approaches on transboundary water and land management issues.

28. At project completion, the disbursed GEF grants amounted to US$7 million, or 100 percent of the estimated GEF cost at project appraisal. By supporting regional and in-country dialogue on SLM alignment across the basin, harmonization of policies and standards, and improved governance of transboundary water systems, the funds contributed to the achievement of several project targets. These are related to the two GEF focal areas for International Waters and Land degradation, within which the project resulted in key achievements and global environment benefits, under the following:

29. **Water quality.** The project generated regional standards for industrial and municipal effluent discharges for adoption by participating countries, GIS-based database and WRIS developed and available for public access, harmonized monitoring protocols and schedules, and training of 24,573 individuals (exceeding the target of 12,000 individuals) in improved SLM practices.

30. **Policy harmonization and collective transboundary action on water management.** The project produced a harmonized policy on water management and agreement on a strategy and time frame for adoption, a regional strategy on water hyacinth monitoring and control, and an updated FMP and a harmonized policy on fishery management, as originally proposed. Through these regional-level efforts, the project brought about commitments to harmonize policy reforms for improved management of transboundary resources.

31. **SLM.** The project reduced land degradation through adoption of SLM techniques that favor soil conservation (for example, terraces). As noted in section II B, Achievement of PDOs, many of the project's SLM activities, though within the sub-catchments that affect the lake, were located far away from the lake and from major rivers; as such, they might not yield erosion reduction benefits that could be measured within the project's lifespan.[99] However, following their success in other Eastern African countries, it is believed that these interventions would be sustained and even expanded in the future, thus generating erosion reduction benefits that could be measured in the long run.

32. In terms of efficiency in the use of GEF funds, the project leveraged co-financing from IDA (US$90 million), Sida (US$11.083 million), and borrowers (US$7.8 million), which together enabled the delivery of results and benefits in a meaningful manner. In addition, the project was delivered as part of the GEF Strategic Investment Program (SIP)[100] and supported its objectives through collaborative management of shared transboundary watersheds, improving cross-sectoral coordination and ecosystem information sharing among the national SLM investment programs.

33. **Implementation efficiency.** The project had a slow start and there were initial delays in achieving project effectiveness, for example, 10 months between Board approval and the effectiveness for Uganda and a year between Board approval and the official regional 'launch'. Implementation of a number of activities, such as municipal sewerage treatment facilities, took a much longer period than was originally planned. The physical interventions that were led by LVBC were implemented well – the cleaner

[99] This is because of (a) the relatively small areas treated under the project and (b) the long transport time for sediments originating from sub-catchments to reach the lake due to temporary sedimentation.
[100] Aligned with the TerrAfrica/SIP approach of cross-sectoral coordination and knowledge exchange.

production program and the navigation safety activities. As mentioned, the former was contracted out to the Kenya National Cleaner Production Centre (KNCPC). The latter mostly involved identifying and implementing a set of physical investments in navigation markers. The restructuring about three years after Board approval helped improve implementation, as discussed earlier. The national project teams did well on delivering a range of very diverse activities and investments which were met with a large degree of satisfaction from project communities and local leaders.

34. Project management costs were clearly underestimated at appraisal, with only about 10 percent of project funds (US$11.6 million) meant to support RPCT and three NPCTs, systems development, M&E, communication and outreach and other capacity-building. The high cost at completion (US$ 27.4 million) also reflects the AF and extended implementation period, as well as numerous knowledge management activities and conferences which should have been reported under Component 1, “Strengthening institutional capacity for managing shared water and fishery resources”. As seen in the key outputs by component table in Annex 1, several activities were carried out under this component which produced a sizeable amount of tangible outputs, including regional and national ecosystem monitoring studies and equipment that had been planned under Component 1.2, “Ecosystem monitoring and applied research”. At the same time, as mentioned earlier, the AF financing was not proportionate to the increased targets under components 2 and 3, suggesting that there were some efficiency gains made during project implementation.

35. Implementing the harmonization agenda and collaborative management also involved significant operational expenditures, higher than originally budgeted. Regional projects tend to have higher operational costs because of the numerous travel and mutual events. The emphasis that the project placed on coordination and knowledge exchange between the teams led to high transaction costs in travel and meetings (in this case, Tanzania, Uganda), which were exacerbated by the high per diems paid for travel. These were in line with agreed government and EAC frameworks for donor projects and were therefore difficult to change at the level of an individual project. The LVBC’s coordination activities partly duplicated the World Bank’s implementation support functions and could have been more narrowly focused on policy coordination and collation of standardized monitoring data. As noted in LVBC audit reports, the size and composition of teams that travelled for meetings was not always well justified and their corresponding benefits to the project objectives were not always self-evident.

36. Based on the modest economic analysis and implementation efficiency, the project's efficiency is assessed as Modest.

ANNEX 5. BORROWER, CO-FINANCIER, AND OTHER PARTNER/STAKEHOLDER COMMENTS

1. The borrowers of LVEMP-II APL-1, including the LVBC, Kenya, Tanzania, and Uganda, all rated the World Bank performance as Satisfactory while providing remarks for appreciation and comments for improving the World Bank's support for the project preparation and implementation. The major appreciations and comments are described in the following paragraphs.

Areas the World Bank Team Performed Well

2. **Financial mobilization and disbursement.** The World Bank, as an international development partner, mobilized financial resources from other partners such as GEF, Sida, and NDF, among others, toward the implementation of the project, thereby helping consolidate the attainment of the development outcomes.

3. **Procurement facilitation.** The World Bank provided guidelines which effectively guided teams in various aspects of procurement. To further strengthen procurement across project teams, the World Bank organized targeted procurement clinics for relevant project staff, which built the capacity of project teams in executing procurement under the project. Further the World Bank procurement specialists were available for consultation on various aspect of procurement.

4. **Technical support and supervision.** The World Bank played a pivotal role in cultivating functioning relations between national and regional tiers of the project in cognizance of the subsidiarity principle for LVEMP-II APL-1 as a pioneer transboundary regional project and carried out extended adequate technical supervisions and support. The World Bank staff involving hired consultants during the missions added knowledge and experiences which contributed to building capacity of project staff as well as providing directions. The World Bank managed to balance regional and national outlooks when deciding issues of project implementation.

5. **Working relation and communication.** The World Bank staff had a generally positive and supportive attitude when working with NPCTs. There were prompt and regular communications with the NPCTs, especially after the introduction of national TTLs, and there was increased close support and faster decision-making, for example, regarding 'no-objections'.

Areas the World Bank Team Needs to Improve

6. **Procurement.** Delays were constantly experienced for most project teams in the issuance of 'no-objections' for various procurements for goods, works, and consultancy.

7. **Disbursement.** The initial funds disbursement took as long as six months for some teams, thereby delaying the commencement of implementation. Further, there were some delays in clearance of withdrawal applications. The World Bank should aim to reduce the gap between project effectiveness and initial funds disbursement and speed up issuance of 'no-objections' and or providing feedback to ensure these are done within stipulated World Bank timelines.

8. **Implementation support.** There was a high turnover of TTLs (five in eight years) during the project implementation, which had an impact on the project. In particular, the change of the TTL responsible for

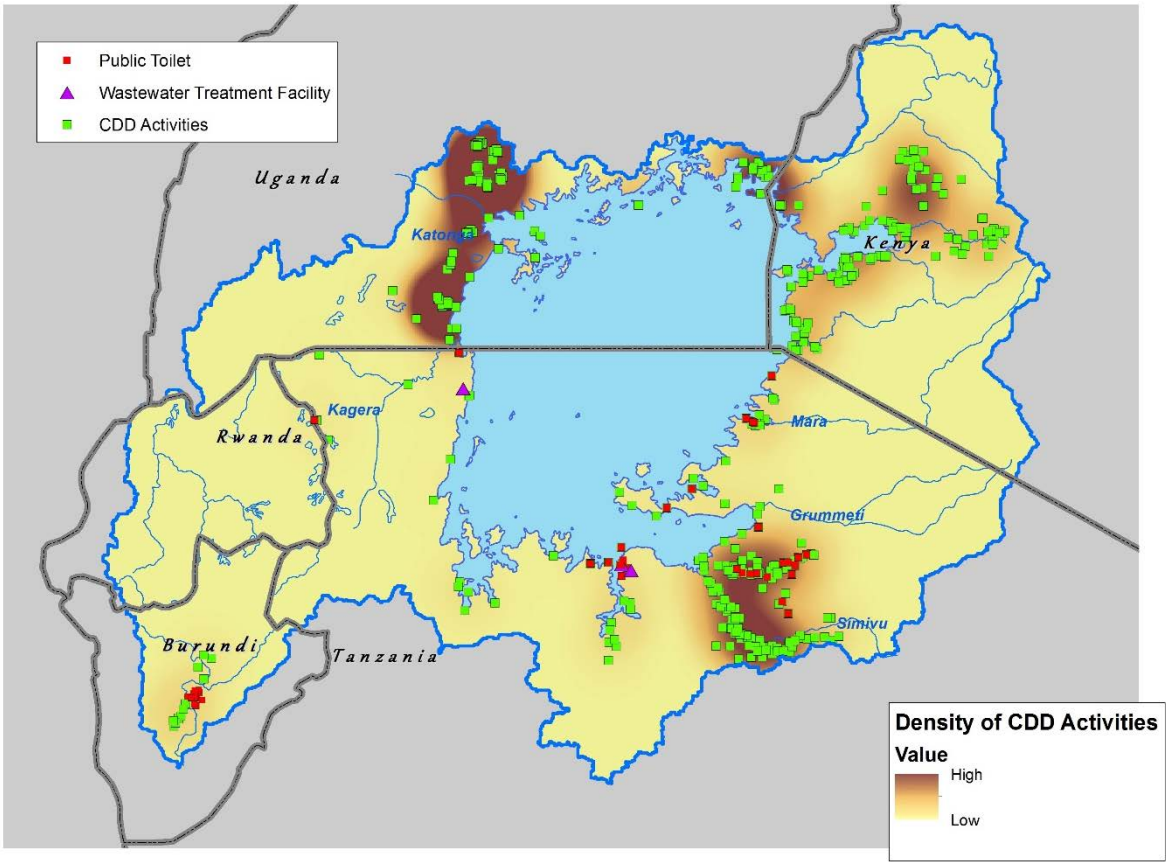
preparation of the project immediately after start of the project in 2009 had marked delays as the new TTL required some time to fully understand the project.

9. The composition of the World Bank task team and supervision missions could have included a specialist responsible for guiding project teams on M&E issues, including designing and setting up of the M&E system to meet the project data requirements.

ANNEX 6. SUPPORTING DOCUMENTS

- Project Appraisal Document for the Lake Victoria Environmental Management Project II, Report No. 45313, February 3, 2009.
- Aide Memoire for the Mid-Term Review Mission and Workshop of the Lake Victoria Environmental Management Project II APL-1; September 5 to 16, 2011.
- Restructuring Paper on a Proposed Restructuring of the Lake Victoria Environmental Management Project II APL-1, Report No. 68287-AFR, June 20, 2012.
- Project Paper on Proposed Additional Credits of US$10 million each to the Republic of Kenya and the United Republic of Tanzania and a Proposed Additional IDA Grant of US$2 million to the East African Community, Report No. PAD1279, May 4, 2015.
- Numerous Implementation Status Reports and Aide Memoires.
- Consolidated Project Completion Reports of LVEMP-II APL-1 prepared by the LVBC, 2018.
- Project Completion Reports prepared by the National Project Coordination Team of Kenya, 2018.
- Project Completion Reports prepared by the National Project Coordination Team of Tanzania, 2018.
- Project Completion Reports prepared by the National Project Coordination Team of Uganda, 2018.

ANNEX 7. LVEMP II APL 1 and APL 2 Map



Source: World Bank 2018. Location of CDD activities, wastewater treatment facilities, and public toilets implemented/constructed under LVEMP-II APL-1 and APL-2.