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PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT IN THE AMOUNT OF SDR 60.6 MILLION
(US\$93.75 MILLION EQUIVALENT)

AND A

PROPOSED IDA GRANT
IN THE AMOUNT OF SDR 20.2 MILLION
(US\$31.25 MILLION EQUIVALENT)

AND A

PROPOSED GRANT FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND
IN THE AMOUNT OF US\$5.08 MILLION

AND A

PROPOSED GRANT FROM THE
LEAST DEVELOPED COUNTRIES FUND
IN THE AMOUNT OF US\$1.5 MILLION

TO THE

REPUBLIC OF MALAWI

FOR A

SHIRE RIVER BASIN MANAGEMENT PROGRAM (PHASE-I) PROJECT APL
IN SUPPORT OF THE FIRST PHASE OF THE
SHIRE RIVER BASIN MANAGEMENT PROGRAM

MAY 23, 2012

Environment and Natural Resources Management Unit (AFTEN)
Sustainable Development Department
Southern Africa Country Department-3 (AFCS3)
Africa Region

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CURRENCY EQUIVALENTS
(Exchange Rate Effective March 15, 2012)

Currency Unit	=	MK
MK166	=	US\$1
US\$ 1.55	=	SDR 1
 FISCAL YEAR		
July 1	–	June 30

ABBREVIATIONS AND ACRONYMS

AAL	Annual average loss
AfDB	African Development Bank
APL	Adaptable Program Loan
BoQ	Bill of Quantities
CABS	Common Approach to Budget Support
CAS	Country Assistance Strategy
CBA	Cost Benefit Analysis
CBO	Community Based Organization
CCA	Climate Change Adaptation
CCC	Catchment Conservation Committee
CCP	Climate Change Program
CIG	Common Interest Group
CPC	Civil Protection Committee
CPP	Community Participation Procurement
CSO	Civil Society Organization
DA	Designated Account
DAECC	District Agricultural Extension Coordination Committee
DADO	District Agricultural Development Office
DCCMS	Department of Climate Change and Meteorological Services
DDRMO	District Disaster Risk Management Officer
DEC	District Executive Committee
DEM	Digital Elevation Model
DfID	UK Department for International Development
DFO	District Forestry Officer
DLRO	District Land Resources Office
DLRC	Department of Land Resources and Conservation
DNPW	Department of National Parks and Wildlife
DNRDM	Department of National Relief and Disaster Management
DoE	Department of Energy
DoF	Department of Forestry
DoI	Department of Irrigation
DoS	Department of Surveys
DPD	District Planning Department/District Planning Director
DWR	Department of Water Resources
DSS	Decision Support Systems
EAD	Environmental Affairs Department
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EPA	Extension Planning Area

ESCOM	Electricity Supply Company of Malawi
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
FBO	Farmer Based Organization
FFEWS	Flood Forecasting and Early Warning System
FM	Financial Management
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographic Information System
GoM	Government of Malawi
GSM	Global System for Mobile Communication
GV	Group Village
HH	Households
Hydromet	Hydro-meteorological
IBA	Important Bird Area
ICB	International Competitive Bidding
IFMIS	Integrated Financial Management Information System
IFR	Interim Financial Report
IFRMP	Integrated Flood Risk Management Plan
IP	Implementing Partner
IPC	Internal Procurement Committee
IT	Information Technology
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
LDCF	Least Developed Countries Fund
MWDI	Ministry of Water Development and Irrigation
MASAF	Malawi Social Action Fund
masl	Meters above sea level
MCC/A	Millennium Challenge Corporation/Account
MCDP	Micro-Catchment Development Plan
MDG	Millennium Development Goal
M&E	Monitoring and Evaluation
ME&L	Monitoring, Evaluation and Learning
MEDP	Ministry of Economic Planning and Development
MEM	Ministry of Energy and Mining
MGDS	Malawi Growth and Development Strategy (2006-2011)
MGDSII	Second Malawi Growth and Development Strategy (2011-2016)
MIS	Management Information System
MLGRD	Ministry of Local Government and Rural Development
MLH	Ministry of Lands and Housing
MECCMS	Ministry of Environment and Climate Change Management
MoAFS	Ministry of Agriculture and Food Security
MoF	Ministry of Finance
MoU	Memorandum of Understanding
MTPW	Ministry of Transport and Public Works
MTC	Ministry of Tourism and Culture
MVAC	Malawi Vulnerability Assessment Committee
MCDP	Micro-Catchment Development Plan
NAPA	National Adoption Programme of Action

NSDC	National Spatial Data Centre
NDVI	Normalized Difference Vegetation Index
NGO	Non Governmental Organization
NLGFC	National Local Government Finance Committee
NPV	Net present value
NWDP-II	Second National Water Development Project
OCC	Opportunity cost of capital
ODPP	Office of the Director of Public Procurement
O&M	Operation and maintenance
OPC	Office of the President and Cabinet
ORAF	Operational Risk Assessment Framework
PA	Protected area
PDO	Project Development Objective
PFM	Procurement and Financial Management
PIP	Project Implementation Plan
PIU	Project Implementation Unit
PMU	Project Management Unit
PP	Procurement Plan
PPA	Project Preparation Advance
PRA	Participatory Rural Appraisal
PS	Principal Secretary
PSC	Program Steering Committee
PTC	Program Technical Committee
RAP	Resettlement Action Plan
RRA	Rapid Rural Appraisal
SESA	Strategic Environmental and Social Assessment
SLM	Sustainable Land Management
SLWM	Sustainable Land and Water Management
SRBMP	Shire River Basin Management Program
SRBMP-I	Shire River Basin Management Program (Phase-I) Project
SPU	Special Procurement Unit
SRB	Shire River Basin
TT	Technical Team
UNDP	United Nations Development Program
UNFCC	United Nations Framework Convention on Climate Change
VAP	Village Action Plan
VDC	Village Development Committee
VFA	Village Forest Area
VNRMC	Village Natural Resources Management Committee
WB	World Bank
WMO	World Meteorological Organization
WRA	Water Resources Area
WRB	Water Resources Board
WRIS	Water Resources Investment Strategy

Regional Vice President:	Makhtar Diop
Country Director:	Kundhavi Kadiresan
Sector Director:	Jamal Saghir
Sector Manager:	Idah Pswarayi-Riddihough
Task Team Leader:	Nagaraja Rao Harshadeep/ Pieter Waalewijn

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PAD DATA SHEET

Malawi

Shire River Basin Management Program (Phase-I) Project

PROJECT APPRAISAL DOCUMENT

Africa

AFTEN

Basic Information	
<p>Date: May 23, 2012</p> <p>Country Director: Kundhavi Kadiresan</p> <p>Sector Manager/Director: Idah Z. Pswarayi-Riddihough / Jamal Saghir</p> <p>Project ID: P117617</p> <p>Lending Instrument:: Adaptable Program Loan</p> <p>Team Leader(s): Nagaraja Rao Harshadeep / Pieter Waalewijn</p>	<p>Sectors: General water, sanitation and flood protection sector (40%); General agriculture, fishing and forestry sector (30%); Flood protection (10%); Public administration- Water, sanitation and flood protection (10%); Irrigation and drainage (10%)</p> <p>Themes: Water resource management (30%); Other environment and natural resources management (30%); Rural services and infrastructure (20%); Biodiversity (10%); Natural disaster management (10%)</p> <p>EA Category: A (Full Assessment)</p>
Does the project include any CDD component? Yes	
<p>Global Supplemental ID: P127866</p> <p>Lending Instrument: GEF/LDCF grant</p> <p>Focal Area: Biodiversity, Land Degradation, Sustainable Forest Management</p> <p>Environmental Assessment: Full Assessment</p> <p>Supplement Fully Blended?: Yes</p>	<p>Team Leader: Nagaraja Rao Harshadeep</p> <p>Sectors: General agriculture, fishing and forestry sector (60%); Forestry (30%); Flood protection (10%)</p> <p>Themes: Biodiversity (40%); Climate change (30%); Other environment and natural resources management (30%)</p>
Joint IFC: n/a	
Borrower: Republic of Malawi	
Responsible Agency: Ministry of Water Development and Irrigation	
<p>Contact: Mr. Sandram Maweru</p> <p>Telephone No.: +265 (0) 1 770 344</p>	<p>Title: Principal Secretary</p> <p>Email: wpcchipeta@yahoo.com</p>
Project Implementation Period: 5.5 yrs. Start Date: June 14, 2012 End Date: January 31, 2018	
Expected Effectiveness Date: August 1, 2012	
Expected Closing Date: January 31, 2018	

Project Financing Data(US\$M)									
<input type="checkbox"/>	Loan	<input checked="" type="checkbox"/>	Grant	<input type="checkbox"/>					Other
<input checked="" type="checkbox"/>	Credit	<input type="checkbox"/>	Guarantee						
For Loans/Credits/Others									
Total Project Cost :			US\$ 145.6m		Total Bank Financing :		US\$ 125.0m		
Total Cofinancing :			US\$ 6.58 m		Financing Gap :		US\$ 0.0m		
Financing Source				Amount(US\$M)					
BORROWER/RECIPIENT				11.3					
Beneficiaries				2.8					
IDA: New				125.0					
GEF				5.08					
LDCF				1.5					
Financing Gap				0.0					
Total				145.6					
IDA Expected Disbursements (in US\$ Million)									
Fiscal Year	13	14	15	16	17	18			
Annual	8.8	23.8	35.5	34.8	16.6	5.4			
Cumulative	8.8	32.6	68.1	102.9	119.5	125.0			
GEF & LDCF Expected Disbursements (in US\$ Million)									
Fiscal Year	13	14	15	16	17	18			
Annual	1.1	2.1	1.6	1.0	0.5	0.28			
Cumulative	1.1	3.1	4.7	5.8	6.3	6.58			
Project Development Objective(s)									
<p>Program Development Objective: <i>Increase sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources.</i> The program would have a duration of 15 years. The first phase project would establish coordinated inter-sectoral development planning and coordination mechanisms, undertake the most urgent water related infrastructure investments, prepare additional infrastructure investments, and develop up-scalable systems and methods to rehabilitate sub-catchments and protect existing natural forests, wetlands and biodiversity. Future phases would consolidate Basin planning and development mechanisms and institutions, undertake further infrastructure investments, and up-scale catchment rehabilitation for sustainable natural resource management and livelihoods.</p> <p>Project Development Objective (PDO): <i>Develop Shire River Basin planning framework to improve land and water management for ecosystem and livelihood benefits in target areas.</i> The project would: (a) strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems; (b) invest in water related infrastructure that sustainably improves water resources management and development; (c) reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing environmental services, agricultural productivity and improving livelihoods; (d) improve flood management in the Lower Shire and provide community level adaptation and mitigation support; and (e) protect and enhance ecological services infrastructure in the Basin.</p>									
Components									
Component Name				Cost (USD Millions)					
COMPONENT A: SHIRE BASIN PLANNING				41.6					
COMPONENT B: CATCHMENT MANAGEMENT				45.0					
COMPONENT C: WATER-RELATED INFRASTRUCTURE				59.0					

Compliance			
Policy			
Does the project depart from the CAS in content or in other significant respects?	Yes []	No [x]	
Does the project require any exceptions from Bank policies?	Yes []	No [x]	
Have these been approved by Bank management?	Yes [x]	No []	
Is approval for any policy exception sought from the Board?	Yes []	No [x]	
Does the project meet the Regional criteria for readiness for implementation?	Yes [x]	No []	
Safeguard Policies Triggered by the Project	Yes	No	
Environmental Assessment OP/BP 4.01	x		
Natural Habitats OP/BP 4.04	x		
Forests OP/BP 4.36	x		
Pest Management OP 4.09	x		
Physical Cultural Resources OP/BP 4.11	x		
Indigenous Peoples OP/BP 4.10		x	
Involuntary Resettlement OP/BP 4.12	x		
Safety of Dams OP/BP 4.37	x		
Projects on International Waters OP/BP 7.50	x		
Projects in Disputed Areas OP/BP 7.60		x	
Legal Covenants			
Name	Recurrent	Due Date	Frequency
Co-Financing Financing/GEF Grant Agreements: Article V	no	Effectiveness	-
Description of Covenant: The Additional Condition of Effectiveness consists of the following, namely, that the GEF Grant Agreement and the LDCF Grant Agreement have been executed and delivered and all conditions precedent to their effectiveness or to the right of the Recipient to make withdrawals thereunder (other than the effectiveness of this Agreement) have been fulfilled			
Name	Recurrent	Due Date	Frequency
Institutional Arrangements Financing/GEF Grant Agreements: Schedule 2 IA; LDCF Grant Agreement: Article II 2.03	yes	Throughout project implementation	-
Description of Covenant: Provisions requiring maintenance of relevant institutional arrangements (Program Steering Committee, Program Technical Committee, Multi-Sector Technical Team) and staffing to enable implementation.			
Name	Recurrent	Due Date	Frequency
Implementation Covenants Financing/GEF Grant Agreements: Schedule 2 IB; LDCF Grant Agreement: Article II 2.03	yes	Throughout project implementation	-
Description of Covenant: Provisions requiring implementation of project in accordance with the Project Implementation Plan and preparation of regular Annual Work Plans.			
Name	Recurrent	Due Date	Frequency
Subgrants Financing/GEF Grant Agreements: Schedule 2 ID; LDCF Grant Agreement: Article II 2.03	yes	Throughout project implementation	-
Description of Covenant: Provisions requiring community subgrants to be carried out according to criteria and procedures acceptable to the Association.			
Name	Recurrent	Due Date	Frequency
Safeguards Financing/GEF Grant Agreements: Schedule 2 IE; LDCF Grant Agreement: Article II 2.03	yes	Throughout project implementation	-

Description of Covenant: Provisions requiring the Project to be carried out in accordance with the provisions of the Safeguard Instruments and Bank Safeguard Policies.

Name	Recurrent	Due Date	Frequency
Safeguards Financing/GEF Grant Agreements: Schedule 2 IE7(iii)	no	September 1, 2017	-

Description of Covenant: The Recipient shall furnish to the Association for review, no later than September 1, 2017 or the date on which at least 95% of the Financing has been disbursed, whichever occurs earlier, operational procedures with respect to the dams constructed or upgraded under the Project.

Name	Recurrent	Due Date	Frequency
Safeguards Financing/GEF Grant Agreements: Schedule 2 IE7(iv)	no	Six months prior to upgraded barrage commissioning	-

Description of Covenant: A Dam Operation and Maintenance Plan no later than six (6) months prior to the commissioning of the upgraded Kamuzu Barrage

Name	Recurrent	Due Date	Frequency
Project Reporting, Monitoring and Evaluation Financing/GEF Grant Agreements: Schedule 2 II; LDCF Grant Agreement: Article II 2.04, 2.05	yes	Throughout project implementation	-

Description of Covenant: Provisions requiring the Recipient to monitor and evaluate project process and prepare regular project reports, maintain a financial management system and provide quarterly interim unaudited financial reports and audited annual Financial Statements.

Name	Recurrent	Due Date	Frequency
Procurement Financing/GEF Grant Agreements: Schedule 2 III; LDCF Grant Agreement: Article II 2.06	yes	Throughout project implementation	-

Description of Covenant: Provisions requiring the Recipient to undertake procurement according to the agreed methods and procedures.

Name	Recurrent	Due Date	Frequency
Withdrawal of the Proceeds of the Financing Financing/GEF Grant Agreements: Schedule 2 IV; LDCF Grant Agreement: Article III	yes	Throughout project implementation	-

Description of Covenant: Provisions requiring the Recipient to withdraw proceeds of the Financing in accordance with the agreed categories of Eligible Expenditures and applicable guidelines.

Name	Recurrent	Due Date	Frequency
Repayment Schedule Financing Agreement: Schedule 3	yes	Throughout project implementation	-

Description of Covenant: Provisions requiring the Recipient to undertake repayment of the Credit according to the agreed schedule.

Team Composition

Bank Staff

Name	Title	Specialization	Unit
Nagaraja Rao Harshadeep (TTL)	Sr. Environmental Specialist	Water Resources, Environment, Spatial Analysis	AFTEN (DC)
Pieter Waalewijn (Co-TTL)	Water Resources Management Specialist	Irrigation, Water Resources	AFTWR (Malawi)
Cary Anne Cadman	Sr. Forestry Specialist (former TTL)	Forestry, Natural Resources Management	AFTOS (earlier AFTEN, Malawi)
Grant Milne	Sr. Natural Resources Management Specialist	Watershed/Catchment Management	SASDA (DC)
Stephen Ling	Environment and Natural Resources Management Specialist	Natural Resources, Climate Change	AFTEN (DC)
George Ledec	Lead Ecologist	Environmental Safeguards/Enhancement, Ecology	AFTEN (DC)
Cheikh Sagna	Sr. Social Development Specialist	Social Safeguards/ Enhancement	AFTCS (Mozambique)
Marjorie Mpundu	Senior Legal Counsel	Legal	LEGAF
Luis Schwarz	Senior Finance Officer	Finance	CTRLA

Frauke Jungbluth	Senior Rural Development Economist	Program Coordinator	AFTEN
Hardwick Tchale	Sr. Agricultural Economist	Agriculture	AFTAR (Malawi)
Stephen Mhone	Procurement Specialist	Procurement	AFTPC (Malawi)
Trust Chimaliro	Financial Management Specialist	Financial Management	AFTFM (Malawi)
Francis Mkandawire	Financial Management Specialist	Financial Management	AFTFM (Malawi)
Dalitso Kafuwa	Natural Resources Management Specialist	Natural Resources Management	AFTEN (Malawi)
Francis Nkoka	Disaster Risk Management Specialist	Climate Resilience	AFTWR (Malawi)
Zeria Banda	Communications Officer	Communications	AFRFC
Rimma Dankova	Disaster Risk Reduction Specialist	Economic Analysis (Kamuzu Barrage)	AFTWR (DC)
Alessandro Palmieri	Lead Dam Specialist	Barrage/Dam Safety	OPCQC (DC)
Ademola Braimoh	Sr. National Resources Management Specialist	Land Degradation Modeling	ARD (DC)
Almudena Mateos	Young Professional	Operational Assistance	Former AFTEN (DC)
Reto Thoenen	Energy Specialist	Renewable Energy; Charcoal	Former AFTEG (Mozambique)
Petros Akililu	Institutional Development Specialist	Institutional Development	AFTEN
Gayatri Kanungo	Environmental Specialist	GEF/LDCF Processing	AFTEN
Hrishikesh Patel	GIS Specialist	Spatial Analysis	AFTEN
Jayne Kwengwere	Program Assistant	Team Assistance (DC)	AFTEN (DC)
Grace Chilambo	Team Assistant	Team Assistance (Malawi)	AFMMW (Malawi)
Agi Kiss	Regional Environmental and Safeguards Advisor	Quality Enhancement	ESCOQ (DC)
Xiaokai Li	Sr. Water Resources Management Specialist	Quality Enhancement	EASIN (DC)
Rita Cesti	Sr. Rural Development Specialist	Quality Enhancement	OPCQC (DC)
Winston Yu	Sr. Water Resources Management Specialist	Quality Enhancement	AFTEN (DC)
Non Bank Staff			
Name	Title	City	
Frits Ohler, FAO TL	Sr. Agricultural Officer	FAO/CP, Rome	
Jean Risopoulos	Economist	FAO/CP, Rome	
Pamela Pozarny	Rural Sociologist	FAO/CP, Rome	
Ross Hughes	Environment and Natural Resources Specialist	Maputo	
Jonathan Denison	Project Implementation Planning Support Specialist	E. London, SA	
B.K. Ranganath	Monitoring and Evaluation Specialist Indian Space research Organization	Bangalore	
Paul Jere	Sustainable Land Management Specialist	Lilongwe	
Mekuria Tafesse	Basin Institutional Specialist	Addis Ababa	
Lulseged Tamene	Catchment Erosion Modeler	Lilongwe	
Matthew Owen	Biomass Energy	Maputo	
Mark Heggli (Innovative Hydrology)	Real-time Hydromet System Specialist	Sacramento, CA	

Locations					
Country	First Administrative Division	Location	Planned	Actual	Comments
Malawi	Southern Malawi	Shire Basin (all areas below are associated with the Shire Basin)			
	Blantyre District	Selected catchments in the escarpment area upstream of Kapichira hydropower plant	33,000 ha		
	Chikhwawa District	Flood-prone villages, Elephant Marshes and Lengwe National Park			
	Machinga District	Kamuzu Barage, Liwonde National Park, and part of the selected <i>Chingale</i> catchment (see Zomba)	10,000 ha		
	Mangochi District	Liwonde National Park and Mangochi Forest Reserve			
	Neno District	Selected <i>Wamkulumadzi</i> catchments, Tsamba and Neno Eastern Escarpment Forest Reserves, upstream of Kapichira hydropower plant	33,000 ha		
	Ntcheu District	Selected <i>Lisungwe</i> catchments upstream of Kapichira hydropower plant	26,000 ha		
	Nsanje District	Flood-prone villages and Elephant Marshes			
	Zomba District	Selected <i>Chingale</i> catchments upstream of three hydropower plants and Blantyre water intake	31,000 ha		

I. STRATEGIC CONTEXT

A. Country Context

1. Malawi is a landlocked country with a population of slightly more than 13.5 million. As one of southern Africa's most densely populated countries, Malawi's young and growing population is expected to reach 22.8 million by 2025.¹ Approximately 85 percent of Malawi's population lives in rural areas with the majority engaged in smallholder, rain-fed agriculture. While agriculture is the main source of Malawi's economic growth, about 40 percent of GDP and over 90 percent of total export earnings, the high level of subsistence farming is a major contributor to poverty. In 2005, approximately 52 percent of the population was living below the poverty line. About 56 percent of the rural population is living in poverty, compared with approximately 25 percent of the population in urban areas.² Malawi is one of the world's poorest countries and is ranked 171 out of 187 countries on the United Nations Human Development Index (UNDP, 2011). Gross National Income (GNI) per capita is US\$290.

2. Malawi has experienced uninterrupted solid growth from 2006-2010 with real GDP growth averaging about 7.4 percent, compared to an average of 2 percent for 1999-2004, amid a decline in inflation to mid-single digits. This robust growth was largely supported by sound economic policies. In addition to a positive macroeconomic environment, good weather and a fertilizer subsidy program have also made significant contributions to agriculture growth -mainly attributed to smallholder producers, and in particular, improvements in maize yields that have led to a significantly enhanced food security situation.

3. Persistent external imbalances compounded by the reduced donor inflows, low tobacco proceeds together with other supply-side bottlenecks have contributed to the weakening of macroeconomic performance over the past year. This has, in turn, contributed to a widening of balance of payment and budget gaps and the slowdown in real economic activities. This has resulted in persistent fuel supply and foreign exchange availability constraints. However, with a recent change in Presidency, Malawi has opened a new window of opportunity to implement reforms to address its serious and long standing economic and governance challenges. The Government has already reached out to key stakeholders including civil society, development partners, and countries in the region. It has also indicated that the top priorities are to address economic, security and social concerns. On the economic side, the Government supports urgent steps to restore macro stability, and would support flexibilization of the exchange rate, with full attention to its impact on the poor. Substantial discussions with the IMF have commenced to restore the IMF program and with the Millennium Challenge Corporation (MCC) to revive the energy compact.

4. Over 70 percent of all farmers cultivate less than one hectare and a significant number struggle to produce enough food to meet their consumption requirements. Between 1967 and 2003 the country experienced six major droughts that had a cumulative impact on 21 million people. The impact of drought is felt mainly by smallholder farmers. Eighteen incidences of floods occurred between 1967 and 2003 affecting 1.8 million people, resulting in loss of life, infrastructure destruction (including roads, rail and homes), crop loss, food insecurity, and health impacts (diarrhea, cholera and malaria).

¹ US Census Bureau, International Database, 2011

² Malawi Poverty and Vulnerability Assessment, 2007

5. Only eight percent of the population has access to electricity: thirty percent of urban households and less than one percent of rural households. Ninety-eight percent of current electricity generation is from run-of-river hydropower plants on the Shire River.³ Installed hydropower capacity is 285 MW, less than demand, and unable to meet peak demand owing to frequent equipment breakdown and environmental factors such as sedimentation and increasing aquatic weed growth. The planned expansion of generation capacity within the middle Shire cascade would further increase dependence on the Shire River for power generation.

6. The adverse economic, social and environmental impacts of these challenges are acute in the Shire River Basin. Given the economic and social importance of the Basin for national growth and development, it is critical to address the root causes of the deteriorating environment and natural resources base in the basin to ensure sustainable growth and poverty reduction.

B. Sectoral and Institutional Context

7. The Lake Malawi–Shire River hydrological system represents Malawi’s single most important natural resource system (see Maps 1&2). The Shire provides water for a number of productive purposes, including: hydropower, agriculture, fisheries, transport, tourism, urban water supply and rural water users along the length of the river, in addition to various environmental functions. The Shire River originates at Lake Malawi and flows for 520 km through the Southern Region of Malawi; it is joined by numerous rivers and streams, and merges with the Zambezi River in Mozambique. The Upper Shire is situated at around 470 meters above sea level (masl) and flows on a very shallow gradient through Lake Malombe to the Kamuzu Barrage at Liwonde, constructed in 1965 to partially control the water level and Shire flows to the benefit of hydropower generation in the Middle Shire. However, structural stability of the barrage is in danger, and regulatory capacity of the barrage is constrained due to the manual operating regime and state of maintenance of Barrage and hydro-meteorological (hydromet) system. Historically, the water level of Lake Malawi fluctuated over seven meters. Before the Kamuzu Barrage was constructed, water flows in the Shire River varied strongly and in some years even fell dry. With increasing climate variability, there are concerns that the existing Kamuzu Barrage would not provide sufficient buffering capacity to ensure continuous water flows. Reduced outflow into the Shire River could cause serious social and economic disruption to Malawi.

8. After Liwonde the Middle Shire flows across a broad plain descending only seven meters in 50 km. It then drops steeply by 360 meters over a distance of around 70 km through a series of rapids and falls, some of which have been harnessed to provide hydropower. The Lower Shire emerges below the falls at Kapichira to flow across a wide floodplain with a minimal gradient of 10 meters in 90 km. The river then flows through an expansive floodplain wetland – including the Elephant marshes – that supports extensive dry season agriculture, high levels of biodiversity and a productive fishery. These wetlands also play an important role in reducing downstream sedimentation and flooding. The Lower Shire hosts large areas of traditional and commercial agriculture (sugar), and adjacent to the river, more than half a million people live in areas that are vulnerable to droughts and floods.

³ “Run-of-river” means that there is little or no capacity to store and control the flow of water upstream of the power generation stations except small pondage for peaking; the amount of electricity that can be produced depends on the daily flow of the river.

9. High population density and poverty have led to significant human pressure on the environment and degradation of the Shire Basin's natural resource base, notable land and forests. The growing population expands land area under cultivation and exploits forests and woodlands for firewood and charcoal production. Deforestation, soil erosion and sedimentation form the most serious threats to the environment and natural resource base in the Shire River Basin, resulting in the increased incidence of erosion, run-off and flash floods. High loads of sediment are deposited in river beds, reservoirs and floodplain wetlands, affecting irrigation canals, fisheries and hydropower generation. Water resources are increasingly degraded through silt loads, sedimentation, eutrophication, biological contamination and effluents. Some tributaries pass through heavily cultivated areas, townships and cities, resulting in water pollution from agricultural run-off, and human and industrial waste, contributing to increased concentrations of nitrogen, phosphorus and heavy metals that generate adverse impacts on human health and accelerate growth of aquatic weeds. These problems are a direct result of catchment degradation, unsustainable land use and management practices, and increased use of chemical fertilizers without complementary soil and water conservation measures.

10. There is at present no institutional mechanism to coordinate integrated investment planning and systems operations for the Shire Basin, and there is no modern knowledge base and no modeling tools to support decision making. The Water Resources Act (1969) provided for the establishment of the national Water Resources Board (WRB), who would be responsible for control and development of water resources within catchment areas, monitoring and assessment of surface and groundwater resources, determination of investments, etc. Decisions on development of the water resources of the Shire have been taken on an ad-hoc and uncoordinated basis as each new need arises (i.e. river regulation, power generation, agricultural, urban and industrial water supply, Shire-Zambezi waterway project, management of major tributaries and ecological reserves).

11. At times of low flow, water resources are unlikely to be sufficient to meet all needs, and new proposals for development of hydropower, water supply and irrigation may potentially conflict with each other and with other established uses. The National Water Resources Investment Strategy (MWDI, 2011) highlights as key priorities the need to maintain inflows to the Lake Malawi-Shire system; development of significant inter-seasonal storage; coordinate especially hydropower and irrigation development. It also identifies priority strategic investment, ranking Kamuzu Barrage rehabilitation as highest priority, followed by water supply augmentation for Blantyre, additional hydropower and weed/sediment management on the Shire River. International collaboration on the Lake, enhanced data collection and management, including planning tools; multipurpose development planning and catchment management planning are identified as priority management measures.

C. Higher Level Objectives to which the Program Contributes

12. The Malawi Growth and Development Strategy II (MGDS-II, 2011-2016), recently approved by Cabinet, is the overarching medium term strategy to achieve long term aspirations as spelt out in Malawi's Vision 2020. The MGDS-II identifies six broad thematic areas: sustainable economic growth, social development, social support and disaster risk management, infrastructure development, improved governance, and cross-cutting issues. It further identifies nine key priority areas that have been drawn from the six themes.

13. The MGDS-II outlines plans to stimulate economic growth and development including a series of large-scale infrastructure investments in the Shire River Basin (irrigation, hydropower plants, restoration of transport links, flood mitigation works and mining). Such large scale investments may generate long-term and cumulative adverse environmental, social and economic impacts if the interlinked challenges of increasing population pressure on a degraded natural resources base, declining agricultural yields, rapid urbanization (driving demand for charcoal), unreformed land ownership, and weak institutional capacity to promote sustainable land and water management, are not addressed in an integrated, multi-sectoral fashion.

14. On January 18, 2012, the Minister responsible for Agriculture, Irrigation and Water Development sent a Letter of Sector Policy to the Bank concerning the need for a new, collaborative long-term vision and enabling institutional environment for a multi-sectoral approach to effectively and sustainably develop and use the Shire River Basin's resources, and confirming the Government's commitment to address the Basin's evolving challenges and realize its true potential for the benefit of Malawi and its growing population. The letter proposes a set of phased activities over a 15-year timeframe and an integrated program approach to establish coordinated inter-sectoral development planning and coordination mechanisms, aligned with the draft MGDS-II (see Annex 10).

15. The proposed Shire River Basin Management Program and the proposed project in support of the first phase of the program are designed to address these challenges in a comprehensive manner and are aligned with the draft MGDS-II's: Theme (1) Sustainable economic growth, in particular sub-theme (1.3) natural resources and environmental management, and sub-theme (1.5) rural development; Theme (3) Social support and disaster risk management, sub-theme (3.2), disaster risk management; Theme (4), Infrastructure development, sub-theme (4.1) water development; and Theme (6) Cross-cutting issues, sub-theme (6.2) capacity development. The project also addresses priorities identified in the Malawi National Biodiversity Action Plan and for climate change – the National Adaptation Plan of Action (NAPA).

16. The Bank has a long history of engagement with the Government of Malawi (GoM) supporting investments in the Shire Basin in the agriculture, energy, environment, irrigation, transport and water sectors as well as disaster risk reduction. Building on these investments, the opportunity to support GoM to adopt a comprehensive and integrated planning and development approach for the Shire River Basin will not only enhance the impact of these earlier investments but ensure the long-term sustainability of GoM's ambitious investment plans in the Basin.

17. The proposed program emerged out of the Bank's fourth Country Assistance Strategy, 2007-2010, which highlighted the interlinked challenges of natural resources base degradation, climate risk, energy production and institutional fragmentation. The program is a key element of the Bank's draft fifth Country Assistance Strategy (CAS) for Malawi, 2011–2016. The operation is also aligned with the Africa Strategy through investments in sustainable water infrastructure investments and agriculture (*Pillar 1: Competitiveness and employment*); through work on improving community climate resilience and hydro-meteorological services (*Pillar 2: Vulnerability and resilience*); and through building capacity and coordinating the work of key institutions related to the Shire Basin (*Pillar 3: Governance and public sector capacity*). The program focuses on strengthening the sustainable management of the environmental and natural resource base for the Shire River Basin to ensure improved and sustainable livelihoods, food security, water supply and electrical energy generation; essential elements to support sustainable

economic growth and poverty alleviation efforts. Program investments are aligned with all three pillars of the CAS: Theme 1 Promoting sustainable, diversified and inclusive growth; Results Area 1.3 Strengthening productivity in a diversified economy; and associated Outcome 2: Improved capacity to plan, manage and develop water resources for multipurpose use; and Theme 2 Enhancing human capital and reducing vulnerabilities; Results Area 2.2 Lowering vulnerability and enhancing resilience; Outcome 3 Sustained rural livelihoods and improved protection of investments dependent on the resource base; and Outcome 4 Enhanced capacity to respond to current and future climate and disaster risks; Theme 3: Mainstreaming Governance for Enhanced Development Effectiveness; Results Area 3.2 Improving Decentralization Capacities; Outcome 1: Improved fiscal and institutional decentralization capacities.

D. Link with the GEF and Least Developed Country Fund (LDCF) Strategies

18. The proposed project will be developed as an integrated multi-focal area project combining several GEF strategic goals, and one LDCF objective namely:

- The *Biodiversity Focal Area strategy* (BD#1) in that it will directly improve the sustainability of protected areas, forest reserves and floodplain wetlands covering roughly 2,900 km² (2.9 million hectares) and much of the remaining lowland forest and wetland habitats in the lower Shire, and globally significant biodiversity.
- The *Land Degradation Focal Area strategy* (LD#3) through supporting a cross-sectoral basin planning and management approach that integrates management of natural habitat blocks and responsible agencies including the Department of Parks and Wildlife and the Department of Forestry, and (LD#1) through the substantial investments being made in improved land and water management within agricultural landscapes within the parent project.
- The *Sustainable Forest Management Focal Area strategy* (SFM#1) through establishing community-based management within Forest Reserves in the lower Shire, following a nationally developed model. The project will also mainstream biodiversity conservation into landscape planning at both the basin and PA cluster levels.
- The *LDCF Climate Change Adaptation (CCA#1)* objective through supporting integrated broader community flood resilience program in the lower Shire floodplain to enable reduced vulnerability to extreme climate events (lives and damage saved through integrated flood management).

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

19. The overall **Program Development Objective** of the Shire River Basin Management Program (SRBMP) is to *increase sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources*. The SRBMP supports GoM's Shire Basin Letter of Sector Policy, and will have a duration of 15 years. The first phase project – the Shire River Basin Management Program (Phase-I) Project (SRBMP-I) – will establish coordinated inter-sectoral development planning and coordination mechanisms, undertake the most urgent water related infrastructure investments, prepare additional infrastructure investments, and develop up-scalable systems and methods to rehabilitate sub-catchments and protect existing natural forests, wetlands and

biodiversity, thereby beginning to address some of the most critical issues facing the Basin. This approach ensures a balance between building capacity for strategic planning and on-the-ground investments to address immediate needs. Future phases would scale up and broaden these activities based on lessons learned from the implementation of the first phase. A chart of the overall program is presented in Annex 2. The SRBMP is intended to serve as an integrating framework to synergize the work of all key institutions in the Basin. In this regard, it can be considered that other ongoing and proposed projects and programs are contributing to this overall framework. Other development partners supporting work on the Shire include UNDP/GEF (Public Private Sector Partnership on Capacity Building for Sustainable Land Management in the Shire Basin); JICA (Project for Community Vitalization and Afforestation in Middle Shire); and the Millennium Challenge Corporation (MCC – Environmental and Natural Resources Management Action Plan for the Upper Shire Basin).

20. The **Project Development Objective** (PDO) and the **Global Environmental Objective** (GEO) of the SRBMP-I would be to *develop Shire River Basin planning framework to improve land and water management for ecosystem and livelihood benefits in target areas*. The project would: (a) strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems; (b) invest in water related infrastructure that sustainably improves water resources management and development; (c) reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing environmental services, agricultural productivity and improving livelihoods; (d) improve flood management in the Lower Shire and provide community level adaptation and mitigation support; and (e) protect and enhance ecological services in the Basin.

B. Project Beneficiaries

21. **Direct project beneficiaries** would include some 430,000 people (50 percent female) in about 86,000 rural households (assuming 5 persons per HH), of which: (a) 230,000 people in approximately 45,000 households of targeted priority catchments in the Middle Shire that will benefit from integrated catchment rehabilitation activities; and (b) another 200,000 people in about 40,000 rural households of flood prone areas in the Lower Shire that will benefit from improved water management and flood mitigation works.

22. **Indirect project beneficiaries** include: (a) rural households located close to areas of natural forests and wetlands (including those within national parks and forest reserves and on adjacent customary land) whose improved management under the project will provide a more sustainable natural resource base and additional livelihood options; (b) the 30 percent of urban households, companies and public agencies in Malawi with access to electricity that will benefit from reduced downtime of the hydropower stations on the Shire; (c) the urban populations and industry of Blantyre and Limbe that depend for their drinking water of the Shire river, and reduced costs for Blantyre Water Board because of reduced silt loads and associated water treatment costs; (d) the commercial and communal irrigation sector; and (e) the fisheries sector in Lake Malombe through increased security of reliable water levels.

C. PDO Level Results Indicators

23. The SRBMP Program level results indicators over 15 years include: (a) change in percentage of people living below the poverty line in program areas (reduction by 10%); (b) high erosion area (>25 t/ha/yr) in targeted catchment areas (reduced by 15,000 ha); (c) total hydropower generation from the Shire Basin (20 percent increase); and (d) persons with access to improved flood management (increased by 250,000) (see Annex 1).

24. The SRBMP-I project PDO level results indicators include: (a) Shire Basin Plan developed by multi-sector Shire Basin Institution; (b) vegetation cover as a percentage of baseline in selected catchments (increased by ten percent); (c) downtime for hydropower plants on the Shire River (reduced by eight percent); (d) households in targeted (flood prone) areas re-classified to lower risk (20,000 HH); and (e) direct project beneficiaries (430,000) of which female (50 percent).

D. APL Triggers

25. The proposed triggers include a mix of institutional, policy and physical progress indicators, on basin planning, catchment planning, monitoring as well as flood management. These triggers are closely aligned with the proposed results indicators, so as to assure practicality and alignment in their monitoring. The triggers aim to reflect real progress on several project fronts, while allowing implementation flexibility. They also allow a second phase project to be processed concurrently to the SRBMP, to enhance program continuity and up-scaling depending on performance and need.

26. Moving from the first to the second phase of the APL will require attainment of six triggers: (i) an acceptable institutional mechanism to facilitate Shire Basin multi-sectoral development planning and coordination established and operational; (ii) real-time Shire Basin hydromet data collected for operational decision support system; (iii) harmonized national guidelines for catchment management developed; (iv) Kamuzu Barrage upgrading stage one civil works satisfactorily completed; (v) effective flood early warning system operational in the Lower Shire; and (vi) continued commitment by GoM to the Program. A full description of what achieving these triggers implies is included in Annex 1.

27. Moving from the second to the third phase of the APL would depend on attaining a second set of triggers. These would include: (i) the institutional mechanism to facilitate Shire Basin multi-sectoral development planning and coordination firmly embedded through an expanded legal mandate; (ii) Shire Basin Plan and Shire Basin Decision Support Systems effectively used by GoM to make decisions regarding infrastructure development for the use or management of the Basin's water resources; (iii) Kamuzu Barrage upgrading completed and its operations guided by a real-time decision support system; (iv) satisfactory progress observed in Phase I and Phase II targeted catchment areas in accordance with participatory catchment management plans; (v) flood management system improved for Lower Shire (with flood zones delineated, flood zoning policy formulated, and priority flood management investments prepared); and (vi) demonstrated continued commitment by GoM to the Program. These triggers will be reviewed for relevance and fine-tuning at the start of Phase II, while others may need to be added based on the prioritization of actions under the Shire Basin Plan and subsequent detailed design of the second phase of the APL within the broad parameters of the program.

III. PROJECT DESCRIPTION

A. Project Components

28. The project would address the interlinked challenges of poverty and a deteriorating natural resource base in the Shire Basin to reduce the process of environmental degradation and improve the productive potential of natural resources. The project would promote integrated climate resilient investment planning in the basin, including institutional capacity building to plan and monitor changes in land use patterns at a basin level. Project activities would also support strategic planning and implementation of large-scale infrastructure investments; adoption of sustainable land, forest and water management practices to reduce land degradation in production and natural landscapes, to build resilience to climate risk and to improve the productivity and incomes of smallholder farmers in priority catchments. The project would also improve flood management in the Lower Shire. Project investments would be designed to support the GoM's economic growth and development plans for the basin.

29. The SRBMP-I in support of the first phase of the SRBMP, will have a duration of five and a half years and is organized in three components (see also Annex 2): (a) Shire Basin Planning, (b) Catchment Management, and (c) Water Related Infrastructure. More detailed technical component description is provided in Annex 2, and a full detailed description is included in the Project Implementation Plan (PIP). Further details on GEF and LDCF financing support to specific activities are provided in Annex 9.

30. **Component A: Shire Basin Planning (US\$ 41.6 M)** seeks to *lay the foundation for more integrated investment planning and modernized system operations for the Shire Basin*. The component would finance development of a modern integrated Shire Basin knowledge base and analytical tools, as well as well-planned structured stakeholder consultation processes, in order to facilitate investment planning and systems operation. This component is critically required to move from the current fragmented approach to investments and systems operation, to a more coordinated and holistic approach based on a shared and sustainable vision for the development and management of the Shire Basin. A modern knowledge base with associated knowledge products will be created along with a basin planning decision support system to support a strategic multi-sectoral systems perspective in evaluating future investment possibilities. In addition, the component will support modernization of the water resources monitoring systems (including the development of real-time hydromet systems) and an operational decision support system to improve integrated hydromet data visualization and archival, support forecasting and early warning systems, and provide inputs for water systems infrastructure operations. The component will support institutional coordination mechanisms for basin planning and management for the basin's socio-economic development and environmental sustainability, and is organized in four sub-components.

(a) ***Sub-component A.1: Develop a Shire Basin Planning Framework***, with two activities:

(i) ***Shire River Basin Planning***. This activity would initially support the development of a structured knowledge base for the Shire Basin and associated knowledge products (hardcopy and interactive), including a Shire River Basin Atlas, a Shire State of the Basin Report, and other spatial analysis products (including technical and interpretive biodiversity and ecosystem knowledge products). The knowledge base would be strengthened through collation of existing data and information products, as well as through support for new surveys and mapping (e.g. of water resources, natural habitats, biodiversity, satellite imagery acquisition

and analysis, etc.). This knowledge base would provide the inputs to the development of a basin planning Decision Support System (Planning DSS), which will have a suite of modeling tools to help simulate, optimize, and compare investment choices that affect various aspects of the water systems. For example, it would help strategically inform decisions on the synergies and trade-offs among future investment paradigms in irrigation, hydropower, catchment management, flood management, and ecological infrastructure using criteria and indicators that capture the economic, environmental, and social development perspectives of the Shire Basin, as well as decisions relating to water allocation and design of operating principles/rules of water infrastructure within a holistic basin context. The activity would then support the development of a Shire Basin Plan (a rolling plan to be updated every few years) that is based on both the analysis supported by the Planning DSS as well as well-structured stakeholder participation. The stakeholder participation would be supported through the proposed Shire Basin Stakeholder Forum (with representatives from multiple stakeholders in basin management which will form a platform for debate and basin vision development) and other consultations to be conducted throughout the process. This activity would primarily support the acquisition and computerization of datasets, hardware, software, specialized consultancy inputs for the Basin planning process and development of a Planning DSS, stakeholder meetings, creation and dissemination of knowledge and analysis products, and associated operational costs. The work would be initially carried out by the Technical Team coordinating with various departments, and gradually be phased into the proposed Shire Basin Institution.

(ii) *Shire Basin Institution*. This activity would support the setting up and operationalization of a multi-sectoral Shire Basin institution to support long-term planning and management of the Shire Basin. The institution would be staffed by a multi-sectoral team of professionals representing various water-related sectors and support staff augmented by specialized technical skills for data and knowledge management, modeling, technical analysis, and stakeholder engagement. The institution is expected to become the knowledge and analysis hub for multi-sectoral water resources planning and management in the Shire Basin. It would help develop knowledge products, the Planning DSS, and organize and facilitate meaningful stakeholder consultations at various levels to support the basin planning process, including effective meetings of the Shire Basin Stakeholder Forum. It would also help build links with other knowledge partners, including academia, and facilitate the development of an integrated basin perspective for sectoral planning to improve resource sustainability and reduce resource conflicts at basin scale. This activity would also specifically address issues of institutional and financial sustainability of basin management and operational functions, including those related to water and weed management at Kamuzu Barrage. The sub-component would support the provision of specialist consultant inputs, civil works (office building), internships, communications, research and innovation, and operational costs (also see Annex 6). Support to the institution shall gradually decrease in follow-up phases as the institution is established.

(b) ***Sub-component A.2: Build Institutional Capacity for Coordinated Basin Management***, will strengthen the different line agencies involved in Shire basin management to more effectively carry out their respective roles in the Program. These agencies will include: Department of Water Resources (DWR) and Department of Irrigation (DoI) in MWDI; the Department of Land Resources and Conservation (DLRC) in the Ministry of Agriculture and Food Security (MoAFS); Department of Forestry (DoF) and its associated Forest Research Institute of Malawi and National Botanical Gardens and Herbarium, Department of Climate Change and Meteorological Services (DCCMS), and the Environmental Affairs Department

(EAD) in the Ministry of Environment and Climate Change Management (MECCM); the Department of Energy (DoE) of the of the Ministry of Energy and Mining (MEM); National Spatial Data Centre (NSDC) within the Department of Surveys of the Ministry of Lands and Housing (MLH); Department of National Relief and Disaster Management (DNRDM) of the Office of the President and Cabinet (OPC); Department of National Parks and Wildlife (DNPW) of the Ministry of Tourism and Culture (MTC); and external knowledge partners in areas such as forest planning, biodiversity assessment and fisheries. This sub-component would support improvement of building infrastructure, IT and office equipment, vehicles, specialized consultant inputs, training, internships, and other operating costs.

(c) ***Sub-component A.3: Improve Water Resources Information Systems***, with two sets of activities:

(i) **Modernization of the Water Resources Monitoring Network**: This would include support to modernize the monitoring of weather, water levels, flows, water quality, groundwater, and sediment loads. It is expected that this would result in a core network that provides information in real-time or quasi real-time (especially for hydromet parameters to be used for real-time decision support) using appropriate technology (including cellphones for existing readers, low-cost modern GSM or WMO-supported satellite telemetry). It is also expected to support the deployment and operation of what would be Malawi's only operational weather radar to support forecasting. It is expected that this will provide the backbone for a modern water resources information system, improved forecasting and early warning, and an operational decision support system. The activity would support supply, installation and operation of improved gauging systems, communication, data integration and quality management, and associated operating costs

(ii) **Operational Decision Support System**: This would include support for an integrated hydromet data visualization platform; weather, hydrologic, and flood forecasting and warning systems, and integrated water system infrastructure operations (especially for the upgraded Kamuzu barrage operations). The data visualization platform would help visualize archived, real-time, and forecast hydromet parameters and integrate information from gauging/radar, satellite knowledge products, modeling outputs from global, regional, and Malawi centers, and community-based disaster surveillance systems. It is expected to also improve the availability of information in the public domain using open data platforms to encourage downstream use of the data for further specialized analysis and dissemination. The improved seasonal and short-term weather forecasting would also support the introduction of systematic hydrologic forecasting in Malawi. This would then also be used for improved hydrologic and hydraulic/routing modeling of the flood zones, refining tools developed as part of the Integrated Floor Risk Management Plan (IFRMP) for the Shire Basin that is being prepared by DNRDM and MWDI with Bank support under the Global Facility for Disaster Reduction and Recovery (GFDRR) and the LiDAR high-resolution floodplain elevation datasets being supported by the National Water Development Program-II. This would support flood and drought early warning systems for communities at risk and disaster management related agencies. An integrated Operational DSS would be developed to support water infrastructure management in a systems context that uses a more multi-sectoral perspective (e.g. for operation of the upgraded Kamuzu barrage that is currently primarily operated only for hydropower considerations). The Operational DSS would be accessed through Operational Control Rooms at key water-related institutions at various levels. The activity would support the provision of

specialized consultant inputs to develop the overall decision support system, IT and office equipment, training, building upgrading, and operational costs.

(d) **Sub-component A.4: Program Management, Monitoring and Evaluation**, to ensure efficient and timely delivery of project resources in accordance with the project's objectives. A multi-sector and multi-agency Technical Team (TT) has been formed and located in MWDI, led by a Project Coordinator who reports directly to the Principal Secretary. This arrangement has been in place throughout project preparation, and a multi-agency office is fully operational. Fiduciary management will be with this TT, and procurement and FM staff have been recruited. While responsibility lies with the TT, cross-support and backstopping on procurement and FM will be provided by the PMU of the NWDPII. The project will provide funding for professional and support staff to strengthen the Technical Team and facilitate its operations, including procurement, financial management, environmental and social safeguards specialists, an institutions specialist, GIS and modeling experts, liaison/ communication specialist, economist and water resources planner, as well as a diverse range of short term expertise and annual external audits. There are also provisions for workshops, short training courses and formal training (in hydrology and land resources). Specific support will be provided to overall project monitoring and evaluation and reporting.

31. **Component B: Catchment Management (US\$ 45.0 M)** has as objective that *targeted sub-catchments and protected areas are rehabilitated and managed for reduced erosion and improved livelihoods*. Development of community-based natural resource management systems is a long-term process that requires sufficient time to build the necessary capacity and ownership. Since the activities promoted ideally require a longer time horizon than the project duration, this project will institutionalize a successful approach and show early results that will be expanded upon and consolidated through the next phase in the program. There would be three stages at the micro-catchment level: (i) building conditions for micro-catchment rehabilitation and alternative livelihood development, including community sensitization, social mobilization and capacity building to ensure ownership and a strong foundation for subsequent interventions; (ii) implementation of micro-catchment development plans and alternative rural livelihoods; (iii) continuing financial and technical support for catchment rehabilitation and livelihood activities while phasing-out project activities.

(a) **Sub-component B.1: Develop Institutional Capacity for Catchment planning and monitoring**, with four sets of activities: (i) strategic planning and facilitation to support the development of broad catchment plans covering approximately 33,000 ha each and including several Group Villages in two or three sub-catchments, as well as highly targeted applied research and technology transfer; (ii) participatory micro-catchment planning at the Group Village level to develop integrated plans covering approximately 4,700 ha each; (iii) development of (project and national) guidelines for integrated catchment management and rural infrastructure development and detailed field manuals and training on their use; and (iv) monitoring and evaluation. The monitoring model that is proposed for catchment management planning and implementation would apply remote sensing and GIS along with field based data collection and surveys to track program inputs and outputs, key processes, institutional performance, impacts and outcomes. Support will be provided to recruit NGOs to help interface between government and community activities in catchment management.

(b) **Sub-component B.2: Rehabilitate Targeted Catchments**, will finance interventions identified in micro-catchment plans prepared under sub-component B.1, including: (i) soil and

water conservation for more sustainable and productive agriculture; (ii) forestry and rural energy interventions to restore forest cover and reduce firewood consumption within the sub-catchments; (iii) stream and water control, including checkdams and small earthen dams to support improved water management through smaller-scale structures built by community members. Larger infrastructure investments at sub-catchment and/or catchment level such as upgrading feeder roads, culverts and small bridges, will be based on a strategic feasibility assessment. The activity would support the activities through service providers (contracted) and works and goods (equipment) for catchment management interventions.

(c) ***Sub-component B.3: Support Alternative Rural Livelihoods*** will support demand and market driven income-generating activities, with special targeting of women, youth and landless groups, to gradually decrease dependency on low performance agriculture and unsustainable harvesting of forest products as sources of income. This includes: (i) area-specific market demand and value chain transaction support studies; agricultural fairs aimed at identification of and linkages with markets; (ii) development and start-up of alternative livelihoods through support to common interest groups (CIG) for commercially oriented income-generating activities, including capacity building and mentoring to build organizational, technical, financial and business capacities; (iii) mini and small scale irrigation, multi-purpose farm ponds on both hills and flatter arable lands to assist farmers in drawing water from small storage structures to support agricultural intensification, particularly related to agri-business development; (iv) district level infrastructure in each sub-catchment based on initial strategic assessments, for instance market infrastructure and community-level facilities for post-harvest storage; and (v) provision of livelihood grants to the Village Development Committees to enable them to undertake productive livelihood initiatives and enable CIG to set up micro enterprises and other income generating activities.

(d) ***Sub-component B.4: Improve Ecological Management***. Incremental GEF support will provide for strengthened management of large natural habitat blocks within the Shire Basin, including: (i) selected infrastructure and capacity investments in Lengwe and Liwonde National Parks to increase their long-term revenue flows; (ii) implementation of community forest co-management in the Neno Eastern Escarpment and Tsamba Forest Reserves in Neno district, which will complement the IDA-funded SLWM investments under sub-component B.2 to form part of an integrated landscape management approach; and (iii) zoning, patrolling and monitoring of the Mangochi Forest Reserve adjacent to the Liwonde National Park, in recognition of the key importance of these forests as a wildlife corridor.

32. **Component C: Water Related Infrastructure (US\$ 59.0 M)** has an aim that *new investments enable improved regulation of Shire flows and strengthen climate resilience*. Development of critical infrastructure is essential to overcome annual and long-term variability in water resources availability for communities, environment and economic sectors. The Shire Basin has a unique resource base as it is the outflow of one of the largest lakes in the world; with very complex climate response dynamics; and at the same time virtually the entire economy of the country is based on this resource, making improvements to water resources management a must. This component will support the upgrading of the Kamuzu Barrage, community-level flood adaptation investments, and the preparation of new water infrastructure, building on the basin planning carried out under Component A, and the priorities as set out in the national Water Resources Investment Strategy prepared in 2011.

(a) ***Sub-component C.1: Upgrade Kamuzu Barrage*** will support:

(i) The civil works, gates, weed management, and construction supervision of the Kamuzu Barrage upgrade at Liwonde. The upgrade would extend the operational life of the barrage and support its key functions to (1) regulate water flows downstream to meet the needs of various stakeholders (e.g. related to hydropower, irrigation, water supply, flood management, and environment), (2) regulate water levels upstream to help improve climate resilience and meet environmental and socio-economic needs, (3) improve weed management to reduce interruptions in hydropower installations downstream, and (4) improve traffic circulation on the major North-South corridor in Malawi and safety by separating road traffic from the gates. The incremental influence of the upgraded barrage (which will allow for 40cm higher regulation) on Lake levels is limited and will not significantly affect the highest and lowest water levels in the lake. However, by allowing additional flexibility to change the proportion of time that the lake is at intermediate levels, it allows for greater buffering to climate variability and change (in the last century, the lake levels had become so low that the Shire had stopped flowing for fifteen years – a scenario that could be catastrophic for Malawi if repeated), as well as provides additional reliability of flows downstream that can improve the electricity generation in downstream hydropower plants (such as Nkula, Tedzani, and Kapichira). The improved water resources information system and operational DSS developed under Component A should also help improve the ability to optimize barrage operations in real-time. The activity will fund the concrete works on the Barrage and bridge structures, apron construction as well as the construction of a second road bridge extending the existing structure downstream; a separate design, build and install contract for new hydraulic gates, improved steel weed boom, hoisting and operating system; long reach weed collector; third party construction supervision on behalf of the Government.

(ii) The activities of the National Dam Safety Review Panel, a separate and independent group of experts, to review the quality of the engineering and construction, in order to guarantee that they reflect international good practice and standards with respect to dam safety.

(iii) The implementation of the Environmental and Social Management Plan (ESMP), and Resettlement Action Plan (RAP), on the basis of the independent Environmental and Social Impact Assessment (ESIA).

(b) ***Sub-component C.2: Improve Flood Management*** to improve climate resilience in the basin, primarily through support for the implementation of the Integrated Flood Risk Management Plan (IFRMP) for the Lower Shire in collaboration with other initiatives (see Component A for a description of the linked flood forecasting and early warning systems): (i) priority flood mitigation interventions, such as river bank stabilization, dykes, culverts, flood diversion structures etc; (ii) community awareness raising and planning based on flood mapping and zoning; (iii) community level support to the design and construction of adaptation measures, such as flood demarcation, elevated platforms, shelters and safe havens, connectivity to and training on the Flood Forecasting and Early Warning Systems; (iv) communication and transport equipment for Civil Protection Committees and rescue teams; and (v) planning and pilot investments in ecological flood mitigation and climate resilient livelihoods in the Elephant Marshes. Incremental GEF/LDCF support will provide for studies of the ecology, hydrology and natural resource exploitation in the Elephant Marshes, along with participatory planning to establish management aimed at enhancing the value of the area for environmental services

(particularly flood attenuation), livelihoods and biodiversity. Some community NRM pilot activities will also be included.

(c) ***Sub-component C.3: Prepare Priority Water Investments*** within the Shire Basin will support feasibility and design studies for additional water related infrastructure works. There is ample demand, scope and need to further develop the Basin's resources for different economic sectors, such as: agriculture in general and irrigation agriculture in particular, aquaculture, urban and rural water supply, hydropower, transport and disaster resilience. Special attention could be given to the design of a set of measures for flood mitigation in the Ruo River, the notoriously forceful flooding tributary to the Lower Shire, for possible financing in a second phase or a different initiative, based on the recommendations of the IFRMP.

B. Project Financing

Lending Instrument

33. The proposed Shire River Basin Management Program would be financed through an Adaptable Program Loan (APL) instrument with fully blended co-financing from the Global Environment Facility and the Least Developed Countries Fund (GEF/LDCF). The program would be implemented in three phases over a 15 year period with a nominal budget envelope of US\$375-400 million. The resource envelope for phase one is US\$125 million IDA, plus US\$6.58 million of GEF/LDCF grants (US\$5.08 million from Malawi's GEF STAR allocation and Sustainable Forest Management (SFM) incentive and US\$1.5 million from the LDCF). The GoM contribution would amount to US\$11.3 million and comprises foregone taxes on construction of Kamuzu Barrage. In addition, the GoM would contribute to staff and office costs and payment of cash compensation for resettled people. The beneficiaries' contribution is confined to the activities on Catchment and Flood Risk Management, as well as alternative rural livelihoods, and consists of in-kind contributions to these activities (labor, local materials). These inputs will be quantified and monitored and captured in the project's reporting.

Project Financing Table

	Total		IDA		GEF		LDCF		Benef		GoM	
	US\$ m	%	US\$ m	%	US\$ m	%	US\$ m	%	US\$ m	%	US\$ m	%
A. Shire Basin Planning												
Develop a Basin Planning Framework	11.1	7.6	9.6	86.1	0.81	7.3	-	-	-	-	0.7	6.6
Build Institutional Capacity (...)	9.1	6.2	8.8	97.0	0.27	3.0	-	-	-	-	-	-
Improve Water Resources Information Systems	12.6	8.6	12.6	100.0	-	-	-	-	-	-	-	-
Program Management, Monitoring & Evaluation	7.4	5.1	6.9	93.2	-	-	-	-	-	-	0.5	6.8
[Project Preparation Advance]	1.5	1.0	1.5	100.0	-	-	-	-	-	-	-	-
Subtotal	41.6	28.6	39.3	94.4	1.08	2.6	-	-	-	-	1.2	3.0
B. Catchment Management												
Develop Institutional Capacity for Catchment Planning & Monitoring	11.9	8.2	11.3	95.3	-	-	-	-	-	-	0.6	4.7
Rehabilitate targeted sub-catchments	18.7	12.9	17.4	92.9	-	-	-	-	1.33	7.1	-	-
Support Alternative Rural Livelihoods	10.3	7.1	9.4	91.1	-	-	-	-	0.91	8.9	-	-
Improve Ecological Management	4.0	2.8	-	-	4.00	99.1	-	-	0.03	0.9	-	-
Subtotal	45.0	30.9	38.1	84.8	4.00	8.9	-	-	2.28	5.1	0.6	1.2
C. Water-related Infrastructure												
Upgrade Kamuzu Barrage	39.6	27.2	30.4	76.8	-	-	-	-	-	-	9.2	23.2
Improve Flood Management	13.0	9.0	10.7	82.2	-	-	1.5	11.5	0.54	4.2	0.3	2.1
Preparation of Priority Water Investments	6.4	4.4	6.4	100.0	-	-	-	-	-	-	-	-
Subtotal	59.0	40.5	47.5	80.5	-	-	1.5	2.5	0.54	0.9	9.5	16.0
Total PROJECT COSTS	145.6	100.0	125.0	85.8	5.08	3.5	1.5	1.0	2.82	1.9	11.3	7.7

Note: There are minor rounding discrepancies. Sub/totals are accurate as per project design and the text.

C. Lessons Learned and Reflected in the Project

34. The design of the project takes into account lessons learned from: (i) the Environmental Management Project (1997-2002); (ii) the ongoing and recently restructured Infrastructure Services Project (2006-2012); (iii) the Country Assistance Strategy 2007-2010; (iv) the independent Bank funded Strategic Environmental and Social Assessment (SESA) of the Shire River Basin carried out in 2010-2011; (iv) National Water Development Program and other water sector projects; (v) Irrigation and Rural Livelihoods and Agricultural Development Project; (vi) MCC Environmental and Natural Resources Management Action Plan (design studies); and (vii) lessons from other national projects and programs, as well as comparable projects in other countries in Africa and Asia in particular.

35. The many lessons learned and reflected in project design can be summarized as follows, a detailed analysis of the different lessons learned from each operation is included in Annex 7:

- (a) issues relating to sustainable development in the Shire River Basin are wide ranging, complex, involve every sector of the economy, and can be grouped under three key headlines: land management, water management, and human resource management;
- (b) the dynamics of environmental change in the Shire Basin need to be properly understood, monitored and responded to, and effective water resource and regional land use/ spatial planning need to be introduced;
- (c) in projects with a significant institutional development aspect, project design needs to be based on a realistic assessment of the Borrower's existing and potential future institutional capacity (EMP);
- (d) risks identified at entry need to be tracked and mitigated on an ongoing basis and responses provided should be commensurate (EMP);

- (e) complex institutional and technical river basin management issues need to be addressed in an integrated program that explicitly tackles anticipated problems and has realistic budget and time provisions;
- (f) need to integrate modern information tools (e.g. remote sensing, GIS, GPS, GSM telemetry, decision support systems, interactive knowledge base) in planning, monitoring and evaluation systems, which will both improve knowledge and decision making and reduce transaction costs;
- (g) the project needs to establish clear roles, responsibilities and coordination mechanisms upfront and closely monitor efficiency and robustness of procurement and financial management arrangements;
- (h) the framing and implementation of policies, plans and programs needs to involve all relevant ministries and district councils;
- (i) GoM capacity constraints in areas of financial management, procurement, project management, monitoring and evaluation, needs to be reflected and the project should build up the capacity of the agencies involved in project implementation;
- (j) the potential success of bottom up identification of priority actions at community level, with central government's role to transfer funds and monitor results, and the important role that civil society, the private sector and the media are able to offer;
- (k) the importance of upfront focused investments to show demonstrable impact; and
- (l) the early identification of specific localized commodity chains/market linkages that can be supported under the project.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

Overall

36. The institutional arrangements in the SRBMP need to involve multiple agencies that are critical to managing the complex reality of interlinked social, economic and environmental/natural resources issues in the Basin. The Ministry of Water Development and Irrigation (MWDI) has been designated as lead implementing agency, and overall program coordination will be housed in MWDI, while each component, sub-component and activity will be implemented through the relevant ministry and department. The program also requires cross-sector coordination with and between the many stakeholders (see Annex 3).

37. The *Program Steering Committee* (PSC) will provide programmatic and strategic guidance, direction and oversight to the program. The PSC is chaired by the Principal Secretary of Water Development and Irrigation and is composed of Principal Secretaries of MWDI; the Ministry of Finance (MoF); The Ministry of Economic Planning and Development (MEDP); the Ministry of Agriculture and Food Security (MoAFS); the Ministry of Environment and Climate Change Management (MECCM); the Ministry of Energy and Mining (MEM); the Department of National Relief and Disaster Management (DNRDM); the Ministry of Lands and Housing (MLH); Ministry of Local Government and Rural Development (MLGRD); the Ministry of Transport and Public Works (MTPW); and the Ministry of Tourism and Culture (MTC). Composition and terms of reference for the PSC will be further detailed in the PIP. The Project Coordinator will serve as Secretary of the PSC. The PSC would meet at least twice a year and is responsible for: inter-sectoral coordination and facilitation, annual programming of activities and

approval of work plan and budget, monitoring implementation and results (including audits), policy guidance and recommending corrective actions that may be necessary.

38. The *Program Technical Committee* (PTC) will provide a multi-sector advisory and consultative platform to review technical reports, synthesize information and insight on program preparation and implementation issues. The PTC is chaired by a the Director of Water Resources in MWDI and members include Director-level representatives of the national Water Resources Board (WRB) and the Departments of: Water Resources (DWR); Irrigation (DoI); Land Resources and Conservation (DLRC); Forestry (DoF); National Parks and Wildlife (DNPW); Energy (DoE); Environmental Affairs (EAD); Department of Surveys (DoS); Climate Change and Meteorological Services (DCCMS); and Department of National Relief and Disaster Management (DNRDM); as well as representatives of the Electricity Supply Company of Malawi (ESCOM); Civil Society Organizations (CSOs); academia and invitees as appropriate. The Project Coordinator will serve as Secretary of the PTC. The PTC would meet at least three times per year and be responsible for: technical guidance and oversight of program activities (including reports and studies), taking part in the Shire Basin Stakeholder Forum, review and synthesize suggestions and recommendations from studies, reports and by the stakeholder forum and submitting these to the PSC for review and decision.

39. The Multi Sector *Technical Team* (TT), led by the *Project Coordinator* from MWDI and based in MWDI, would ensure day-to-day SRBMP-I coordination and management. The Project Coordinator would report directly to the Principal Secretary (PS) and act as Secretary of the PSC and PTC. Memorandums of Understanding (MoU) will be established ahead of Project Effectiveness between the different concerned ministries and departments to formalize existing working arrangements and clearly define roles and reporting modalities. The TT is a fully integrated project team which includes professional staff from the main government agencies involved in the SRBMP-I who are assigned full-time to work on this project. The TT would in close collaboration with the Water Resources Board assume many functions that a Catchment Management Institution would fulfill by championing the basin planning activities under component A. Eventually and gradually, overall basin coordination and related functions will be shifted to the Shire Basin Authority. This shift of responsibilities will only take place once the new institution has the actual capacity to handle management responsibility.

40. The project will provide funding to contract professional and support staff to strengthen the TT and facilitate its operations, including: (i) professional staff: an environmental and social safeguards specialist, an institutions specialist, GIS and modeling experts, economist and water resources planner, financial management specialist, procurement specialist; (ii) short-term expertise is foreseen in the fields of for instance: planning and M&E, architecture, irrigation engineer, water supply, hydropower engineer, catchment management, civil engineer, facilitators, water quality, legal expertise, IT services, etc.; (iii) support staff: accountant, liaison officer, data entry clerk; and (iv) annual external audits. These staff will be hired as required under the guidance of the TT on short term consultancy or Technical Assistance contracts; or on regular non-established positions for the longer-term positions and integrated within the implementing agencies; and will not constitute an external PIU.

41. The *Project Management Unit* (PMU) of the ongoing Bank financed Second National Water Development Project (NWDP-II), will provide back-up and mentoring support to SRBMP-I, in particular the procurement and financial management needs, as already practiced during the Project Preparation Advance (PPA) stage, until about mid-term of the SRBMP-I,

which would coincide with the closure of the NWDP-II. Fiduciary and administrative capacity within MWDI would be enhanced to be able to carry out these functions after NWDP-II closure. This will be re-assessed ahead of mid-term.

42. *Partnership arrangements* would be established amongst others with the Millennium Challenge Corporation/Account (MCC/A), UK Department for International Development (DfID), Norway and the United Nations Development Program (UNDP), Japan International Cooperation Agency (JICA), and the International Fund for Agricultural Development (IFAD), who are actively investing in catchment management and/or flood mitigation activities in the Shire River Basin. General agreement has been reached on both thematic and spatial division of labor between the major programs of these partners. DfID proposes to provide parallel Technical Assistance to improved basin wide M&E of catchment management, linked to Sub-component B.1 of this project.

43. *Shire Basin Stakeholder Forum*. Apart from project specific steering and implementation, the nature of the program also requires a structured process of stakeholder consultations on different aspects of basin planning, catchment management, and prioritization of investments. These structured stakeholder consultations started during project preparation, and should become more systematic and institutionalized during project implementation and form the backbone of basin vision development and information exchange. The Shire Basin Stakeholder Forum will have representatives from multiple stakeholders in basin management, including from GoM, civil society, private sector and communities, representing the breadth of perspectives on river basin management and serve as the platform for debate and information exchange. The Forum would be linked to the basin management institution; and its specific mandate will be developed in unison with the institution.

44. *Districts*, including Technical Officers from relevant departments at District and Field Extension levels, Traditional Authorities, Village Development Committees (VDCs), Group Villages (GVs), community groups and committees, such as Village Natural Resource Management Committees (VNRMCs), are involved to a greater or lesser extent in most sub-components. They will be represented at the Shire Basin Stakeholder Forum; attend the PTC Meetings when relevant as invitees and they will be strongly involved in the guidance and implementation of activities under Component B, Catchment Management, and Sub-component C.2, Flood Management.

45. *Market-oriented civil society partners*, private sector actors such as small and medium-scale traders, market intermediaries, outlet and chain store operators and other stakeholders operating in agribusiness and commercial enterprises will be partners in project implementation. This also includes cooperatives and national farmer organizations as appropriate. Likewise, coordination will be optimized with other projects and NGOs operating in target catchment sites.

By Component

46. *Component A Shire Basin Planning* includes mainly planning, institutional capacity building, information systems development, project management, coordination, monitoring and evaluation activities. The lead implementing agency is MWDI, with a range of supporting agencies involved. Sub-component A.1 would develop a comprehensive Shire Basin Plan and related Decision Support System and it would also strengthen the institution where the planning and decision support system would be located. Sub-component A.2 would build institutional capacity for coordinated basin management and Sub-component A.3 would improve water

resources information systems, including some activities at community level that would be implemented with the assistance of a contracted Service Provider on improved flood risk management in the Lower Shire. In addition to MWDI, the following agencies will have key roles: the DCCMS in MECCM in the area of hydro-meteorological measurements and forecasting; and DNRDM on improved flood risk management. Critical technical studies will be tendered for consultancy by the TT (hydromet system design and specifications, water resources modeling and decision support system platform design, etc.).

47. *Component B Catchment Management* implementation will be through a partnership between GoM, communities, and highly qualified NGOs. The lead implementation agency would be the DLRC in MoAFS. Other ministries will have key functional roles in component implementation: MECCMS, through DoF, in particular in reforestation and community forest management; DoI (MWDI) in irrigation development, multi-purpose small-scale dams, weirs and gully control; MTC, through DNPW, in management of national parks; and MLH in surveys, and geospatial information through the NSDC in the DoS.

48. The District Councils will play a leading role with coordination of line departments, although the District Agricultural Development Officer (DADO) would have functional technical leadership for field level implementation in close collaboration with District Forestry Officer (DFO) and also the Director of Planning and Development (DPD) at the district-level. The council, through the District Executive Committee (DEC) would have a strong role in catchment planning review and approval, and to ensure harmonization of these plans with other district development plans. At Group Village level, where actual interventions are planned and implemented, the project will be guided by the Village Development Committee (VDC) and its sub-committee the VNRMC. The entire process of catchment management planning and implementation at the district level would be facilitated by Service Providers (NGOs). Districts will be involved in the selection process of these NGOs, who will be accountable and report foremost to the DEC, who would be responsible for ensuring coordination of NGO activities, including with district field staff, and provide oversight and monitoring of their interventions.

49. *Component C Water Related Infrastructure* includes three very diverse sub-components. Sub-component C.1 the construction and construction supervision of the Kamuzu Barrage would be contracted out to a construction company and an engineering firm respectively. The construction process would also be technically overseen by an independent panel of experts on dam safety; and overall supervision from the GoM's side is with the MWDI (DWR) in close collaboration with MTPW. Relevant elements of the Environmental and Social Management Plan would be included in the construction contract and others would be contracted separately. The associated Resettlement Action Plan (RAP) would be implemented with the assistance of a contracted Service Provider, possibly an NGO. Sub-component C.2, Flood Management, would be implemented by MWDI and DNRDM, with field level activities coordinated by the DEC, and carried out by a Service Provider (NGO) working with District staff, Group Villages and Traditional Authorities, and with DNPW on management of the Elephant Marshes. Engineering and construction supervision functions for community level activities would be contracted out, and community engagement, works and equipment distribution largely implemented through the Service Provider that is also involved in sub-component A.3. Detailed activities under Sub-component C.3 would be identified and prioritized by the Shire Basin Stakeholder Forum and agreed upon by the PTC with the approval of the PSC, after which they would be packaged for consulting studies.

B. Results Monitoring and Evaluation

50. Program, project and intermediate level performance indicators and targets are included in Annex1. The project will establish an appropriate monitoring and evaluation (M&E) system to track progress against these core indicators as well as against a larger set of component-wise indicators that will paint a broader picture of overall project performance. The TT, on behalf of the implementing agencies, would be responsible for the overall SRBMP M&E, as detailed in the PIP, and would coordinate the establishment of a management information system (MIS) and M&E plan with the support of partner government agencies, contracted service providers, NGOs, and communities. The project-wide MIS would mainly address input-output monitoring related to the various activities proposed under the three components and sub-components as a means of tracking implementation progress. A baseline survey is currently being prepared against the project indicators.

51. A major effort and substantial investments will be dedicated to improving, updating and modernizing M&E systems at different levels and for different purposes, such as for instance: (a) water and climate monitoring systems; (b) vegetative cover and land-use monitoring systems; (c) capacity of community groups in terms of SLWM and business management skills; (d) project financed infrastructure construction; (e) Environmental and Social Management Plans; (f) functioning of flood mitigation systems and actual flood damage occurring; and (g) vulnerability levels of target populations. Some of these have a much wider reach than the overall project input-output monitoring framework, for instance by providing data and analysis on the Shire Basin as a whole. A major thrust of the project will be on transparency, where stakeholders have open access to project reports via the internet, including basin thematic maps and state-of-the-basin reports.

52. Component B requires a much more comprehensive M&E sub-system due to the complex and wide-ranging activities related to catchment rehabilitation, management, institutional development, and rural livelihoods. A highly qualified third party institution will be contracted for the duration of the project to support M&E support to DLRC that would encompass inputs and outputs, key implementation processes, periodic impact assessments, and targeted studies/analyses where implementation problems are identified. As activities under this component are largely implemented at the district and village/ community levels, a monitoring system will be applied that will strengthen participatory methods and processes for data collection. The M&E approach for component B would involve a combination of field-based data collection and remote sensing/ GIS. The third party institution would develop a comprehensive MIS to capture field information and allow for effective data analysis and reporting to guide implementation. The Component B MIS would also be linked to the broader project-wide MIS managed by the TT (MWDI).

C. Sustainability

53. *Technical Sustainability:* The technical sustainability of SRBMP-I activities are being addressed by ensuring that the physical infrastructure supported (e.g. Kamuzu Barrage, the catchment land and water infrastructure, etc.) are built to good technical design, construction, and operational standards, with adequate dam safety, instrumentation and operational decision support considerations. There have been a number of detailed studies by qualified international consulting firms relating to the upgrading of Kamuzu Barrage in this regard. Basin Planning

activities are designed to set up a long-term knowledge base for the Basin and improve systematic hydro-climatological monitoring and inflow/flood forecasting. Catchment management investments are based on technologies and approaches that have already proved successful and sustainable in Malawi. The preparation of new water investments, as well as investments in IT infrastructure will also be done in a manner that ensures technical sustainability of these investments to the extent possible.

54. *Environmental Sustainability:* The project is designed to reduce natural resources and environmental sustainability threats to the country. This is expected to be accomplished through sustainable land and water management investments made according to catchment plans that reflect both stakeholder participation and priorities and scientific inputs. Given that it is difficult to effectively manage what is not measured, the project seeks to invest in water resources, water quality and groundwater monitoring to build a solid knowledge base for environmental management for the basin. Investments will follow the ESMP for the Kamuzu Barrage and the ESMF for the overall project, both of which were developed during project preparation; the preparation of future investments under Component C will include support for environmental assessments. A special focus on biodiversity and ecosystem management in both protected areas and productive landscapes will help conserve biodiversity, improve ecosystem services, and improve livelihoods.

55. *Social Sustainability:* The project is also being conceived at a time where Malawi has a major focus on jobs, especially for the rural poor. It is expected that project activities, especially those related to catchment and flood management, would provide opportunities for the rural poor to benefit from short-term jobs, as well as longer-term livelihood improvements and improved resilience to recurrent natural disasters. Women's livelihoods, in particular, would likely be improved by the project through: enhancing incomes and income opportunities (e.g. suitable livelihood income opportunities, livelihood investment grants); increasing empowerment (acquiring skills through capacity development, accessing services, participating in decision-making bodies and assuming leadership roles in community-based institutions and common interest groups; and reducing labor burdens (e.g. improved cook-stoves, reduced firewood collection). Improved catchment planning and management of natural resources would reduce conflicts within and among villages caused by a depleting resource base, and promote cohesion among communities within the sub-catchments. A comprehensive program for capacity building at different institutional levels, including district and community level training is envisaged under the Project, which will contribute to social sustainability by improving and developing new skills.

56. *Financial and Economic Sustainability:* The economic sustainability of the project investments is demonstrated to some extent by the economic analysis carried out. The project seeks to support the upgrading of the Kamuzu Barrage in order to improve the country's ability to better regulate flows in the Shire River to help optimize its multiple demands – hydropower, irrigation, urban water supply, flood management, and ecosystem management. Financial sustainability is also demonstrated somewhat by the financial analysis carried out for the project. There is a need for sustained commitment to project-related sectors – both for operations and maintenance of investments, but also scaling-up investments in water and other natural resources information, institutions, and infrastructure in the Shire basin. The design of the project as a long-term program should also help mitigate this concern to some extent. To address the issue of long-term financial sustainability of the Kamuzu barrage investments, the project would provide

assistance to GoM in analyzing institutional and financial aspects of barrage management in the context of the water sector institutional reform, including possible management, financing and cost recovery options. Of specific interest is the financial sustainability and fiscal burden of the proposed institutional set-up for Shire Basin Management. Although in terms of direct cost, the proposed institutional set-up and water resources monitoring system is more expensive than the current set-up, its benefits are considerable in the longer term through improved service delivery and revenue collection, and reduced transaction costs in communication and data management. It is anticipated that many of these functions can be sustained with only modest increase in budget allocation; and in the long term the Basin institution will be designed to be largely self-sustaining.

57. *Institutional Sustainability:* The country's move away from traditional PIUs and the opportunity presented by a long-term programmatic framework have resulted in a Program focus on improving the long-term institutional capacity of key land and water related institutions to perform their core mandate. For example, the NSDC would be supported at its inception to prototype providing integrated modern spatial knowledge services for the country. The DWR would be strengthened with basic capacity-building, its first real-time monitoring network, decision support tools, and developing a pipeline of bankable investments. The DoI and the DLRC would be strengthened with improved institutional capacity to facilitate participatory catchment planning and implementation (in collaboration with NGOs and district governments), national guidelines for improved catchment management, as well as a modern M&E system for all its operations. DNRDM, DCCMS, and DWR will collaborate to improve climate resilience in the short and long-terms. Departments responsible for forests, parks, environment, and wildlife will help develop a paradigm of collaboration for integrated ecosystem management in a manner that both protects biodiversity and improves local livelihoods. These new capacities and activity paradigms should help the institutional sustainability of investments under this Program.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary

58. The key risks to the Project are related to Capacity (rated high): The implementing agencies have weak technical capacity, in terms of knowledge base, availability of good numbers of competent technical staff at the district level, and the ability to conduct specialized technical functions. In addition, implementing agencies may not follow proper financial management practices and may have difficulties in hiring qualified staff trained in Bank procedures. There are also weaknesses in internal audit functions. However, Government policy, agreed with DPs excludes the use of stand-alone PIUs. The Project will make significant investments in the development of a publicly available Shire Basin management knowledge base. Technical support will be provided by consultants to make sure that certain specialized tasks are delivered successfully. Delivery of many of the field activities under component B will be contracted out to qualified NGOs to compensate for gaps in local government capacity. Government staff will be involved in all activities and receive training to build capacity to maintain appropriate support to project activities in the longer run. The implementing agencies under which major project activities will take place will need to undertake intensive training to have adequate FM staff to ensure that adequate capacity is available throughout the implementation period. Internal and external audits will be required as part of the implementation requirements.

59. Other risks relate to Governance (rated substantial): Multi-sector and multi-donor coordination is always challenging, and may be especially so in Malawi, where capacities and information availability are low. Component A of the project is designed explicitly to strengthen coordination through establishment of a robust knowledge base and institutions. A number of strategies have been devised, including joint M&E, the establishment of a stakeholder Forum, awareness raising programs, etc.

60. Risks related to design (rated substantial) are due to the fact that the Project is inherently complex, including multiple types of investments, implementing agencies and stakeholders, and that investments in catchment management are long-term by nature, and investment impact can be hampered by extreme weather impacts. Building on previous experience in Malawi with multi-sectoral Projects, responsibilities of individual government departments are clearly defined in Project Documentation and the project will explicitly strengthen coordination through the Multi-Sectoral Technical Team and later through the proposed basin management institution. The program explicitly designed as an APL. This approach will allow local experience to be gained and lessons learned to guide scaled up operations in later phases.

61. Lastly, risks related to delivery monitoring and sustainability (rated substantial) are to do with low capacity in Government coupled with implementation and monitoring responsibilities, the risk that community based activities are not taking into account socio-economic conditions and invest insufficiently in local capacities and institutions. Lastly, lack of willingness on data and information sharing can seriously hamper basin level monitoring. Local experience has shown that strong community leadership and building interest and motivation are key determinants of success. The project will therefore focus initially on establishing successful models amongst the most motivated communities. The program is proposing a basin level MIS and M&E framework that not only tracks project inputs-outputs, but also provides a platform for basin-level coordination. It is designed for open access data and information sharing and efforts will be ongoing to demonstrate benefits of this data sharing for sector planning, with sectors that might be less engaged. A 3rd party M&E agency will be supporting existing government M&E systems, which will be concurrently strengthened by the project.

62. Key risks are summarized in the risk rating table below and are further elucidated in Annex 4.

Risk	Rating
Project Stakeholder Risk	Moderate
Implementing Agency Risk	
- Capacity	High
- Governance	Substantial
Project Risk	
- Design	Substantial
- Social and Environmental	Moderate
- Program and Donor	Moderate
- Delivery Monitoring and Sustainability	Substantial
Overall Implementation Risk	Substantial

B. Description

63. A Program of this nature faces a number of challenges and the program and first phase project design has sought to mitigate many of these risks. There are macro-economic and governance risks to the Program in terms of commitment. Economic difficulties as recently experienced will increase rural population's vulnerability, and potentially increase unsustainable resource use. The Program is designed to address these vulnerabilities through long term integrated Basin and rural development planning. There are several institutional risks – both of coordination and capacity. The SRBMP-I is by design multi-sectoral in nature as it seeks to integrate current fragmented efforts on the Shire Basin, and is one of the first projects to be implemented without a traditional PIU in accordance with the GoM objective to phase-out PIUs. Hence, SRBMP-I implementation is primarily mainstreamed through existing departments with the support of the NWDP-II PMU for some aspects (e.g. support to procurement/ financial management) during early implementation. There are project risks, especially related to the Kamuzu Barrage upgrading as it is, while not in itself a complex structure, a very critical piece of infrastructure in the country and the design, safeguards, implementation, and transition need to be well-executed. HIV/AIDS continues to affect social fabric, capacity and rural labor necessary to address sustainability issues in Natural Resources Management.

64. Project preparation has helped to: (i) ensure appropriate technical design of activities to minimize specific delivery risks; (ii) focus as much as possible, for example targeting micro-catchment rehabilitation investments within a limited area where tangible impacts can be demonstrated, before broadening the scope; (iii) ensure that the project takes opportunities to strengthen coordination amongst many donor activities in the Shire, whilst remaining self-sufficient with respect to its own objectives; and (iv) ensure adequate implementation capacity will be made available to the implementing agencies, and that community activities are designed in consideration of available capacity. Nevertheless, by its nature, a river basin management project remains a complex undertaking.

65. Despite measures taken during preparation, the complex nature of integrated river basin management, low capacity environment, and uncertain economic and political outlook mean that significant risks will remain during implementation and require appropriate supervision resources to be made available. Hence, the overall risk has been rated as Substantial for both preparation and implementation.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

66. **Economic Analysis.** An economic cost-benefit analysis (CBA) has been carried out to assess the economic viability of the project. The analysis was conducted separately for each of the three main types of investments proposed under the SRBMP-I: (i) upgrade of the Kamuzu barrage (including associated investments in the development of an integrated planning and management system for the basin as described in Component A); (ii) improved flood protection in the Lower Shire; and (iii) catchment management interventions to rehabilitate degraded sub-catchments for sustainable natural resource management and livelihoods. For all three components the appraisal has used a CBA comparing “with the project” and “without the project” situations. The economic internal rate of return (EIRR) and the net present value (NPV) were calculated to evaluate the economic merit of the proposed investments discounted at the opportunity costs of capital (OCC) assumed at 12 percent.

67. The project will have many intangible and hard-to-quantify benefits to natural resources, environment, biodiversity and livelihoods. While the project will endeavor to register those benefits, these have not been incorporated in the economic analysis, in part because the economic analysis is sufficiently robust with the quantifiable benefits alone. The conducted economic analysis demonstrates the proposed investments are justified on economic grounds, with economic internal rate of returns (EIRRs) ranging between 15.8 – 48.6 percent (Table below). The sensitivity analysis demonstrates that economic viability of each investment component withstands an increase up to 20 percent in the total costs for any of the options considered. Likewise all three investment components remain economically viable under a decrease in their total benefits by up to 20 percent.

Results of Economic Cost- Benefit Analysis

Investment Component	NPV (US\$ m)	EIRR (%)
<i>1. Kamuzu Barrage</i>		
by operational option ^a :		
E20 - 260	24.5	18.1
E40 - 260	78.8	30.2
E20 - 300	121.3	38.6
E40 - 300	177.0	48.6
E20 - 340	30.4	19.5
E40 - 340	97.8	34.1
<i>2. Flood Management</i>	1.8	16.0
<i>3. Catchment Management</i>	6.0	15.8

^a E= highest regulated water level increase over the current situation (resp. 475.52 and 475.72 masl); and water release range at the barrage in cm and m³/s respectively.

68. **Financial Analysis.** The Kamuzu barrage has an important function to regulate water flow in order to satisfy multi-sectoral water requirements in the Shire basin, and there is currently no water resources institution that would be able legally, technically and financially to assume the responsibility for the barrage operation and management. Currently ESCOM is responsible for the actual operation of the barrage and will be able to recover the costs required for the barrage’s operation and maintenance from sales of additional energy generated due to the structure upgrade. To address the issue of long-term financial sustainability of the Kamuzu barrage investments, the project would provide assistance to GoM in analyzing institutional and financial aspects of barrage management.

69. *Fiscal Impact.* In the short term, the fiscal impact of the project will be negative, given that the GoM’s contribution to project costs primarily comprises waiving the taxes and duties related to the upgrade of Kamuzu barrage. In addition, the GoM will contribute to salaries of the various officials that will be appointed to implement or to work with the project and a provision for recurrent costs to allow GoM departments to continue to provide the services that were financed by the project during project implementation. However, in the medium to long term, the potential positive fiscal impact of the project would be substantial, mainly due to: (a) increased output, income, reliability in energy supply, resulting in increased tax revenues, and (b) multiplier effects due to increased economic activities in rural areas, which are expected to generate additional income and employment in targeted districts leading to increased government tax revenues.

B. Technical

70. The project preparation included several technical assessments to help shape project design, which are further described in Annex 7:

- (a) *Basin Planning:* The urgent need for an integrated approach for planning and management of water-related investments in the Shire Basin is clear. The approach proposed for developing a comprehensive knowledge base, decision support tools, and measures for institutional coordination is pragmatic and in line with international good practice. Appropriate international expertise has also been brought to bear on assessing the needs for improvement in the hydro-meteorological network.
- (b) *Spatial Assessment:* During preparation, considerable attention was paid to developing a spatial knowledge base with the best available local, regional, and global datasets. This was used to make maps and atlases of areas of interest as well as to undertake spatial analysis on erosion modeling to help prioritize catchment areas.
- (c) *Catchment Management:* Preparation has included significant multi-sectoral inputs to design a catchment management program that builds both on local experience and global good practice to provide both natural resources management and livelihood benefits. A modern M&E system has also been proposed in this regard.
- (d) *Kamuzu Barrage Preparation:* The preparation has clearly indicated the critical role of the Kamuzu Barrage in Malawi's economy and the need for its upgrading. The Bank has reviewed carefully the hydrology, technical specifications, designs, dam safety, environmental and social aspects, and procurement aspects of the proposed Barrage to ensure that it is technically well-prepared.
- (e) *Flood Management:* The preparation has included developing detailed overviews of disasters and their impact in Malawi confirming the vulnerability of the Lower Shire to floods, initiating preparation of a detailed flood management master plan for the Lower Shire, and learning lessons from other countries (e.g. Bangladesh) on effective flood management activities.

71. There were many alternatives considered and rejected during project preparation. The main alternative choices considered are described in detail in Annex 7, these include: (a) using a different lending instrument; (b) focus on either water institutions or investments; (c) a single sector focus; (d) not considering co-financing; (e) picking other spatial areas of program/project focus; and (f) no project approach.

C. Financial Management

72. A financial management assessment of the implementing agencies involved in the project was conducted. The MWDI has been designated as lead implementing agency, and overall program coordination will be housed in MWDI, including financial management functions. An FM specialist has been hired within the TT to strengthen FM capacity during implementation, and an assistant FM specialist from the Ministry has been assigned to the Program. An additional accounting staff is proposed to be deployed in the TT to further strengthen FM arrangements for the Project. Financial Management functions are supported by the PMU of the NWDP-II (backstopping, mentoring). By effectiveness, the SRBMP-I FM staff will be ready to carry out

all accounting issues required for the project. The financial management arrangements agreed for the project including mitigation measures are assessed as adequate to account for and report on the sources and uses of project funds and will meet the Bank's minimum fiduciary requirements. The overall FM residual risk rating for MWDI is *Substantial* hence the project will have in-field supervision at least twice a year, complemented with frequent implementation support. The FM action plan in Annex 3 outlines the FM risk mitigating measures.

D. Procurement

73. A procurement capacity assessment was conducted by the Bank on December 8, 2011 and that time it was concluded that there was limited capacity to carry out procurement activities related to the proposed project. Since then, an experienced Procurement Specialist who has worked on other Bank financed projects has been recruited. During the early part of project preparation, the project relied on the PMU of NWDP-II for procurement related activities, and while the NWDPII PMU will continue backstopping, the responsibility for procurement lies with the Procurement Staff within the Technical Team under SRBMP-I. In the past, procurement under MWDI has experienced serious delays in approvals of contract awards due to extended approval systems within Government. Mitigation measures have been designed accordingly in agreement with MWDI including training, preparation of a Project Implementation Plan, and a Procurement Plan for the first 18 months of the project.

74. Procurement of ICB contracts for goods will be carried out in accordance with the *Guidelines: Procurement of Goods, Works and Non Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers; January 2011*. Bank's Standard Bidding Documents and Standard Bid Evaluation Forms for goods under International Competitive Bidding (ICB) will be used. Since the Government has prepared Standard Bidding Documents for procurement of goods under National Competitive Bidding (NCB), procurement of goods under NCB will be carried out using these documents. Bank's Standard Bid Evaluation forms would be used for NCB contracts with necessary modifications.

75. Selection of Consultants will be carried out in accordance with the *Guidelines: Selection and Employment of Consultants IBRD Loans and IDA Credits & Grants by World Bank Borrowers, January 2011*. Bank's Standard Request for Proposals (RFP) and evaluation forms will be used where applicable.

76. The "*Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants*", dated October 15, 2006 and updated January 2011, shall apply to the project.

77. Overall capacity of MWDI to carry out procurement under the proposed SRBMP-I is Medium and overall risk is rated Moderate as there is staff that has adequate qualifications and experience in the use of World Bank guidelines and procedures and as part of mitigation measures capacity building will be undertaken.

E. Social

78. The project fully incorporates social safeguards considerations in its design. Preparatory activities have included consideration of these issues as part of an Environmental and Social

Management Framework (ESMF), and Resettlement Policy Framework (RPF), and with Process Framework (PF) for the overall project, and an Environmental and Social Impact Assessment (ESIA), Environmental and Social Action Plan (ESMP) and Resettlement Action Plan (RAP) for the Kamuzu Barrage (Component C.1). Appropriate management of HIV/AIDS risks related to construction labor influx is incorporated in the ESMP. Stakeholder involvement is planned throughout the project and the preparation has included stakeholder identification at various levels. This will build on work by various CSOs/NGOs, especially related to catchment management and related livelihood enhancement and capacity-building activities. The impacts and safeguard instruments used are further described in the following section.

F. Environment/Additional Safeguards Information

79. Expected Environmental Impacts: The project is designed with environmental sustainability in mind for all components and activities. The environmental impacts of improved coordination in basin water resources management, catchment management, improved regulation of the Shire river, improved climate resilience, and ecosystem improvements (also see Annexes 8 and 9) are expected to be highly positive overall; likely environmental benefits include improved forest conservation and restoration, reduced soil erosion and land degradation, reduced sedimentation in the Shire River and some of its tributaries, and a reduced risk that the Shire River would run dry during an extended drought. Environmental considerations will be given major attention in Shire River Basin planning, as well as major civil works, to ensure that any adverse environmental impacts are minimized and adequately mitigated. The most significant environmental impacts related to major project activities are summarized next:

- (a) **Kamuzu Barrage Upgrading (Sub-component C.1)** at Liwonde is the most environmentally sensitive Project component, and the reason to classify the overall Project as Category A. The most significant environmental and social impacts relate to anticipated changes in the upstream levels of the Shire River and Lake Malawi, as well as downstream Shire River flows. The Kamuzu Barrage upgrading will, at particular times (mainly during dry seasons), enable an increase of the regulation level of the upstream Shire River and Lake Malawi by up to 40 cm compared to the existing barrage. This would potentially affect the surface area and distribution of certain riverine ecosystems within the upstream Liwonde National Park (particularly river sandbars, sandy river banks, and floodplain grasslands), with corresponding impacts on certain wildlife species. Although the level of Lake Malawi would still be subject to natural fluctuations of approximately 1 meter annually and larger multi-annual variation of approximately 7 meters historically (and the Barrage upgrading will not change the minimum and maximum levels of the Lake), the level could at times be up to 40 cm higher than currently, implying more land inundated a higher proportion of the time (especially during dry seasons). The more frequent inundation of land along Lake Malawi, Lake Malombe, and the Shire River (upstream of Liwonde) would also affect some seasonally cultivated areas (under flood-recession agriculture). Downstream of Liwonde, the upgraded barrage will provide greater opportunities than presently exist to regulate Shire River flows, with potentially greater environmental and social impacts (positive and negative) than under the more limited river regulation that is possible with the existing barrage. Support to improved adaptive management and a flow regime that would provide for some seasonal variation in the flow regime is considered positive in comparison with the fixed flow regime currently in place. Barrage construction activities at Liwonde will also

produce localized environmental and social impacts during construction, including (i) land acquisition on both banks of the Shire River, including the likely demolition of at least one house and the removal of trees and crops; (ii) disruptions to aquatic life and the fishing patterns of local communities due to the construction of temporary coffer dams; (iii) traffic disruptions and other temporary disturbances related to construction activities; and (iv) extraction and disposal of rocks, earth, and other construction materials. Following construction, bridge traffic over the Shire River at Liwonde is expected to flow more smoothly and safely than is presently the case, due to reduced congestion.

- (b) **Flood Management (Sub-component C.2):** The proposed flood mitigation civil works in the lower Shire Basin are expected to have fairly minor adverse environmental or social impacts because they are relatively small-scale and localized. Nonetheless, attention will be needed to address a range of environmental and associated social issues, such as ensuring sufficient river access and crossing points for animals (domestic and wild) and people since the embankments tend to be rather steep-sided. The wetland conservation and management activities planned around the Elephant Marshes are expected to be highly positive from an environmental standpoint.
- (c) **Catchment Management (Component B):** The investments and activities planned under this component are expected to be environmentally positive overall, without significant adverse environmental impacts. These include (i) check dams, gabions, and other small civil works intended to reduce erosion and slow down stream runoff; (ii) alternative livelihood promotion and income-generating activities, which will be screened to rule out any environmentally or socially problematic investments; (iii) community management of natural forests and woodlands on village lands and within the Neno Eastern Escarpment and Tsamba Forest Reserves and basic planning and management activities in the Mangochi Forest Reserve; and (iv) protected areas management investments in and around the Lengwe and Liwonde National Parks.
- (d) **New Water Investments (Sub-component C.3):** New water investments planned or designed under the Project might be sensitive from an environmental and/or social standpoint. In general, the Project is intended to promote increased focus on the environmental and social implications of any proposed new investments, based on the capacity-building activities within Component A. Moreover, the Project would support preparation of the environmental and social impact assessments that might be needed for any such new investments.
- (e) **Shire Basin Planning (Component A):** The planning, information management, and capacity-building activities to be supported under Component A are all intended to facilitate increased awareness, understanding, and mainstreaming of environmental and social considerations within water resources planning for the Shire River Basin.

80. To ensure that the project is designed so as to comply fully with Bank safeguard policies, the following safeguards-related instruments have been developed during project preparation:

- (a) A **Strategic Environmental and Social Assessment (SESA)** of the Shire River Basin has been completed (2010-11). The SESA is intended to assess the environmental, social, economic, and institutional implications of development policies, plans, and programs for the Shire River Basin.

- (b) An **Independent Environmental and Social Impact Assessment (ESIA)** of the Kamuzu Barrage Upgrading (including an **Environmental and Social Management Plan – ESMP**, and **Resettlement Action Plan – RAP**) exists in draft form. The Preliminary ESIA with ESMP were publicly disclosed on December 1, 2011. The draft RAP was publicly disclosed on January 1, 2012. The ESIA provides inputs for modifying the future operating rules of the Barrage. Prior to this independent ESIA, a preliminary Environmental Impact Assessment (EIA) was completed in 2003 as part of the Feasibility Study (The Integrated Water Resources Development Plan for Lake Malawi and Shire River System “Lake Malawi Level Control”—Stage 2, Final Feasibility Report, Volume II, Part C—EIA of Upgraded Liwonde Barrage, Norconsult).
- (c) An **Environmental and Social Management Framework (ESMF)** has been prepared to address the expected environmental and social impacts of the overall project (aside from the Kamuzu Barrage). The ESMF indicates the corresponding mitigation and enhancement measures for each type of environmental and social impact identified (whether negative or positive). This ESMF serves as a companion volume to the Independent ESIA of the Kamuzu Barrage Upgrading. The draft ESMF was publicly disclosed on January 1, 2012.
- (d) A **Resettlement Policy Framework and Process Framework** for the overall project serve to (i) complement the Resettlement Action Plan that is being produced under the Independent ESIA of the Kamuzu Barrage; (ii) specify the criteria and procedures to be followed if other components of the project (besides the Kamuzu Barrage work) would lead to involuntary physical relocation, loss of assets or access to assets, or (in the case of people living near Project-supported National Parks or Forest Reserves) new restrictions on access to natural resources used to maintain livelihoods. The draft RPF was publicly disclosed on February 2, 2012 and the PF was publicly disclosed on January 1, 2012.
- (e) The World Bank has sent, on behalf of the Republic of Malawi, a **Riparian Notification Letter** to the governments of all the other Zambezi River Basin countries (Mozambique, Tanzania, Angola, Botswana, Namibia, Zambia, and Zimbabwe), since the Shire Basin forms part of the larger Zambezi Basin. This notification and request for any official comments is done to support good information sharing among the riparian countries and is in compliance with OP 7.50 on Projects in International Waterways. The Team assessed that the Project’s impacts will be largely positive and not cause appreciable harm to any riparian. Two responses (from the Republic of Namibia and the Republic of Zimbabwe) were obtained by the end of the notification period and both are supportive of the Project and its objectives.
- (f) **Dam Safety:** The SRBMP-I will finance rehabilitation of the Kamuzu Barrage. Although this barrage is a relatively small structure by itself (only 4 m high), it has great strategic importance for Malawi and partially influences water levels in Lake Malawi, one of the world’s largest freshwater lakes. Accordingly, it has been decided to apply the World Bank’s Safety of Dams Policy (OP4.37) and the Bank’s Lead Dam Specialist has provided advice on measures to improve dam safety. The project will not finance the construction of other large dams. Under the Catchment Management Component B, the project may finance construction of small earth reservoirs, farm and fish ponds, for which the application of generic dam safety measures will apply. The construction or rehabilitation of such water retention structures under the project requires the project to be in accordance with small dam guidelines, which include the existing regulations and the generic guidelines in the FAO

Technical Guide for Small Earth Dams (FAO, 2010). These technical guidelines will need to be adopted early in the project before such structures are built in order to complement the national regulation and guidelines for construction, maintenance and safety of small dams.

- (g) As a result of project preparation, along with experience with other World Bank-supported projects (including NWDP-II), the Government agencies responsible for this Project are increasingly familiar with the Bank’s environmental and social safeguard policies. Additional **safeguards training for project staff** is planned to take place during the first year of project implementation.

Safeguard Policies Triggered	Yes	No
Environmental Assessment (OP/BP 4.01)	x	
Natural Habitats (OP/BP 4.04)	x	
Forests (OP/BP 4.36)	x	
Pest Management (OP 4.09)	x	
Physical Cultural Resources (OP/BP 4.11)	x	
Indigenous Peoples (OP/BP 4.10)		x
Involuntary Resettlement (OP/BP 4.12)	x	
Safety of Dams (OP/BP 4.37)	x	
Projects on International Waterways (OP/BP 7.50)	x	
Projects in Disputed Areas (OP/BP 7.60)		x

Annex 1: Results Framework and Monitoring

MALAWI: Shire River Basin Management Program (Phase-I) Project

I. Results Framework

Program Development Objective: Increase sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources										
Program Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values			Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR5	YR10	YR 15				
Change in percentage of people living below the poverty line in Program Areas	<input type="checkbox"/>	%	52	-3%	-6%	-10%	Every 5 years	Baseline and household surveys	MWDI	Use poverty data from country and program surveys to describe change in poverty levels in the program areas.
High erosion area (>25/t/ha) in targeted catchment areas	<input type="checkbox"/>	ha	66,000 ¹	61,000	56,000	51,000	Every 5 years	Modeling and Bio-physical survey/ monitoring	DLRC, Contracted partner	Modeled high erosion areas, supplemented with field biophysical and remote sensing measurements
Total hydropower generation from Shire Basin	<input type="checkbox"/>	GWh	1,100	+5%	+10%	+20%	Every 5 years	Power generation output data	ESCOM	More energy available from the Basin; New projects.
Persons with access to improved flood management, of which % female	<input type="checkbox"/>	Number and (%)	0	200,000 (50%)	225,000 (50%)	250,000 (50%)	Every 5 years	Institution reports and surveys	DCCMS, DWR and DNRDM	This is also partially captured in LDCF Tracking Tools on Elephant Marshes

¹ See Annex 7 Table 1.

Project Development Objective (PDO): Develop Shire River Basin planning framework to improve land and water management for ecosystem and livelihood benefits in target areas													
PDO Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values						Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR3	YR 4	YR 5	YR 6				
Shire Basin Plan developed by multi-sector Shire Basin Institution	<input type="checkbox"/>	Y/N	N	N	N	N	N	Y	Y	Annual	Project reports	MWDI	Multi-sector land and water management plan based on analysis and stakeholder consultation developed by Shire Basin Institution
Vegetation cover change as a percentage of baseline in selected catchments	<input type="checkbox"/>	%	0%	+0%	+0%	+2%	+5%	+8%	+10%	Annual	Satellite imagery, vegetation index	National Space Data Centre	Indicator captures changes in agricultural land (currently x ha) as well as forest land ¹ (currently y ha) and protected areas (currently z ha) in targeted areas.
Downtime for hydropower stations on the Shire river	<input type="checkbox"/>	%	8 (2009)	8	8	8	8	7.6 (-5%)	7.2 (-10%)	Annual	Power generation output data	ESCOM	Downtime of HP stations in the cascade due to weed, silt, sediments and low flows
Households in targeted areas re-classified to lower risk	<input type="checkbox"/>	Number	0	0	0	3,000	10,000	15,000	20,000	Annual	Project reports	DWR DNRDM	Reflection of changes in flood risk to communities
Direct project beneficiaries ² , of which female (%)	<input checked="" type="checkbox"/>	Number (in1000) and (%)	0 (-)	0 (-)	15 (50%)	100 (50%)	230 (50%)	350 (50%)	400 (50%)	Annual	Implementing agency project reports	DLRC, DWR DNRDM	Number of beneficiaries targeted under components B and C.2 (catchment management and flood risk management).

¹ For forest reserves, the results will be used to estimate carbon storage gains according to the GEF SFM tracking tool.

² Assuming 5 persons per beneficiary household

Intermediate Results Component A – Shire Basin Planning: Collaborative and knowledge based Shire River Basin Plan developed													
Intermediate Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values						Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR3	YR 4	YR 5	YR 6				
Progress on Shire Basin knowledge base and decision support systems development, including ecological aspects ¹ .	<input type="checkbox"/>	Y/N	N	N	Spatial knowledge base	State of Shire Basin report	Basin planning DSS developed	Shire Basin Plan developed		Annual	Project reports	Basin agency/ TT	Knowledge products (hardcopy/ electronic) and decision support systems/ web based tools developed with appropriate integration of new ecological information
Hydromet stations with accessible data in real time.	<input type="checkbox"/>	Number	0	0	0	0	10	20	30	Annual	Agency reports Project reports	DWR DCCMS	Hydro & meteorological stations to collect water and climate data
Average warning time for flood forecast information to reach targeted communities for improved preparedness	<input type="checkbox"/>	hrs	no existing effective system	no existing effective system	no existing effective system	no existing effective system	2	8	24	Annual	Reports	DNRDM/ DCCMS/ DWR/ Basin Agency	Improved capacity to provide flood early warnings through hydrological forecasting and basin monitoring gauges to targeted communities.

¹ This will also be captured through the GEF LD tracking tool assessment of progress under Outcome 3.1: Enhanced enabling environments between sectors in support of SLM.

Intermediate Results Component B – Catchment Management: Targeted sub-catchments and protected areas rehabilitated and managed for reduced erosion and improved livelihoods													
Intermediate Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values						Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR 3	YR 4	YR 5	YR 6				
Annual average sediment load from selected sub-catchments compared to control catchments reduced	<input type="checkbox"/>	Ratio	1	1	1	1	0.98	0.95	0.9	Annual	Bio-physical survey/ monitoring	DLRC, Implementing Partner (IP)	Ratio: Selected / Control Catchment Sediment Load averages. Sediment load for high turbidity, sample analyzed for total suspended solids.
Proportion of households within targeted sub-catchments engaged in sustainable land and water management	<input type="checkbox"/>	%	15	15	20	35	45	65	75	Annual	IP reports, Project reports	IP, MWDI, Project coordination	Planning documents including performance agreements and plans, as well as records of consultations and maps.
Total value of livelihood investment grants managed by targeted GVs	<input type="checkbox"/>	Million MK	0	0	0	0	40	120	220	Annual	VDC financial records IP report	IP, DLRC Project coordination	Startup financing of GVs is maintained reflecting good management and loan to profitable business.
Percentage increase in total value of agriculture related products marketed from targeted GVs	<input type="checkbox"/>	%	0	0%	0%	0%	5%	10%	25%	Annual	Socio economic survey	Project Coordination	Value of marketed agricultural production and processed products ¹ currently estimated to be X million MK
Average Management Effectiveness scores for 6 targeted protected areas/forest reserves ²	<input type="checkbox"/>	METT score	39	0			50		65	MTR+I CR	METT scores in GEF tracking tools	MTC (DNPW)	Target sites: Liwonde & Lengwe NPs; Neno Eastern Escarpment, Tsamba & Mangochi FRs; Elephant Marshes

¹ Income generating activities include processing, improved storage, livestock, apiculture, etc.

² Management Effectiveness Tracker Tool (METT) is a GEF tool that uses a basket of indicators to score changes in protected area management effectiveness. This is a required M&E tool for all GEF funded biodiversity programs and will be applied to all targeted natural habitat sites under the program.

Intermediate Results Component C – Water Related Infrastructure: New investments enable improved regulation of Shire river flows and strengthen climate resilience													
Intermediate Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values						Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR 2	YR3	YR 4	YR 5	YR 6				
Kamuzu barrage upgraded and operational with improved management	<input type="checkbox"/>	Y/N	0	Works contracts awarded		Operational Rule DSS developed	Phase I of construction completed	Phase II/III of construction completed	Operation on DSS operational	Annual	Contractor reports, project reports	Contractor MWDI MTPW	Barrage fully functional in regulating discharge and controlling water levels as designed.
GV with improved community flood management infrastructure	<input type="checkbox"/>	Number	0	0	0	7	20	30	40	Annual	Project reports	DNRDM and DWR	Infrastructure of first phase of integrated flood risk management plan
New water investment plans prepared to pre/feasibility stage	<input type="checkbox"/>	Number	0	0	0	0	2	3	4	Annual	Project reports	MWDI	Includes detailed design, pre-feasibility and costs.
Budgeted management plan established for Elephant Marshes	<input type="checkbox"/>	Y/N	N	N	N	N	Y	Y	Y	Annual	Project reports	DNPW	Also included under LDCF Adaptation Monitoring & Assessment Tool indicator on budgeted sector plans.

Baseline is to be confirmed by socio-economic baseline survey before project effectiveness

II. APL Triggers

Moving from the first to the second phase of the adaptable program loan:

Moving from the first to the second phase of the APL will require attainment of six triggers. It is agreed that achieving these triggers implies the following:

1. **Trigger:** *An acceptable institutional mechanism to facilitate Shire Basin multi-sectoral development planning and coordination established and operational.*

Description: Identification, adoption and implementation of an appropriate institutional mechanism to establish the Shire Basin as management unit for water resources management and ensure coordinated multi-sectoral planning and development of these water resources. This mechanism should ensure that a multi-sectoral knowledge base and analytical tools are developed along with basin stakeholder engagement to develop a Shire Basin Plan that would focus on the sustainable use, management and development water resources.

2. **Trigger:** *Real-time Shire Basin hydromet data collected for operational decision support system.*

Description: Development of an integrated hydrological and meteorological real-time gauging network and visualization platform to support improved weather, hydrological, and flood forecasting. This will also support an operational support system to facilitate Basin water infrastructure operations and early warning systems.

3. **Trigger:** *Harmonized national guidelines for catchment management developed.*

Description: Guidelines for catchment rehabilitation and management prepared in collaboration with other programs, projects and partners, building on existing documented Malawi, regional and global good practice and experience relating to technical and processing aspects of participatory integrated catchment management.

4. **Trigger:** *Kamuzu Barrage upgrading stage one civil works satisfactorily completed.*

Description: Stage one of the Kamuzu Barrage upgrading includes civil works and associate structural improvements on the eastern half of the Barrage. Completion of this stage would be certified by the Site Engineer from the Supervising Consultant.

5. **Trigger:** *Effective flood early warning system operational in the Lower Shire.*

Description: Targeted flood-prone areas of Nsanje and Chikwawa covered by an operational flood early warning system that provides targeted communities at risk with at least 8 hours advance warning of imminent floods. The flood early warning system would be linked to the operational decision support system and use real time hydromet data, as well as community based information and communication systems.

6. **Trigger:** *Continued commitment by GoM to the Program.*

Description: The commitment would be evidenced by a letter of sector policy that reinforces continued commitment to the Shire Basin Program and the Government's endorsement of the multi-sectoral planning framework.

Moving from the second to the third phase of the APL:

Moving from the second to the third phase of the APL would depend on attaining a second set of triggers. These would include:

- (i) The institutional mechanism to facilitate Shire Basin multi-sectoral development planning and coordination firmly embedded through an expanded legal mandate.
- (ii) Shire Basin Plan and Shire Basin Decision Support Systems effectively used by GoM to make decisions regarding infrastructure development for the use or management of the Basin's water resources.
- (iii) Kamuzu Barrage upgrading completed and its operations guided by a real-time decision support system.
- (iv) Satisfactory progress observed in Phase I and Phase II targeted catchment areas in accordance with participatory catchment management plans.
- (v) Flood management system improved for Lower Shire (with flood zones delineated, flood zoning policy formulated, and priority flood management investments prepared).
- (vi) Continued commitment by GoM to the Program.

These triggers will be reviewed for relevance and fine-tuning at the start of Phase II, while others may need to be added based on the prioritization of actions under the Shire Basin Plan and subsequent detailed design of the second phase of the APL within the broad parameters of the program.

Annex 2: Detailed Project Description

MALAWI: Shire River Basin Management Program (Phase-I) Project

Long-term Shire River Basin Management Program

1. The overall **program development objective** of the Shire River Basin Management Program is to *generate sustainable social, economic and environmental benefits by effectively and collaboratively planning, developing and managing the Shire River Basin's natural resources*. The program would support the Government's Shire basin Policy Letter (Annex 10), and would have a duration of 15 years. The proposed phasing of the Project has been established with Government and is illustrated in figure 1 (next page). The first phase project – the Shire River Basin Management Program (Phase-I) Project (SRBMP-I) – would establish coordinated inter-sectoral development planning and coordination mechanisms, undertake the most urgent water related infrastructure investments, prepare additional infrastructure investments, and develop up-scalable systems and methods to rehabilitate sub-catchments and protect existing natural forests, wetlands and biodiversity. Future phases would consolidate Basin planning and development mechanisms and institutions, undertake further infrastructure investments, and up-scale catchment rehabilitation for sustainable natural resource management and livelihoods. The SRBMP is intended to serve as an integrating framework to synergize the work of all key institutions in the Basin. In this regard, it can be considered that other ongoing and proposed projects and programs are contributing to this overall framework. Other development partners supporting work on the Shire include UNDP/GEF (Public Private Sector Partnership on Capacity Building for Sustainable Land Management in the Shire Basin); JICA (Project for Community Vitalization and Afforestation in Middle Shire); and the Millennium Challenge Corporation (MCC – Environmental and Natural Resources Management Action Plan for the Upper Shire Basin).

Project Development Objective, Beneficiaries and Indicators

2. The **Project Development Objective** (PDO) (and **Global Environmental Objective**) of the Shire River Basin Management Program (Phase-I) Project (SRBMP-I) would be to *develop Shire River Basin planning framework to improve land and water management for ecosystem and livelihood benefits in target areas*. The project would: (a) strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems; (b) invest in water related infrastructure that sustainably improves water resources management and development; (c) reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing environmental services, agricultural productivity and improving livelihoods; (d) improve flood management in the Lower Shire and provide community level adaptation and mitigation support; and (e) protect and enhance ecological services in the Basin.

3. **Direct project beneficiaries** include some 430,000 people (50 percent female) in 86,000 rural households (assuming 5 persons per HH), of which: (a) 230,000 people and 45,000 households of targeted priority catchments in the Middle Shire that will benefit from integrated catchment rehabilitation activities; and (b) another 200,000 people and 40,000 rural households of flood prone areas in the Lower Shire that will benefit from improved water management and flood mitigation works.

4. **Indirect project beneficiaries** include: (a) rural households located close to areas of natural forests and wetlands (including those within national parks and forest reserves and on adjacent customary land) whose improved management under the project will provide a more sustainable natural resource base and additional livelihood options; (b) the 30 percent of urban households, companies and public agencies in Malawi with access to electricity that will benefit from reduced downtime of the hydropower stations on the Shire; (c) the urban populations and industry of Blantyre and Limbe that depend for their drinking water on the Shire river, and Blantyre Water Board because of reduced silt loads and associated water treatment costs; (d) the commercial and communal irrigation sector; and (e) fisheries sector in Lake Malombe through increased security of reliable water allocation.

5. The **PDO level results indicators** include: (a) Shire Basin Plan developed by multi-sector Shire Basin Institution; (b) vegetation cover as a percentage of baseline in selected catchments (increased by ten percent); (c) downtime for hydropower plants on the Shire River (reduced by eight percent); (d) households in targeted (flood prone) areas re-classified to lower risk (20,000 HH); and (e) direct project beneficiaries (430,000) of which female (50 percent).

6. **Approach.** The project would address the interlinked challenges of poverty and a deteriorating natural resource base in the Shire River Basin to reduce the process of environmental degradation and improve the productive potential of natural resources. The project would promote integrated climate resilient investment planning in the basin, including institutional capacity building to plan and monitor changes in land use patterns at a basin level. Project activities would support strategic planning and implementation of large-scale infrastructure investments; adoption of sustainable land, forest and water management practices to reduce land degradation in production and natural landscapes, to build resilience to climate risk and to improve the productivity and incomes of smallholder farmers in priority catchments. The project would also improve flood management in the Lower Shire. Project investments would be designed to support the GoM's economic growth and development plans for the basin.

Component A: Shire Basin Planning (US\$ 41.6 M)

7. The objective of this component is to *lay the foundation for more integrated investment planning and modernized system operations for the Shire Basin*. The component would develop the appropriate knowledge and institutional platforms to promote integrated and sustainable planning and management of investments on the Shire. The component would finance development of a modern integrated Shire Basin knowledge base and analytical tools, as well as well-planned structured stakeholder consultation processes, in order to facilitate investment planning and systems operation. This component is critically required to move from the current fragmented approach to investments and systems operation, to a more coordinated and holistic approach based on a shared and sustainable vision for the development and management of the Shire Basin. A modern knowledge base with associated knowledge products will be created along with a basin planning decision support system to support a strategic multi-sectoral systems perspective in evaluating future investment possibilities. In addition, the component will support modernization of the water resources monitoring systems (including the development of real-time hydromet systems) and an operational decision support system to improve integrated hydromet data visualization and archival, support forecasting and early warning systems, and provide inputs for water systems infrastructure operations. The component will support institutional coordination mechanisms for basin planning and management for the basin's socio-

economic development and environmental sustainability, and is organized in four sub-components.

8. It would finance development of a modern integrated Shire Basin knowledge base and analytical tools, as well as well-planned structured stakeholder consultation processes, in order to facilitate investment (e.g. in water storage, hydropower, irrigation, water supply, transport, disaster resilience, etc.) and systems operation planning (e.g. operation of Kamuzu Barrage based on multiple objectives, system flood forecasting), whilst giving due consideration to the safeguarding and enhancement of natural catchment functions and other environmental services. Investments in hydro-meteorological systems, especially in appropriate real-time systems and integration with satellite products will improve system operations and disaster management. This component is critically required to move from the current fragmented approach to investments and systems operation, to a more coordinated and holistic approach based on a shared (and evolving) vision for the development and management of the Shire Basin. A modern knowledge base with associated knowledge products will be created along with modeling tools to support this planning. This will include information about climate, water resources (surface and groundwater), topography, water and other infrastructure (existing and proposed), water users, environment, biodiversity, soils and land use, demographic and other socio-economic indicators, water related public health indicators, and institutions and programs, all organized in both spatial (GIS-based) systems as well as supporting documentation, easily accessible for planners and stakeholders. It will support institutional coordination mechanisms for basin planning and management for the basin's socio-economic development and environmental sustainability; and improve information available in the public domain.

9. A critical part of Shire Basin Planning will be an improved knowledge base and a comprehensive strategy on flood risk management, with a focus on the lower Shire, which is the area most frequently affected by flooding of the Shire and its tributaries. Several initiatives are being implemented by GoM and other stakeholders to reduce the risks and mitigate the impact of floods on more than half a million people living in the valley. However, these efforts are localized and not harmonized, with little visible impact overall. Currently, the Bank, with funding under the Global Facility for Disaster Reduction and Recovery (GFDRR), is supporting DNRDM, DWR and DCCMS with the development of an Integrated Flood Risk Management Plan (IFRMP) for the Shire River Basin. The Action Plan will provide guidance on mitigation (infrastructure and readiness) interventions, flood zoning, forecasting and early warning, to all stakeholders in the basin, packaged for procurement and management for the first five years and will be supported by the SRBMP-I.

Sub-component A.1: Develop a Shire Basin Planning Framework

10. This sub-component includes provisions for preparing a Shire Basin Plan as well as for the strengthening of a Shire Basin planning and coordination mechanism and institution.

11. *Activity A.1.1: Shire Basin Planning.* A key element of this work is the development of a *structured knowledge base and analytical tools* to improve strategic planning in the Shire Basin. This includes the development of a modern knowledge base collating existing information, using modern GIS, remote sensing, and other spatial datasets and tools. This work would be done in collaboration with all the key water-related institutions working on the Shire Basin. A number of knowledge products would also be developed in this regard – including a Shire Basin Atlas, a State of Shire Basin Report, an interactive Shire Basin Knowledge Base, a web portal, and other

such knowledge products (including technical and interpretive biodiversity and ecosystem knowledge products). The knowledge base would be strengthened through collation of existing data and information products, notably the water resources investment strategy of 2010, as well as through support for new surveys and mapping (e.g. of water resources, natural habitats, biodiversity, satellite imagery acquisition and analysis, etc.).

12. This knowledge base would provide the inputs to the development of a *Basin Planning Decision Support System* (Planning DSS), which will have a suite of modeling tools to help simulate, optimize, and compare investment choices that affect various aspects of the water systems. For example, it would help strategically inform decisions on the synergies and trade-offs among future investment paradigms in irrigation, hydropower, catchment management, flood management, and ecological infrastructure using criteria and indicators that capture the economic, environmental, and social development perspectives of the Shire Basin, as well as decisions relating to water allocation and design of operating principles/rules of water infrastructure within a holistic basin context.

13. The Planning DSS for the Shire Basin would be based on appropriate knowledge base and water resources modeling tools. The Planning DSS would help support investment choices across key water-related sectors in the basin to optimize the allocation and use of basin resources. This would involve the analysis of proposed investments (e.g. irrigation, hydropower, catchment management, bulk water supply, etc.) in a basin context to illustrate synergies and trade-offs. The DSS will be designed to address key economic, environmental and natural resources, and social issues and develop appropriate knowledge bases in this regard. For example, the work on survey and mapping of natural habitats and biodiversity hotspots within the Basin will allow the contribution of ecological infrastructure to river basin functions to be modeled and evaluated and critical natural habitats to be identified, so that basin planning and investments take proper account of these issues.

14. The activity would then support the development of a *Shire Basin Plan* (a rolling plan to be updated every few years) that is based on both the analysis supported by the analytical framework supported by the knowledge base and Planning DSS, as well as by well-structured stakeholder participation. The stakeholder participation would be supported through the proposed Shire Basin Stakeholder Forum (with representatives from multiple stakeholders in basin management which will form a platform for debate and basin vision development) and other consultations to be conducted throughout the process. This activity would primarily support the acquisition and computerization of datasets, hardware, software, specialized consultancy inputs for the Basin planning process and development of a Planning DSS, stakeholder meetings, creation and dissemination of knowledge and analysis products, and associated operational costs. The work would be initially carried out by the TT coordinating with various departments, and gradually be phased into the proposed Shire Basin Institution.

15. The sub-component would finance the acquisition of data sets including satellite imagery; surveys and mapping exercises; development of knowledge tools and products, development of the Planning DSS tools, and support for the preparation of the Shire Basin Plan.

16. *Activity A.1.2 Shire Basin Institution.* This activity would support the setting up and operationalization of a multi-sectoral Shire Basin institution to support long-term planning and management of the Shire Basin. The institution would be staffed by a multi-sectoral team of professionals representing various water-related sectors and support staff augmented by

specialized technical skills for data and knowledge management, modeling, technical analysis, and stakeholder engagement. The institution is expected to become the knowledge and analysis hub for multi-sectoral water resources planning and management in the Shire Basin. It would help develop knowledge products, the Planning DSS, and organize and facilitate meaningful stakeholder consultations at various levels to support the basin planning process, including effective meetings of the Shire Basin Stakeholder Forum. It would also help build links with other knowledge partners, including academia, and facilitate the development of an integrated basin perspective for sectoral planning to improve resource sustainability and reduce resource conflicts at basin scale. The activity will pay adequate attention to institutional and financial sustainability of critical basin management, operation and knowledge functions, and among others will fund a study on the financial sustainability of different operation modalities and responsibilities for the operation and maintenance of Kamuzu Barrage. The sub-component would support the provision of specialist consultant inputs, civil works (office building), internships, communications, training/workshops, research and innovation, and operational costs (also see Annex 6). Support to the institution shall gradually decrease in follow-up phases as the institution is established.

17. The project proposes to work towards establishment of a Shire River Basin Institution to help serve as a focal point for multi-sectoral planning and management of the Basin. It is recognized that the existing systems for multi-sectoral water resources management are not very effective and would not be useful in effectively addressing evolving water challenges and manage conflicts among alternative water uses. There are aspects where virtually no management systems exist (e.g. sustainable groundwater management), where degradation of resources is reported to be occurring at increasing rates (e.g. urban contamination of water resources and siltation arising from degraded catchments fueled by deforestation), and there has been a steady decline in the effectiveness of previously robust monitoring regimes (surface water network). While many good pieces of analytical work have been carried out, including on improved institutional set-up, these will still have to be implemented. The project will support establishment of a Shire Basin Institution in line with best international practice and national policy (National Water Policy of 2005); recognize the river basin as the management unit for WRM, establish knowledge base and tools for multi-sectoral water planning, and improve implementation and enforcement capacity in addition to the Ministry, which sets overall policy. The Shire River Basin institution will be a prototype organization, and can develop as a sub-organ to or in parallel with a more efficient national system, which will also be supported under this project where necessary.

18. The responsibilities and functions of the Shire Basin Institution could be summarized as facilitating the technically, environmentally, financially and economically sustainable use of water resources in the Shire Basin and its tributaries; and include: (a) facilitating stakeholder discussion through a stakeholder forum on development and monitoring of a basin development vision; (b) survey and analysis – surface and groundwater quality sampling, climate and meteorological investigations, hydrological surveys, GIS and computer modeling; (c) monitoring and evaluation – lake water levels, Shire and tributary river flows, flood events, drought impacts, soil moisture deficit; (d) advice on policy formulation, including researching, documenting and making accessible information on the state of resources in the Basin; (e) resource planning – establishing greater understanding of the water balance in the catchment, making projections of future demand, developing long-term plans to maximize water use efficiency and water conservation, formulating a multi-purpose development plan covering irrigation locations and

water demand, resettlement of displaced population, assessing potable water supplies; (f) reviewing applications for and granting (while informing the Minister) water rights, water abstraction rules, definition of sensitive water catchments and water storage, supply area, protection of surface and ground water reserves, land use policies to prevent soil erosion and discharge of excessive nutrients to water courses; (g) disaster risk management – response planning for flood and droughts in coordination with DNRDM; (h) management of critical water infrastructure in the Basin; (i) navigation – regulation of lakes, rivers and waterways for shipping transport; (j) protection of the key ecological resources; (k) pollution control; (l) policing and enforcement of regulations; and (m) public awareness raising on all water uses, capacity building and training.

19. The Shire Basin Institution could be created under existing water legislation, but effective development would require further legislative reforms related to multi-sectoral water resources management that support national policy. The project would support the initial development of a multi-sectoral institution that focuses on the basic functions related to development of a comprehensive basin knowledge base and decision support tools, knowledge products, awareness building, stakeholder discussions, and development of a first integrated Basin Plan. These activities can be deepened and further functionality addressed as further legislative backing is provided to the institution in further phases.

20. Incremental GEF support would provide for strengthening the management of ecological and biodiversity knowledge in the basin, based both on the information generated under the ecological surveys in sub-component A.1, and other existing and ongoing data generation. Existing information on basin ecology will be collated and a spatial meta-database will be developed to organize and provide access to it. Specialized technical institutions, such as the Forest Research Institute of Malawi and the National Herbarium, will receive support to improve their in-house knowledge management, to allow them to link their data resources to the meta-database. Ecological and biodiversity information products will be developed from this knowledge base both to reflect the value of natural ecosystems to the hydrology and economy of the basin, and to provide field guides and interpretive materials for protected areas.

Sub-component A.2: Build Institutional Capacity for Coordinated Basin Management

21. The project would strengthen the different line agencies involved in Shire basin management to more effectively fulfill their different roles (as shown in the table on the next page) and to facilitate multi-sectoral work across departments. Capacity enhancement activities would be based on a Capacity Enhancement Needs Assessment that identifies capacity gaps in fulfilling key functions (currently underway) and would be detailed in a comprehensive Capacity Development Plan. Training will be focused on practical hands-on training with clear objectives for improved service delivery and will be based on a mix of individual on-the-job and short training courses to institutional, equipment and information support.

Key Institutional Capacity-Building Areas of Project Support

Targeted Institutions		Illustrative Focus Areas for Capacity-building
Ministry of Water Development and Irrigation		
	Department of Water Resources	Basin planning Water resources monitoring (incl. real-time hydromet systems, water quality & groundwater monitoring/surveys), modern earth observation products Hydrologic, inflow, and flood forecasting Planning and real-time decision support systems
	Department of Irrigation	Irrigation planning, improved design of community managed hill irrigation and check-dams Improve project preparation and implementation, and integration with catchment management activities
Ministry of Agriculture and Food Security		
	Department of Land Resources and Conservation	Catchment prioritization Participatory and scientific catchment planning Modern Monitoring & Evaluation system (top-down, bottom-up, and process) and GIS/ visualization/ spatial analysis Strengthening of a land and water management training institute in Zomba
Ministry of Environment and Climate Change Management		
	Department of Forestry	Modern participatory forest management Enhancement of biodiversity in forest landscapes
	Department of Climate Change and Meteorological Services	Improved real-time weather monitoring and forecasting (integrating ground and satellite products) Climate variability and change scenarios for basin planning Customized provision of weather and climate information products to various stakeholders for basin and activity management
	Environmental Affairs Department	Environmental and social safeguards including SEAs at Basin level Certified Environmental Auditing Relevant GIS and data management Environmental quality measurement and monitoring Pollution control technology
Ministry of Energy and Mining		
	Department of Energy	Hydropower planning and management in basin context
Ministry of Lands and Housing		
	Department of Surveys - National Space Data Centre	Modern GIS, Remote Sensing Access to available global and other spatial datasets Making modern hardcopy and electronic (incl. interactive and online) spatial knowledge products Improving public access to data and providing spatial knowledge services
Office of the President and Cabinet		
	Department of National Relief and Disaster Management	Flood forecasting use Last-mile communication Community preparedness Flood/drought monitoring and response facilitation
	Forest Research Institute of Malawi, and National Botanical Gardens and Herbarium	Equipment for field surveys Internal data management systems Installation of modern taxonomic database at Herbarium Networking amongst local biodiversity agencies and organizations Collaboration with expert regional and international partners

Sub-component A.3: Improve Water Resources Information Systems

22. The sub-component provides for water resources information systems improvement, and, based on these systems, hydrological modeling and flood warning systems. These information systems would also be used to refine and update the Shire Basin Plan and management system of sub-component A.1, as well as the Integrated Flood Risk Management Plan for the Shire Basin that is being prepared by DNRDM with Bank support under the Global Facility for Disaster Reduction and Recovery. It will also feed into the decision support system for operation of the Kamuzu Barrage.

23. *Activity A.3.1: Modernization of the Water Resources Monitoring Network:* The current monitoring system for the Shire Basin is almost completely comprised of manual observations with almost no real-time data availability or use of modern earth observation satellite data products. This activity would include support to modernize the monitoring of weather, water levels, flows, water quality, groundwater, and sediment loads. It is expected that this would result in a core network that provides information in real-time or quasi real-time (especially for hydro-met parameters to be used for real-time decision support) using appropriate technology (including cellphones for existing readers, low-cost modern GSM or WMO-supported satellite telemetry). It is also expected to support the deployment and operation of what would be Malawi's only operational weather radar to support forecasting. It is expected that this will provide the backbone for a modern water resources information system, improved forecasting and early warning, and an operational decision support system when combined with modern earth observation knowledge products. The activity would support supply, installation and operation of improved gauging systems, communication, data integration and quality management, and associated operating costs.

24. *Water resources information system,* to monitor water flows and discharges, water quality and sediment loads, as well as groundwater, using real time low-cost modern communications such as providing manual readers with cellphones, GSM telemetry, or the ideally suited WMO supported Global Observation System (GOS) as provided through the METEOSAT Data Collection System (DCS). Resolving the data communication method will depend on the availability of a given communication solution as determined on a site-by-site basis and the phasing-in of appropriate technology. The measurement system will consist of a robust cost effective solution, well-designed to minimize maintenance while being able to operate over a wide range of river and general environmental conditions. For instance, water level can be measured at many sites (including difficult to access ones where readers have to work with the danger of being attacked by crocodiles, snakes, and other hazards) with a low-cost ultrasonic sensor that can operate over a wide range of environmental conditions. A range of earth observation data products that are currently available for the region are seldom utilized and efforts will be made to integrate these to take advantage of an increasingly powerful class of public-domain near real-time spatial datasets that can often be downloaded effectively using tools such as GEONETCast even in environments such as Malawi with poor internet connectivity. The water resources information system will integrate ground-based hydro-meteorological observations with satellite products in interactive portals (described in the next activity) accessible in MWDI, DCCMS and DNRDM; and where possible shall be made publicly available using a number of traditional and modern communication channels.

25. This water resources information system will form a major input into the forecasting and early warning systems; and will be linked to national water resources monitoring and

information systems that are currently partially being modernized under the African Development Bank (AfDB) support to the National Water Development Program as well as the Water Sector M&E project, also funded by AfDB. The support will include efforts to make all current manually-read systems more real-time by providing readers with cellphones to call-in and eventually text the readings. The network is currently being optimized and will identify gaps in hydromet data collection, as well as suggest improvements for transmission, data storage, analysis, and customized dissemination products. The proposed modernization will be largely based on this assessment and equip key water resources monitoring sites, where appropriate, with modern data collection and transmitting stations that are robust, tamper-proof and can transmit data real-time, yet using newest technology at considerably lower cost than more traditional telemetric stations. Lessons from previous initiatives are taken into account into systems design. The project will also support data collection associated with the Lake and in the upstream catchments of the Lake so as to complement the data needed for improved operation of the Barrage and complement the activities in the Basin for improved national water resources information. Water Resources information relevant for Shire Basin Management will be fully integrated with national systems as well as regional grids (HYCOS) where appropriate.

26. The project will support water quality measurement both through enhanced manual and automated systems in critical locations as well as through devising a minimum required yet representative system of water quality checks with clear intervals and locations, replacing the current *ad hoc* water quality sampling and recording. This network will also include very detailed water quality monitoring in the target and control catchments, intended to monitor project impacts erosion through measurement of suspended solids.

27. *Activity A.3.2: Operational Decision Support System:*

28. Operational Decision Support System: This would include support for an integrated hydromet data visualization platform; weather, hydrologic, and flood forecasting and warning systems, and integrated water system infrastructure operations (especially for the upgraded Kamuzu barrage operations). The data visualization platform would help visualize archived, real-time, and forecast hydromet parameters and integrate information from gauging/radar, satellite knowledge products, modeling outputs from global, regional, and Malawi centers, and community-based disaster surveillance systems. It is expected to also improve the availability of information in the public domain using open data platforms to encourage downstream use of the data for further specialized analysis and dissemination. The improved seasonal and short-term weather forecasting would also support the introduction of systematic hydrologic forecasting in Malawi. This would then also be used for improved hydrologic and hydraulic/routing modeling of the flood zones, refining tools developed as part of the Integrated Flood Risk Management Plan (IFRMP) for the Shire Basin that is being prepared by DNRDM, DWR and DCCMS with Bank support under the Global Facility for Disaster Reduction and Recovery (GFDRR) and the LiDAR high-resolution floodplain elevation datasets being supported by the NWDP-II. This would support flood and drought early warning systems for communities at risk and disaster management related agencies. An integrated Operational DSS would be developed to support water infrastructure management in a systems context that uses a more multi-sectoral perspective (e.g. for operation of the upgraded Kamuzu barrage that is currently primarily operated only for hydropower considerations). The Operational DSS would be accessed through Operational Control Rooms at key water-related institutions at various levels. The activity would support the

provision of specialized consultant inputs to develop the overall decision support system, IT and office equipment, training, building upgrading, and operational costs.

29. A particular focus of the Operational DSS would be Flood Early Warning Systems, which would include the design and roll out in terms of hardware and software and capacity building for a basin-level flood forecasting and early warning system, as well as last-mile connectivity linked to the early warning system. The present forecasting and early warning system, based on a simple procedure of manually reading and communicating rainfall and water levels, will need to be further professionalized to make these data more real-time. This activity will also help strengthen capacities and collaboration between DWR, DCCMS and DNRDM. Currently, meteorological data is recorded and rainstorms are forecast, but there is no hydrologic forecasting based on the weather forecasting - this is proposed to be pursued in this project through actions such as enhanced runoff-rainfall modelling, routing, and inundation monitoring (to be supported through detailed topographic surveys of low-lying flood-prone areas such as in the lower Shire being conducted under the NWDP-II). Communication and decision support on early warning is then proposed to be enhanced. This activity ties in directly with other activities in this component - on improved water resources information and basin planning. The flood early-warning system builds on, and fits within, the roll-out of the IFRMP for the Shire Basin, which is expected in mid 2012 as a guiding action plan for disaster risk management in the Lower Shire Valley. The IFRMP will include feasibility and design for the forecasting and early warning system, based on a hydrological and flood model for the Shire and its tributaries, and will suggest the detailed ToR for implementation and support under this activity.

30. The flood forecasting and early warning system should have the following characteristics: (a) be robust and reliable, it should function under extreme conditions and be addressable from various locations in order to guarantee its use; (b) make use of real-time information from ground-based and satellite monitoring, including weather and hydrological data, including the actual outflow from the Kamuzu barrage from Lake Malawi; (c) make use of a reliable and cost effective communication system; (d) should be balanced, not too simple to miss essential components of the flood forecasting procedure, but also avoiding unnecessary complexity that will overwhelm the institutional capacity, easily lead to errors or, worse, abandoning of the system; (e) have a clear institutional framework for both the forecasting procedure itself as well as the dissemination of the forecasts; (f) be easy to update as the conditions in the basin can easily change, e.g. due to the ongoing sedimentation process; (g) be easy to enhance when more stations and / or more sophisticated models or procedures become available; (h) include backup systems that allow for a reliable forecast in case certain modules or stations are not available in extreme conditions; and (i) include community based input (e.g. nested systems), as well as last mile connectivity in dissemination of the warnings (e.g. cell phone broadcasting and other community mechanisms for response).

31. A useful addition to any flood warning, and especially flash flood warning effort is the utilization of weather radar that can be optimized for use in hydrology. The weather radar is able to measure precipitation over a fairly large area (nominally 70,000 km²). The radar can also extend lead times of flood threatening rainfall by 45 minutes or more. The possible inclusion of a radar will require a thorough site assessment which will factor in the availability of power, communications, and local access, along with a site that will provide radar coverage as close to the ground as possible over the area of interest, and would be supported with associated capacity enhancement support.

32. The system will greatly benefit from the proposed detailed topographic survey (aerial survey) of the lower Shire floodplain under the NWDP-II, as it will allow very precise flood mapping, flood zoning and modelling of flood impacts. It is expected that the results of this topographic survey will become available during the first year of the project and can be incorporated into the final design of the Flood Early Warning System. The flood modelling and mitigation scenarios will be used and further populated/updated during the project to calculate different future investment scenarios for the middle- and longer term. There will also be specific attention to further strengthening of regional linkages within the Zambezi Basin and in the region on forecasting and early warning. This activity will include consultancy (detailed design, implementation support and institutional capacity enhancement on the early warning system), civil works (on measurement stations where not covered under A.3.1, limited work on operational control rooms), and goods (early warning equipment).

33. Community level elements of the early warning system will be integrated with the support to improved flood management under component C. This includes training of communities on the early warning systems (on input and output side), simplified flood hazard map and community level strategies on response strategies. It will also include community equipment (i.e. cell phones, megaphones) to be used within the context of early warning systems, as well as a provision for limited support to community level operating costs in maintenance and participation in the early warning system. These community level activities will be supported through the Service Provider to be contracted on improved flood management in the lower Shire.

Sub-component A.4: Program Management, Monitoring and Evaluation

34. To ensure efficient and timely delivery of project resources in accordance with the project's objectives, a multi-sectoral Technical Team has been formed with representatives from the concerned departments and ministries, and located in MWDI and a Project Coordinator has been appointed from MWDI, who reports directly to the Principal Secretary (PS) of MWDI. The Project Management Unit (PMU) of the ongoing Bank financed NWDP-II, will also provide backstopping and mentoring support to the procurement and financial management specialists (to be) recruited under the SRBMP-I. This project is therefore following GoM guidance on project management and is not introducing a Project Implementation Unit; rather the technical team is drawn largely from - and the project is strengthening - line departments to carry out program management functions, and the project is breaking new ground in multi-agency collaboration through the multi-sector Technical Team.

35. The project will provide funding to contract professional and support staff to strengthen the Technical Team, facilitate its operations and ensure that certain specialized tasks are professionally executed by people with the required background and knowledge, including:

- (a) Professional staff: procurement, financial management, environmental and social safeguards specialists, an institutions specialist, GIS and modeling experts, liaison/ communication specialist, economist and water resources planner, as well as a diverse range of short term expertise and annual external audits.
- (b) Short term expertise is foreseen in the fields of for instance: planning and M&E, architecture, irrigation engineer, water supply, hydropower engineer, catchment management, civil engineer, facilitators, water quality, legal expertise, IT services, etc..
- (c) Support staff: executive assistant, liaison officer, accountant, data entry clerk.
- (d) Annual external audits.

36. The sub-component also has provisions for workshops, short training courses and formal training (in hydrology and land resources).

37. Specific provisions for M&E includes baseline, mid-term and end-of-project surveys. A Mid-Term Review will be conducted, to review project implementation arrangements and assess project performance in addressing outcomes and objectives. Performance indicators and targets are included in Annex 1. The information system will record M&E inputs and track activities related to the various proposed activities, under the different components and sub-components. A baseline survey is currently being conducted and will be available shortly after project effectiveness.

38. A major effort and substantial investments will be dedicated to improving, updating and modernizing M&E systems at different levels and for different purposes, such as for instance water and climate monitoring systems, vegetative cover and land-use monitoring systems, capacity of community groups in terms of land and business management skills, large and small program financed infrastructure construction, associate resettlement action plans, functioning of flood mitigation systems and actual flood damage occurring, vulnerability levels of target populations, which have a much wider reach than project input-output monitoring and project M&E framework, by providing data and analysis on the basin as a whole, accessible to stakeholders in an open access environment (internet), including basin thematic maps and state-of-the-basin reports.

Component B: Catchment Management (US\$ 45.0 M)

39. The objective of this component is that *targeted sub-catchments and protected areas are rehabilitated and managed for reduced erosion and improved livelihoods*. Development of community-based natural resource management systems is a long-term process that requires sufficient time to build the necessary capacity and ownership. The first phase of the program would have a duration of 5.5 years, but the activities promoted would ideally require a longer time horizon, and shall continue into future phases of the program. There would be three stages at the local micro-catchment level: (i) building conditions for micro-catchment rehabilitation and alternative livelihood development, including community sensitization, social mobilization and capacity building to ensure ownership and a strong foundation for subsequent interventions; (ii) design and implementation of micro-catchment development plans and alternative rural livelihoods; (iii) continuing financial and technical support for catchment rehabilitation and livelihood activities; and (iv) longer-term community support.

Priority catchments

40. It is envisaged that the component would be implemented in four separate catchments of between 26,000 ha and 41,000 ha each, with an average size of 33,000 ha, and adhering to watershed boundaries. The primary criteria driving selection of sub-catchments is reducing sedimentation impacting on downstream hydropower plants in the Shire River. During project preparation a modeling exercise was undertaken to help identify priority catchments and sub-catchments for Component B. Selection criteria included rainfall intensity, topography, soil erosion risk, land cover, population and economic costs of downstream sedimentation at hydro-electric dams on the Shire River. The modeling results propose potential high priority sub-catchments (see also Annex 7). This was combined with further selection considerations, such as

nature of the erosion hot-spots and “manageability” of the areas. Spreading the work across four districts would provide a range of site characteristics and challenges to generate valuable lessons for scaling up. At the same time, a catchment site of around 33,000 ha allows for comprehensive coverage and monitoring of measurable changes in silt loads at the furthest point downstream. The component would have approximately 45,000 direct beneficiary households.

41. The first priority sites selected include four catchments (see also Annexes 7 and 11): (a) Upper Lisungwe in Ntcheu District; (b) Upper Wamkulumadzi in Neno District; (c) the Escarpment area upstream of Kapichira falls in Blantyre districts; and (d) Chingale in Zomba and Mangochi districts. Based on initial district level data from a variety of sources, followed by more detailed mapping of selected catchments, the estimated total project area of 133,000 ha would have the following estimated land use patterns and demographics: (i) arable land 41% of catchment area; (ii) non-arable land (often degraded forest on steep slopes), 55% of area; (iii) standing forest 4%; (iv) Group Villages 28; (v) villages 336; (vi) households 45,600; (vii) population 230,000. The component activities would go through an initial phase in which the methodology is tested in a smaller area and within two years would be scaled up to include the full planning area.

42. While catchments and sub-catchments have been prioritized and selected, and micro-catchments will be prioritized, actual community level activities will be triggered by and continued support will be dependent on community demand and demonstrated commitment and performance in carrying out planned activities. In this way, the location and pace of support depends on adherence to mutually developed and agreed micro-catchment development plans (MCDP). Activities within production landscapes will also be complemented by enhanced management of remaining larger natural habitat blocks on state lands (national parks and forest reserves) in the lower Shire. This will involve participation of neighboring communities, and opportunities will be sought to combine this with community catchment management in some locations.

43. Field delivery of activities with communities will be extensively supported by a contracted Service Provider, most likely in the form of a national-level NGO working either with their own internal field staff, or partnering with existing NGOs already operating in the sub-catchment. Implementation of activities through working with lead farmers and community mobilizers (typically young women and men of the village) will be encouraged, to build local capacity and enhance sustainability following project support.

Sub-component B.1: Develop Institutional Capacity for Catchment Planning and Monitoring

44. The aim of this sub-component is to build institutional capacity for catchment planning and monitoring, and for developing, implementing, and monitoring participatory micro-catchment plans at the Group Village (GV) level, within smaller sub-catchments, through the Village Development Committees (VDC). These processes would be linked to broader district level development plans and activities. The sub-component would also support drafting of national guidelines for catchment development through consultative processes, and more specific field guidelines for component implementation. The latter would be part of the PIP.

45. *Activity B.1.1: Strategic planning and facilitation* will support the development of four broad catchment plans for project sites, each covering an average of 33,000 ha and several GVs. The plans will identify key water and land issues that will guide lower level planning. In complement with sub-component B.3 below, the project will support sub-catchment level

marketing assessments to identify current and potential product lines and private sector linkages; and in complement with B.2, applied research and technology transfer for farming system intensification and other sub-catchment priorities, such as demonstrating efficient technologies that could reduce fuelwood demand (new brick forming machines, small scale solar energy, fuel efficient stoves, eco-sanitation, etc).

46. *Activity B.1.2: Participatory micro-catchment planning* would finance a comprehensive process carried out by communities, government technical staff, field NGOs and relevant private sector actors to develop 28 integrated micro-catchment development plans (MCDPs) covering approximately 4,700 ha each at the GV/VDC level; in turn these plans would then support development of village level action plans (VAPs) for field implementation. The planning process would be harmonized with and incorporate any relevant existing plans and activities (e.g. those developed by Village Natural Resource Management Committees – VNRMCs). The MCDPs and VAPs would specify specific activities for each stakeholder, to feed into the M&E framework and performance management.

47. *Activity B.1.3: Development of national guidelines for integrated catchment management* will support preparation of: detailed field manuals for component implementation, and guidelines for designing, constructing, and maintaining minor civil works for soil and water conservation, integrating irrigation and rural road planning and implementation in a landscape approach (and explicitly including dam safety for small dams); a comprehensive training plan linked to micro-catchment rehabilitation and implementation of specialized training courses; and national catchment guidelines in collaboration with other programs and partners, building on existing MWDI, MoAFS, MECCM and current project guidelines. The aim of these guidelines is to support harmonization and quality standard setting in catchment management programs in Malawi.

Activity B.1.4: Monitoring and evaluation will support intensive participatory M&E operations for component B activities, integrating remote sensing and GIS technology (including for use in community mapping exercises) with field monitoring. It would encompass participatory M&E for inputs/outputs, key implementation processes and institutional performance, impacts and outcomes. The monitoring model that is proposed for catchment management planning and implementation would apply remote sensing and GIS along with field based data collection to track program inputs and outputs, institutional performance, impacts and outcomes. The M&E framework would combine both qualitative and quantitative parameters, be captured in a computerized MIS and linked to the district and national M&E systems. The ultimate objective of the M&E system proposed is to improve the program performance, ensure transparency and accountability in the program and lesson learning and coordination across the Basin. Hence it will work at two levels: individual program level; as well as at the Basin Level mapping different initiatives and creating a common methodology for assessing, documenting, reporting impacts of catchment management activities, with the aim to improve planning and aid effectiveness. Emphasis will be given to participatory M&E approaches at field level, involving the range of relevant stakeholders, to track significant changes and progress in catchment management and improved livelihoods. Undertaking M&E processes that maximize involvement and engagement among key actors heighten their awareness and appreciation of the impacts of their efforts, builds motivation, understanding and sustainability of activities.

Sub-component B.2: Rehabilitate Targeted Catchments

48. The project would finance interventions identified in micro-catchment plans prepared under sub-component B.1, across a total catchment area of approximately 133,000 ha. The project would focus soil and water conservation investments on high priority arable and non-arable lands identified through lower-level participatory planning processes. It would support: soil and water conservation for more sustainable and productive agriculture; mini- and small scale (<50 ha) irrigation for more intensive agriculture and efficient use of water resources (under B.3 Livelihoods); rehabilitation of sub-catchment forests; agro-forestry and homestead planting; more sustainable firewood consumption; stream and water harvesting and control; and selected, common infrastructure within the broader catchment area. As a result, by the end of the project some 50,000 ha of land would have been brought directly under improved soil and water conservation practices and the peak sediment load in rehabilitated micro-catchments would have reduced by ten percent.

49. This sub-component will aim to have a total of 24,000 ha under improved soil and water management, in 28 GVs. The assumption is that implementing partners will work with communities to cover 800 ha of farm land per GV (out of a total of 2,000 ha/GV on average). The aim is to start working in 10 Group Village during Year 2, then an additional 15 GV in year 3, and the final GVs in Year 4. While most of the first year will be needed to recruit the implementing partner, it is expected that the second year will be devoted to sensitization and planning, with field interventions being adopted in Year 3. Targets for area under improved management have been split over two years, so the first ten GVs will see half the area under improved management as of year 3, the other half in year 4. Progression in area under improved management is thus expected to start in year 3, at 4,000 ha, then increase to an additional 10,000 ha in year 4, another 8,000 ha in year 5, and final 2,000 ha in year 6, coinciding with the end of the first phase of the APL.

50. A similar approach is followed for the management and rehabilitation of degraded forests on customary and communal lands. The sub-component will aim to have a total of 18,000 ha of degraded forest better managed and protected by local communities. The assumption is that implementing partners will work with communities to cover 600 ha of non arable land per GV (out of a total of 2,600 ha/GV on average). The same GV coverage and adoption rate is assumed here, leading to 3,000 ha of in year 3, an additional 7500 and 6000 ha in year 4 and 5 respectively, and 1,500 ha in year 6.

51. *Activity B.2.1: Soil and water conservation for more sustainable and productive agriculture* would finance a range of physical and vegetative interventions by communities to improve water retention and reduce soil erosion (e.g. contour ridges, field bunding, conservation agriculture, road protection and run-off harvesting, etc), designed and planned within the comprehensive micro-catchment plan, and promoted with the assistance of Lead Farmers (a common practice in agricultural extension in Malawi). This will help farmers extend their growing season to allow double cropping and more diversified cropping patterns, and protect the catchment areas surrounding the arable fields.

52. *Activity B.2.2: Forestry and rural energy* would include interventions aimed at restoring forest cover and reducing firewood consumption within the sub-catchments. It will support rehabilitation of degraded forests largely through managing natural regeneration, particularly in upper reaches of the catchment, and establish multi-purpose community nurseries and woodlots.

53. *Activity B.2.3: Stream and water control* will support improved water management through smaller-scale structures built by community members with simple engineering guidelines. It will include gully control, drainage lines, farm ponds, multi-purpose small-scale dams and weirs, stream bank forestry, and riparian thicket rehabilitation. Larger infrastructure investments at sub-catchment level, such as small earth dams, checkdams and upgrading feeder roads, culverts and small bridges will be based on a strategic feasibility assessment. Civil works will be outsourced as applicable to engineering firms and contractors, supervised by the Technical Team mobilizing relevant skills from within GoM. Construction will be based on an appropriate mix of equipment and community labor.

Sub-component B.3: Support Alternative Rural Livelihoods

54. This sub-component will support demand and market driven income-generating activities, with special targeting of women and youth. While catchment rehabilitation is expected to improve local incomes from agriculture and forestry, as part of broader economic development, livelihood options need to be expanded through commercially focused income-generating activities. Expanding livelihood options is expected to gradually decrease dependency on unsustainable exploitation of forest (and wetland) products as sources of income by providing alternative and more diversified options to secure incomes. Livelihoods support will be available to communities in sub-catchments targeted under sub-component B.2 and to those participating in community forestry management activities under sub-component B.4 (most of whom will be included in B.2 activities, anyway). It is expected that by the end of the project the value of agriculture related products marketed in the targeted GVs will have increase by 15 percent.

55. *Activity B.3.1: Value chain support to sub-catchment communities* will fund specific advisory services from an agribusiness consultant/NGO that will organize trade fairs; and identify and support establishment of productive production and marketing linkages with the private sector. This will be based on specific analysis on community production strengths and opportunities in a limited number of value chains; identification of bottle necks and quality requirements for selected value chains and development a strategy to overcome these together with the target communities. Market studies should also consider viable livelihood options for adding value to community NRM activities developed under sub-components B.2 and B.4.

56. *Activity B.3.2: Development and start-up of alternative livelihoods* will support identification, mobilization, sensitization, and initial capacity building of common interest groups (CIG) for commercially oriented income-generating activities. Where existing groups require support this will be assessed in terms of past performance, support received and current linkages to other forms of support. Capacity building and mentoring of groups is fundamental for sustainability of small-scale business activities. Once (CIGs) are formed, the activity will support intensive training to build organizational, technical, financial and business capacities. Exchange visits and study tours will be organized (within and possibly outside the country) to stimulate growth and networking among groups, trade fairs and diverse fora, as well as peer-learning and exchange between communities, activities will include media coverage and recognition of leading communities in micro-watershed management and NRM activities, to promote both wider awareness, pride and leadership.

57. The activity will also help groups mobilize internal savings and loans as an integral part of small-scale enterprise development. As CIGs reach agreed threshold levels for capacity and

internal savings and loans, the individuals within the groups will then be eligible to apply for a start-up capital loan under Activity B.3.5, to help finance new business enterprises based on sound business plans, and linkages with identified traders/markets.

58. *Activity B.3.3: Mini and small scale irrigation* will finance specifically targeted small-scale irrigation on both hills and flatter arable lands to assist farmers in drawing water from streams and small storage structures to support agricultural intensification, particularly related to agri-business development. Identification will be vetted by DoI, and design and construction will where appropriate be outsourced as applicable to engineering firms and contractors. Irrigation and other infrastructure needs will be identified early in the program to allow successful completion of the schemes with adequate community input (in design, construction and management). Scheme development will include *a priori* market, community and environmental demand assessments, and will support establishment of water user groups/associations for operation and maintenance, as well as establish/strengthen marketing groups as appropriate.

59. *Activity B.3.4: Sub-catchment level market and access infrastructure* will support local infrastructure in each sub-catchment based on initial strategic assessments. A limited number of facilities for post-harvest storage and trading, based at the community level, will be supported. Civil works will be outsourced as applicable to engineering firms and contractors, supervised by the Technical Team mobilizing relevant skills from within GoM. Construction will be based on an appropriate mix of plant and community labor.

Activity B.3.5: Access to rural finance will support communities through provision of livelihood investment grants to GVs that have reached a certain level of maturity and savings. Thereafter they will utilize these funds alongside their savings and other sources of financing, including from formal financial institutions, to scale-up their livelihood activities. The livelihood grants are envisaged to be a further incentive and investment to the VDCs for the purposes of them actively supporting productive livelihood activities (as specified in Micro-Catchment Development Plans), coupled with the funds they collect from their own saving and proceeds from the inter-loaning to CIGs within the GV using market-based interest rates. The specific use (ie. agriculture, dairy production, sewing machine, etc) of this livelihood grant, and the group's savings, will be demand driven by its members. The institutional building and resource transfer arrangements to VDCs require that they have governance norms, including on leadership, social audits, and require formal audits. Common interest groups within the GV can be supported through to support scaling up of their small-scale enterprises after demonstrating successful business performance and solid business plans for growth. This will be arranged under the project using a matching grant mechanism into savings accounts at a (micro-)finance institution. Through this project assistance CIGs will be supported in forming marketing associations, stimulating value addition and value chain development, accessing larger markets, and building linkages with commercial banks for future business capital needs.

Sub-component B.4: Improve Ecological Management

60. This sub-component will strengthen management of remaining key natural habitat blocks in the Shire Basin to protect and enhance the delivery of environmental services (such as catchment protection, flood attenuation, biodiversity conservation, carbon sequestration and as a basis for generating revenues from tourism). Incremental GEF support would provide for strengthened management of large natural habitat blocks within the Shire Basin, including

selected infrastructure and capacity investments in Lengwe and Liwonde National Parks to increase their long-term revenue flows, and introduction of community forest management and monitoring / patrolling systems to Neno Eastern Escarpment, Tsamba and Mangochi Forest Reserves. These activities will complement the IDA-funded SLWM investments in predominantly agricultural lands under B2 to form part of an integrated landscape management approach.

61. *Activity B.4.1: Investments for sustainable management of Lengwe and Liwonde National Parks*, to strengthen protected areas management and address people-park conflicts, will include: (i) updating of the existing management plans; (ii) development of sustainable financing mechanisms; (iii) development of essential infrastructure to boost revenues from tourism and improve conservation management; (iv) creation of water points, provision of critical basic patrolling & monitoring equipment; (v) modest funds and technical assistance to strengthen sustainable livelihoods in surrounding communities as a confidence-building measure and a precursor to the development of long-term benefit-sharing arrangements under which a share of park revenues would be returned to a community fund; and (vi) development of a tourism strategy to enhance management cooperation amongst Shire Basin protected areas and increase visitor numbers through promotion of a suite of linked nature-based attractions.

62. *Activity B.4.2: Community-based forest management in Neno Eastern Escarpment, Tsamba & Mangochi Forest Reserves* will implement an already endorsed and field-tested (by DoF) forest co-management model in the Neno Eastern Escarpment and Tsamba Forest Reserves in Neno district, in the Wamkulumadzi and Lisungwe sub-catchments. The system is based on the delineation of village co-management areas, and the development of formally endorsed and locally enforced management and use regulations, and in Neno will be complemented by micro-catchment activities in surrounding areas, including support to sustainable livelihoods.

63. The Mangochi Forest Reserve is adjacent to the Liwonde National Park and forms an important biodiversity corridor through which wildlife populations, including significant numbers of elephants move to other forests areas, including in Niassa Province, Mozambique. Management activities supported here will focus more on zoning, patrolling and monitoring, in recognition of the key importance of these forests as a wildlife corridor. General capacity building support and training provided to the District Forestry Office will allow continued support to community forestry activities in areas around the reserve, which could also be extended to co-management activities within sections of the reserve.

Component C: Water Related Infrastructure (US\$ 59.0 M)

64. This component has as objective that *new investments enable improved regulation of Shire flows and strengthen climate resilience*. Development of critical infrastructure is essential to overcome annual and long-term variability in water resources availability for communities, environment and economic sectors. The Shire Basin has a unique resource base as it is the outflow of one of the largest lakes in the world; with very complex climate response dynamics; and at the same time virtually the entire economy of the country is based on this resource making improvements to water resources management a must. The component will build on the basin planning carried out under Component A, and the priorities as set out in the national Water Resources Investment Strategy of 2011. The component is organized in three sub-components.

65. *Sub-component C.1: Upgrade Kamuzu Barrage* will support the civil works, gates, weed management, and construction supervision of the Kamuzu Barrage upgrade at Liwonde. The upgrade would extend the operational life of the barrage and support its key functions to (1) regulate water flows downstream to meet the needs of various stakeholders (e.g. related to hydropower, irrigation, water supply, flood management, and environment), (2) regulate water levels upstream to help improve climate resilience and meet environmental and socio-economic needs, (3) improve weed management to reduce interruptions in hydropower installations downstream, and (4) improve traffic circulation on the major North-South corridor in Malawi and safety by separating road traffic from the gates. The incremental influence of the upgraded barrage (which will allow for 40cm higher regulation) on Lake levels is limited and will not significantly affect the highest and lowest water levels in the lake. However, by allowing additional flexibility to change the proportion of time that the lake is at intermediate levels, it allows for greater buffering to climate variability and change (in the last century, the lake levels had become so low that the Shire had stopped flowing for fifteen years – a scenario that could be catastrophic for Malawi if repeated), as well as provides additional reliability of flows downstream that can improve the electricity generation in downstream hydropower plants (such as Nkula, Tedzani, and Kapichira). The improved water resources information system and operational DSS developed under Component A should also help improve the ability to optimize barrage operations in real-time. The activity will fund the concrete works on the Barrage and bridge structures, apron construction as well as the construction of a second road bridge extending the existing structure downstream; a separate design, build and install contract for new hydraulic gates, improved steel weed boom, hoisting and operating system; long reach weed collector; and third party construction supervision on behalf of the Government.

66. The current Kamuzu Barrage has been in use since 1965. The upgrading investment was considered in 2003 under the first National Water Development Project, when a study was launched on an “integrated water resources development plan for Lake Malawi and Shire River System “Lake Malawi Level Control”, which underlined the importance of improved regulation and recommended the upgrading as the most feasible option, as a low cost and low risk investment; as compared to alternatives studied, such as construction of a dam at Kholombidzo Falls, downstream of the Barrage. This study deferred further decisions regarding a low flow Pumping Scheme at the outflow of the Lake for extreme low lake conditions; and thus far, this has not been taken forward due to potential negative environmental and water management effects of a significant draw-down of the Lake. Since then, studies have indicated that although the Barrage structure is technically sound, there is potentially serious scouring and undermining downstream of the Barrage, several gates can no longer be operated and others are manually operated, which is slow, inaccurate and dangerous for operators as this takes place on traffic lanes. Floating weeds have become prolific and a grave problem for operation of gates at the Barrage and the hydropower turbines downstream; and at the Barrage a boom has been installed; and ESCOM employs a weed-cutting and disposing team. The current arrangement is not sufficient and needs more efficient technical layout and operations.

67. The most important rationale for the upgrade, however, is the shift from year-round stable water supply for energy only to a more sophisticated real-time demand and resource-forecast based adaptive management system; harnessing better the resources of the Lake, conserving water and influencing Lake levels during sequences of low water level years. The upgrade of the barrage would allow for raising the maximum regulation level of the Barrage by 40 cm. This additional storage capacity would be approximately equivalent to two times the

annual firm flow of the Shire. Given the unique storage features and regulation at Liwonde, however, this is not a fixed storage level, and the influence of the Barrage is limited by the actual Lake levels, river channel capacity and flow requirements by the downstream demand. The Barrage can only regulate the middle-ranges of the Lake Level and only to a limited extent as the Shire River only represents 15 percent of the Lake's water balance. The remaining 85 percent of water leaving the lake system is through evaporation on the Lake Surface. The influence of the Barrage is therefore limited to manipulating the annual flow duration curve (incrementally securing an established minimum flow), as well as slightly improving water security over the long term natural mean by its limited storage function. These small influences on the overall water balance of the Lake have tremendous importance for downstream usage, however, as improved water security increases average hydropower production and irrigation potential. Different flow release strategies have been calculated and will support the DSS. It is estimated that this upgrade and improved release strategy of the Barrage, without further investments in the cascade could gain up to 153 GWh in energy production, by securing current installed capacity demands.

68. Therefore, included in the design, and integrated into the proposed Shire Basin wide hydrological monitoring system are key points on the Lake/Shire that will be linked to the operational control of the Barrage. Critically, upgrading the Barrage management goes beyond the civil works, the steel works and the decision support system to operate the Barrage; as it includes the review of the management capacity and arrangements for financial and institutional sustainability. Currently the Barrage is owned by the MTPW, rules are set by the WRB, and actual operation is done by ESCOM, since WRB does not have the resources to perform these operations; and MTPW is not a stakeholder in management of the Barrage and its ownership concerns the civil works mainly. The WRB is currently not a legal persona and therefore cannot own or manage the Barrage. Within the institutional reform proposed to be supported in the Water Resources Management sector under Component A of this program, this management responsibility is a critical issue to be addressed, along with other critical issues such as identification of sustainable revenue flows to sustain and manage the Barrage, including weed removal, effectively; for instance through water security charges to downstream users.

69. The sub-component will finance the implementation of the Environmental and Social Management Plan (ESMP), and the Resettlement Action Plan (RAP), on the basis of the independent Environmental and Social Impact Assessment (ESIA). This includes the activities of the National Dam Safety Review Panel - a separate and independent group of experts - to review the quality of the engineering and construction, in order to guarantee that they reflect international best practice and standards with respect to dam safety.

Sub-component C.2: Improve Flood Management

70. This sub-component would finance improved flood management structures in the Lower Shire in collaboration with other initiatives, to support the implementation of the Integrated Flood Risk Management Plan (IFRMP) for the Lower Shire (see Component A). The floods adversely affect Chikhwawa and Nsanje districts, resulting in higher poverty and vulnerability levels in these districts, which have the highest proportion of households classified as ultra poor in the country. Floods frequencies and severity are rising and climatic variability has caused both floods and droughts to occur in the same year; there are hardly any years that no damage occurs due to either floods or droughts. The project will implement elements of the first phase of the Integrated Flood Risk Management Plan and associated Action Plan, as a result of which it is

expected that 40,000 households in flood-prone areas will directly benefit in terms of better preparedness and reduced vulnerability.

71. The Elephant marshes form a key part of the lower Shire Basin ecosystem and provides a hydrologic buffer to the system and the area is impacted by the backwaters as the Shire flow is impeded by flash floods from the Ruo tributary that joins downstream of the marshes. An effective and sustainable plan of interventions to improve climate resilience in this area requires an enhanced understanding of the dynamics and ecosystem of the Elephant marshes and the design and implementation of measures to ensure that its buffer functions are maintained. Effective management of the Elephant Marshes wetlands will complement community preparedness and protective infrastructure investments to form a comprehensive flood resilience program that integrates community preparedness, physical and ecological infrastructure investments and enhancement of natural-resource dependent livelihoods. Incremental GEF/LDCF support will provide for studies of the ecology, hydrology and natural resource exploitation in the Elephant marshes, and participatory planning to establish management aimed at enhancing the value of the area for environmental services (particularly flood attenuation), livelihoods and biodiversity. Some community NRM pilot activities will also be included. These activities will complement other activities in the project related to knowledge base/analytical tool development, capacity-building, community engagement, and preparation of additional interventions to improve climate resilience in this highly disaster-prone area.

72. *Activity C.2.1: Community level adaptation support* to the design and construction of adaptation measures for those communities living in high-risk zones as a priority strategy. This support will be provided through a contracted service provider as Implementation Partner (IP), possibly an NGO, building on the current support provided by NGOs in the area, and will focus on a limited set of adaptation measures: (a) flood zone demarcation, identification of safe havens and safe routes for response, based on the flood hazard maps, as well as community participatory mapping, and community discussions on implications for different flood zones; (b) community level infrastructure, including elevated platforms/community shelters/warehouses designed to act as safe havens, equipped with solar lights and managed at community level; (c) community response equipment includes support to Civil Protection Committees (CPCs) in the equipping them with megaphones, cell phones, bicycles where necessary, as well as response dinghies for most affected and least connected villages in the flood plain; and (d) roll out and support to last mile connectivity to the Flood Forecasting and Early Warning System (FFEWS, an integral part of the Operational Decision Support System described in Activity A.3.2), including provision of FFEWS-linked cell phones for CPC members, for sms/ image-based flood warning dissemination, and to feed back information on the actual flood situation. It is expected that these measures will learn from global (e.g. Bangladesh) and regional good practice, and provide a new paradigm of flood early warning for the country.

73. *Activity C.2.2: Priority flood mitigation interventions* will include initial no-regrets flood risk management investments in the lower Shire floodplain. Future phases can also include larger investments based on more detailed modeling to be carried out during the project. These investments should be identified in the Action Plan, and list among priorities of communities. The types of investments range from construction of embankments to protect dense settlements, river training, river bank protection, improved storm drainage and protection of critical infrastructure. This is pursued through infrastructure (dykes, gabions, culverts, etc) as well as through vegetative measures (vetiver grass, banana, bamboo, strips, tree planting, nurseries, etc).

The focus will be on small scale infrastructure that will make a difference to the risk profile of the Valley in the short term, can be implemented with simple design and has limited social and environmental impacts. In infrastructure development, communities will be actively engaged and institutional arrangements for management, maintenance and repair will be clearly agreed, and communities will be asked a percentage of construction costs as their contribution (in kind). The process of identification, community mobilization and monitoring will be through the Service Provider, while engineering services for design and supervision will be packaged and sourced from qualified engineering firm(s). Construction will be a mix of plant-based and labor-intensive methods, depending on size and type of investments, as well as availability of local wage labor. It is planned that a total of 200 km of embankments will be constructed, as well as an equal distance of streams protected using vegetative measures.

74. *Activity C.2.3: Community-based management of Elephant Marshes* provide technical assistance for studies on the hydrological, ecological and resource-use characteristics of the 1200km² Elephant Marshes as a basis for will establishing participatory management planning, and piloting community resource management activities, in unison with flood management activities identified under the IFRMP. The Marshes occupy a significant proportion of the lower Shire floodplain, and are important for their hydrological function within the floodplain in absorbing floodwaters, for their biodiversity, and also for their potential for supporting enhanced climate-resilient livelihoods such as fisheries and tourism. Given access difficulties, investments in boat facilities to support the research will also be necessary, which can also support DNPW management and patrolling access and jetty investments can be designed so as to facilitate future tourism development in the area. This will pave the way for further investments, not least through the second phase SRBMP and support for conserving these areas that are critical for climate resilience in the lower shire (e.g. through potential gazettement of the wetlands within the Malawian protected areas system).

Sub-component C.3: Prepare Priority Water Investments

75. The project provides for the preparation of new water related investments within the Shire basin, in particular feasibility and design studies for additional priority water related infrastructure works. There is ample scope and need to further develop the Basin's resources for different economic sectors, such as: agriculture in general and irrigation agriculture in particular, aquaculture, urban and rural water supply, hydropower, transport and disaster resilience. In several sector programs investments have been identified and are currently studied or prepared for investment. It is important that these investments have to be well-conceived, coordinated, and analyzed in a basin context within the basin plan (Sub-component A.1) to improve sustainable water productivity and climate resilience. Investments under this program can focus specifically on enhancing multipurpose development through additional studies, and also support fostering of further development through appropriate surveys, scoping-level studies and dedicated investment preparation studies on technical, financial and economic feasibility, associated environmental and social assessments and consultations, thereby creating a well-designed pipeline of investments in the basin, for possible financing in a second phase of this Program or from other sources. Special attention will be given to the design of a set of measures for catchment protection, resource development and flood mitigation in the Ruo River, a significant contributor to flooding in the Lower Shire. Particular effort will be made to ensure that multiple relevant sectors coordinate on the selection of potential investments and in the conduct and review of these studies.

Component Inter-dependence

76. The project has been structured in a manner that encourages significant inter-relationships across components as indicated below:

		<i>for Component</i>		
		A. Shire Basin Planning	B. Catchment Management	C. Water-related Infrastructure
Implications of work on Component	. Shire Basin Planning		<ul style="list-style-type: none"> • Knowledge base and analytical tools (e.g. erosion modeling) for catchment planning and M&E • Satellite imagery procurement and analysis facilitation to support planning/ M&E 	<ul style="list-style-type: none"> • Priority investments based on analysis using Basin Planning DSS and stakeholder consultations • Real-time water information system and Operational DSS (including flood forecasting)
	. Catchment Management	<ul style="list-style-type: none"> • Land and ecosystems degradation information and prioritization of catchments for basin planning • Linkages of catchment M&E systems to Basin knowledge base 		<ul style="list-style-type: none"> • Future watershed management interventions packaged and prepared
	. Water-related Infrastructure	<ul style="list-style-type: none"> • Surveys and investment scoping and preparation studies strengthen basin knowledge base and investment options for Planning DSS • Priorities to improve real-time hydromet/Operational DSS forecasting needs 	<ul style="list-style-type: none"> • Inputs for improved climate resilience management in targeted watersheds 	

Annex 3: Implementation Arrangements

MALAWI: Shire River Basin Management Program (Phase-I) Project

I. PROJECT ADMINISTRATION MECHANISM

A. Institutional and Implementation Arrangements

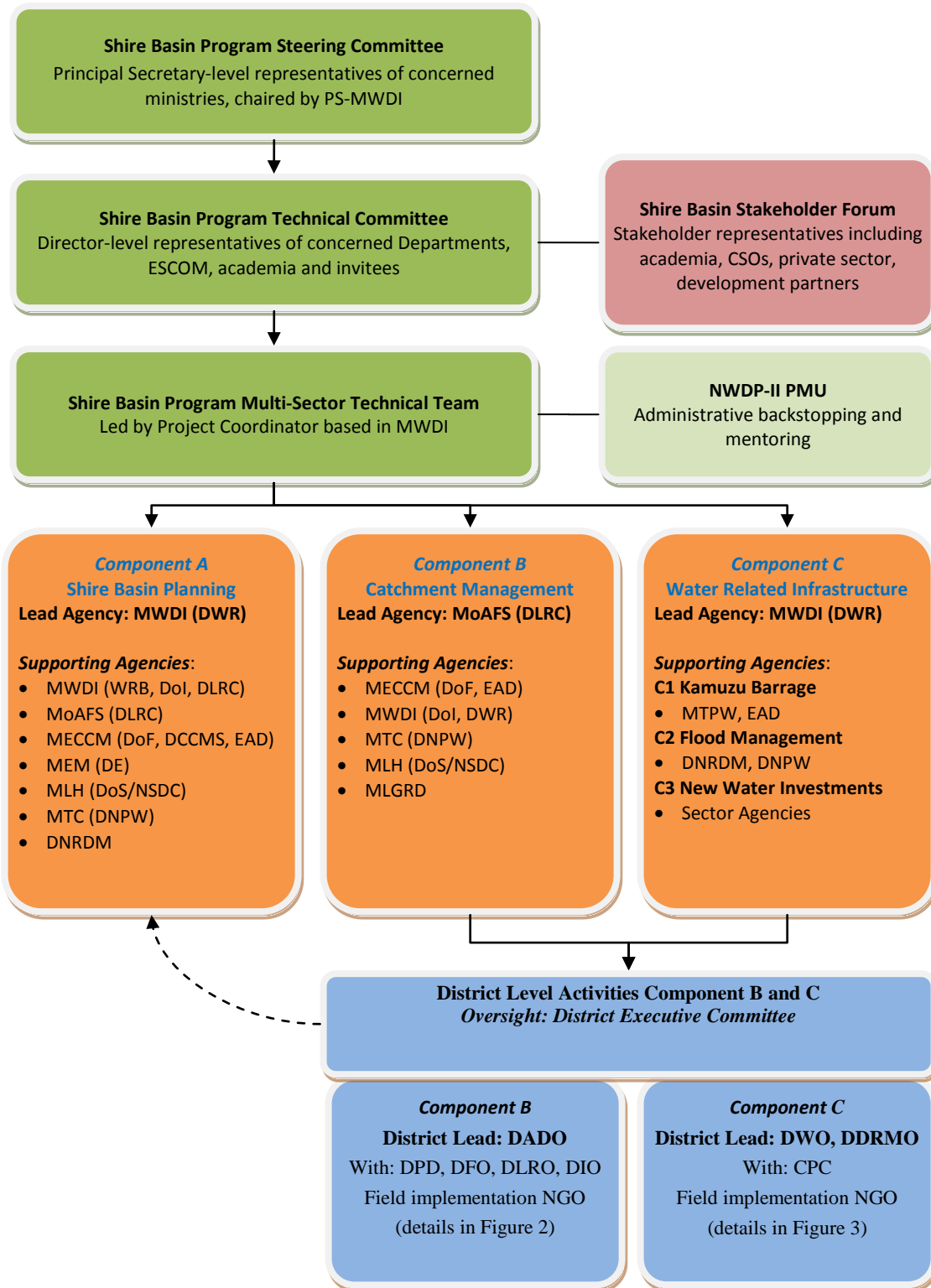
1. The *Shire River Basin Management Program (Phase-I) Project* (SRBMP-I), as first phase of the Shire River Basin Management Program (SRBMP), is complex and of multi-sectoral nature, but centered around water and its different roles, functions and uses. Therefore, the Ministry of Water Development and Irrigation (MWDI) has been designated as lead implementing agency, and overall program coordination will be housed in MWDI. To ensure broad government ownership and long-term leadership of the program, each component, sub-component and activity will be implemented through the relevant ministry and department. The program also requires cross-sector coordination with and between the many stakeholders. Figure 2 includes an outline of the institutional arrangements of the program.

2. The Shire Basin *Program Steering Committee* (PSC) will provide programmatic and strategic guidance, direction and oversight to the program. The PSC is chaired by the Principal Secretary MWDI and is composed of the Principal Secretary level representatives of the Ministry of Finance (MoF); Ministry of Economic Planning and Development (MEDP), Ministry of Agriculture and Food Security (MoAFS); Ministry of Environment and Climate Change Management (MECCM); Ministry of Energy and Mining (MEM); Department of National Relief and Disaster Management (DNRDM), Ministry of Lands and Housing (MLH), Ministry of Local Government and Rural Development (MLGRD), Ministry of Transport and Public Works (MTPW), and Ministry of Tourism and Culture (MTC). The Project Coordinator will function as the Secretary of the PSC. The PSC would meet at least twice a year and be responsible for: (i) annual programming of activities and approval of work plan and budget; (ii) monitoring implementation and results, in particular the analysis and approval of activity reports and financial and operational audits; (iii) recommending corrective actions that may be necessary; (iv) providing guidance to the Program Technical Committee and the Technical Team on key policy, multi-sector implications, and financial issues relating to program implementation; (v) decide on the appropriateness of the suggestions and recommendations by the Shire Basin Stakeholder Forum as reviewed and advised by the Program Technical Committee.

3. The Shire Basin *Program Technical Committee* (PTC) will provide a multi-sector advisory and consultative platform to review technical reports, synthesize information and insight on program preparation and implementation issues. The PTC is chaired by the Director of Water Resources in MWDI. Members include Director-level representatives of the national Water Resources Board (WRB) and the Departments of: Water Resources (DWR); Irrigation (DoI); Land Resources Conservation (DLRC); Forestry (DoF); National Parks and Wildlife (DNPW); Energy (DoE); Environmental Affairs (EAD); Department of Surveys (DoS); Climate Change and Meteorological Services (DCCMS); and DNRDM; as well as representatives of the Electricity Supply Company of Malawi (ESCOM); Civil Society Organizations (CSOs); academia and invitees as appropriate. The Project Coordinator will ensure the role of Secretary of the PTC. The PTC will meet at least three times per year and is responsible for: (i) technical guidance and oversight of project activities; (ii) review studies and reports and advice on their validity and use, and submit main conclusions to PSC for review and decision; (iii) take part in

and (when appropriate) lead the Shire Basin Stakeholder Forum; (iv) review and synthesize suggestions and recommendations by the stakeholder forum and submit these to the PSC for review and decision.

Figure 2: Project Implementation Arrangements



4. A Sub-Committee, including those members directly involved with biodiversity and management of natural habitats (e.g., DNPW, DoF, EAD), and augmented as necessary with academic institutions with ecological expertise and private or no-governmental organizations involved in field conservation in the Shire, would convene as needed to review activities related to ecological management. They would coordinate and provide technical review to cross-agency tasks such as basin-wide ecological surveys, biodiversity knowledge products, regional eco-tourism development strategy, and strengthening management coordination between protected areas within the basin.

5. A Shire Basin Program multi-sector **Technical Team** (TT) led by a **Project Coordinator** and based in MWDI, will ensure day-to-day coordination and management of the project. The Project Coordinator reports directly to the Principal Secretary (PS) and also acts as Secretary of the PSC and PTC. A **Deputy Project Coordinator** will focus on the implementation of Component B, Catchment Management. The TT includes representatives of the main government agencies involved in the project and are based in MWDI.

6. The project will provide funding to contract professional and support staff to strengthen the TT, facilitate its operations and ensure that certain specialized tasks are professionally executed by people with the required background and knowledge, including: (i) professional staff: an environmental and social safeguards specialist, an institutions specialist, GIS and modeling experts, economist and water resources planner; (ii) short term expertise is foreseen in the fields of for instance: planning and M&E, architecture, irrigation engineer, water supply, hydropower engineer, catchment management, civil engineer, facilitators, water quality, legal expertise, IT services, etc.; (iii) support staff: accountant, liaison officer, data entry clerk; and (iv) annual external audits.

7. **The Project Management Unit (PMU) of the ongoing Bank financed Second National Water Development Project (NWDP-II)**, will provide administrative backstopping support to SRBMP-I, in particular the procurement and financial management needs of the project, as done during the PPA stage until mid-term of the SRBMP-I, which coincides with the closure of the NWDP-II. During project implementation, fiduciary and administrative capacity will be enhanced in MWDI to carry out these functions and will be re-assessed at mid-term. The SRBMP-I Project Coordinator will approve all procurements using procedures that are in line with MWDI procedures and Bank guidelines, as defined in the PIP.

8. **Partnership arrangements** will be established with the Millennium Challenge Corporation/Account (MCC/A), UK Department for International Development (DfID), Norway and the United Nations Development Program (UNDP), Japan International Cooperation Agency (JICA), and the International Fund for Agricultural Development (IFAD) among others, who are actively investing in catchment management and/or flood mitigation activities in the Shire River Basin. There is general agreement on both thematic and spatial division of labor between the major programs of these partners, and DFID will be financing Technical Assistance for improved basin wide monitoring and evaluation of catchment management, linked to Sub-component B.1 of this program.

9. **Shire Basin Stakeholder Forum**. Apart from project specific steering and implementation, the nature of the program also requires a structured process of stakeholder consultations on different aspects of basin planning, catchment management, and prioritization of investments. These structured stakeholder consultations started during project preparation,

and should become more systematic and institutionalized during project implementation and form the backbone of basin vision development and information exchange. The Shire Basin Stakeholder Forum will have representatives from multiple stakeholders in basin management, including from GoM, civil society, private sector and communities, representing the breadth of perspectives on river basin management and serve as the platform for debate and information exchange. The Forum will be linked to the basin management institution; and its specific mandate will be developed in unison with the institution.

10. **Districts, including Technical Officers from relevant departments at District and Field Extension levels, Traditional Authorities, Village Development Committees (VDCs), Group Villages (GVs), community groups and committees**, such as VNMRCs, are involved to a greater or lesser extent in most sub-components. They will be represented at the Shire Basin Stakeholder Forum; attend the PTC Meetings when relevant as invitees and they will be strongly involved in the guidance and implementation of activities under Component B, Catchment Management, and Sub-component C.2, Flood Management.

11. **Market-oriented civil society partners, private sector actors** such as small and medium-scale traders, market intermediaries, outlet and chain store operators and other stakeholders operating in agribusiness and commercial enterprises will be partners in project implementation. This also includes cooperatives and national farmer organizations as appropriate. Likewise, coordination will be optimized with other projects and NGOs operating in target catchment sites.

B. Implementation Arrangements by Component

12. **Component A Shire Basin Planning** includes mainly planning, institutional capacity building, information systems development, program management, coordination, monitoring and evaluation activities. The lead implementing agency is the Department of Water Resources (DWR) and the Water Resources Board within MWDI, with a range of supporting agencies involved (see Figure 2). Sub-component A.1 would develop a comprehensive Shire Basin Plan and related Decision Support System and it would also strengthen the institution where the planning and decision support system would be located. A range of short and longer term technical assistance inputs and analytical work will support this process. Sub-Component A.2 would build institutional capacity for coordinated basin management; and Sub-component A.3 would improve water resources information systems, including some activities at community level that would be implemented with the assistance of a contracted Service Provider/ Implementation Partner on improved flood management in the Lower Shire.

13. The Shire Basin has a wide range of institutions that are involved with various aspects of water management as indicated in the Table below:

Aspect	Institution	Description
Hydropower	Electricity Supply Company of Malawi (ESCOM), Energy Department of Ministry of Energy and Mining (MEM)	ESCOM operates the Shire hydropower plants (such as Nkula, Kapichira) that supply almost all of Malawi's power. ESCOM also currently operates the Kamuzu Barrage and weed control to optimize hydropower operations. MEM and ESCOM make plans to upgrade existing hydropower stations (e.g. as proposed on Kapichira) and prepare and implement new hydropower investments.
Irrigation	Irrigation Department (DoI) of the MWDI, Green Belt Initiative Secretariat (OPC), Irrigation Users	DoI plans for and facilitates development of irrigation. Water users construct and manage schemes. Consumptive use of water for irrigation; planning, preparation and implementation of new investments (e.g. Shire Valley Irrigation Project in the Lower Shire).

Aspect	Institution	Description
Water Supply	Water Boards (e.g. Blantyre Water Board, Southern Region Water Board)	Management of Urban and Rural water supply from the Shire Basin, development of new sources (surface/groundwater for water supply systems).
Industry/ Mining	Ministry of Industry and Trade; Private Sector, Ministry of Energy and Mining (MEM)	Water use, waste discharge, industry/mine operations and planning
Catchment Management	MoAFS	Management of land degradation and local livelihood improvement (esp. through improved catchment management, Sustainable Land and Water Management, Conservation Agriculture)
	Department of Forestry of MECCM	Community forest management, forest regulation, afforestation
Environmental Regulations	Environmental Affairs Department	Compliance with Malawi regulations (e.g. Integration of environmental safeguards into new investments and state of environment reporting).
Tourism/Wildlife (incl. eco-tourism)	Department of National Parks and Wildlife of the Ministry of Tourism and Culture (MTC)	Management of National Parks and Protected Areas
Climate	Department of Climate Change and Meteorological Services of the MECCM	Meteorological data, weather and seasonal forecasts, and climate change information
Disaster Management	Department of National Relief and Disaster Management in OPC	Drought and flood management, relief; and disaster risk reduction
Water Monitoring and Assessment	Department of Water Resources of MWDI	Surface water levels, groundwater levels, water quality monitoring and water resources availability assessments, drought and flood forecasting
Water Accounting	Water Resources Board of MWDI	Water licensing, water use information management and levy assessment
Spatial Information	Department of Surveys, Department of Lands and National Spatial Data Center of MLH	Conducting and facilitation of surveys (e.g. aerial/satellite/ground), satellite image processing, Geographic Information Systems (GIS) knowledge base; Land titling and land use regulation, interdisciplinary spatial database management
Local Government and Communities	Ministry of Local Government and Rural Development, Districts, Traditional Authorities, Group Villages, Communities	District and local-level planning, budgeting and decision making; Activity implementation, coordination, and supervision
Other	General Economic Planning (MEDP), Public Works, Navigation, Fisheries, Universities, NGOs, Private Sector, General Public	Planning, resource use, studies, education and awareness

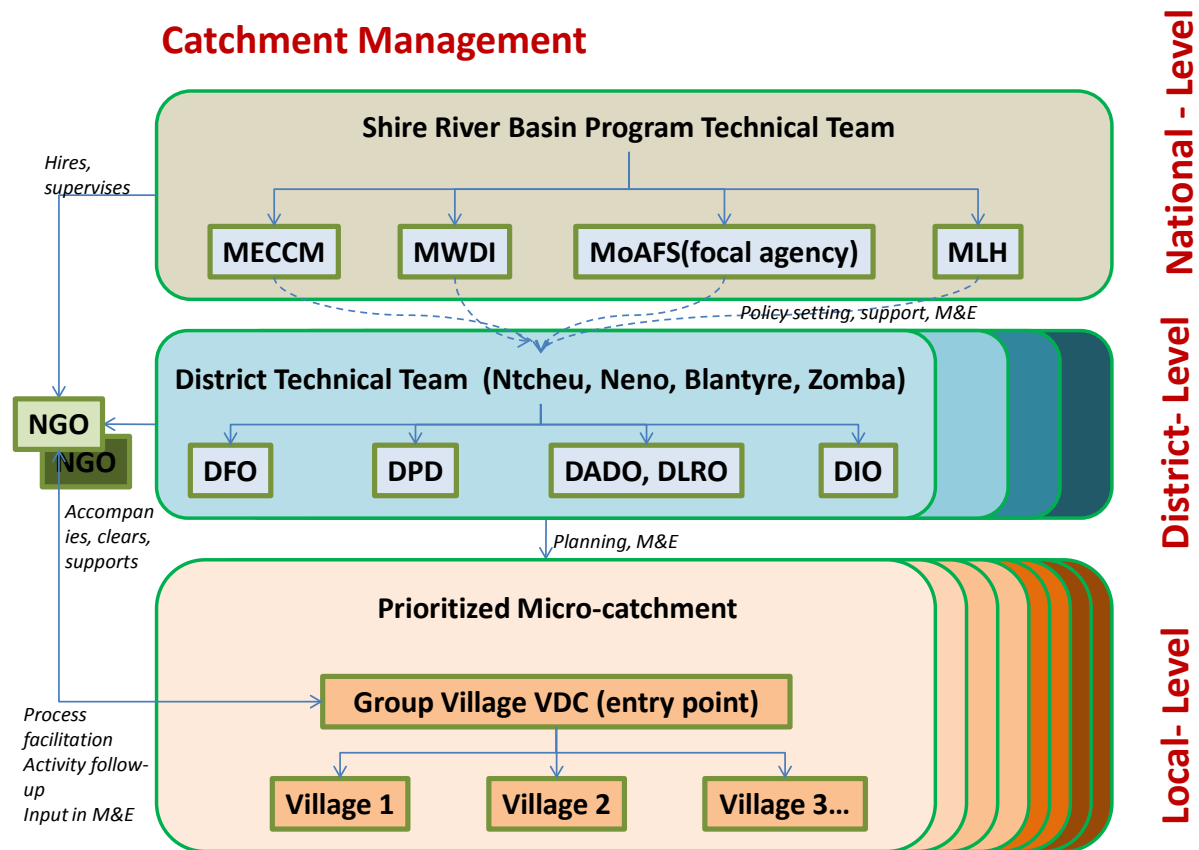
14. Although it is not possible, nor even desirable, for a single project or even program to build the capacity of all these complex institutions, it is essential that any program that seeks to promote shared-vision planning in the Shire Basin begins to provide an institutional platform for these institutions to interact and coordinate. It is in this spirit that the proposed Shire Basin Institution, the Shire Basin Stakeholder Forum and Basin Planning framework have been evolved in this project.

15. **Component B Catchment Management** implementation in production landscapes will be through a partnership between government, communities, and highly qualified NGOs (Figure 3). The lead technical agency is the Department of Land Resources and Conservation (DLRC) within MoAFS. Other departments will have key functional roles in component implementation: MECCM, through DoF, in particular in reforestation and community forest management; DoI (MWDI) in irrigation development, multi-purpose small-scale dams, weirs and gully control;

MTC, through DNPW, in management of national parks; and MLH in surveys, and geospatial information through the NSDC. This component will also support the development of harmonized catchment management guidelines and a comprehensive catchment management M&E system that will contribute to institutional coordination. There will also be regular catchment management coordination meetings between the project, concerned departments and development partners active in the sector.

16. At the district level, the District Council will play a leading role with coordination of line departments, and the District Agricultural Development Officer (DADO) would have functional technical leadership for field coordination and implementation in close collaboration with the District Forestry Officer (DFO), the District Irrigation Officer and the Director of Planning and Development (DPD) at district-level. The council, through the District Executive Committee (DEC) would have a strong role in catchment planning review and approval, and to ensure harmonization of these plans with other district development plans. The Council, through the DADO would ensure strong links with both the Extension Planning Area (EPA) offices and Traditional Authorities within which the project is operating. Line departments at the district level, especially the District Agricultural Development Office (DADO) and District Lands Resources Office (DLRO) would play an important role in extension services and oversight.

Figure 3. Implementation flowchart, Component B



17. **Field implementation**, the entry point is through the Village Development Committees (VDCs) at Group Village (GV) level (representing 10-12 villages). The component will work with villages through existing local institutions such as the Village Natural Resource Management Committee (VNRMC) and Catchment Conservation Committee (CCC). Lead Farmers would play a role in the promotion of more sustainable and productive agriculture (a common practice in agricultural extension in Malawi). The project will strengthen these institutions and if absent, help establish them. These committees, as well as Village Forest Areas (VFAs), producer associations, and Civil Protection Committee (CPCs) (and possibly others) are a common entry point among villages comprising VDCs and making up the Group Village.

18. Field delivery of activities with communities would be extensively supported by a contracted Service Provider, most likely in the form of a national-level NGO working either with their own internal field staff, or partnering with existing NGOs already operating in the sub-catchment. DEC's would be involved in the selection of these partners. Implementation of activities through working with lead farmers and community mobilizers (typically young women and men of the village) will be encouraged, to build local capacity and enhance sustainability following project support.

19. DEC's and other key entities at district level such as District Agricultural Extension Coordination Committees (DAECC) would play pivotal roles in coordination, financial oversight, and ensuring technical quality and reporting of catchment activities. Service providers (NGOs) will be accountable and report foremost to the DEC's (e.g. submission of annual workplans, progress reports). DEC's will ensure coordination between NGO staff and district field staff, providing guidance and oversight of interventions¹⁰. Financial oversight could be tied into the current Integrated Financial Management Information System (IFMIS), a real-time financial management system linking district councils and the parent Ministry of Local Govt.

20. **Access to rural finance** in Sub-component B.3: a livelihood investment grant allocation equivalent to maximum US\$ 25,000 equivalent will be available for each VDC to support livelihoods enhancing activities within the communities and disburse to selected CIGs. Inter-lending of up to about US\$ 2,500 would be disbursed to viable CIGs – prioritizing to start nine groups per GV for viable alternative livelihoods and income generating activities that are in line with the Micro-Catchment Development Plans. The livelihood investment grant will be managed by the VDC and made available only to groups who have demonstrated successful implementation of income-generating activities, savings and loans. Operational mechanisms of the fund and management requirements to the VDCs and CIGs will be detailed in the operational guidelines. It is expected that the grant amount would revolve and grow, based on additional savings, access to other (formal) funding and repayment of intra-community loans at a determined interest rate, and then revolve to other qualified groups in the GV after a certain time period (around one year). The VDC, with the NGO, will be responsible for oversight and reporting of the fund. Once CIGs have established financial and management systems, the project will assist these groups and federations in accessing sources of credit through various financial institutions.

21. **Management of natural habitat blocks** (under Sub-components B.4 and C.2), will be implemented by DNPW within national parks and the Elephant Marshes, and by DoF within forest reserves, working with villages through the Village Natural Resource Management

¹⁰ These aspects will be clearly detailed in the TOR for NGOs.

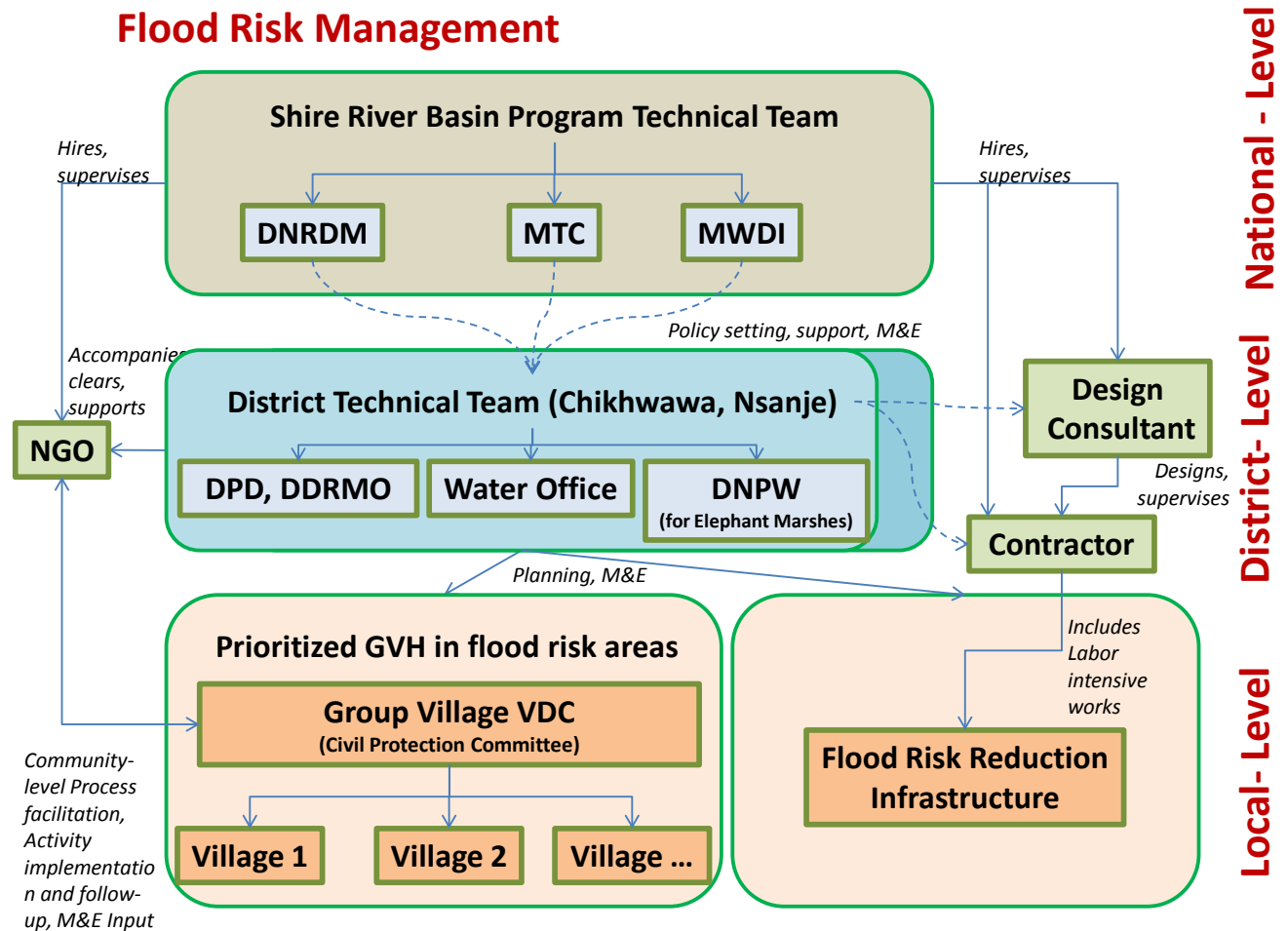
Committee (VNRMC) wherever appropriate. The project will strengthen VNRMCs, and other relevant institutions such as producer associations and Civil Protection Committee (CPCs). Implementing agencies will be supported by long-term international and national advisors focused on protected area management and community participation respectively, as well as a range of specific Technical Assistance inputs. DNPW's regional presence and mandate will also allow them to facilitate coordination and cross-support across different conservation sites in the Shire, for example on training, use of spatial imagery, production of interpretive materials and development of a nature-based tourism strategy. Coordination and knowledge networking will also draw in a number of capable NGOs working on sustainable management of biodiversity, particularly those already working on site-based management of important wetland and terrestrial ecosystems, including the Mulanje Mountain Conservation Trust, LEAD International, the World Fish Center and African Parks Foundation. Where possible, synergies will be explored with the community based activities on catchment management and flood risk management under the project, so that natural habitat area management is merged into catchment planning where appropriate and that flood risk management activities in and around the Elephant Marshes and ecosystem management be planned in unison. This shall be arranged at district and Technical Team level, through regular project monitoring.

22. ***Component C Water Related Infrastructure*** includes three very diverse sub-components. Sub-component C.1 is implemented under the leadership of MWDI Water Resources Board, and implemented in close consultation with the Ministry of Transport and Public Infrastructure (MTPI) and ESCOM regarding the road functions and gate operation rules during construction respectively. Construction and construction supervision of the upgrading of Kamuzu Barrage would be contracted out to a number of construction companies under predefined lots for civil works, steel and mechanical works; as well as specific equipment supply; and an engineering firm respectively. The environmental and social management plan (ESMP) will be, where possible, integrated in the construction contract. Elements from the ESMP that have no bearing on the construction process, and the associated Resettlement Action Plan (RAP) would be implemented with the assistance of a contracted Service Provider/ Implementation Partner, possibly an NGO. Construction supervision, especially in terms of dam safety, will be enhanced through the independent Dam Safety Panel of Experts, established for giving independent advice to MWDI. The existing Kamuzu Barrage Committee (a multi-stakeholder group of key stakeholders in the operation of the barrage) will be enhanced and broadened, and in the process be integrated (as a sub-committee) in the newly formed Shire Basin Stakeholder Forum. The committee will be closely consulted on all issues of dam safety, safeguards implementation, construction process and progress, as well as on the determination of operational rules that match the basin development vision.

23. Sub-Component C.2, Flood Management, would be implemented by DNRDM and MWDI, working with Districts, Group Villages (Civil Protection Committees) and Traditional Authorities, and with DNPW on planning for long-term management of the Elephant Marshes (see Figure 4). Community level activities would be coordinated and implemented at district level through the same contracted Service Provider/Implementation Partner involved in sub-components A.3. At district level, there will be a coordination platform on the implementation of the activities of the Flood Risk Management Action Plan, so that synergies are established with ongoing NGO programs on flood risk management, by ensuring that the Action Plan provides the broad framework for action, and that activities build upon the experiences of the district-level NGOs. Infrastructure works beyond community capacity (including all

embankments, drainage works, complex protection works) will be designed and supervised by an engineering firm to be contracted, and constructed by qualified contractors using a mix of plant- and labor based methods.

Figure 4. Implementation flowchart, Component C2



24. The Sub-component C.3 that involves preparation of new water-related investments will involve all water-related sectors represented in the Shire River Basin Institution. Detailed activities under this Sub-component would be identified and prioritized by the Shire Basin Stakeholder Forum and agreed upon by the PTC with the approval of the PSC, after which they would be packaged for consulting studies. The EAD would be involved with the preparation of terms of reference for environmental and social impact screening and assessment studies relating to new investments.

Summary table of the roles of different GoM institutions in each project component

Institution	Component A	Component B	Component C
Technical Team (TT)	<ul style="list-style-type: none"> Overall project management, M&E and fiduciary support to departments Hatch Shire Basin planning institution Facilitate inter-departmental cooperation 	<ul style="list-style-type: none"> Implementation of project planning and activities M&E Facilitate inter-departmental cooperation 	<ul style="list-style-type: none"> Implementation of prioritized activities Fiduciary oversight Kamuzu Barrage M&E Facilitate inter-departmental cooperation
Department of Water Resources (DWR)	<ul style="list-style-type: none"> Knowledge base development Water Resources Information System DSS planning DSS realtime 	<ul style="list-style-type: none"> Hydrological analysis Small dam design Support operationalization of Zomba center of excellence for Land and water management 	<ul style="list-style-type: none"> Kamuzu Barrage upgrading Dam Safety Panel Supervise community level early warning and infrastructure (incl. hiring service provider)
Shire Basin Institution	<ul style="list-style-type: none"> Hydrological / flood forecasting 	<ul style="list-style-type: none"> Catchment stakeholder meetings 	<ul style="list-style-type: none"> Analysis of and facilitating prioritization and preparation of new investments
Department of Irrigation (DoI)	<ul style="list-style-type: none"> Irrigation planning as part of basin planning → knowledge base 	<ul style="list-style-type: none"> Support development of irrigation within catchment approach, including support to WUAs Support to national guidelines Support operationalization of Zomba center of excellence for Land and water management 	<ul style="list-style-type: none"> New irrigation investment preparation Support prioritization next set of catchments for phase 2
Department of Land Resources and Conservation (DLRC)	<ul style="list-style-type: none"> Catchment mgmt planning as part of basin planning → knowledge base 	<ul style="list-style-type: none"> Lead preparation and implementation of catchment management plans Catchment M&E planning Development of national guidelines Set up and operationalize Zomba center of excellence for land and water management 	<ul style="list-style-type: none"> Support Ruo River investment studies Prioritize next set of catchments for phase 2
Department of Forestry (DoF)	<ul style="list-style-type: none"> Interfacing forestry strategic plans with Shire Basin Plans Improve forestry knowledge base Support to national herbarium/NFRI 	<ul style="list-style-type: none"> Support co-management of FRs Promote agroforestry/ woodlots in catchment management Support to national guidelines 	<ul style="list-style-type: none"> Prioritize further forestry activities for phase 2.
National Space Data Centre (NSDC) in the Department of Surveys (DoS)	<ul style="list-style-type: none"> Coordinate development of Spatial knowledge base/products Facilitate coordinated procurement of satellite imagery Facilitate spatial data sharing across institutions and in the public domain (online) 	<ul style="list-style-type: none"> Support catchment management /M&E with mapping and spatial analysis. Develop catchment thematic maps/Atlas 	<ul style="list-style-type: none"> Support flood management with mapping and spatial analysis Support LiDAR and other surveys Mapping/spatial analysis to support investment preparation Develop flood area atlas

Institution	Component A	Component B	Component C
	<ul style="list-style-type: none"> • Support development of hydromet visualization portal • Developing Shire Basin Atlas 		
Department of Climate Change and Meteorological Services (DCCMS)	<ul style="list-style-type: none"> • Improve hydromet network (incl radar) • Make realtime data available in public domain visualization portal. • Improve weather forecasting and linkage with hydrological/flood forecasting • integration of climate change/variability analysis in basin planning • Drought management planning as part of Basin Planning 	<ul style="list-style-type: none"> • Support M&E/ catchment planning by tailor-made meteorological observations 	<ul style="list-style-type: none"> • Support flood last mile connectivity for disaster management • Support preparation of new investments.
Department of National Relief and Disaster Management (DNRDM)	<ul style="list-style-type: none"> • Support Flood Forecasting and Early Warning System development and operational control • Support flood mapping and information for basin knowledge base 		<ul style="list-style-type: none"> • Support supervision of community based investment • Support supervision and communication on flood early warning • Strengthen response capacity and operational control • Support preparation of new investments on Ruo.
Department of National Parks and Wildlife (DNPW)	<ul style="list-style-type: none"> • Biodiversity assessments to support basin knowledge base 	<ul style="list-style-type: none"> • Improved Protected Area management in Lengwe, Liwonde • Hire long term technical assistance 	<ul style="list-style-type: none"> • Improved community based ecosystem mgmt in Elephant Marshes
Department of Environmental Affairs (EAD)	<ul style="list-style-type: none"> • State of Environment Reporting as Basin knowledge base • Provide technical input into Shire River Basin Plan and thematic areas including biodiversity and ecosystem management. • Participate in monitoring and evaluation of the environmental and social performance of the SRBMP. 	<ul style="list-style-type: none"> • Review EIA and implementation of ESMP for catchment sub-projects • Provide input in the identification of critical natural habitats and biodiversity hotspots within the Basin. • Facilitate environmental education and awareness raising in the SRBMP. 	<ul style="list-style-type: none"> • Review EIA and implementation of ESMP • Review ToR and ESIA for new investments
Department of Energy (DoE)	<ul style="list-style-type: none"> • Support basin knowledge base with energy planning inputs • Support dialogue on long term sustainable weed and barrage operation and maintenance 	<ul style="list-style-type: none"> • Advise on Catchment energy aspects (e.g. pico-hydro, solar, improved cookstoves) 	<ul style="list-style-type: none"> • Support preparation and analysis for new investments

II. FINANCIAL MANAGEMENT, DISBURSEMENTS AND PROCUREMENT

A. Financial Management

25. **Introduction.** A financial management (FM) assessment of the project implementing agencies was conducted. The MWDI has been designated as lead implementing agency, and overall program coordination will be housed in MWDI, including the financial management function. The other significant implementing agencies are DLRC of MoAFS; DoF and DCCMS of MECCM; NSDC within the DoS of MLH; DNPW of MTC and DNRDM of OPC. The FM assessment of these other implementing agencies focused on contract management only as funds flow and accounting functions will be centralized at MWDI. The objective of the assessment was to determine: (a) whether the entities have adequate FM arrangements in place to ensure the funds will be used for the purposes intended in an efficient and economical manner and the entities are capable of correctly and completely recording all transactions and balances related to the Project; (b) the Project's financial reports will be prepared in an accurate, reliable and timely manner; (c) the entities' assets will be safely guarded; and (d) the Project will be subjected to auditing arrangements acceptable to the Bank. The assessment complied with the Financial Management Manual for World Bank-Financed Investment Operations that became effective on March 1, 2010 and AFTFM Financial Management Assessment and Risk Rating Principles.

Financial Management Arrangements

26. **Budgeting arrangements:** MWDI's budgeting process is deemed to be adequate. The budgeting process will be informed by the project's annual work plans that will be agreed between the Bank and the project. The budget will be incorporated into the accounting package until IFMIS project module including budgeting is operational.

27. **Accounting arrangements:** MWDI has acquired an accounting package for the project instead of using IFMIS as it is currently configured with a chart of accounts that does not allow for transaction processing and reporting in accordance with IDA requirements. The newly recruited FM staff for the project is already being trained using the same system, also operated by NWDP-II, while the FM system was being set up. The project will use government policies and procedures as entailed in the treasury manual in addition to the project specific FM manual. The FM staff hired under the TT and housed within MWDI consists of a project accountant (recruited for the Project) and an assistant accountant (assigned to the Project by the Ministry). An additional accounting staff is proposed to be deployed in the TT to further strengthen FM arrangements for the Project.

Internal control and internal auditing arrangements

28. **Internal Auditing:** MWDI like other government agencies has a weak internal audit function with dormant audit committees and consequently issues raised by both internal and external audit reports are not systematically addressed. Capacity building for audit committees are planned under the Public Financial Management reform program which the government has initiated with multi donor trust funding, administered by World Bank. The effects of the proposed reforms are likely to occur far into the implementation of the project, but the Project is expected to be internally audited. If necessary, project budget would be available to cover the incremental operating costs of the internal auditing functions.

29. **Internal Control Systems:** MWDI will have a financial management manual as part of the PIP, documenting the internal control systems to be used under the project. The project would also follow treasury instructions which detail internal control procedures for government transactions and accounting.

Funds Flow and Disbursement Arrangements

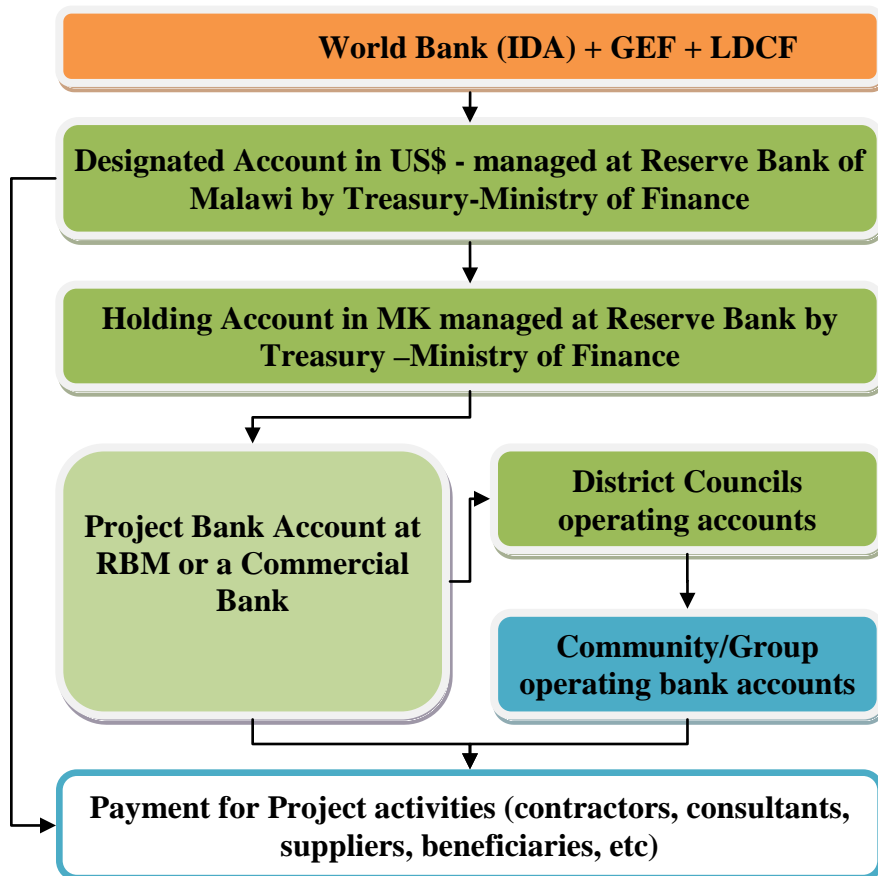
30. **Banking arrangements:** MWDI through the Ministry of Finance (treasury) will be required to open appropriate Designated Accounts denominated in United States Dollars and a Holding Account in Malawi Kwacha at the Reserve Bank of Malawi. MWDI may open a United States Dollars Holding account as well for facilitating foreign currency payments co-financed by IDA, GEF and LDCF. MWDI will also open an operating account with the Reserve Bank of Malawi or with a Commercial bank acceptable to the Bank. Details of these accounts once opened and the signatories are to be submitted to the Bank.

31. **Funds Flow Arrangements:** Funds flow arrangements for the project (through the abovementioned bank accounts) are as follows:

- Withdrawal applications for advances into the Designated Account and other forms of disbursement will be supported by Interim Financial Reports.
- Project expenditure can be paid from either the Designated Account or Project Account.

32. Delays have been experienced albeit in very few cases in terms of the Reserve Bank of Malawi paying foreign suppliers out of the designated account.

33. Community and group level activities within sub-projects under the Project (Component B and C) will be financed through District Councils. Funds flow to the Districts will be based on requests from the District Councils to the Ministry. Upon approval of such payment request by MWDI, the Ministry will transfer the funds to the District’s operating accounts to be opened for exclusive use for the Program at a Commercial bank acceptable to the Bank. Once the funding is transferred, the District will be able to issue cheques from their operating accounts. Depending on the Procurement Method



for activities, the District can directly pay suppliers or transfer to communities' and groups' Bank accounts that are being established under the Project for Savings and Loans groups and the Livelihoods Investment Grants. The National Local Government Finance Committee should be informed by MWDI of transfers to Districts to assist in monitoring funds flow and accounting at District Level.

FM arrangements at community sub-project level

34. The communities will need to maintain some minimum level FM arrangements. Through the Malawi Social Action Fund (MASAF) project, most communities are already familiar with some FM arrangements. The communities that will be involved in this project will be assessed to ensure that they can manage the FM arrangements. The National Local Government Finance Committee (NLGFC) and District Councils have been responsible for training communities in FM and Procurement. In order to strengthen the coordination between the communities and district councils, it is recommended that any required training in FM and procurement should be handled by NLGFC and district councils. This will also facilitate the oversight function of these institutions on communities. The FM training to communities should ensure the following:

35. **Planning and budgeting.** The communities need to be trained by the Service Provider to carry out their planning and budgeting process. They should be able to (i) articulate the objectives of a chosen sub-project; (ii) determine the outputs/milestones that will achieve the objectives; and (iii) determine discrete steps/activities required to achieve outputs. The activities required should include timing and associated costs. The sub-projects will need to be appraised for their economic, social and financial viability by the Districts with final approval by the Technical Team.

36. **Funds flow.** Participating communities would have to open an operating account at a commercial bank of their choice. Communities that have been involved in MASAF projects are familiar with the operation of bank accounts.

37. **Accounting and reporting.** The communities should maintain a cash book and a file containing procurement and accounting records. The cash book would need to record all incoming funds whether from project or community contribution and interest income where applicable. Expenses or payments to beneficiaries would also be recorded. Incoming funds will be acknowledged by receipts and all payments will have a payment voucher and supporting documentations like quotations, invoices and supplier receipts. This means that all entries in the cash book will be supported by documents in the community project file.

38. The community would need to produce monthly financial reports showing expenditure classified according to budgeted items/activities. The financial reports should relate to physical progress of the subprojects and also show remaining funds.

39. For management of the livelihood investment grant, apart from maintenance of a cash book and documents file, the communities will also need to be trained on keeping subsidiary beneficiary ledgers. This will include the processing of repayments including interest income.

40. **Internal controls.** The sub-projects should have an implementation committee composed of at least a literate treasurer and secretary. The signatories to the community bank account should be at least three. The treasurer should always be accompanied by at least one member of the committee when withdrawing funds. The treasurer should be trained in basic bank reconciliation where by he/she should be able to trace all payments and receipts as recorded in

cash book to bank statement and vice versa, pick out bank charges and record them in cash book and seek explanations from the bank for any discrepancies. Some of the communities under MASAF have been having problems reconciling their cash books with bank statements.

41. Subject to materiality, district internal auditors to audit selected sub-projects to assess compliance with required FM and other procedures.
42. **External Audit.** Subject to materiality, selected sub-projects may be subjected to external auditing.
43. **Accountability mechanisms.** The sub-project committee should report to project beneficiaries on a monthly basis during which financial and other progress reports should be presented. All beneficiaries should be aware of funding available to a sub-project and funding tranches should be publicly announced. The operational guidelines for the community managed livelihood investment grants should specify accountability mechanisms within the community, for instance performance of individual beneficiaries should be publicly announced and enforcement mechanisms employed and publicly announced.
44. NLGFC and districts should visit the sub-projects at least once a year and assess their adherence to FM requirements, and build capacity where there are gaps.
45. The above FM arrangements for sub-projects should form part of the MOU between the project/government and the communities.

B. Disbursements

46. **Special Commitments and Direct Payments:** Special Commitments using irrevocable letters of credit may be used as well direct payments to suppliers for works, goods and services upon the borrower's request.
47. **Advances:** The project will also receive funds into the designated account based on forecasts reflected in quarterly interim reports. IDA will make the initial disbursement to the project after receiving a withdrawal application with a six months cash flow forecast. This withdrawal application should be prepared within one month after project effectiveness. Thereafter, IDA will disburse into the respective Designated Account based on quarterly IFRs, which would provide actual expenditure for the preceding quarter (3 months) and cash flow projections for the next 2 quarters (6 months). The IFR will be reviewed by the Bank's Financial Management Specialist (FMS) and approved by the Task Team Leader before the request for disbursement is processed by the Bank's Loan Department.
48. **Reimbursements:** Reimbursements can be made for expenses pre-financed by Government. These payments will also be reported in quarterly IFRs.
49. The IDA Disbursement Letter will provide details about each of the above disbursement arrangements.

Financial Reporting Arrangements

50. The MWDI will produce quarterly unaudited Interim Financial Reports (IFRs) for the designated account and the related project account. The IFRs are to be produced on a quarterly basis and submitted to the Bank within 45 days after the end of the calendar quarterly period. MWDI and the Bank agreed on the format and content of the IFRs during negotiations. The

reporting requirements will be incorporated into the accounting package to enable automatic generation of the IFRs.

51. The IFRs submitted to the Bank will have a section on Financial Reporting and Disbursement containing the following:

52. Reporting Section includes:

- Statement of Sources and Uses of Funds; and
- Statement of Uses of Funds by Project Activity/Component.

53. Disbursement Section includes:

- Designated Account (DA) Activity Statement;
- Bank Statements for both the Designated and Project Account;
- Summary Statement of DA Expenditures for Contracts subject to Prior Review; and
- Summary Statement of DA Expenditures not subject to Prior Review.

54. The project will prepare the annual audited accounts/financial statements which must be submitted to the Bank within 6 months after the end of the accounting year (i.e. December 31). MWDI will prepare its accounts in accordance with International Public Sector Accounting Standards.

55. The accounts/financial statements will comprise of:

- (a) A **Statement of Sources and Uses of Funds/Cash Receipts and Payments**, which recognizes all cash receipts, cash payments and cash balances controlled by the entity; and separately identifies payments by third parties on behalf of the entity.
- (b) The **Accounting Policies Adopted and Explanatory Notes**. The explanatory notes should be presented in a systematic manner with items on the Statement of Cash Receipts and Payments being cross referenced to any related information in the notes. Examples of this information include a summary of fixed assets by category of assets, and a summary of IFR Withdrawal Schedule, listing individual withdrawal applications; and
- (c) A **Management Assertion** that Bank funds have been expended in accordance with the intended purposes as specified in the relevant World Bank legal agreement.

Auditing Arrangements

56. The National Audit Office (NAO) will audit the project's annual financial statements prepared by MWDI using the International Standards on Auditing. The audited financial statements will be submitted to the Bank within 6 months after the end of the fiscal year along with the management letter. Generic terms of reference for Audit have been agreed with MWDI.

Financial Management Action Plan

57. The following actions need to be taken in order to enhance the financial management arrangements for the Project:

	Action	Date due by	Responsible
1	Agree the format of Interim Financial Report with the Bank	Negotiation (done)	MWDI/IDA
2	Recruit an assistant accountant for the project	Year 1 of the project, based on evaluation of FM arrangements	MWDI
3	Project FM staff trained in FM and Disbursement procedures	Before effectiveness	IDA/MWDI
4	The Bank and Government of Malawi to agree on counterpart funding arrangements to ensure there are no delays in remitting the funds to the projects	During negotiations (done)	IDA and Ministry of Finance
5	Ensure MWDI has an accounting information systems to produce the project books of accounts	Before effectiveness	IDA, MoF and MWDI
6	Prepare FM manual	Before negotiation (done)	MWDI
7	Agree audit ToRs	During negotiation (done)	IDA/MWDI
8	Government commit to conducting internal audits	During negotiation (done)	MoF, MWDI

58. **Financial Covenants:** Financial covenants are as stated in the Financing Agreement Schedule 2, Section II (B) on Financial Management, Financial Reports and Audits and Section 4.09 of the General Conditions.

59. **Implementation Support Plan:** Based on the outcome of the FM risk assessment, the following implementation support plan is proposed to ensure the project maintains a satisfactory financial management system throughout the project's life:

FM Activity	Frequency
Desk reviews	
Interim financial reports review	Quarterly
Audit report review of the program	Annually
Review of other relevant information such as interim internal control systems reports.	Continuous as they become available
On site visits	
Review of overall operation of the FM system	Semi-annual for MWDI (Implementation Support Mission)
Monitoring of actions taken on issues highlighted in audit reports, auditors' management letters, internal audit and other reports	As needed
Transaction reviews (if needed)	As needed
Capacity building support	
FM training sessions	During implementation and as and when needed.

60. **Conclusion of the assessment:** The financial management arrangements meet the Bank's minimum requirements under OP/BP10.02. The overall residual risk rating for MWDI is Substantial, hence the project will have an on-field supervision at least twice a year. The financial management action plan outlines the mitigating measures.

C. Procurement

Introduction and procurement capacity assessment

61. ***Legal Aspects and Procurement Practices.*** Public Procurement in Malawi is governed by the Public Procurement Act of August 2003. The Act requires procurement Regulations to provide, inter alia, threshold for use of various procurement methods, bidding and bid evaluation procedures and contract management. The Law further establishes the Office of Director of Public Procurement (ODPP) with oversight for public procurement. The Office became operational in 2005 with the appointment of the Director and other substantive officers. The Government also established Internal Procurement Committees (IPC) and Specialized Procurement Units (SPU) in all Ministries and Departments as the responsible bodies for procurement in the Ministries and Departments. Procurement Regulations and Desk Instructions have been distributed to all procuring entities. The Office of Director of Public Procurement has also established a dedicated website for sharing of information, placing of adverts and notification of awards to the general public.

62. An ***initial procurement capacity assessment of MWDI*** for the implementation of SRBMP-I was undertaken by the Bank on November 18, 2010 and the conclusion of that assessment was that capacity was inadequate and there was need for technical assistance to support procurement activities under the project. Since November 2010 assessment, further developments have been undertaken by MWDI to address the problem, which include: the setting up of a Technical Team (TT), which would be responsible for project implementation; and the process of recruitment of a Procurement Specialist.

63. A ***follow-up procurement capacity assessment of MWDI*** was conducted by the Bank on December 8, 2011 and that time it was concluded that there was limited capacity to carry out procurement activities related to SRBMP-I. However, at appraisal (February 2012) an experienced Procurement Specialist who has worked on other Bank financed projects has been recruited. During the early part of project preparation, the project has relied on the PMU for NWDP-II for preparation of project related activities, and the PMU will continue to provide backstopping if required, however, full responsibility for procurement is with the TT housed in MWDI. In the past, procurement under MWDI has experienced serious delays in approvals of contract awards due to extended approval systems within Government. Mitigation measures have been designed accordingly in agreement with MWDI and include training, preparation of a Project Implementation Plan, and a Procurement Plan (PP) for the first 18 months of the project.

64. The overall capacity of MWDI to carry out procurement under the proposed SRBMP-I is Medium and overall risk is Moderate as there is staff that has adequate qualifications and experience in the use of World Bank guidelines and procedures and as part of mitigation measures capacity building will be undertaken.

Summary assessment of procurement capacity risk and mitigation action plan

Analysis of Procurement Capacity	Issues/Risks	mitigation Measures	y When/Who
Weak capacity to carry out procurement efficiently	Staff are not conversant in using World Bank guidelines, standard bidding documents nor have they prepared RFPs.	Training in particular in World Bank procedures is needed and a training planning to be agreed with IDA should be prepared by MWDI.	MWDI- On going

Monitoring/Control Systems	Need to introduce Contract Monitoring system ;	Establish an acceptable contract monitoring system	MWDI- On going
No project implementation manual to provide guidance financial management and procurement	Need to introduce procurement manual to guide staff	Prepare project implementation manual , including Community Procurement section	MWDI by effectiveness – Already drafted

Organization, Functions and Staffing

65. The implementing agencies have set up a Multi-Sector TT within MWDI headed by a Project Coordinator from Water Resources Department and comprising government officers from a.o. Land Resources, Forestry Department, Climate Change & Meteorological Services, Irrigation Department, Disaster and Relief Department, National Spatial Data Centre, National Parks and Wildlife who will be responsible for procurement under the Project. Offices for the TT have been rented at ADL House, City Centre Lilongwe. The TT will be supported by Technical Assistance staff on fiduciary aspects which will include a Financial Management Officer, a Procurement Specialist, a Project Liaison Officer and an Administrative Assistant.

66. Procurement under SRBMP-I will be undertaken by a full time Procurement Specialist with experience both in World Bank Guidelines as well as procurement under Malawi Public Procurement Law. The Procurement Specialist will report to the Project Coordinator and will be supported by seconded officers in the preparation of bid specifications, Terms of Reference and Request for Proposals as well as Bid Evaluations.

67. **The Internal Procurement Committee** (IPC) under MWDI based at Tikwere House will be responsible for award of contracts and oversight functions. The current arrangement of the IPC is that the Director of Technical Services is the Chairperson of the Internal Procurement Committee (IPC) and other members include the Director of Administration and Finance, Director of Finance, Director of Water Supply Services, Director of Water Resources, Deputy Director Planning, Controller of Human Resources Management and Development, Under Secretary and Deputy Directors of Water Supply Services and Water Resources. The Project Coordinator is a member of the IPC and will present project interests.

Planning and Reporting

68. **The Procurement Plan** outlines the best procurement procedures to use for a given program or project. It also helps plan and monitor implementation of project activities. The PP for implementation of the Project shall define: (a) the particular contracts for the goods, works, and/or services required to carry out activities; (b) estimated cost of each individual contract; (c) proposed methods for procurement contracts; (d) expected bid opening date; and (e) related review procedures. Details on all procurements undertaken will also be provided in a quarterly Procurement Annex to the IFRs. The PP for the first 18 months of the project has been prepared. Major anticipated Procurement includes:

Goods: Hydromet equipment, water quality kits, IT hardware, software and datasets (incl. satellite imagery), vehicles, boats, survey equipment, community level catchment and flood risk management equipment and tools, agricultural/forestry growth materials;.

Works: Upgrading of Kamuzu barrage (civil works, steel gates and weed boom, weed collector); offices/training center/laboratory, civil works associated with hydromet equipment, works for rural infrastructure (e.g. small dams, irrigation, community flood protection infrastructure);

Consultant's Services: Shire River Basin Planning support; implementation service providers for community level activities for catchment management, flood risk management and ecological improvement, real time decision support systems, including flood forecasting and early warning, overall project M&E support, catchment management monitoring system, technical supervision of Kamuzu Barrage upgrading, water information system, biodiversity surveys, development of national guidelines/manuals for catchment management, protected area/Forest Reserve management support.

Procurement guidelines

69. Procurement of ICB contracts for goods will be carried out in accordance with the *Guidelines: Procurement of Goods, Works and Non Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers; January 2011*. Bank's Standard Bidding Documents and Standard Bid Evaluation Forms for goods under International Competitive Bidding (ICB) will be used. Since the Government has prepared Standard Bidding Documents for procurement of goods under National Competitive Bidding (NCB), procurement of goods under NCB will be carried out using these documents. Bank's Standard Bid Evaluation forms would be used for NCB contracts with necessary modifications.

70. Selection of Consultants will be carried out in accordance with the *Guidelines: Selection and Employment of Consultants IBRD Loans and IDA Credits & Grants by World Bank Borrowers, January 2011*. Bank's Standard Request for Proposals (RFP) and evaluation forms will be used where applicable.

71. The "*Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants*", dated October 15, 2006 and updated January 2011, shall apply to the project.

Prior Review and Associated Thresholds

72. All goods contracts estimated to cost US\$500,000 equivalent or more will be subject to IDA review in accordance with the procedures in Appendix I of the Procurement Guidelines.

73. Consultancy contracts with firms estimated to cost US\$200,000 equivalent or more, and consultancy contracts with individuals estimated to cost US\$100,000 equivalent or more will be subject to IDA review in accordance with the procedures in Appendix I of the Consultant Guidelines.

74. The Bank will review the Procurement Plan as well as the set of Government Standard Bidding Documents to be used for goods and consulting services. The format of procurement plan, standard bidding documents, the procurement methods and the thresholds for prior review should be reviewed and jointly agreed by Ministry of Water Development and Irrigation and IDA.

75. Contracts which are not subject to prior review will be selectively reviewed by the Bank or on behalf of the Bank by an independent Procurement Auditor during project implementation and will be governed by the procedures set forth in paragraph 4 of Appendix I to the relevant Guidelines. All documentation used for the procedures of contracting, recruitment of consulting

services, evaluation and award shall be retained for subsequent examination by auditors and IDA supervision missions.

76. It is also envisaged that there will be annual procurement post review whose aim is to: (i) verify that the procurement and contracting procedures and processes followed for the projects were in accordance with the agreed procedure manual; (ii) verify technical compliance, physical completion and price competitiveness of each contract in the selected representative sample; (iii) review and comment on contract administration and management issues as dealt with by executing agencies; (iv) review capacity of executing agencies in handling procurement efficiently; and (v) identify improvements in the procurement process in the light of any identified deficiencies. Project risks and their management will be monitored through PRAMS.

Use of National SBDs

77. Procurement below the prior review thresholds shall be carried through National competitive Procedures (NCB) in accordance with the Malawi Public Procurement Act and shall include: (i) an explicit statement to bidders of the evaluation criteria; (ii) award to the lowest evaluated responsive and qualified bidder; (iii) rejection of bids outside a range of bid values shall not be permitted; (iv) foreign bidders would not be precluded for participation in National Competitive Bidding; (v) Registration and Classification of bidders may be used for establishing bidder qualification or preparing a list for use under price comparison procedure but not as criteria for bidding; and (vi) artificial division of lots into small quantities and set aside for small and medium enterprises will not be used.

Procurement Methods

78. ***International Competitive Bidding (ICB)***. All procurement above the thresholds specified for NCB shall be conducted using ICB as set forth in Section II of the Guidelines for Procurement under IBRD Loans and IDA Credits of January, 2011. For ICB, the Ministry may apply national preference in accordance with the Guidelines. Use of Bank standard bidding documents shall be mandatory.

79. ***Limited International Competitive Bidding***: Limited International Bidding (LIB) is essentially ICB by direct invitation without open advertisement. Under the proposed Project, the Borrower may use LIB on agreement with the Bank under circumstances where (a) there is only a limited number of suppliers, or (b) other exceptional reasons may justify departure from full ICB procedures. Under LIB, Borrower shall seek bids from a list of potential suppliers broad enough to assure competitive prices, such list to include all suppliers when there are only a limited number. Domestic preferences will not be applicable in the evaluation of bids under LIB.

80. ***National Competitive Bidding (NCB)***. NCB procedures will apply to contracts for goods and works estimated to cost less than US\$500,000. NCB will be carried out in accordance with the Malawi Procurement Act No. 8 of 2003. The following additional provisions shall apply under NCB procedures:

- (i) No bidder or potential bidder shall be declared ineligible to bid for reasons other than those provided in Section I of the Procurement Guidelines;
- (ii) Bidding documents acceptable to the Association shall be used;

(iii) The bidding documents and contract shall include provisions reflecting the Bank's policy relating to firms or individuals found to have engaged in fraud and corruption as defined in the Procurement Guidelines;

(iv) Each bidding document and contract shall provide that bidders, suppliers and contractors, and their subcontractors, agents, personnel, consultants, service providers, or suppliers, shall permit the Association to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Association. Acts intended to materially impede the exercise of the Association's inspection and audit rights provided for in the Procurement Guidelines constitute an obstructive practice as defined in the Procurement Guidelines;

(v) Unquantifiable criteria, such as local content, technology transfer, and managerial, scientific, and operational skills development, shall not be used in the evaluation of bids; and;

(vi) Contracts may not be split into small lots, and their award may not be restricted to small enterprises for purposes of promotion of the participation of small enterprises.

81. **Shopping:** Shopping is a procurement method based on comparing price quotations obtained from several suppliers. A minimum of three suppliers shall be considered to assure competitive prices, and is an appropriate method for procuring non-routine readily available off-the-shelf goods or standard specification commodities or non-consulting services. Requests for quotations shall indicate the description and quantity of the goods or specifications of non-consulting services, deadline for submission of quotations, as well as desired delivery (or completion) time and place. Quotations should be submitted in sealed envelopes within the deadline and be opened by the Borrower at the same time. The evaluation of quotations shall follow the same principles as NCB. The terms of the accepted offer shall be incorporated in a purchase order or brief contract.

82. **Direct contracting for goods:** Direct contracting is contracting without competition (single source) and may be an appropriate method under the following circumstances:

(i) An existing contract for goods, awarded in accordance with procedures acceptable to the Bank, may be extended for additional goods or works of a similar nature. The Bank shall be satisfied in such cases that no advantage could be obtained by further competition and that the prices on the extended contract are reasonable. Provisions for such an extension, if considered likely in advance, shall be included in the original contract.

(ii) Standardization of equipment or spare parts, to be compatible with existing equipment, may justify additional purchases from the original Supplier. For such purchases to be justified, the original equipment shall be suitable, the number of new items shall generally be less than the existing number, the price shall be reasonable, and the advantages of another make or source of equipment shall have been considered and rejected on grounds acceptable to the Bank.

(iii) The required equipment is proprietary and obtainable only from one source.

(iv) The Contractor responsible for a process design requires the purchase of critical items from a particular Supplier as a condition of a performance guarantee.

(v) In exceptional cases, such as in response to natural disaster.

83. **Framework Agreements:** A Framework Agreement (FA) is a long term agreement with suppliers, contractors and providers of non consulting services which sets out terms and conditions under which specific procurements can be made throughout the term of the agreement. The procurement documents should stipulate the estimated quantity requirement for each item over a certain period of time, the delivery time, the terms and conditions of contract, the payment schedule. The evaluation and selection of supplier should be for each item separately based on minimum lowest unit rate and agreement of the supplier to abide by the provisions and conditions of the procurement documents. The Purchaser will issue a Purchase Order each time it requires a specific quantity. FAs may be used as alternative to NCB and Shopping for goods that can be procured off the shelf, commonly used with standard specifications, non consulting services that are simple and required from time to time and small value works contracts under emergency operations. FAs shall not restrict foreign competition, shall be limited to a maximum of three years duration, Bank no objection will be required for use, and will use NCB procedures as per agreed procurement plan.

84. **Procurement of non-consulting services.** Non-consulting services are services that are not of intellectual or advisory in nature. Such services may include internet services; freight services etc., and would include the provision of services for conducting the airborne geo-physical survey planned under the Project.

85. **Selection of Consultants:** Consulting services under the Project will include development of communication strategy, feasibility studies and mining advisory services. Except as detailed below, consulting services will be selected through competition among qualified short-listed firms based on Quality and Cost-Based Selection (QCBS). Consultants for financial audits and other repetitive services estimated to cost less than US\$50,000 equivalent per contract may be selected through Least Cost Selection (LCS) method. Consulting services by firms estimated to cost less than US\$200,000 equivalent may be selected on the basis of Selection Based on Consultant Selection (CQS). As appropriate, other selection methods such as Fixed-Budget Selection (FBS), Quality Based Selection (QBS) may be used for selection of consulting firms. Individual consultants shall be selected on the basis of Individual Consultant Selection method (IC) as per Section V of the Consultant Guidelines.

86. **Single Sourcing of Consultants:** Single-source selection may be appropriate only if it presents a clear advantage over competition: (i) for tasks that represent a natural continuation of previous work carried out by the firm, (ii) in emergency cases, such as in response to disasters and for consulting services required during the period of time immediately following the emergency, (iii) for very small assignments, or (iv) when only one firm is qualified or has experience of exceptional worth for the assignment.

87. **Training:** The SRBMP-I will formulate an annual training plan and budget which will be submitted to the Bank for its prior review and approval. The annual training plan will, inter alia, identify: (i) the training envisaged; (ii) the justification for the training, how it will lead to effective performance and implementation of the operation and or sector; (iii) the personnel to be trained; (iv) the selection methods of institutions or individuals conducting such training; (v) the institutions which will conduct training, if already selected; (vi) the duration of proposed training; and (vii) the cost estimate of the training. Report by the trainee upon completion of training would be mandatory

88. **Short lists of consultants:** Short-list of consultants for services estimated to cost less than US\$200,000 equivalent per contract, may be comprised entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Community Participation Procurement(CPP)

89. **Procurement for community driven activities** will be carried out through NGOs/District Councils using structures and systems for Community Participation Procurement method that exist at district and local levels. The development of robust procurement plans is the basis of project implementation in most World Bank operations; it will be difficult to develop the same for rural communities' activities as these activities are community-driven and depend on market conditions. However, attempts will be made to ensure that the relevant procurement framework is updated regularly (periods of six- twelve months) to reflect projected procurements for the ensuing periods. .

90. With due attention to economy and efficiency and in accordance with procedures set forth in the Project Implementation Plan (PIP), goods and works required under components involving rural communities may procure through CPP utilizing a combination of methods that include the following:

91. **Local Shopping under Community Procurement.** This shall be the most commonly used method where communities will solicit at three price quotations for the purchase of goods or services in order to make a cost comparison. This process requires a level of procurement expertise on the part of the community, which will be provided through the service provider contracted to support the implementation of Component B (included in the TOR). Communities are often interested in open competition in order to enhance the economy, a perception of fairness and equal opportunity to suppliers and contractors. Open tendering procedures would be limited to local advertising using local newspapers, community radio stations, posting notices on trees at strategic places or announcements in churches and community public meetings. The request for bids spells out the work or goods needed, the criteria for selection, and the deadline for submission of bids. Bids are opened in a public ceremony. The bids are evaluated by a committee appointed by the community. Bids are examined to determine whether they meet the minimum specifications mentioned in the bidding documents (experience, quality of works, equipment, services offered and delivery dates). Bids that meet the minimum requirements specified in the bid invitation are retained for further evaluation and the bidder who meets the minimum requirements and offers the lowest bid is selected. The award and amount of the contract should be announced to all bidders. A contract should be signed within five days of the announcement. Goods and works estimated to cost more than US\$10,000 equivalent per contract, but not exceeding US\$50,000 equivalent per contract, may be procured under this method.

92. **Direct Contracting under Community Procurement.** This method may be used when the cost to the community of another procedure would be disproportionately high relative to the value of the procurement itself and where only one supplier or contractor is available locally. Other reasons for direct contracting could be urgency, the need to adopt certain technology or a repeat order. The supplier can thus be chosen without going through either the bidding or shopping procedures described above, provided the cost are in line with local market rates (using an updated Unit Cost Database). Direct contracting should be one case that requires approval of

the community committee in order to remove the inherent risk of comparison. This method may be used for items estimated to cost not more than US\$3,000 equivalent per contract.

93. **A CPP Procurement Manual** will be drafted by MWDI as part of the Project Implementation Plan. In further refining and reviewing these manuals, MWDI should solicit participation of all stakeholders, set out the procurement plans, assess local counterpart fund requirements, specify responsibilities for commitment and implementation, and the risks that need to be controlled.

94. **CPP procurement monitoring and audit procedures** for the community demand driven components will follow the procedures available at district and local levels as described in the Project Implementation Manual.

Procurement Monitoring

95. During implementation, the Project Coordinator will provide quarterly reports on progress of procurement highlighting difficulties encountered in the past, and how these would be addressed in the future to ensure timely project completion. There will be procurement supervision every twelve months which will include special procurement supervision for post reviews. During these missions, IDA will review 20% of post review contracts signed during the past twelve months as per the agreed procurement plan:

(i) **Operating Costs.** Operating costs will be procured using the Government of Malawi administrative procedures which were reviewed and found acceptable to the Bank. Operating cost will not include salaries or top up salaries of civil servants.

(ii) Procurement decisions subject to Prior Review by the Bank as stated in Appendix 1 to the Guidelines for Procurement:

	Procurement Method	Prior Review Threshold	Comment
1.	ICB and LIB (Goods)	US\$500,000	All contracts
2.	NCB (Goods)	More than US\$50,000 and less than US\$500,000	First contract, and as specified in PP
3.	ICB and LIB (Works)	US\$3,000,000	All contracts
4.	NCB (Works)	More than US\$100,000 and less than US\$3,000,000	First contract, and as specified in PP
5.	ICB (Non-Consultant Services)	As per Goods	First contract
6.	Shopping (Goods & Works)	Below US\$50,000	None
7.	Direct contracting	All contracts above US\$1,000	All contracts
8.	Framework Agreements	Less than US\$ 500,000	First Contract

(iii) Procurement decisions subject to Prior Review by the Bank as stated in the Consultant Guidelines:

	Selection Method	Prior Review Threshold	Comment
1.	Competitive Methods QCBS, QBS,CQS,FBS,LCS,(Firms)	US\$200,000	All contracts
2.	Single Source	US\$1,000	All contracts
3	Individual Consultants	US\$100,000	All contracts

(iv) Contracts which are not subject to prior review will be selectively reviewed by the Bank through Procurement Post Reviews or on behalf of the Bank by an independent Procurement Auditor during project implementation and will be governed by the procedures set forth in paragraph 4 of Appendix I to the relevant Guidelines. All documentation used for the procedures of contracting, recruitment of consulting services, evaluation and award shall be retained for subsequent examination by auditors and IDA supervision missions.

96. **Misprocurement.** If it is determined that any goods, works or services have not been procured by the project in accordance with the agreed Procurement Plan and procedures, misprocurement will be declared. Bank policy requires canceling that portion of the Grant allocated to the goods, works, and services that were misprocured.

97. **Procurement Manual.** A manual detailing how financial and procurement will be undertaken under the project has been drafted by MWDI to facilitate project effectiveness.

98. **Implementation readiness.** As part of project preparation, Bid documents for the Kamuzu Barrage have been prepared and the Bank has already commented on them. Staff to undertake procurement including technical personnel that will support them in preparations of ToRs, bid specifications and evaluation has already been identified.

III. ENVIRONMENTAL AND SOCIAL (INCLUDING SAFEGUARDS)

99. The proposed operation is classified as a Category A project because of the inherent environmental sensitivity of the Kamuzu Barrage (Sub-Component C.1). The project would also help to plan future large-scale infrastructure investments, as well as influencing land use decisions within the Shire River Basin.

100. Specific World Bank safeguard policies applicable to the APL are:

Safeguard Policies Triggered	Yes	No
Environmental Assessment (OP/BP 4.01)	x	
Natural Habitats (OP/BP 4.04)	x	
Forests (OP/BP 4.36)	x	
Pest Management (OP 4.09)	x	
Physical Cultural Resources (OP/BP 4.11)	x	
Indigenous Peoples (OP/BP 4.10)		x
Involuntary Resettlement (OP/BP 4.12)	x	
Safety of Dams (OP/BP 4.37)	x	
Projects on International Waterways (OP/BP 7.50)	x	
Projects in Disputed Areas (OP/BP 7.60)		x

101. **Expected Environmental Impacts:** The project is being designed with environmental sustainability in mind for all components and activities. The environmental impacts of Basin Planning and monitoring (Component A), catchment management (Component B), and flood management (Component C) are expected to be highly positive overall; likely environmental benefits include improved forest conservation and restoration, reduced soil erosion and land degradation, reduced sedimentation in the Shire River and some of its tributaries, and a reduced risk that the Shire River would run dry during an extended drought. Environmental

considerations will be given major attention in Shire River Basin planning, as well as major civil works, to ensure that any adverse environmental impacts are minimized and adequately addressed.

102. **Social Development Issues:** The project has incorporated social safeguards considerations in its design. Preparatory activities included careful consideration of these issues as part of the Environmental and Social Impact Assessment for the Kamuzu Barrage, Environmental and Social Management Framework for the overall project, Resettlement Action Plan for the Barrage and a Resettlement Policy Framework with Process Framework for the overall project. Stakeholder involvement is proposed throughout the project and the preparation provides for stakeholder identification and engagement at various levels. Project design builds on previous work by various CSOs and NGOs, especially related to catchment management and related livelihood enhancement and capacity-building activities.

103. **Environmental and Social Safeguards Reports.** The following World Bank Safeguard Policies apply to this project: Environmental Assessment OP 4.01, Natural Habitats OP 4.04 and Forests OP 4.36, Pest Management OP 4.09, Physical Cultural Resources OP 4.11, Involuntary Resettlement OP 4.12, Safety of Dams OP 4.37, and International Waterways OP 7.50. To ensure that the project is designed so as to comply fully with these policies, the following safeguards-related instruments have been developed during project preparation, with drafts publicly disclosed in advance of project appraisal and (except for the Riparian Notification Letter and Dam Safety reports) at least 120 days before formal project approval by the World Bank's Board of Executive Directors.

104. A **Strategic Environmental and Social Assessment (SESA)** of the Shire River Basin was completed in 2010. The SESA is intended to assess the environmental, social, economic, and institutional implications of development policies, plans, and programs for the Shire River Basin.

105. An independent **Environmental and Social Impact Assessment (ESIA)** of the Kamuzu Barrage Upgrading, including an **Environmental and Social Management Plan (ESMP)** and **Resettlement Action Plan (RAP)**, exists in draft form (disclosed January 1, 2011), with a Preliminary ESIA (including Environmental Management Plan), publicly disclosed on December 1, 2011. This ESIA is expected to provide inputs into modifying the final design or operating rules of the Barrage. Prior to this independent ESIA, a preliminary Environmental Impact Assessment (EIA) was completed in 2003 as part of the Feasibility Study (The Integrated Water Resources Development Plan for Lake Malawi and Shire River System "Lake Malawi Level Control"—Stage 2, Final Feasibility Report, Volume II, Part C—EIA of Upgraded Liwonde Barrage, Norconsult).

106. An **Environmental and Social Management Framework (ESMF)** of the SRBMP-I has been prepared to address the expected environmental and social impacts of the overall project (aside from the Kamuzu Barrage). The ESMF indicates the corresponding mitigation and enhancement measures for each type of environmental and social impact identified (whether negative or positive). This ESMF serves as a companion volume to the Independent ESIA of the Kamuzu Barrage Upgrading. A draft ESMF has been publicly disclosed on January 1, 2012.

107. A **Resettlement Policy Framework with Process Framework** for the overall project will (i) complement the Resettlement Action Plan that will be produced under the Independent ESIA of the Kamuzu Barrage; (ii) specify the criteria and procedures to be followed if other

components of the Project (besides the Kamuzu Barrage work) would lead to involuntary physical relocation, loss of assets or access to assets, or (in the case of people living near project-supported National Parks or Forest Reserves) new restrictions on access to natural resources used to maintain livelihoods. The draft PF has been publicly disclosed on January 1, 2012 and the draft RPF has been publicly disclosed on February 2, 2012.

108. The World Bank has sent, on behalf of the Government of Malawi, a **Riparian Notification Letter** to the governments of all the other Zambezi River Basin countries (Mozambique, Tanzania, Angola, Botswana, Namibia, Zambia, and Zimbabwe), since the Shire Basin forms part of the larger Zambezi Basin. This notification and request for any official comments is done to support good information-sharing among the riparian countries and is in compliance with OP 7.50 on Projects in International Waterways. The team assessed that the Project's impacts would be largely positive and not cause appreciable harm to any riparian. Two responses (from the Republic of Namibia and the Republic of Zimbabwe) were obtained by the end of the notification period and both are supportive of the Project and its objectives.

109. **Dam Safety:** The SRBMP-I will finance rehabilitation of Kamuzu Barrage. Although this barrage is a relatively small dam structure by itself (only 4 m high), it has great strategic importance for Malawi and partially influences water levels in Lake Malawi, one of the world's largest freshwater lakes. Accordingly, it has been decided to apply the World Bank's Safety of Dams Policy (OP 4.37) and the Bank's Lead Dam Specialist has provided advice on measures to improve dam safety. The project will not finance the construction of other large dams. Under the Catchment Management Component B, the project may finance construction of small earthen dams, farm and fish ponds, for which the application of generic dam safety measures will apply. The construction or rehabilitation under the project of such water retention structures requires the project to be in accordance with small dam guidelines, which include the existing regulations and the generic guidelines in the FAO Technical Guide for Small Earth Dams (FAO, 2010). These technical guidelines will need to be adopted early in the project before such structures are built, in order to complement the national regulation and guidelines for construction, maintenance and safety of small dams.

IV. MONITORING & EVALUATION

110. Program, project and intermediate level performance indicators and targets are included in Annex1. The project will establish an appropriate monitoring and evaluation (M&E) system to track progress against these core indicators as well as against a larger set of component-wise indicators that will paint a broader picture of overall project performance. The TT, on behalf of the implementing agencies, would be responsible for the overall SRBMP M&E, as detailed in the PIP, and would coordinate the establishment of a management information system (MIS) and M&E plan with the support of partner government agencies, contracted service providers, NGOs, and communities. The project-wide MIS would mainly address input-output monitoring related to the various activities proposed under the three components and sub-components as a means of tracking implementation progress. A baseline survey is currently being prepared.

111. A major effort and substantial investments will be dedicated to improving, updating and modernizing M&E systems at different levels and for different purposes, such as for instance: (a) water and climate monitoring systems; (b) vegetative cover and land-use monitoring systems; (c) capacity of community groups in terms of SLWM and business management skills; (d) project financed infrastructure construction; (e) Environmental and Social Management Plans; (f)

functioning of flood mitigation systems and actual flood damage occurring; and (g) vulnerability levels of target populations. Some of these have a much wider reach than the overall project input-output monitoring framework, for instance by providing data and analysis on the Shire Basin as a whole. A major thrust of the project will be on transparency, where stakeholders have open access to project reports via the internet, including basin thematic maps and state-of-the-basin reports.

112. Component B requires a much more comprehensive M&E sub-system due to the complex and wide-ranging activities related to catchment rehabilitation, management, institutional development, and rural livelihoods. A highly qualified third party institution will be contracted for the duration of the project to support M&E support to DLRC that would encompass inputs and outputs, key implementation processes, periodic impact assessments, and targeted studies/analyses where implementation problems are identified. As activities under this component are largely implemented at the district and village/ community levels, a monitoring system will be applied that will strengthen participatory methods and processes for data collection. The M&E approach for component B would involve a combination of field-based data collection and remote sensing/ GIS. The third party institution would develop a comprehensive MIS to capture field information and allow for effective data analysis and reporting to guide implementation. The Component B MIS would also be linked to the broader project-wide MIS managed by the TT (in MWDI).

V. ROLE OF PARTNERS

113. GEF/LDCF is co-financing this project as a fully-blended project with grant resources for biodiversity, sustainable forest management, land degradation, and climate resilience. DFID is considering parallel financing for improved basin-wide monitoring and evaluation of catchment management under Sub-component B.1. Partnership and coordination arrangements have been initiated with the Millennium Challenge Corporation/Account (MCC/A), UK Department for International Development (DfID), Norway and the United Nations Development Program (UNDP), JICA, the International Fund for Agricultural Development (IFAD) among others, who are actively investing in catchment management and or flood mitigation activities in the Shire River Basin. The Program would also facilitate interactions with additional partners as they emerge to synergize activities on the Shire Basin.

Annex 4: Operational Risk Assessment Framework (ORAF)

MALAWI: Shire River Basin Management Program (Phase-I) Project

Stage: Board

Project Stakeholder Risks		Rating: Moderate	
Description : integrated river basin management is necessarily multisectoral in nature, and involves coordinating activities across a large number of public, private and donor agencies. Creation of a river basin planning and coordination agency will be a new step for Malawi, and whilst multisectoral planning should produce synergies in most cases, there remains a risk that individual stakeholder agencies may feel that their actions are being constrained and therefore oppose the basin planning process or agency.	Risk Management: Design of the institutional structure of the expected basin management agency will take into account the need for sufficient status of the agency and representation of key stakeholders, via e.g. the Shire Basin Stakeholder Platform. The project will also greatly improve the knowledge base for decision-making, including real-time spatial tracking of development activities within the Basin. It will make the knowledge base public and include a program of external relations and media activities, which will increase understanding and the onus on stakeholders to engage constructively. The project does not need to achieve 100% harmonization of development activities to effectively improve basin coordination, and with GoM commitment, the risk of major activities occurring outside the basin planning framework is modest.		
	Resp: GoM	Stage: Implementation	Due Date : early implementation
Implementing Agency Risks (including fiduciary)			
Capacity		Rating: High	
Description : Technical capacity The implementing agencies have weak technical capacity, in terms of knowledge base, availability of good numbers of competent technical staff at the district level, and the ability to conduct specialized functions, such as community mobilization or hydro-meteorological and water quality monitoring. However, Government policy, agreed with DPs excludes the use of stand-alone PIUs.	Risk Management : The Project will make significant investments in the development of a publicly available Shire Basin management knowledge base. Technical support will be provided by consultants to make sure that certain specialized tasks are delivered successfully, such as an environmental and social safeguards specialist, an institutions specialist, GIS and modeling experts, economist and water resources planner and short-term expertise in the fields of planning and M&E, architecture, irrigation engineer, water supply, hydropower engineer, catchment management, procurement, civil engineer, facilitators, water quality, legal expertise, IT services. Delivery of many of the field activities under component B will be contracted out to qualified NGOs or other local service providers to compensate for gaps in local government capacity. Government staff will be involved in all activities and receive training from NGOs and consultants to build capacity to maintain appropriate support to project activities in the longer run.		
	Resp: Project team	Stage: Implementation	Due Date : on-going
Description : FM capacity Implementing agencies may not follow proper financial management practices and may have difficulties in hiring qualified staff trained in Bank procedures. The accounting staff operate under a common service and are frequently transferred around various Ministries. This causes disruption in FM activities as new project staff require training. Lack of a proper accounting system to process and report on project transactions is another risk factor. The IFMIS has not been customized to cater for project activities thus necessitating a parallel data	Risk Management : The implementing agencies under which major project activities will take place will need to undertake intensive training to have adequate FM staff to ensure that adequate capacity is available throughout the implementation period. The Government is working on activating the project module in IFMIS that will allow processing and reporting on project transactions in line with requirements, but in the meantime the project will not rely on IFMIS and will procure commercial accounting software. Internal and external audits will be required as part of the implementation requirements.		
	Resp: Client	Stage: Preparation and Implementation	Due Date : on-going

<p>processing for project reporting purposes. This could lead to errors and delays. There is also a weakness of internal audit with no functioning audit committees to follow up on audit recommendations, further compounded by lack of remedies/penalties being enforced by law to deal with management teams for not taking into consideration audit recommendations</p>				
<p>Description : Procurement & administrative capacity There are no staff in the government trained in procurement hence there is weak procurement management capacity, slow and bureaucratic systems of government. Delays in procurement of goods and services are expected with the phasing out of PIUs. Extended reviews and approvals at central level as well as at the Ministry level will impact on procurement. The restriction for local bidders to only bid in Malawi Kwacha affects their capacity to procure goods from outside the country. Lack of forex and fuel also are a big challenge to procurement.</p>	<p>Risk Management : The project will employ a procurement specialist and support staff, who will be trained on the procurement guidelines. Harmonized M & E mechanisms will be put in place and followed closely by WB and all concerned parties to ensure timely and quality delivery of investments. The Bank will need to make significant supervision resources available to ensure smooth implementation in the early stages. On delays due to bureaucracy and allowing local bidders to bid in forex, these shall be monitored and made explicit in the project implementation arrangements.</p>			
<p>Governance</p>	<p>Resp: Client and Bank</p>	<p>Stage: Preparation and Implementation</p>	<p>Due Date : on going</p>	<p>Status: : Not yet due</p>
<p>Description : Project activities and river basin management more generally require effective coordination between a range of government agencies and donor programs, as well as NGOs (who play a prominent role in rural service delivery) and private sector. Multi-sector and multi-donor coordination is always challenging, and may be especially so in Malawi, where capacities and information availability are low. A specific instance is that an exploration license has been given for coal mining in areas near to or possibly even within Lengwe National Park, while the project supports DNPW to improve wildlife and park management.</p>	<p>Rating: Substantial</p> <p>Risk Management:. Component A of the project is designed explicitly to strengthen coordination through establishment of a robust knowledge base and institutions: A Program Steering Committee has been established to support effective coordination across sectors. The design and establishment of the basin management agency will take into account the need to ensure it can engage at a sufficiently high level to effectively influence decision-making, that leadership and staff are selected on merit and supported with effective training, and that the agency will have appropriate legal and administrative backing as intended by the National Water Policy. The Stakeholder Forum will facilitate representation of all major stakeholders from water-dependent sectors, and their participation in the review of planning activities through formalizing and structuring a consultative process with clear inputs into Basin Management and service provision. Joint M&E systems will be established including mapping of development activities within the basin. This and other analytical information will be made available via a public portal as basis for coordination of donor activities. Awareness raising programs will interpret technical information for a broad public audience and include training for media on basin management issues. Field activities, such as micro-catchment management, will involve participatory planning processes and considerable training and empowerment of both community members and district staff. Regarding coal mining, GoM has assured that any activities, including exploration, would need to be subject to a satisfactory EIA. If mining activities would be planned within Lengwe, the team will work with Government to ensure that the until the E&S management framework for minerals (currently in development under the Mining TA Project) will be complied with.</p>			

	Resp: Project team	Stage: Preparation and Implementation	Due Date : not yet due	Status: not yet due
Project Risks				
Design	Rating:	Substantial		
Description : Project is complex, including multiple types of investments, implementing agencies and stakeholders.	Risk Management: Responsibilities of individual government departments are clearly defined in Project Documentation and the project will initially strengthen coordination through the Department of Water Resources, and later establish an autonomous basin management institution (proposed). River basin and catchment management projects are necessarily complex as they aim to synergize the actions of a variety of agencies. Within that context, the Project aims to be as focused as possible (e.g. limiting the area of phase 1 micro catchment management investments), take a phased approach to implementation that builds on early success and lessons, and has pared down the design to include the most essential elements (e.g. woodfuel use and population growth are important long-term issues, but will not be a major focus of activities under phase 1). The SRBMP-I will draw on the wealth of experience and lessons learned by the Bank and other organizations in designing and executing similar projects across regions.			
	Resp: Bank and GoM	Stage: Preparation	Due Date : Appraisal	Status: Included in design
Description: Investments in catchment management are long-term by nature, and their impact is difficult to monitor and dependent on a critical mass of activity being achieved.	Risk Management: The program explicitly designed as an APL, with the first phase concentrating activities to show demonstrable impact in selected hotspot catchment areas and other targeted areas critical for maintenance of ecological infrastructure and for flood risk management. This approach will allow local experience to be gained and lessons learned to guide scaled up operations in later phases.			
	Resp: Bank and GoM	Stage: Preparation	Due Date : Appraisal	Status: included in design
Description: While the project is helping to reduce vulnerability to climate variability, extreme weather events could hamper project progress in all components, not least by restricting access to rural areas. If water levels are consistently high or low, the upgraded barrage will essentially be redundant, and therefore may be perceived as a bad investment.	Risk Management: The Kamuzu barrage upgrade is justified on a probabilistic analysis and the critical reliance of Malawi's economy (e.g. electricity generation, irrigation, drinking water) on this structure, and even in the event of consistently high or low water levels (e.g. due to non-stationarity implications of climate change), it is difficult to envisage a scenario where the barrage will not be required. The improvement in the hydromet systems and flood management activities are also expected to provide early warning and facilitate adaptation. Aside from the Barrage, planning will be based on a seasonal project calendar to ensure critical construction takes place in the dry season and early warning and flood mitigation measures can be adequately tested in cases of extreme weather events.			
	Resp: Project team	Stage: Implementation	Due Date : on going	Status: Not yet due
Social & Environmental				
Description : The upgrading of Kamuzu Barrage would affect the upstream dry season water levels of the Shire River and Lake Malawi, as well as downstream Shire River flows. Depending on how the upgraded Kamuzu Barrage is operated, some adverse environmental and social impacts could occur. In particular, the area of certain ecosystem types within the	Risk Management : An independent Environmental and Social Impact Assessment (ESIA) of the Kamuzu Barrage has developed an Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP) for the Barrage. An Environmental and Social Management Framework (ESMF) for the overall project (including GEF activities) and a Resettlement Policy Framework (RPF) with Process Framework (PF) have also been prepared. Drafts of all these safeguards documents have been publicly disclosed in January 2012. A Strategic Environmental and Social Assessment (SESA) has been completed and its			
	Rating:	Moderate		

<p>upstream Liwonde National Park along the Shire River (such as river sandbars and floodplain grasslands) would be reduced, with adverse impacts on some wildlife species. The area of flood-recession agriculture upstream of the barrage could also be marginally reduced. Downstream environmental and social impacts should be positive overall, but will depend upon the future Operating Rules for the Barrage. The other project components, including Shire Basin Planning, Catchment Management, and Flood Management are expected to have highly positive overall environmental and social impacts. The project will support alternative livelihood activities to reduce the pressure on natural resources within selected upper catchments, 3 Forest Reserves, 2 National Parks, and the Elephant Marshes in the lower Shire River floodplain.</p>	<p>recommendations have been internalized in program design, amongst which is the centrality of Kamuzu Barrage upgrading to help ensure sustainable future development within the Shire Basin. For the Kamuzu Barrage, dam safety concerns have also been addressed and a Dam Safety Panel with international experts is being formed. Potential adverse impacts of Kamuzu Barrage upgrading will be addressed through (i) monitoring of sensitive species and ecosystems; (ii) assistance if needed to people engaged in flood-recession agriculture; and (iii) adjusting the future Operating Rules for the Barrage if the need arises.</p>				
<p>Program & Donor</p>	<p>Resp: Client</p>	<p>Stage: Preparation</p>	<p>Due Date : on going</p>	<p>Status: Safeguards documents exist as publicly disclosed drafts. Other actions not yet due</p>	
<p>Description : Whilst broader program objectives on coordinated basin management require considerable cooperation with other donors, the delivery of project-specific activities and PDOs is mostly dependent only on funding from IDA and the fully blended GEF/LDCF financing. Component C, however, assumes that local NGOs will continue to work on community flood preparedness activities that would complement the investments in small-scale infrastructure and warning systems being made by the Project.</p>	<p>Rating:</p>	<p>Moderate</p>			
<p>Risk Management: The project aims explicitly to improve the coordination of donor support, through establishing a stronger institutional and knowledge base, as discussed above. WB staff will also ensure synergy with other IDA irrigation and community investments in southern Malawi as well as the UNDPs project on <i>Private Public Partnerships in Sustainable Land Management for the Shire River basin</i>. In the event that external community resilience activities are reduced in the lower Shire, the Project may have to re-evaluate needs for community capacity-building, but current indications are that support is more likely to expand, and the agencies involved are strongly engaged with the Action Plan development.</p>	<p>Resp: Project team</p>	<p>Stage: Implementation</p>	<p>Due Date :</p>	<p>Status: not yet due</p>	
<p>Delivery Monitoring & Sustainability</p>	<p>Rating:</p>	<p>Substantial</p>			
<p>Description : There may be challenges to collaboration between district staff and NGOs in the implementation of field activities under components B and C which require substantial inputs from NGOs to substitute limited GoM manpower and technical capacity. This could manifest as: (i) implementation delays due to district inputs (particularly procurement) not being provided on schedule for NGO activities; or (ii) low sustainability after the NGO contract because Districts feel they have been bypassed and therefore do not fully engage with activities or capacity-building.</p>	<p>Risk Management : High involvement of government staff (notably District and field levels) will be assured through NGO contracting arrangement that ensure a role for Districts in the selection, guidance and oversight of field activities. Local leadership among target communities will also promote their gradual adoption of responsibility for activities.</p>	<p>Resp: GoM</p>	<p>Stage: Early implementation</p>	<p>Due Date : NGO contracts expected to be finalized shortly after Effectiveness</p>	<p>Status: Not yet due</p>
<p>Description : There are several complexities and risks of failure involved with work at the community level: Livelihoods-based catchment management at the community level is often unsustainable if designed without taking into</p>	<p>Risk Management : Local experience has shown that strong community leadership and building interest and motivation are key determinants of success. The project will therefore focus initially on establishing successful models amongst the most motivated communities, and awareness through local study tours and activities to recognize and publicize the most success communities and leaders. Lessons learned from successful operations in the country and other regions will guide design and implementation of community</p>				

<p>account socio-economic conditions and making sufficient investments in local capacities and institutions</p> <p>Participatory management of natural habitats may fail if sustainable uses promoted (e.g. tourism, community forestry) do not provide sufficient incentives or income to overcome short-term resource depletion incentives (e.g. subdued tourism market, failure to establish regulated charcoal market).</p> <p>Many NRM activities are highly gender-specific. Community NRM objectives may not be met if activities are not suitably gender-targeted, or may not be sustained if youth groups are not involved.</p>	<p>activities. The principle would be to pilot a solid approach that could then be replicated at the broader basin level. Micro-catchment investments would follow an in-depth social analysis and participatory planning conducted with local leaders and stakeholders representing the range of needs and priorities of the targeted population. Natural habitat management will be pragmatic, exploring a range of options and emphasizing multiple revenue streams where possible, including ongoing government support and global conservation funding. Private sector will be involved in identifying opportunities for tourism and value addition to natural resource products. Community forestry activities will build on the successful model currently being supported in a second phase by the EU in Malawi. Community engagement will facilitate and emphasize the participation of women along with enhancing opportunities of other vulnerable groups (e.g. direct targeting such as quotas and self-targeting measures). The project will promote women's active participation in local institutions (e.g. VDC, VNRMC) including in leadership positions.</p>			
	<p>Resp: Project team</p>	<p>Stage: Implementation</p>	<p>Due Date :</p>	<p>Status: Not yet due</p>
<p>Description : Basin level monitoring is hampered by lack of willingness on data and information sharing between Government agencies, development partners and other stakeholders</p>	<p>Risk Management : The program is proposing a basin level MIS and M&E framework that not only tracks project inputs-outputs, but also provides a platform for basin-level coordination. It is designed for open access data and information sharing and efforts will be ongoing to demonstrate benefits of this data sharing for sector planning, with sectors that might be less engaged. A 3rd party M&E agency will be supporting existing government M&E systems, which will be concurrently strengthened by the project.</p>			
	<p>Resp: Project team</p>	<p>Stage: Implementation</p>	<p>Due Date :</p>	<p>Status: not yet due</p>
<p>Description : Intensive project investments may not be sustainable beyond project life given the weak fiscal situation of government.</p>	<p>Risk Management : The program is designed as an APL given the large number of interconnected issues that will need long-term planning and engagement. From the first phase onwards, however, sustainability issues are built into activities through inclusion of capacity building, cost-saving approaches such as the use of modern communication equipment for automated hydro-meteorological monitoring, and attention to financing mechanisms (e.g. for the Shire basin management agency through water fees and for protected areas from increased visitor revenues). For component B, average investment costs per ha are well in line with costs for similar projects in other regions.</p>			
	<p>Resp: Project team</p>	<p>Stage: implementation</p>	<p>Due Date :</p>	<p>Status: not yet due</p>
<p>Implementation Risk Rating: Substantial</p>				
<p>Comments: Despite measures taken during preparation, the complex nature of integrated river basin management, low capacity environment, and uncertain economic and political outlook mean that significant risks will remain during implementation and require appropriate supervision resources to be made available.</p>				

Annex 5: Implementation Support Plan

MALAWI: Shire River Basin Management Program (Phase-I) Project

1. The Implementation Support Plan (ISP) describes how the Bank and other development partners will support the implementation of the risk mitigation measures (identified in the ORAF) and provide the technical advice necessary to facilitate achieving the PDO (linked to results/outcomes identified in the result framework). The ISP also identifies the minimum requirements to meet the Bank’s fiduciary obligations. Its content is as follows.

2. The main focus in terms of support to implementation during different stages of the project is highlighted in the table below:

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First twelve months	<ul style="list-style-type: none"> • Staffing and building basic capacity • Initiating critical procurements • Awareness-building (especially in targeted districts and locations for decentralized catchment/flood work) • Establishing M&E and reporting systems • FM, Procurement • Safeguards 	A variety of technical skills such as water resources management, catchment management, biodiversity enhancement, flood management, procurement, FM, safeguards, M&E/ project planning	US\$300,000	Participation in meetings for improved development partner coordination on Shire; potential DfID support for enhancing M&E systems related to catchment management
12-66 months	<ul style="list-style-type: none"> • Basin Planning • Installing hydromet systems and developing forecasting systems • Systematic training programs • Catchment planning and implementation • Community flood preparedness • Kamuzu Barrage – technical supervision • Ecological improvements 	A variety of technical skills such as basin modeling/IWRM, dam safety, water information systems, land and water management, agriculture, disaster management, biodiversity, procurement, FM, safeguards, M&E	US\$300,000	Participation in meetings for improved development partner coordination on Shire; potential DfID support for enhancing M&E systems related to catchment management

II. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Team lead	10+6 per year	2/yr	TTL and Co-TTL (HQ/Malawi), overall implementation support
Basin Planning	4/yr	2/yr	Expertise in decision support systems
Real-time Hydromet Systems	4 in years 1&2	2/yr	Support on technical and procurement aspects
Water Resources Institutional Specialist	5/yr	2/yr	Basin Institutions, Committees, NGOs, Capacity-building

Watershed management expert	5/yr	2/yr	Catchment Management Program planning and associated livelihood activities
GIS/remote sensing specialist	4 in years 1&2, 2 later	1/yr	M&E, basin planning support
Ecosystem management specialist	2/yr	1/yr	Protected area management, GEF aspects
M&E Specialist	2/yr	1/yr	M&E indicator tracking, refinement, use
Environmental Specialist	4/yr	2/yr	Environmental aspects and safeguards
Social Development Specialist	4/yr	2/yr	Social aspects and safeguards
Procurement Specialist	6/yr	2/yr	Procurement aspects, procurement plan revision and implementation monitoring, procurement audits
Financial Management Specialist	5/yr	2/yr	FM aspects, fund flow, FM audits
Lawyer	1/yr	1	Legal aspects (e.g. for water resources)
Flood management specialist	4/yr	1/yr	Review of flood management aspects
Construction Specialist	4/yr (for years 2&3)	2	Supervision of Kamuzu Barrage Construction
QACU	1/yr (for years 1-3)	1/yr	Dam Safety aspects
Rural Finance Specialist	2/yr (every two years)	1/yr	Community Livelihood investment grants, access to finance
Team Assistance	2 HQ+5 Malawi	1	Team support

III. Partners

Name	Institution/Country	Role
GFDRR	The World Bank	Flood Management Aspects
Government of Norway	Norway	Support for Malawi Climate Change Program (through the World Bank)
DfID	UK	Support for Malawi Climate Change Program (through the World Bank); Possible parallel financing for M&E enhancement
FAO/CP	FAO (UN)	Technical expertise on agriculture, livelihoods and watershed management aspects of program

3. It is planned that a significant part of this expertise can be mobilized locally in the Country Office, including team leadership. A mission based approach will not suffice in being able to adequately and timely respond to coordination and implementation issues. Currently, a significant part of the task team is decentralized and this will continue to enhance

implementation support. Fiduciary support is also provided at the country office. In addition to missions and on-call support the task team proposes pro-active bi-monthly or monthly implementation support meetings, including with team members/experts based outside of Malawi connected by audio/video connection. This approach has proven to be effective in other investment programs in Malawi and ensures efficient use of resources and responsiveness to the demands of the Government. Lastly, program design places strong emphasis on monitoring and evaluation, as well as third party support to progress and impact evaluation and sub-project supervision (consultancies). This emphasis on information gathering and management will complement implementation support by the World Bank Task Team.

Annex 6: Economic and Financial Analysis

MALAWI: Shire River Basin Management Program (Phase-I) Project

Introduction

1. The primary benefits of the Shire River Basin Management Program (Phase-I) Project (SRBMP-I) will be accrued from implementation of infrastructure and catchment management investments identified through strategic water resources planning and improved basin management institutions and based on adoption of sustainable land, forest and water management practices. The project interventions are expected to result in improved water resources management in the Shire basin, reduced land degradation, strengthened resilience to climate risk and improved the productivity and incomes of smallholder farmers in priority catchments. The project will also improve flood management in the Lower Shire.

2. An economic cost-benefit analysis (CBA) was carried out to assess the economic viability of the project. The analysis was conducted separately for each of the three main types of investments proposed under the SRBMP-I: (i) upgrade of the Kamuzu barrage (including investments in the development of an integrated planning and management system for the basin as described in Component A); (ii) improved flood protection in the Lower Shire; and (iii) catchment management interventions to rehabilitate degraded catchments for sustainable natural resource management and livelihoods. For all three investment components the appraisal has used a cost benefit analysis comparing “with the project” and “without the project” situations. The economic internal rate of return (EIRR) and the net present value (NPV) were calculated to evaluate the economic merit of the proposed investments discounted at the opportunity costs of capital (OCC) assumed at 12 percent. An analysis was also carried out to assess financial sustainability of the project investments.

3. The conducted economic analysis demonstrates the proposed investments are justified on economic grounds, with economic internal rate of returns (EIRRs) ranging between 15.8 – 48.6 percent (Table 1).

Table 1. SRBMP-I Economic Internal Rates of Return by component

Investment Component	NPV (US\$ m)	EIRR (%)
<i>Kamuzu Barrage</i>		
by operational options ^a :		
E20 - 260	24.5	18.1
E40 - 260	78.8	30.2
E20 - 300	121.3	38.6
E40 - 300	177.0	48.6
E20 - 340	30.4	19.5
E40 - 340	97.8	34.1
<i>Flood Management</i>	1.8	16.0
<i>Catchment Management</i>	6.0	15.8

^a E= highest regulated water level increase over the current situation (resp. 475.52 and 475.72 masl); and water release range at the barrage in cm and m³/s respectively.

Kamuzu Barrage Upgrade

4. *Background.* Lake Malawi acts as a large natural reservoir, which has the effect on seasonal variation in the Shire River due to the significant hydrological variations of the level of Lake. The resulted periodic reduction of the outflow from Lake Malawi into the Shire River imposes significant economic and social risks to the country, affecting such main downstream water users as hydropower plants that produce 95percent of Malawi's electricity, fisheries, transportation and navigation, agriculture and irrigation, water supply and sanitation, tourism and recreation, and the Lower Shire wetlands and ecosystems. To balance the impact of the variation of the Lake and achieve the reliable year round minimum flow required for economic uses the Kamuzu (Liwonde) barrage was commissioned in 1965; it now requires major rehabilitation. To improve safety and efficiency of the barrage in regulating water flow in the Shire River, the project will support investments in the Kamuzu Barrage upgrade to sustain its major functions to regulate water flow in the Shire River to meet demands from downstream water users.

5. A CBA was carried out to examine the viability of the proposed upgrade of the Kamuzu Barrage and assumes that the project is developed in the public sector. The CBA analysis is based on a comparison between a baseline option scenario "without- the- project", and six scenarios "with-the-project". These latter six scenarios assume three alternative water releases at the barrage, 260, 300 and 340 m³/s, for each of the two options of regulated Lake water levels, 475.52 masl and 475.72 masl respectively. 475.32 masl represent existing regulated water level in the Lake. These scenarios are evaluated in incremental terms in relation to the baseline option of the lake level of 475.32 masl and water releases at the barrage of 300 m³/sec. The six release and Lake level regulation scenarios assume the same investments costs into the barrage upgrade, however result in different project benefits due to different water availability in the Shire basin for economic use.

6. *Project costs* comprise the lifetime costs of investment, maintenance and operation of the barrage, and the costs of the development of an integrated planning and management system for the Shire basin (the costs of Component A of the project). The development of an integrated river basin planning and management system is critically required to ensure a coordinated and holistic approach to the development and management of the basin's water resources, including more efficient operation of the existing water infrastructure to maximize benefits of economic utilization of the resource. This will include development of a modern integrated Shire Basin knowledge base and analytical planning tools, improved institutional coordination and establishment of participatory stakeholder consultation processes in the basin. The economic costs of the project are calculated based on the project financial costs, net of transfer payments, duties and taxes, and expressed in constant 2011 prices. The financial project costs have been converted to economic costs using the COSTAB software. Total economic costs included in the analysis were estimated at US\$ 76.2 million.

7. *Project Benefits.* The primary benefit of the proposed investments in the Kamuzu barrage upgrade will accrue through the increase in average energy production by the downstream hydropower plants. It is expected the increase in the average energy production will constitute a main fraction of the total value of the Kamuzu barrage investment benefits. Additional benefits are also expected from improved regulation of the river's water flow to satisfy growing water demands of irrigation, fisheries, water supply, and flood control in the downstream of the barrage. However, estimation of these benefits requires detailed modeling of the barrage operational rules and water allocation scenarios among the basin's economic water uses and such

studies will be conducted during project implementation. While other than hydropower benefits of the barrage upgrade are acknowledged, they have not been included in this analysis.

8. Preliminary hydrological simulations were carried out to investigate the effect of increased level of the Lake due to the barrage upgrade on hydropower production in the basin, and for three alternative water releases at Kamuzu barrage of 260, 300 and 340 m³/s, and with two lake water levels, 475.52 masl (E20) and 475.72 masl (E40) respectively. 475.32 masl represent existing regulated water level in the Lake. Table 2 shows changes in energy output compared to the base alternative, defined as a combination of the regulated Lake level at 475.32 masl and water release from the barrage at 300 m³/sec (E00-300)¹.

Table 2. Annual average additional energy production (GWh)

Release (m ³ /sec)	Highest Regulated Water Level (masl)		
	475.32	475.52	475.72
340	13	66	99
300	0	115	153
260	-36	49	86

9. The average economic value per Kwh of the additionally produced energy is estimated at US\$0.25/kwh. This estimate is based on the assumption that the incremental electricity produced due to the barrage upgrade will be used to cover the unmet demand by industrial / commercial and residential consumers in the 50/50 proportion². It is also assumed that the costs of the diesel substitutes for electricity for industrial / commercial consumers are US\$0.23/kwh and for residential consumers (kerosene lighting) – US\$0.27/kwh. For estimating the benefits of the additional average power production due to the barrage upgrade, the average weighted value of US\$0.25/kwh was applied. The analysis also assumes that, given that the country is energy supply-deficient and that unmet electricity demand is projected to grow in time, each additional unit of energy produced due to the Kamuzu barrage upgrade will be consumed by the economy.

10. The *results of the CBA* demonstrate that the proposed upgrade of the Kamuzu barrage is an economically viable investment for all release and regulation level options included in the analysis. The results of the analysis are presented in Table 3. In all scenarios assessed, the EIRR is above 12 percent, ranging from 19.5 percent for the 20 cm Barrage level increase and 260 m³/sec average water releases; to 48.6 percent for the 40 cm Barrage level increase in combination with 300 m³/sec water releases.

Table 3. Results of Economic Analysis of Kamuzu Barrage upgrade

Options (HRW/release)	Additional power GWh/year	NPV	EIRR
		\$mln	%
E-20-260	49	27.13	19.8%
E-40-260	86	78.78	30.2%
E-20-300	115	121.32	38.6%
E-40-300	153	177.06	48.6%
E-20-340	66	30.40	19.5%
E-40-340	99	97.85	34.1%

¹ Norplan / Willy and Partners Engineering Services and Meya Kalindekafe. Preliminary Economic Analysis of Upgraded Kamuzu Barrage. November 2011

² Data from ESCOM's website on energy sales in Malawi in the period from 2003 - 2007

11. The sensitivity analysis of the EIRR to changes in the value of costs and benefits demonstrates that economics of the proposed investments is robust. The project shows low sensitivity to the costs overrun of 20% or decrease in the value of total benefits up to 20%, with the resulted EIRRs ranging from 15.7% to 42% for different barrage operational options included in the analysis.

12. *Financial Sustainability.* The Kamuzu barrage is owned by GoM through the Ministry of Transport and Public Works, its operational rules are determined by the Water Resources Board and ESCOM is responsible for the actual operation of the barrage and necessary O&M costs since the barrage construction. Annual O&M costs of the upgraded barrage are estimated at about US\$0.56 million and could be adequately recovered from the increased revenues of main water users¹ due to the improved flow regulation by the upgraded barrage. The benefits accrue over a long time period however, and are not a firm annual increase. Also, while the Kamuzu barrage has an important function to regulate water flow in order to satisfy multi-sectoral water requirements in the Shire basin, there is currently no water resources institution that would be able legally, technically and financially assume the responsibility for the barrage operation and management². To address the issue of financial sustainability of the Kamuzu barrage investments, the project will provide assistance to GoM in analyzing institutional and financial aspects of barrage management in the context of the water sector institutional reform and developing recommendations on the possible management, financing and cost recovery options of the structure operation, this is covered under Component A of the Project.

Flood Management in the Lower Shire

13. The project will finance activities to improve flood management in the Lower Shire, focusing specifically on the most flood prone Chikhwawa and Nsanje districts that also have the highest incidence of extreme poverty in the country. The objective of the flood management interventions under the project is to reduce the vulnerability of communities at risk through improved community disaster preparedness, increased flood warning times, and improved government planning based on flood mapping and zoning. The proposed investments will support: (i) construction of small- scale flood protection infrastructure (river bank stabilization, dykes, culverts, flood diversion structures); (ii) disaster risk awareness raising and planning based on flood mapping and zoning; (iii) community –based adaptation measures, such as flood demarcation, elevated platforms, shelters and safe havens, connectivity to and training on the Flood Forecasting and Early Warning Systems; (iv) communication and transport equipment for Civil Protection Committees and rescue teams; and (v) pilot investments in ecological flood mitigation and climate resilient livelihoods in the Elephant Marshes.

14. *Economic benefits* of the proposed flood management interventions include flood losses avoided as a result of the investment implementation. According to the study done on flood damage assessment in the Shire basin³, in case of the Chikhwawa and Nsanje districts, the main direct losses from flooding include damages to households, dwellings, local infrastructure, and

¹ ESCOM will generate an estimated financial revenue of US\$ 2—6.5 million a year (based on the current ESCOM national average tariff of US\$0.043/ kwh) through sales of additional average energy produced as a result of the Kamuzu barrage upgrade and improved regulation of the Shire river flow.

² The MTPW is not a stakeholder in the management of the barrage and the WRB is not a legal entity and therefore cannot own or manage water resources infrastructure.

³ Economic Vulnerability and Disaster Risk Assessment in Malawi. RMSI, January 2010

agricultural crops. The study estimates that total flood-related annual average loss (AAL) in the Southern region of Malawi is US\$26 million, out of which non-agricultural losses constitute US\$5.85 million. Out of the US\$5.85 million, at least half of the losses are attributed to Chikhwawa and Nsanje districts. It is expected, that the project will mitigate through the planned interventions at least 60% of the non-agricultural losses in these districts, with the economic value of average annual losses avoided in the amount of US\$1.75 million¹. The economic value of the flood damage is estimated based on replacement costs. No indirect benefits of avoiding economic losses due to disruption to business, transport networks and public services, and avoiding the costs of emergency response were estimated and included in the analysis. The *total economic costs* of the proposed flood management investments were estimated at US\$11.3 million, including the capital and O&M costs over the project lifetime period of 30 years.

15. *Estimated NPV and EIRR.* The estimated NPV (at 12%) for the proposed flood management investments is about US\$1.8 million. The corresponding EIRR is 16%, indicating that the investments are economically justified. The sensitivity analysis of the EIRR to key variables shows that the results of the economic analysis are robust, as the project withstands the costs increase by 20% with the EIRR decreasing to 14.5%. The decrease in the project benefits by 20% decreases the EIRR to 12.1%, with the investments still remaining economically viable.

Catchment Management

16. The catchment management component of the project will generate both on-site and off-site benefits. On-site improvements are related to improved catchment management in the Middle Shire in particular through the promotion of conservation agriculture, agro forestry and other soil and water conservation measures, including mini and small-scale irrigation, as well as alternative livelihood activities. Off-site benefits include reduced sedimentation and improved water flow control through the rehabilitation of the Kamuzu barrage, leading to reduced dredging and associated costs and increased power generation capacity resulting into increased electricity available to consumers and increased revenue for the power supply company.

17. Specific on-site benefits expected from the project include: (a) adoption of new technology packages including conservation agriculture, agro-forestry, soil and water conservation, improved varieties and increased use of input leading to improved yields; (b) reduced post-harvest losses and improved produce processing and/or packaging through livelihood diversification grants; (c) improved access to goods, services, information: and (d) improved access to rural finance. The project will serve to diversify and increase rural incomes, mainly through supporting small-stock enterprises and processing of existing crops thereby contributing to reduced vulnerability.

18. The project's support to the rehabilitation of degraded forests, afforestation and community level investments for gully control, riverbank protection and small multi-purpose dams and mini/ small-scale irrigation investments are expected to result in numerous *environmental benefits*, including: (a) reduced soil erosion; (b) reduced vulnerability to climate hazards and mitigated effects of droughts; (c) improved sediment retention and flood control. The technology introduced by the project will help reduce weather related vulnerability of the targeted population.

¹ Out of the total 85 GVs, the project will target 40 most flood prone GVs with highest historical flood losses.

19. Major on-site *institutional and social benefits* expected from the project are: (a) producer and rural enterprise groups are effectively functioning and linked to markets; (b) districts, and local communities are planning and managing their micro-catchment in a sustainable way; (c) public and private sector operators are providing quality services that are demanded by smallholder producers and rural entrepreneurs; (d) a strengthened public institution responsible for overseeing catchment management in Malawi. The on-site *social benefits* expected from the project result from its focus on rural poverty reduction and consideration of social factors in the selection of groups, in particular the targeting of women.

20. *Overall Assumptions.* The primary beneficiaries of the SRBMP-I catchment management component are the small- size farmers in four selected catchments in the Middle Shire. It is estimated that approximately 45,000 households will benefit directly and indirectly under this component: (a) *directly*, through support to improved land management, including promoting soil and water conservation agriculture, agro-forestry, small-scale irrigation and water control measures, and alternative livelihood investments in micro enterprises such as small-stock production, crop processing and others (b) *indirectly*, through improved micro-catchment planning & management, capacity building for technical, financial, business capacities, access to financial services to scale up successful micro and small scale enterprises.

21. This component will promote more sustainable land management practices of various crops with a focus on maize, rice and horticulture, in four districts of the Middle Shire. This component is expected to cover approximately 40,000 ha of cultivated land, and to improve land management practices in 20,000 ha. About 1,300 ha of land will be put under irrigation.

22. *Crops.* In the Middle Shire, maize represents approximately 66% of land under crop, while horticulture is grown on 5% and rice is grown on 3% of arable land. The areas targeted for each crop are thus approximately 25,000 ha of maize, 2,000 ha of horticulture crops, and 1,200 ha of rice. Approximately 40% of this area is expected to be irrigated thanks to the project. In order to derive financial benefits at household, this analysis assumes that an average household will grow 0.66 ha of maize, 0.1 ha of horticulture and 0.25 ha of rice.

23. Crop yields are expected to increase gradually during project lifetime, and to continue after project completion through the gradual adoption of improved land management practices and technology. Full adoption is assumed to be reached during the eighth year after project start, and approximately two years after project completion. Average crop yields in project intervention area are expected to increase mainly through the adoption of improved varieties, soil fertility improvement and with minimal external inputs. Horticulture and rice yields are also expected to increase through the use of irrigation. Assumptions are presented in Table 4.

Table 4: Average yields without and with project (kg/ha)

Average Yield Change	Yields (kg/ha)		% Increase
	Without	With	
Maize	750	2,395	219%
Horticulture	5,000	7,500	50%
Rice	800	1,960	145%

24. *Livelihood Diversification.* The project will target a total of 360 common interest groups (CIG) out of 40 Group Villages totaling 480 villages. The project will assist in strengthening their managerial and organizational skills, while at the same time working with them to identify promising enterprises that could be supported by the project. Each CIG will receive investment

support for business start-up, and will have to contribute a share of the investment. The project will also ensure that groups receive appropriate training in financial management, and will ensure that each group receives an initial start-up fund to finance their operation (working capital).

25. *Environmental Aspects.* Selected sub-catchments are identified in Annex 7. Total high erodability project area is expected to cover approximately 90,000 ha, of which approximately 45,000 ha will be in sub-catchments that are close to the Shire River and directly up-stream of the hydropower stations there (Nkula, Tedzani and Kapichira), and an additional 45,000 ha will be further away from the river (see map). Total area in the Middle Shire is approximately 1.5 million ha (1,500 km²), of which 450,000 ha of high erodability area. Assuming these area contribute 66% of total current sediments, this project will target 15% of high erodability area in the Middle Shire, which contributes 10% of current sediment load in the Shire River.

26. This component aims to reduce the amount of sediment load by 10% in selected sub-catchments. Thus the assumption is that the project will contribute in reducing 1% of sediment load in the Shire River by the end of the project intervention, and that, over time, this percentage will increase to 3% by year 15 and 5% by year 25.

27. *Financial Analysis.* This section examines the financial viability of the main crop and farm models that will be supported by the project and assess their potential for increased profitability and income as a result of project interventions. Financial crop models have been prepared on the basis of the prevailing farming system in the Middle Shire and information available from similar projects and programs supported by the Government and other development partners. The models compare the “future without project” and “future with project” scenarios.

28. Without the project, it is expected that farmers would continue with low-input, low-output, largely rain-fed production systems, which are increasingly being threatened by loss of soil fertility and soil erosion. Available information from ongoing interventions supporting improved land management in Malawi suggests that there is scope for significant increases in productivity, through conservation agriculture, improved soil and water conservation, agro-forestry, micro and small-scale irrigation, reflected in the “future with project” scenario. For the financial analysis, family labor has been valued at 200 MK per person-day. Given land scarcity in the Middle Shire in particular, this analysis does not assume any increase in cropped area, nor change in crops pattern distribution.

29. Table 5 presents a summary of the detailed calculations operated under the different assumptions for financial results of crop models. At farm level, the annual incremental benefit varies according to which crops are grown. The average net margins per ha and return to labor appear much higher for horticulture than rice and maize.

Table 5. Summary of financial returns on production (without project scenario)

	without project situation			with project situation		
	Maize	Horticulture	Rice	Maize	Horticulture	Rice
Area per household (ha)	0.66	0.1	0.25	0.66	0.1	0.25
Income (MK/ha/year)	5,230	117,800	28,805	13,120	174,464	85,992
Return to labor (MK/person/day)	291	1602	414	447	1664	582
Income per hh (MK/year)	3,452	11,780	7,201	8,659	17,446	21,498

30. This table also presents the financial results of the various and combined cropping patterns in the with-project situation. For maize, the net margin per household, for an identical cultivated area as in the without-project situation, would increase from 3,450 MK without project to 8,600 MK with project. For horticulture, under the same conditions, the increase passes from 11,780 MK up to 17,450 MK per household and year. For Rice it goes from 7,200 MK to 21,500 MK. Overall income weighted average would go from 7,000 MK/year/household to 13,600 MK/year/household, while value of production of affected households would rise from 418 to 818 million MK.

31. *Livelihood interventions.* Several enterprise models were included in the analysis, these include processing of oil crops, honey production and a range of small-stock enterprises. These enterprises are all assumed to be in the “with-project” scenario, as these will be promoted by the project. Since this component will be demand driven, it is difficult to estimate how many groups will engage in each type of enterprise. There may also well be additional enterprises that are not included in the analysis at this stage. In view of this constraint, an average annual return in MK/year was calculated (and converted to an economic benefit for the economic analysis). Total investments are expected to be in excess of 200 million MK, while gross margin generated by these activities is estimated to be around 100 million MK/year, during an average of eight years. A summary of the various enterprise model annual returns is presented in Table 6.

Table 6. Income diversification project – annual returns (MK/year)

Financial analysis: Income diversification projects –Annual returns							
Type	Unit	Oil Press	Goat	Layers-egg	Broiler Chicken	Honey	Average
Investment	MK/year	1,419,700	149,000	177,110	284,900	795,500	565,242
Recurrent costs	MK/year	1,028,260	62,360	127,150	117,975	417,100	350,569
Benefits	MK/year	1,364,000	150,000	358,215	255,000	1,082,900	642,023
Gross margin	MK/year	335,740	87,640	231,065	137,025	665,800	291,454

32. *Environmental costs due to erosion and sedimentation.* The costs incurred by the power utility, ESCOM, due to high levels of sediments and weeds in the Shire River and the hydropower plants reservoirs are provided in the table below (Table 7). These figures are based on historic data from ESCOM and from the Blantyre Water Board over the last ten years. Power outage was estimated to be 44,000 MWh per year for the three power stations on the Shire River, by using the average financial tariff charged by ESCOM (0.05 US\$/kwh).

Table 7. Financial costs incurred by ESCOM and the Water Boards (2009)

	(‘000 US\$)
ESCOM annual financial losses due to power outage	2,200
ESCOM annual dredging costs	500
ESCOM annual machinery/equipment maintenance	480
Blantyre Water Board annual treatment costs	425
<i>Source: MCC ENRAP economic analysis</i>	
	US\$/Kwh
ESCOM financial tariff	0.05
Economic cost (energy replacement)	0.25

33. These environment costs are estimated to be constant over time in the “without-project” scenario, while they will be gradually reduced by the factor of one percent reduction after project intervention, increasing to 3 percent reduction in year 15 and five percent reduction in year 25, in the “with-project” scenario. The environmental benefits provided by project interventions will thus be in the form of avoided future costs.

34. *Economic Analysis.* The economic analysis is primarily based on an estimation of (a) improved productivity resulting from sustainable soil and water management practices and improved agronomic practice, (b) farm-level incremental benefits, (c) diversified and increased farm benefits from enterprise support and improved access to financial services and (d) avoided environmental costs to the electric company and to energy consumers.

35. The analysis is based on the on-site benefits related to the sustainable land management and enterprise diversification component and off-site environmental benefits (avoided future costs). It should be noted that no attempt has been made to estimate indirect benefits from afforestation, rural roads rehabilitation, stream rehabilitation and gully control, small scale dams and market infrastructure. For the purpose of the analysis, the following assumptions have been made:

- (a) *Economic benefits:* Economic crop models have been calculated by removing taxes and duties on financial prices of imported inputs such as fertilizer and pesticides and applying an economic conversion factor (cf) ranging between 0.9 and 0.95. All prices are current (second quarter of 2011) prices. The opportunity cost of family labor has been valued at an estimated of 150MK/person day, by applying a cf of 0.75. Economic cost of energy loss to consumers due to power outage is estimated to be 0.25 US\$/kwh.
- (b) *Economic Project Costs:* The financial project costs have been converted to economic costs, which exclude taxes, duties and price contingencies, using the COSTAB software. The conversion factor (CF) applied to the project budget was 1.0. Total economic costs for component B represent US\$37.3 million.
- (c) *Timeframe:* The analysis is based on a twenty five year period, during which the SRBMP will generate benefits, including the six year project implementation period. There are no further investment costs after year six of project implementation. However, annual operation and maintenance costs were included until Year 25 as these costs will have to be incurred if the future benefits are to be sustained. These costs have been estimated at US\$0.23 million/year.

36. Based on the assumptions as presented above, the Economic Internal Rate of Return (EIRR) of the project is estimated at 15.76 percent. The associated Economic Net Present Value (NPV), based on a 12 percent discount rate, is close to US\$6 million, and the Benefit/Cost ratio is 1.24. The simulation is based on the analysis of the consequences of improved production (mainly through increased yields), as well as improved returns through livelihood diversification enterprises as well as environmental benefits due to reduced erosion and sedimentation. These results indicate that the Catchment Management component will generate a satisfactory ERR and is therefore justified on economic grounds.

37. *Sensitivity Analysis.* SRBMP catchment management economic viability is robust to adverse changes in project costs, and the project remains viable if there is an increase in capital and/or recurrent costs of up to 20%. Economic viability is also robust to changes in incremental benefits and becomes uneconomic if incremental benefits are reduced by more than 20 percent.

A delay in project benefits by one year reduces the ERR to 13.27 percent (ENPV: US\$2.23 million), while a two year delay means the project is uneconomical, with a ERR just below 12 percent. The project is still economically viable if costs are increased by 10 percent and benefits reduced by 10 percent simultaneously, with an ERR of 12.9 percent and a ENPV of US\$0.32 million.

38. *Fiscal Impact.* In the short term, the fiscal impact of the project will be negative, given that the GoM's contribution to project costs primarily comprises waiving the taxes and duties related to the upgrade of Kamuzu barrage. In addition, the GoM will contribute to salaries of the various officials that will be appointed to implement or to work with the project and a provision for recurrent costs to allow GoM departments to continue to provide the services that were financed by the project during project implementation. However, in the medium to long term, the potential positive fiscal impact of the project will be substantial, mainly due to: (a) increased output, income, reliability in energy supply, resulting in increased tax revenues, and (b) multiplier effects due to increased economic activities in rural areas, which is expected to generate additional income and employment in targeted districts leading to increased government tax revenues.

Annex 7: Technical Analysis

MALAWI: Shire River Basin Management Program (Phase-I) Project

A. BACKGROUND

1. The Shire River Basin covers 3.1 million ha and directly or indirectly influences the livelihoods of over 5.5 million people in the Southern Region of Malawi. The basin is of critical economic importance. The Shire provides water for a number of productive purposes, including: hydropower, agriculture, fisheries, transport, tourism, urban water supply and rural water users along the length of the river, in addition to various environmental functions. Ninety-eight percent of current electricity generation is from run-of-river hydropower plants on the Shire River¹. Installed hydropower capacity is 285 MW, but available power generation capacity is less than 260 MW and unable to meet peak demand owing to frequent equipment breakdown and environmental factors such as sedimentation and increasing aquatic weed growth. The planned expansion of generation capacity would further increase dependence on the Shire River for power generation. The Shire Basin also presents significant socio-economic, demographic and bio-physical challenges, including increasing population pressure, food security and poverty; major deforestation in upper catchments and along river banks for firewood and charcoal, and from conversion to agricultural land; frequent drought; and reliance on rainfed agriculture.

2. The Shire River originates at Lake Malawi and Lake Malombe and flows for 520 kilometers through the Southern Region of Malawi; it is joined by numerous rivers and streams, and merges with the Zambezi River in Mozambique. Water levels in Lake Malawi are highly variable, and have a direct effect on the flow rate in the Shire River, which may lead at the one extreme to a no-flow situation in the river, or, at the other extreme, to floods, causing damage to agricultural lands, infrastructure and loss of life.

3. The Upper Shire is situated at around 470 meters above sea level (asl) and flows on a very shallow gradient to the Kamuzu Barrage at Liwonde, constructed in 1965 to control the water level over a range of 4.5 meters to the benefit of hydropower generation in the Middle Shire. However, in recent years only three out of 11 gates can be operated effectively, severely constraining the regulatory capacity of the barrage.

4. Between Liwonde and Matope the Middle Shire flows across a broad plain descending 7 meters in 50 kilometers. It then drops steeply by 360 meters over a distance of around 70 kilometers through a series of rapids and falls, some of which have been harnessed to provide hydropower. The Lower Shire emerges below the falls at Kapichera to flow across a wide floodplain with a minimal gradient of 10 meters in 90 kilometers. Much of the land bordering the river remains permanently waterlogged as marsh, swamp and open water. The area of these wetlands increases greatly in the rainy season, when heavy rains cause the Shire and its tributaries to flood. The Lower Shire hosts large areas of traditional and commercial agriculture (sugar). More than half a million people live in areas that are vulnerable to droughts and floods.

5. Although the main flow in the Shire River originates from Lake Malawi, significant contributions are made by tributaries that join the Shire below Liwonde. Until 20 years ago this contribution was continuous throughout the year, but many rivers that were perennial, like

¹ “Run-of-river” means that there is little or no capacity to store and control the flow of water upstream of the power generation stations, the amount of electricity that can be produced depends on the daily flow of the river.

Mwanza river (and other streams on the west bank) now dry up in the dry season. Evidence points clearly to the impact of deforestation and increased agricultural activity in these parts of the catchment. A related issue is the increase in the intensity and magnitude of the flash floods from rivers like the Ruo that have always been prone to rapid runoff due to steep sided valleys and headwaters of the upper catchments. Mulanje Mountain and the Thyolo highlands can experience enormously high levels of rainfall and the volumes of water discharged can be 3 or 4 times the high flow of the Shire River itself.

6. Deforestation, soil erosion and sedimentation form the most serious threats to the environment and natural resource base in the Shire River Basin, resulting in the increased incidence of erosion, run-off and flash floods. High loads of sediment are deposited in river beds, reservoirs and flood plains, affecting irrigation canals, fisheries and hydropower generation. Water resources are increasingly degraded through silt loads, sedimentation, eutrophication, biological contamination and effluents. Some tributaries pass through heavily cultivated areas, townships and cities, resulting in water pollution from human and industrial waste, contributing to increased concentrations of nitrogen, phosphorus and heavy metals that generate adverse impacts on human health and accelerate growth of aquatic weeds. These problems are a direct result of catchment degradation, unsustainable land use and management practices, and increased use of chemical fertilizers without complementary soil conservation measures.

7. An estimated 61 percent of households in the southern region have inadequate food security. In some of these districts, four out of five households face food insecurity for at least three to four months a year. The most vulnerable households generally include those with less than 1 ha of land to cultivate (which is common in many parts of the Middle and Lower Shire Basin). In the southern districts of the country, 64 percent of all households are classified as poor, and another 31 percent as ultra-poor, well above the national average. Most poor families rely on natural resources such as forests and fisheries for their livelihoods. Environmental and natural resource degradation is a livelihood seeking behavior among the poor who have few incentives or opportunities to transition towards more sustainable practices.

8. The original vegetation cover across most of the Shire River Basin was contiguous stands of Miombo woodland, which is now seen in sporadic patches on small, inaccessible sites or within national parks and wildlife reserves. Miombo woodlands are often highly productive, even when degraded, and many woody species found in these forests can reproduce naturally. While Miombo can therefore recover well from controlled harvesting, it rarely recovers after land has been cleared for agriculture. Upper catchments areas tended to contain denser closed forest, including the increasingly rare indigenous cedar groves on Mt. Mulanje. In the southern region, 97 percent of all households use solid fuel for cooking, predominantly fuelwood in rural areas and charcoal in urban centers. In the Neno and Mwanza district forests, charcoal production alone is estimated to result in forest losses of 5,000 ha per annum. The estimated value of the charcoal industry for the four largest urban areas in Malawi is about MK 6 billion. Charcoal production is responsible for about one third of overall forest loss in the country.

9. The loss of forest cover and unsustainable agricultural practices in upper catchments contribute to exceptionally high surface run-off during the short and intense rainy season with subsequent high rates of erosion and downstream sedimentation. Heavy siltation of the Shire and its tributaries is causing: (a) High operating costs across the four major hydro-electric dams for annual dredging and turbine maintenance (approximately US\$1 million per year). (b) Dredging costs at Walker's Ferry pumping and water treatment centre, supplying 95 percent of the

drinking water to Blantyre (up to US\$100,000 per year) and higher average treatment costs to reduce turbidity in urban drinking water (MK7.0/m³ for river water versus MK0.2/m³ for groundwater). (c) Loss of 1/3 of the storage capacity of Mudi dam (supplying 5 percent of drinking water to Blantyre) due to siltation; expected dredging costs are US\$225,000. (d) Periodic and severe flooding in the lower Shire from siltation, particularly during the rainy season when high water flows from the Ruo River in Mulanje and the Mwanza river join into the Shire River. Economic costs are significant for infrastructure repair and replacement and food aid. The loss of the road and rail bridge where the Ruo River conjoins the Shire is a good example of the potential impact of flooding. The new port development at Nsanje could also be impacted by sediment flows and flooding.

B. DEVELOPMENT PROPOSALS ON THE SHIRE RIVER¹

10. Many development proposals on the Shire are either under discussion or some form of feasibility study or preparation:

- (a) The *Upgraded Kamuzu Barrage* at Liwonde, which has emerged as the preferred option for regulating the Upper Shire River.
- (b) A *High Dam at Kholombidzo*, around 80 km downstream from Liwonde to would raise the river levels to the same height as the Kamuzu Barrage and would create a reservoir between the dam and Liwonde, combined with a new hydro power plant.
- (c) A *Low Dam at Kholombidzo*, in combination with an upgraded Kamuzu Barrage and smaller hydro power plant than with a high dam.
- (d) *Emergency Pumping from Lake Malawi*, as contingency plan in case Lake Malawi water levels fall below 473 m asl, and the Shire would stop flowing into the Shire.
- (e) *The Green Belt Initiative*, GoM's ambitious plan to develop an additional 1 million ha of irrigated land over 10-15 years, much of which would be along the Shire River. Part of this could be along the Upper Shire in Mangochi, Balaka and Machinga districts. Another part would be along the Lower Shire, for instance one proposal is to add 40,000 ha of irrigated sugar cane estates.
- (f) *Water for Blantyre City*, which draws 95% of its current water supply from the Shire River at Walker's ferry and the remaining 5% from the Mudi Dam above Blantyre. The rapid growth of Blantyre and inefficiencies in the existing water network mean that only 30% of the City's population receives piped water supplies. Water is also distributed to neighbouring towns in the rainy season, when these settlement's river intakes become inoperable due to high turbidity (silt).
- (g) *The Shire-Zambezi Waterway Project*. At Nsanje, construction is ongoing to form an inland port (already formally opened) capable of handling 5,000 ton vessels carrying containers, fuel and other bulk cargoes. In order to provide a navigable channel to the Zambezi, many kilometers of both the Shire River channel and the Zambezi will need to be dredged.

11. Historically, decisions on development of the water resources of the Shire River have been taken on an ad-hoc and independent basis as each new need arises (i.e. river regulation, power generation, agricultural, urban and industrial water supply, Shire-Zambezi waterway project, management of major tributaries and ecological reserves). At times of low flow, these resources are unlikely to be sufficient to meet all needs, and new proposals for development of hydropower, water supply and irrigation may potentially conflict with each other and with other established uses.

¹ Based on the 2011 independent WB funded Strategic Environmental and Social Assessment (SESA) of the Shire River Basin.

C. POLICY AND INSTITUTIONAL FRAMEWORK

12. The Water Resources Act (1969) and the Waterworks Act (1995) define a main legal and regulatory framework for water resources management in Malawi. It outlines institutional and organizational arrangements under which the water sector operates, the pricing and tariff principles and the water supply and sanitation service delivery norms and rules. The abstraction of water is regulated by the system of licensing and water permits stipulated in the Water Resources Act (1969). This Act also made provisions for the establishment of a national Water Resources Board (WRB) and to set up Authorities to administer the natural resources of declared controlled areas.

13. The responsibilities of the national WRB include¹: coordination and regulation of water resources development and operation; advising on protection and management of catchments; advising on the establishment of water user associations (rural piped water, irrigation and fisheries); could regulate on implementation of water demand management.

14. The Waterworks Act (1995) established the three Regional Water Boards and reconstituted Blantyre and Lilongwe Water Boards. Other laws and policies guiding functioning of the water sector are the Environmental Management Act (1996); Fisheries Conservation and Management Act (1997); Forestry Act (1998); Local Government Act (1998); Land Policy (2002); National Irrigation Policy and Development Strategy (2000); and Malawi Vision 2020.

15. A new Water Resources Bill has been drafted and presented to the Cabinet, after which it is being re-drafted. One of the expectations of the new Water Resources Bill is that it would enable to establishment of a Shire Basin Agency or equivalent. This could be done either by establishing a new institution, or by vesting the authority foreseen for such an institution in an already existing institution, which would then probably have to be reorganized and strengthened.

16. The National Water Policy adopted by the Government in 2005 promotes an integrated approach to water resources management and defines the primary policy objectives as the sustainability of both the resource and of service delivery. The policy declares objectives and principles, which are consistent with the Dublin Principles, and, specifically, emphasizes the need in an integrated approach to water resources management with “equitable” access to water; promotes the availability of safe potable water for all users; the need in preparedness and contingency plans for droughts and floods; and outlines principles of water utilization for the main water using sectors (irrigation, WSS, hydropower, fisheries, tourism, forestry).

17. The National Water Policy is complemented by the National Irrigation Policy and Development Strategy (NIPDS) of 2000. It focuses on such key issues as promoting public-private partnership in irrigation development, full participation of the beneficiary farmers in irrigation management, and introduction of cost recovery principles. The NIPDS was further elaborated in the Irrigation Act (2001).

18. The main national institutions for water resources management include the Ministry of Water Development and Irrigation, which, in turn, is divided into four departments, namely, Surface Water, Ground Water, Hydrogeology, and Department of Irrigation; various Ministries responsible for natural resources (Forestry, Fisheries, Lands, Environment), Water Resources

¹ Source: W. Mulwafa et al, BASIS Water Research Team, University of Malawi, 2002: The Status of Water Demand and Management in Malawi and Strategies for Promoting it”.

Board (WRB), and five Regional Water Boards responsible for implementation of water and sanitation services, including Blantyre Water Board, Lilongwe Water Board, Southern, Central and Northern Regional Water Boards.

19. Reliable hydrological data are necessary for effective water resources management and informed decision making on the use and development of water resources. The hydrographic network established in Malawi prior to Independence is almost completely out of action and the current challenge for the Ministry for Water Resources Development is to restore the system of hydrological data collection and archiving.

20. The *Ministry of Agriculture Irrigation and Water Development* (MWDI), the primary implementing agency for the SRBMP-I faces a number of challenges, including¹: (a) weak capacity to implement own policies due to inadequate technical skills more especially at local assembly level; (b) limited public awareness on sustainable water management and utilization; (c) policy harmonization with other sectors such as forestry, agriculture and other sectors; and (d) weak Water Resources Board.

21. The *Department of Land Resources and Conservation* (DLRC) under MoAFS will be the lead implementing agency for SRBMP-I Component B, Catchment Management, also faces a number of challenges, including the following¹: (a) due to inadequate human capacity and understaffing, the department has to rely on already constrained extension staff in most districts, which further dilutes its work and influence to deliver effective land resources conservation services; (b) inadequate funding leaves both from the government and donor sources; (c) inadequate and obsolete equipment which hampers technical capacities in areas of surveying, soil assessment and mapping; (d) limited coordination and collaboration in land resources management initiatives with other departments and ministries and other sectors; and (e) there are no formal coordination mechanisms with other sectors to facilitate collaboration with these sectors, such as land, forestry and water.

D. POTENTIAL CATCHMENTS FOR MANAGEMENT ACTIVITIES

22. For project Component B, catchment management, four separate catchment sites (average 33,000 ha each – see Table 8 and map in Annex 11) have been selected:

- (a) *Upper Lisungwe* in Ntcheu district.
- (b) *Upper Wankulumadzu* in Neno district.
- (c) The *Escarpment area upstream of Kapichira* falls in Blantyre district.
- (d) The *Chingale area* in Zomba and Mangochi districts.

The primary selection criterion is to reduce sedimentation impacting on downstream hydropower plants in the Shire river. During project preparation, a modeling exercise was undertaken to help identify potential high priority catchments. Modeling parameters included rainfall intensity, topography, soil erosion risk, land cover and population. This was combined with further selection considerations, such as nature of the erosion hot-spots and “manageability” of the areas. Spreading the work across four or five districts would provide a range of site characteristics and challenges to generate valuable lessons for scaling up. At the same time, a catchment site of 25,000 to 40,000 ha allows for comprehensive coverage and monitoring of measurable changes in silt loads at the furthest point downstream.

¹ Source: MCC Environmental and Natural Resources Management Action Plan for the Upper Shire Basin (2010).

Table 8: Overview of priority (clusters of) sub-catchment areas.

Sub-catchment Code	No of GV	No. of HH	Area (ha)	High Soil Loss (ha)	High Soil Loss (%)	Area/GVH (ha)	Ha/HH
Catchment 1 - Upper Lisungwe							
48	3	7,424	16,075	9,803	61.0	5,358	2.2
47	1	2,334	9,706	3,917	40.4	9,706	4.2
Sub-total	4	9,758	25,781	13,720	53.2	6,445	2.6
Catchment 2 - Upper Wamkulumadzu							
53	1	1,273	15,913	6,760	42.5	15,913	12.5
51	2	4,089	7,703	3,551	46.1	3,852	1.9
52	2	1,955	9,641	5,159	53.5	4,821	4.9
Sub-total	5	7,317	33,257	15,470	46.5	6,651	4.5
Catchment 3 - Escarpment Upstream from Kapichira Falls (Blantyre District)							
70	5	6,269	20,130	13,402	66.6	4,026	3.2
79	3	4,923	12,996	7,362	56.6	4,332	2.6
Sub-Total	8	11,192	33,126	20,764	62.7	4,141	3.0
Catchment 4 - Chingale							
39	6	9,600	17,578	7,700	43.8	2,930	1.8
40	4	5,110	9,829	3,321	33.8	2,457	1.9
42	1	2,618	13,345	5,138	38.5	13,345	5.1
Sub-Total	11	17,328	40,752	16,159	39.7	3,705	2.4
Total	28	45,595	132,916	66,113	49.7	4,747	2.9

E. LESSONS LEARNED AND REFLECTED IN THE PROJECT

23. The design of the project takes into account lessons learned from: (i) the Environmental Management Project (1997-2002); (ii) the ongoing and recently restructured Infrastructure Services Project (2006-2012); (iii) the Country Assistance Strategy 2007-2010; (iv) the independent Bank funded Strategic Environmental and Social Assessment (SESA) of the Shire River Basin carried out in 2010-2011; (v) National Water Development Program and other water sector projects; (vi) Irrigation and Rural Livelihoods and Agricultural Development Project; (vii) MCC Environmental and Natural Resources Management Action Plan (design studies); and (viii) lessons from other national and projects and programs, as well as comparable projects in other countries in Africa and Asia in particular.

24. The outcome of the *Environmental Management Project* for Malawi (1997-2002) was unsatisfactory, the sustainability was unlikely, the institutional development impact was negligible, and the Bank and borrower performance were both unsatisfactory. Lessons learned include: (a) avoid the 'Christmas tree' projects attempting to tackle all important issues at once in a stand-alone project through many components and complex design; (b) in projects with a significant institutional development aspect, base the project design on a realistic assessment of the Borrower's existing and potential future institutional capacity and institutional mandates and remember that both the Bank and the Borrower typically overestimate Borrower's current and potential capacity; (c) ensure that risks identified at entry are tracked and mitigated on an ongoing basis, and that responses are commensurate - in timing and magnitude - to the seriousness of the risks; (d) carry out a detailed implementation review early (before mid-term) to allow ample time to identify and address potential problems, and ensure that measures mitigating against risks identified at entry are adequate; (e) clarify the objectives of any capacity-building activities in terms of enhanced ability to perform in specific areas, rather than simply gaining knowledge; (f) base indicators of capacity building on application of new skills (output/outcome) rather than training or equipment/facilities provided (inputs); (g) stress practical hands-on experience and targeted skills-building over general academic training; (h) stretch capacity-building budgets by emphasizing in-country and on-the-job training over external courses; (i) effective coordination of support from different donors may fail because it is beyond the capacity of the Borrower or sometimes against the interests of particular agencies or individuals; and (j) while donor coordination is the Borrower's responsibility, donors should also take care to promote complementarity and consistency of their support, avoid overwhelming government agencies, and avoid creating opportunities and incentives for "double-dipping" (two or more donors funding the same activity) or other inefficient use of resources. The proposed program is built on a very different project design and implementation arrangements and has taken on-board these lessons by providing realistic budget and time requirements to address complex institutional and technical river basin management issues in an integrated program that explicitly tackle many of the difficulties illustrated amongst others by performance of the EMP.

25. The *Infrastructure Services Project* (2006-2012) experienced major delays from the start: (a) actual implementation of the infrastructure works had not begun after 3.5 years due to major delays in completion of technical designs (only 25% of the grant had been disbursed), (b) procurement capacity of implementing agencies, and project coordination, management and oversight are weak; and (c) the project faced major cost overrun in civil works largely due to under-estimation of the cost of infrastructure investments (e.g. 80% increase in roads, 30% increase in water supply and sanitation and 25% for electricity components). After restructuring,

and clarification of agency implementation and coordination roles, this project has made major progress. The current project has hence been designed with emphasis on clarifying agency roles and building in coordination mechanisms from the outset.

26. *Lessons from CAS implementation* reflected in project design include: (a) weak Government capacity, especially financial management, procurement, project management, and monitoring and evaluation, slows project implementation; the new project reflects such capacity constraints and is designed to build up the capacity of the agencies involved in project implementation in the context of the phasing out of project implementation units; (b) the need for comprehensive fiduciary support due to weak capacities in the Government; (c) the implementation of a decade of MASAF, which supported a bottom-up identification of community-level needs, with central government's role to transfer funds and monitor results; and (d) the important role that civil society, the private sector and the media are able to offer.

27. The *SESA of the Shire River Basin* focused on the question "what are the most critical issues that need to be addressed to achieve sustainable development in the Shire River Basin?" A number of salient issues were identified, and the project is addressing many of them. The lessons from the SESA that are reflected in project design include: (a) issues relating to sustainable development in the Shire River Basin are wide ranging, complex, involve every sector of the economy, and can be grouped under three key headlines: land management, water management, and human resource management; (b) the framing and implementation of policies, plans and programs need to involve all relevant government ministries and district councils; (c) the private sector has a key role to play in sustainable development in the Shire Basin, and there needs to be greater involvement of NGOs, civil society and the public in general in ensuring that strategic issues are kept in focus by government; (d) the dynamics of environmental change in the Shire Basin need to be properly understood, monitored and responded to; and (e) effective water resource and regional land use /spatial planning need to be introduced.

28. The *National Water Development Program* is an ongoing multi-donor program supporting the water sector, amongst which the water resources sector. The Shire river Basin Management Program is a natural continuation/offshoot from this program in that it takes further many of the recommendations from analytical, preparatory and policy work supported under the Program. The National Water Development Program supports the development of enabling legislation to support the National Water Policy that will enable further institutional reform including on river basin management; it further supports design and independent ESIA for the Kamuzu Barrage and has supported the development of the National Water Resources Strategy, many of which recommendations and priorities are incorporated in Project Design. The National Water Development Program has also established mechanisms for donor coordination, and strengthened capacity in MWDI. Lessons on implementation include the need to establish clear responsibilities and coordination mechanisms upfront, and the need to closely monitor efficiency and robustness of procurement and financial management arrangements.

29. The *Irrigation, Rural Livelihoods and Agricultural Development Project* supported catchment management and irrigation activities and rural livelihoods support amongst others. Key lessons from this project that have been incorporated into this project design are the (a) importance of upfront focused investments to show demonstrable impact; (b) the upfront integrated planning of irrigation and catchment management and the need for spatial planning rather than output planning to have significant impact; (c) importance of identifying administrative boundary bottlenecks; (d) importance of performance management and mutually

agreed workplans and transparent monitoring for sustainability and reduction of dependency syndrome and hand-out mentality; (e) lessons on district planning and fiduciary capacity, as IRLADP pioneered many of the district based planning; (f) strategic importance to early on identify specific localized commodity chains/market linkages that can be supported under the project to avoid supply driven marketing.

30. Preparatory studies for the *Millennium Challenge Corporation/Account program* on the Environmental and Natural Resources Management Action Plan clearly demonstrated the need to address erosion and silt load in the Shire River, as well as the need to improve management of floating weeds in the upper Shire due to the high cost to energy production downstream. This analytical work has been instrumental in defining scope for and economic analysis of the off-site benefits primarily for the energy sector benefits.

31. Lessons from other comparable projects and programs in Malawi or other developing countries include: (a) harmonized and integrated basin planning and real time multi-sectoral decision support systems need to be developed for the Shire Basin as disconnected planning has created and will continue to create serious resource use problems; (b) environmental and natural resource degradation is a livelihood seeking behavior and programs addressing soil and water conservation must offer better incentives to villagers, for example from alternative livelihoods dependent on resource conservation rather than exploitation; (c) development of community-based natural resource management systems is a long-term process, necessitating participatory planning steps and mutual commitment over a longer period before and after the actual interventions and there are many upscalable initiatives funded by different agencies and implemented by a range of local and international NGOs and government agencies; (d) traditional authorities, the local traditional leaders are very important to involve in facilitating development activities at the local level, any development activity that bypasses the local leadership is likely to fail; likewise it is vital to work through existing community-based institutions – namely the VDC and VNRMC – and optimize and coordinate within their existing plans, interventions and systems; (e) working through and under the leadership of existing government structures notably at District level, namely DEC's; and (f) there are very substantial opportunities to integrate modern technological tools in the different planning, monitoring and evaluation systems, including for instance remote sensing, Geographical Information Systems, Global Positioning Systems, and GSM telemetry, etc., which will both improve knowledge and decision-making and reduce transaction costs.

F. ALTERNATIVES CONSIDERED

32. There were many alternatives considered during project preparation. The main alternative choices considered are described below:

33. *Using a different Lending Instrument:* There was a possibility to use either a traditional instrument such as a SIL or an evolving instrument such as a Program for Results (P4R). A more programmatic approach was chosen in order to provide a long-term framework for Bank partnership in this sector that is critical for Malawi's development. In addition, it was obvious that the kinds of investments required to help the country in realizing its development aspirations and providing climate resilience could not be provided in just one project. The first project in this program is expected to provide the information, institutional, and investment foundation for a longer-term program. The newer P4R approach was not pursued given that the country had many basic capacity-building requirements to provide the kind of institutional and monitoring

framework required for this approach. Preparation discussions with the client and guidance from the country and sector management were consistent with this choice.

34. *Focus on either Water Institutions or Investments:* There was a choice of including only institutional capacity-building activities or focusing on new investment implementation. A combined approach with “learning by doing”, also based on lessons from similar Bank operations, was pursued given the futility in just building capacity in a country with significant needs for investment in both land and water management and water infrastructure at various scales. Also, a project focusing just on investment implementation would have been inappropriate given the poor institutional capacity to prepare, implement, and manage its critical land and water investments at scale.

35. *Single Sector Focus:* The project would undoubtedly be simpler if the focus was only on a single sector or even institution (e.g. the Water Resources Department) that already has significant needs. However, this would not help achieve the very basic concept of this project – to develop an integrated multi-sectoral planning, investment, and operational framework for the Shire Basin. This is because the essence of integrated basin management is multi-sectoral – considering catchment, agricultural/irrigation, hydropower, domestic and industrial water supply, environment/ecosystem, climate resilience, social, and other economic needs throughout the water-dependent Shire basin. The focus on the basic land and water management institutions, knowledge base development, and demonstrative investments and investment planning efforts are all geared to encourage a shared vision for such basin management. The Program seeks to recognize implementation and coordination capacity by not setting the bar too high, while still seeking to put Malawi on the path for a much-needed transformational change by not setting the bar too low.

36. *Not Considering Co-Financing:* The Project is already reasonably complex given the focus on an even a few critical elements in the sector, and it would be reasonable to expect that smaller additional financing from sources such as GEF and bilateral partners would not be necessary. However, there are significant needs in Malawi for an integrated catchment and ecosystem management approach that could help conserve biodiversity, improve local livelihoods, and contribute to boosting eco-tourism revenues to spur an alternative growth paradigm. In addition, catchment management in the Basin has had a patchwork uncoordinated approach, where enhancement of collaboration and harmonization through new modes of implementation is as important as getting activities implemented on the ground. GEF and bilateral Grant resources could help catalyze such action and help build additional partnerships for sustainable management of the Shire basin.

37. *Picking other Spatial Areas of Program/Project Focus:* The Shire basin is the most critical basin in Malawi. It is by far the largest water resources management area; it generates about 97% of its electricity and is home to almost all its irrigated land and the majority of Malawi’s population. Major cities (such as Blantyre) pump their water supplies from the Shire river at great distances. It is also home to the key flood-prone areas in Malawi. The upstream Lake Malawi from which the Shire arises has the most diversity of fish in any lake in the world. Its catchments are severely degraded due to deforestation for fuel, agriculture, and housing for its dense population. Significant new water-related investments are planned in the basin. Planning and management of all these requires an integrated approach based on modern information and knowledge management, institutional skill development and partnerships, and optimal and sustainable planning, preparation, and implementation of critical water investments. The project

focuses on only a few catchment areas out of several degraded ones – this was determined by soil erosion modeling to evolve a consensus of priority for catchment management.

38. *No Project Approach:* An option always to be considered is a no-project approach. This would imply continued deterioration of the catchment lands, not being able to provide a foundation for the long-term sustainable development and management of the basin, continued vulnerability of populations to floods and droughts, continuing poor land productivity, continued loss of biodiversity and inability to benefit from it effectively, major conflicts across water allocations for new investments without an information or analytical basis for such choices, continued degradation of the critical Kamuzu Barrage, and inadequate preparation for new investment preparation of a quality that makes them bankable. Hence, in this case, a long term programmatic approach to help address a few key priority issues was selected.

G. SYNERGIES WITH OTHER PROGRAMS

39. The *National Water Development Program*, which is partly financed by the Bank under the *Second National Water Development Project*, and which focuses on urban water supply and sanitation, but also includes provisions for water resources management, and provisions to take out investment preparation studies. The feasibility studies for the upgrade of Kamuzu Barrage were financed through this project.

40. The *Infrastructure Services Project*, which is financed by the Bank, and which will include roads works that pass through the upper Rivirivi, Lisungwe and Wamkulumadzi priority catchment areas in Ntcheu and Neno districts. This would also involve Community Contractors to reshape the feeder road leading to the trading centers along the corridor were identified and trained sometime back. They will employ gangs to reshape the roads. The community contractors will get 80% of the reshaping component of the contract. The main contractor will get the remaining 20% of which 10% will be used to procure tools for the community contractors while the other 10% will be used to pay for overheads and profits on this item.

41. The *Agricultural Sector Wide Approach Support Project (ASWAp-SP, formerly ADP-SP)*, which is financed by the Bank, GEF, Norway and the EU, and which includes Sustainable Land Management activities, though not in concentration areas comparable to SRBMP-I.

42. *Environmental and Natural Resources Management Action Plan (ENRMAP) for the Upper Shire Basin*, financed by the Millennium Challenge Corporation (MCC) will assess environmental, social-economic and land use and management conditions in Malombe East and Malombe West upstream of the Liwonde Barrage (currently this project is on hold). These two catchments contribute significantly to the siltation and weed infestation problems. Based on this assessment, the action plan shall identify and prioritize specific interventions which MCC, GoM and other donors could fund to address siltation and weed problems and promote sustainable land use and natural resource management practices in the two sub-catchments.

43. *Private Public Sector partnership on Capacity Building for Sustainable Land Management (SLM) in the Shire Basin*, financed by GEF through UNDP, has as objective to reduce land degradation in the Shire River Basin through improved institutional, policy and PES arrangements. This will be achieved through: (i) policy and institutional arrangements for basin-wide SLM; (ii) private public partnerships providing financial incentives for SLM (through green water credits and sustainable charcoal); (iii) improving knowledge and skills at all levels to support SLM; and (iv) crop insurance providing the basis for increased access to credits as well

as increased use of up to date weather information and decision making; and (v) project management, M&E and lessons learning for adaptive management and up-scaling. The project intends to support the establishment of a River Shire Development Authority. Its immediate focus would be on the Middle and Lower Shire, in particular Mwanza and Neno districts.

44. The *Improved Forest Management for Sustainable Livelihoods Programme*, financed by the European Union and jointly implemented with the Department of Forests and NGOs, is showing some success in improving forest productivity while providing rural incomes through livelihood activities and small business development, emphasizing non-timber forest products. The programme has developed community forest management standards and guidelines that can be replicated in the Shire Basin.

45. The *Project for Community Vitalization and Afforestation in Middle Shire*, financed by JICA, with productive activities that include tree growing and soil erosion control for forest conservation and rehabilitation in target villages. The approach is largely based on training.

46. There are many other development partners, NGOs and community-based organizations and Trusts that are supporting alternative rural livelihood activities in the Shire Basin in partnership with government, including for instance: (a) the Norway supported and FAO-implemented Enhancing food security and developing sustainable rural livelihoods project; (b) the IFAD financed Rural livelihoods support programme; (c) World Vision has been promoting integrated farming systems focused on aquaculture in Zomba District in partnership with the World Fish Centre; (d) the Mulanje Trust economic enterprise development in combination with biodiversity and conservation activities; (e) the Zipatso Association in Mwanza and Neno district, which promotes afforestation and sustainable production practices with support from USAID; (f) the NGO Total Land Care, and several other organizations.

47. Despite promising examples, challenges were raised during project preparation field missions. Priority among these was weak local capacity and the need for intensive mobilization and support through long-term process required to build sustainable livelihood enterprises. In complement, community commitment and understanding, building a sense of ownership and ensuring ongoing maintenance and sustainability of interventions were common challenges. In some cases, enterprise identification and technical design was poorly adapted to local conditions and building partnerships and reliable linkages with local agents of technical government departments proved challenging. Access to financing has been noted as a constraint and promoting market linkages and commercialization of products were common challenges raised across districts, due to poor roads and problems in identifying viable market outlets and suitable market prices.

Annex 8: Context for Natural Habitat Management in the Shire River Basin (GEF/LDCF)

MALAWI: Shire River Basin Management Program (Phase-I) Project

A. Status of Malawi's Ecosystems

1. **Malawi's natural heritage:** Malawi has high levels of biodiversity – a consequence of varied topography and a range of different natural habitats, which until relatively recently covered a large proportion of the country. Lake Malawi, the third largest lake in Africa (and eighth largest in the world), is internationally-renowned for its rich diversity of endemic cichlid fish. The lake contains the largest number of fish species (between 500 and 1,000) of any lake in the world, 90% of which are thought to be endemic. Over 600 species of birds have been recorded in Malawi and over 190 mammals. It is estimated that approximately 47 species of the 172 species of molluscs, 12 species of reptiles and seven species of amphibians (especially frogs) are endemic to Malawi. The 2002 IUCN Red List of Threatened Plants for Malawi lists 14 endangered, 89 vulnerable and 25 critically endangered species.

2. Natural resources are of critical importance to the national economy. Agriculture accounts for 33% of GDP and 85% of exports. Other key sectors are even more directly dependent on natural ecosystems. Tourism is overwhelmingly nature-based, with Lake Malawi as the country's biggest single attraction. The tourism and travel sector contributed US\$184.8 million (5.8%) of Malawi's GDP in 2008, and is seen as a growth priority by Government. Fuel wood and charcoal account for around 90% of household energy supply, and 94% of electricity generation is from hydropower (almost all generated in the Shire Basin). Capture fisheries account for 98% of fish production and 40% of domestic protein consumption.

3. Malawi has ratified a number of key international environmental agreements. It ratified the Convention on Biological Diversity in 1992, the Convention on Wetlands in 1997 (designating Lake Chilwa as its first, and so far only, Ramsar site) and submitted its First Communication Paper on Climate Change to the United Nations Framework Convention on Climate Change (UNFCCC) in 2003.

4. **Degradation of natural resource base:** About 85% of Malawi's population live in rural areas and the total population is expected to double over 20 to 25 years. The average population density is 105 people/km², but higher, at ~143/km², in the southern region. There are over 6 million people farming as smallholders on fragmented customary land and roughly a third of all agriculture takes place on land considered to be unsuitable. The over-riding environmental issue in the country is land degradation resulting from population pressure¹, especially in the densely populated southern region. Key issues are deforestation, soil erosion (10-43t/ha/yr), decreasing soil fertility, and extreme climatic variations all affecting agricultural production and linked economic sectors. Forest cover declined from ~ 47% in 1975 to ~26% in 2006. Remaining forest is found mostly in Forest and Wildlife Reserves and National Parks although these are also being degraded by over-harvesting for firewood and charcoal, which are still provide the overwhelming majority of energy used for cooking and heating, and by agricultural encroachment.

¹ Country Environmental Profile for Malawi (EC, 2006)

5. The population of the Shire Basin is growing rapidly – from less than 4 million in the mid 1960s to nearly 13 million by 2008. The basin’s natural resources have been rapidly depleted, and today, most areas outside of wildlife and forest reserves have been deforested, and even some reserves, such as Thyolo Mountain, have been extensively denuded. The degradation of these important natural systems will reduce their capacity to deliver environmental services. This will have negative implications for the livelihoods of substantial numbers of poor people who already have to cope with high levels of climate variability. These trends are typical of global patterns in the degradation of environmental services.¹ However, there remains scope for stabilizing and in some cases even restoring these systems, which would bring important benefits to local, downstream and global beneficiaries of their services.

B. Importance of natural ecosystems in the Shire Basin

6. **Biodiversity and forest conservation:** Despite the high population pressure, conversion and degradation, significant natural habitats remain within the Shire Basin. Within the middle Shire (between the Kamuzu barrage and the steep escarpment south of Blantyre), there remain scattered patches of mopane and Zambezian woodlands. Grassland / mopane forest mosaics are also found such as those in the highlands around Zomba and Thyolo; and on Mulanje mountain (drainage from part of which flows into the Shire basin). The lower-middle and lower Shire basin still supports extensive woodlands – mostly under forest reserve, wildlife reserve and national park status and the lower Shire also supports two extensive riverine wetland systems – the Elephant marshes and the Ndindi marshes (the latter shared with Mozambique). Map 2 in Annex 11 shows a selection of the key sites.

7. Remaining forest and wetland areas in the Shire Basin continue to support biodiversity of global significance and there are seven Important Bird Areas (IBAs)² listed by BirdLife International for the Basin³. All of these IBAs are threatened to some extent.

- ***Mangochi Forest Reserve*** - together with the adjacent forests in Liwonde National Park, it is the only site in Malawi for Lilian’s Loverbird *Agapornis lilianae*. The site also supports the globally-endangered Thyolo Alethe *Alethe choloensis* which occurs in low densities on Mangochi mountain; and the near-threatened Stierling’s woodpecker *Dendrocopus stierlingi* which is reported to occur on the eastern side of Mangochi mountain.
- ***Liwonde National Park*** - Only site in Malawi (together with adjacent Mangochi Forest Reserve) for Lilian’s Lovebird and Brown-breasted Barbet.
- ***Liwonde Hills Forest Reserve*** - Important for Thyolo Alethe and Green-headed Oriole
- ***Mulanje Mtn. Forest Reserve*** – Most important single center of terrestrial endemism in Malawi, and subject to considerable conservation management efforts.
- ***Thyolo tea estates*** - Remnant forests important for White-winged Apalis and Green-headed Oriole.

¹ The G8-supported study on *The Economics of Ecosystems and Biodiversity (TEEB)* has estimated that the cumulative loss of ecosystem services to the global economy will amount to around €14 trillion per year by 2050. Market mechanisms to capture these values do not exist for many ecosystem services - although this is changing with the emergence of improved ecosystem valuation techniques and a diverse new portfolio of biodiversity and ecosystem service markets.

² IBAs are sites of international biodiversity conservation importance and are selected because they hold (a) bird species that are threatened with extinction or have highly restricted distributions; (b) species assemblages characteristic of particular biomes; and/or (c) exceptionally large numbers of congregatory bird species.

³ Directory of Important Bird Areas (IBAs). BirdLife International, Cambridge, UK.

- **Thyolo Mtn. Forest Reserve** - Forest has been destroyed, with loss of Afromontane species (incl. second largest population of Thyolo Alethe in Malawi).
- **Lengwe National Park** - around 330 species of birds are known from Lengwe. There are several records of the endangered Madagascar Pond-heron *Ardeola idae* and a number of restricted-range species are resident in the park, including Crested Guineafowl *Guttera pucherani*, Neafrapus *boehmi* Boehm's Bee-eater and Southern Yellow-billed Hornbill *Tockus leucomelas*.

8. Both Liwonde National Park and Majete Wildlife Reserve now support re-introduced populations of critically-endangered Black Rhino *Diceros bicornia* – part of efforts to restore the ecological integrity of these two protected areas. Liwonde National Park supports a significant population of the endangered African Savanna Elephant *Loxodonta africana* and these continue transfrontier migration cycles into Niassa Province, Mozambique (via Mangochi Forest Reserve and forest areas on customary village land). An elephant population has also been re-established in its former range at Majete Wildlife Reserve with translocated stock from Liwonde NP. Red Bush Squirrel *Paraxerus palliatus* and Spotted-necked Otter *Lutra maculicollis* – both categorized as ‘vulnerable’ are found in the forests and wetlands of the middle and lower Shire. Threatened birds include Blue Swallow *Hirundo atrocaerulea*, categorized as endangered and which is documented as breeding on the montane grasslands of Mulanje mountain and perhaps other upland areas in the Shire basin¹, Thyolo Alethe *Alethe choloensis*, and Stierling's Woodpecker *Dendropicos stierlingi* (both considered vulnerable) and the endangered Spotted Ground Thrush *Zoothera guttata* – a very rare resident of the southeastern montane forests. The White-winged Apalis *Apalis chariessa*, also considered vulnerable, is found in the low and mid altitude of the Shire highlands. The Elephant Marshes are also likely to fulfill Ramsar criteria as an internationally important wetland by supporting waterbird populations of international significance – although comprehensive surveys have yet to be undertaken. A number of species are also found at the extremes of their natural distribution. For example, Lengwe National Park is the northern most population of Nyala *Nyala angasii*.

9. In addition to their biodiversity value, the remaining forests in the Shire Basin provide a variety of forest products (poles, mushrooms, medicinal plants and honey, as well as wood fuel), and constitute a significant carbon sink. Work is currently underway to quantify the GHG abatement potential of Malawi's forests, but as an approximation, local forests contain roughly 20 tons C per ha, and sound management of the areas targeted under the present project are expected to contribute around 2,400,000 t CO₂ of emission reductions through reduced degradation and natural regrowth.

10. **Land degradation and climate resilience:** Land degradation has caused increasingly severe impacts in the Shire Basin. This is the motivation for the Shire River Basin Management Program and is discussed at greater length elsewhere in the PAD. Soil fertility has decreased, and sedimentation and eutrophication from agricultural run-off have reduced effective hydropower generation capacity, and disrupted fisheries and irrigation systems. Hydrological flows have also become more erratic, and the basin has experienced several severe drought and flooding episodes within the last 20 years.

11. Some anecdotal costs of environmental degradation have been estimated. Heavy siltation of the Shire and its tributaries is causing: (a) high operating costs across the four major hydro-electric dams for annual dredging and turbine maintenance (approximately US\$1 million per

¹ See Blue Swallow. Report of the International Action Planning Workshop. 10-14 June, 2002.

year); (b) dredging costs at Walker's Ferry pumping and water treatment centre, supplying 95 percent of the drinking water to Blantyre (up to US\$100,000 per year) and higher average treatment costs to reduce turbidity in urban drinking water (MK7.0/m³ for river water versus MK0.2/m³ for groundwater); (c) loss of 1/3 of the storage capacity of Mudi dam (supplying 5 percent of drinking water to Blantyre) due to siltation would cost an expected US\$225,000 to address by dredging; and (d) periodic and severe flooding in the lower Shire creates significant costs for infrastructure repair and replacement, and for food aid.

12. Development of basin-wide models during the implementation of the Project should quantify the overall contribution that natural habitats make to the hydrological regulation of the Shire Basin. In the absence of systematic information, catchment management activities under Subcomponent B2 have targeted those areas responsible for generation the highest current sediment flows, and therefore overlooks importance on maintaining natural cover in preventing further increases. Nevertheless, the loss of natural habitat has undoubtedly been the biggest single factor in the erosion of the hydrological function of the Basin in the recent past, and remaining natural habitats are clearly of great importance in specific areas, such as forest patches on uplands (e.g. Mount Mulanje and scarps of either side of the middle Shire) that generate high seasonal rainfall responsible for flash-flooding in the Shire floodplain, and extensive floodplain wetlands, which absorb both floodwaters and sediment.

13. Models are currently being developed that will better reveal the role that the 120,000ha Elephant Marshes and other wetlands in the Lower Shire play in attenuating the flood system, but preliminary estimates suggest that between Chikwawa and Chiromo (at the top and middle of the Lower Shire) the Marshes can reduce peak flows in the Shire itself by a half, and delay the arrival of the flood crest by 3-6 days. The Elephant Marshes are known to substantially reduce downstream sediment loadings which would otherwise contribute to additional flooding lower down. The wetlands also play an important role in supporting livelihoods and helping local communities to cope with considerable climate variability, especially in the lower Shire valley where prolonged dry seasons and often erratic rainfall patterns make farming extremely difficult in the absence of irrigation. Historically, they have provided rich fish and bird resources for the local population, and could resume this role with better management, but these areas too are under pressure from environmental and anthropogenic changes to hydrological flows, and increasing pressure on land and biological resources.

14. The climate adaptation agenda in Malawi is inextricably linked to the land degradation / watershed management agenda. Besides capacity and monitoring, all of the major priorities identified in the 2006 NAPA concern land and watershed management activities – resilient agriculture and off-farm rural livelihoods, restoration of forests (particularly in the Upper and Middle Shire), and improved flood / drought management. Analytical work through the National Program for Managing Climate Change in Malawi (CCP) is being conducted to strengthen the information base for identification of adaptation investment priorities, including a World Bank study on the role that land management can play, but even ahead of that, then first adaptation projects being designed and implemented in Malawi focused largely on land and watershed management themes, including on management of the Lake Chilwa basin and wetlands.

15. More specifically, natural habitats within the Shire Basin make a critical contribution to resilience through flood attenuation, maintaining surface flows for agriculture and energy generation, and provision of alternative livelihoods (particularly forestry, fisheries and tourism). The population within the lower Shire Floodplain is perhaps the most climate-vulnerable in

Malawi, having been subjected to successive floods and droughts. Their resilience is undermined both by upstream changes to hydrological and sediment flows, and by degradation of local floodplain resources. Degradation of Shire Basin habitats accentuates their vulnerability to climate change through erosion of capacity to buffering extreme weather events and of the resource base for climate-resilient livelihoods.

16. **Natural ecosystem knowledge base:** Basin-wide capacity for inventory, planning and management of natural systems is limited – a factor that will constrain effective and sustainable planning within the basin. Key agencies with mandates that include sustainable management of biodiversity include the Forest Department, Fisheries Department, Department of National Parks and Wildlife and the Environmental Affairs Department. Institutions with a mandate for research and inventory (and with potential for hosting knowledge centers) include the Forest Resources Institute of Malawi (FRIM) and the National Botanical Gardens and Herbarium. These agencies are all constrained by a general lack of resources and in some cases, highly centralized decision-making and budgeting systems. Substantial institutional strengthening at national, regional and district level will be needed if these institutions are to contribute effectively to basin planning and management processes and to advance progress at catchment level. There are also a number of relevant and capable non-governmental organizations working on sustainable management of biodiversity both nationally and within the Shire basin. These include the Mulanje Mountain Conservation Trust, LEAD International, the World Fish Center and the Wildlife Conservation Society of Malawi (the BirdLife International partner in Malawi).

C. Natural habitat blocks targeted by the project

17. **Pressures on natural habitats and selection criteria:** Despite the services they provide, natural ecosystems in the Shire Basin are under growing pressures:

- Illegal hunting has reduced populations of wild mammals in most parks and eliminated many medium and larger species from forest reserves and forests on customary land. Reduced numbers of animals within the Parks undermines their ability to generate revenues from tourism and within wetland systems. Reductions in hippopotamus numbers in the Elephant Marshes are thought to have led to a closing up of the many channels and deepwater pools, reducing fisheries production and making the navigation more difficult to for fishermen and tourism operators.
- Unsustainable harvesting of wood for firewood and charcoal production is gradually reducing forest coverage and habitat quality in a number of these areas – a situation that is not helped by weak and unworkable policies that render virtually all forms of charcoal production and trade as ‘illegal’. Growing rural and (especially) urban demand for charcoal will mean that these threats will continue to increase¹.
- Encroachment for agricultural production poses a threat to most remaining natural habitats in the middle and lower Shire valley where smallholder agriculture has replaced most natural forest and woodland cover on most areas under customary land designation. Encroachment has been addressed effectively at Liwonde National Park and Majete Wildlife Reserve but remains a significant problem within most forest reserves and within Lengwe National Park.

¹ Government of Malawi (2009). *Malawi Biomass Energy Strategy*. March 2009 . This document provides clear analysis and policy recommendations, but implementation of the strategy is so far limited.

In recent years, farmers have been expanding agricultural cultivation in the Elephant Marshes during the dry season when water availability is otherwise extremely limited.

18. Widespread challenges and limited (human and financial) resources necessitate careful prioritization. Selection criteria used to identify target natural habitat sites encompassed:

- biological importance (including size, diversity and endemism¹) and watershed function - which both contribute to the potential of a site to yield economically important services to local, national and regional beneficiaries;
- existing donor support – although the needs greatly exceed current levels of support, complementarity was important to avoid exhausting available short-term human capacity;
- geographical distribution – the intention is to use GEF and LDCF funding to demonstrate how management of natural infrastructure can be integrated into a watershed management program, and therefore opportunities were sought to adopt a landscape approach, through linking natural habitat management with catchment management activities on agricultural land (e.g. in Neno District), maintaining ecological connectivity between areas (e.g. investments in both Liwonde National Park and the adjacent Mangochi Forest Reserve that links it to the further habitat blocks in Mozambique), and developing a cluster approach to protected area management to improve efficiency and cooperation in areas such as tourism development (e.g. the Elephant Marshes, as opposed to the Ndindi marshes further south, were selected as the first priority wetland site, due to their proximity to other mid/lower Shire sites, including Lengwe, Majete, Mulanje and forest reserves in Neno and Mwanza).

Project target sites

19. **Liwonde National Park.** Liwonde National Park extends to nearly 540 km² of woodlands and riverine wetlands and is located 245kms from Lilongwe and about 120kms from Blantyre. It's central location means that this Park is one of the most visited protected areas in Malawi. The Park support supports seven distinct types of vegetation, and well over 1000 species of vascular plants. Predominant habitats include mopane woodlands, deciduous thickets and various freshwater wetland habitats along the margins of the Shire valley - the latter are a keystone habitat of the Liwonde ecosystem, providing a significant source of water for wildlife during the dry season and opportunities for game viewing – and thus important for tourism. In recent years, spate flooding and high rates of sedimentation (caused by upstream catchment degradation) have destroyed four bridges on the main access road through the Park. This has reduced flood season access for ranger patrols and for visitors. This provides opportunities for illegal activities to go unchecked in the northern part of the park for nearly 6 months of the year and significantly reduces the potential to generate revenues from tourism.

20. Liwonde has the highest populations of elephant, hippo, waterbuck, crocodile and Sable Antelope in Malawi's National Parks and the Park supports healthy populations of African elephant that migrate through adjacent customary forest land and the Mangochi Forest Reserve into Niassa Province, Mozambique. Other important species include small populations of recently-introduced Black Rhinoceros (a globally Critically-Endangered species) and Roan Antelope, both of which will be released from a protective breeding sanctuary inside the park when conditions permit. Sable antelopes are also found within the Park. Over 330 species of birds have been recorded in the park, including Malawi's only population of Lillian's Lovebirds

¹ Note that to a large extent these are based on the general characteristics of the site and regional patterns of biodiversity, as detailed biological information is sparse, particularly in the cases of the lower Shire wetlands.

(*Agapornis lilianae*). Liwonde-Mangochi is listed as an IBA by BirdLife International. Information on fish biodiversity is also available (although not comprehensive)¹ and the Park has also prepared a checklist of birds².

21. Management issues are examined in some depth in the management plan - prepared with the support of the Frankfurt Zoological Society³. The Park's budget was around \$200,000 for FY10 although this declined by about 30% due to ongoing financial difficulties in Malawi.

22. The Park has also designed an innovative benefit sharing scheme to support the 30 or so villages located around the Park's boundary. This will be operational by the end of 2011 and will involve investing 30% of net revenues from gate fees and the private lodge concession through an association of CBOs that operate at village level. The plan was approved by the State treasury in 2005. This will help address a key management issue, since elephant – human conflicts have been severe over recent years as the elephant population has recovered.

23. **Mangochi Forest Reserve** covers an area of around 300 km² of forest adjacent to Liwonde National Park and provides a biodiversity corridor through which wildlife populations, including significant numbers of elephants move to other forests areas, including in Niassa Province, Mozambique. Improved management of these forests and establishment of appropriate co-management arrangements could help address human-wildlife conflicts in this area and could also help to protect micro-catchments on steep slopes that drain into the middle Shire. However, the Department of Forestry lacks the resources needed to manage the area effectively and in coordination with Liwonde National Park. The Reserve contains only 2 ranger stations, which lack effective transport and equipment. The Department of Forestry is keen to introduce community-based forest management approaches at Mangochi Forest Reserve, but at present is only able to provide some support to village forestry activities in areas outside the Reserve.

24. **Lengwe National Park** covers around 900 square kilometers and comprises mopane and deciduous woodlands – with denser tree growth along the stream courses. The eastern area part of the Park is flat, but to the west, there are steeper slopes, low hills and outcrops of sandstone. The park supports predators such as leopard and hyenas and also a large population of buffalo. Large numbers of Nyala are also easily visible, here at the north of their natural range. Kudu, duiker, Livingston's Suni (only found in Lengwe within Malawi), bushbuck and impala and warthogs are also common. Over 300 species of birds have also been recorded and the area has been designated as an Important Bird Area (IBA). Species include Gorgeous Bushrike (a species that is also only found in Lengwe within Malawi).

25. Lengwe National Park is managed by DNPW and depends largely on state allocations of funding. There is one lodge within the Park, managed on a concession basis from which DNPW retains a share of revenues. Visiting school groups are accommodated in a youth hostel at Park headquarters, but facilities are very basic and efforts to expand environmental education are hampered by a lack of transport. There are plans to expand the number of lodges by two in order to boost revenues, but lack of road infrastructure and financing currently constrain these plans.

26. The main management challenges to Lengwe were documented in the Lengwe Management Plan (2002)¹. Encroachment within the Park boundaries is widespread, particularly

¹ *Liwonde National Park Fishes*. (5 page unpublished report). Undated.

² *Liwonde history and birds list*. Unpublished report. Undated.

³ *Liwonde-Mangochi Protected Area Complex. The General Management Plan 2004-2014*. Department of National Parks and Wildlife and Department of Forestry with Support of the Frankfurt Zoological Society.

during the late wet season and early dry season when there is sufficient moisture for cropping along the main drainage system that runs through the Park. Illegal hunting, firewood collection and charcoal production are reportedly widespread and pose substantial management problems – and efforts to constrain these activities frequently lead to conflicts and resentment with local communities. To address this, the Park has helped establish 23 Community Based Organizations (CBOs) but, since tourism revenues are limited, they lack the resources to invest in community development through these CBOs. There is strong demand from communities around the Park for wells, electricity and small-scale NR projects, but this demand currently cannot be met.

27. Management priorities identified in the Park management plan included the need to address Park-community conflicts through the establishment and support of community based initiatives, the need to expand the Park's road and trail network to facilitate patrolling and tourism, and to address dry season water availability through the construction of check dams and groundwater pump-fed water holes. There are now substantial conflicts between the park and local communities – since the park lacks sufficient revenues to invest in local communities through local development projects. Encroachment continues to be a problem and there are also significant levels of illegal hunting, firewood collection and charcoal production within the Park's boundaries. These threaten to diminish the ecological integrity of the Park if not addressed. There is interest in replicating the concession-management model that has been introduced at the adjacent Majete Game Reserve as this could reduce the burden on state finances, generate a predictable flow of finance and enable a much greater level of conservation and tourism investment in the Park. Ultimately, this would enable the Park authorities to work more proactively with local communities.

28. **Neno Eastern Escarpment and Tsamba Forest Reserves** cover over 110 km² of Neno District, including the headwaters of a number of sub-catchments that are being targeted for micro-catchment planning and rehabilitation under Component B. There are also significant areas of forest on customary land surrounding the reserves. Neno Eastern Escarpment Reserve was gazetted around 2000, has no staff assigned, and the boundaries are poorly known locally, even within the District Forestry Office. Tsamba is more established, having been gazetted in 1927, but has only 2 forest guards assigned to it. Both areas are subject to collection of timber and forest products and some agricultural activities. Some areas within the Neno Eastern Escarpment Reserve have been allocated as farming or grazing land by local authorities. Local communities retain a strong sense of ownership of these areas, and hence strengthening management activities would best be done in a participatory manner.

29. **The Elephant Marshes** are part of the flood plain of the Shire River. Accessing the marshes can be difficult and systematic information on the marshes is still scarce. This section consolidates information from local discussions plus historical records from the expedition diaries of David Livingston (now made available in electronic format) who visited the marshes on two occasions in 1859 as part of the Zambezi expedition. Surprisingly, his observations seem to represent the only recorded biodiversity survey information to date for the marshes.

30. The marshes cover between 400 to 1200 square kilometers (depending on the extent of flooding and use of different wetland categories). At its northern margins they are 'semi-permanent' marshland (ie inundated during high water flows only) while to the south it becomes a small lake with islands – and supports floating mats of vegetation. The name was given by the

¹ *Lengwe National Park. Park Plan.* November 2000. Draft 14 June 2005.

explorer David Livingstone in 1859 who reported ‘800 elephants in a single sighting’ and also observed large flocks of waterbirds, African Skimmers and migratory birds of prey, including African Fish Eagles and references to large flocks of what are likely to have been Amur Falcons (‘...hawking for dragonflies over the marshes’). Hippos, crocodiles and impressive flocks of large waterbirds are reported by local fishermen and also by the small numbers of adventure tourists who periodically visit the marshes, but there have been no recent surveys. Field observations by mission at the edge of the marshes near Ngabu noted large numbers of Black-winged Stilts, avocets, African Open-billed and Yellow-billed storks, and Little and Black egrets. During the austral summer, significant numbers of migratory shorebirds might also be present.

31. Traditional Authorities were clear that there was very little farming in the Elephant Marshes until a severe drought in 1991, since which time droughts have become more frequent and rainfall much more difficult to predict. The drought of 1991 forced farmers into the marshes in search of soil moisture and now many of the islands in the area are cultivated each dry season. The marshes are extremely dangerous for farming and fishing due to risks of getting lost, strong current and (especially) attacks by crocodiles. Each month 1-2 people from the TA are killed or simply disappear in the marshes, so farming there is not pursued with enthusiasm.

32. The marshes now play a key role in delivering local food security in an area where climate change appears to be making food production more and more difficult. Unfortunately, farming practices have included widespread clearance of riverside vegetation – a practice that is thought to have had a negative impact on the local fishery and on biodiversity.

33. Previously, the marshes supported a vibrant fishery, but this has now declined to the extent that fish has to be imported from Bangula. The decline of fisheries is attributed to the damage to fisheries habitat caused by farming up to riverbanks, the clearance of once extensive reedbeds and also to high levels of siltation. However, other changes may also be responsible for example, modified hydrological regimes following the closure of the Kapichira dam. Fertilizer and pesticide run-off from upstream farming systems (and the sugar estates immediately upstream of the marshes), may also be playing a role. The Traditional Authority reports that the district fisheries office has been largely inactive – due to lack of funds.

34. The Traditional Authority reports that bird populations remain vibrant and healthy, although now in smaller numbers than previously. High levels of bird capture and hunting take place and the Traditional Authority believes it is important to zone parts of the marshes to ensure that key breeding colonies and feeding areas are afforded protection. Local CBOs have been established but are not functional and better building blocks for community development might be the village committees that are fully functional throughout the TA area.

35. Hippo and crocodile populations have declined severely in recent years and only small groups of the former are now present. Fishermen expressed the view that their population decline has contributed to a gradual ‘closing-up’ of the vegetation of the marshes, making access more difficult, and also leading to the loss of deeper pools which serve as fish nurseries and dry season refuges. Both crocodiles and hippos are hunted and crocodile populations are also under pressure from high levels of egg harvesting. It is likely that rapid declines in biodiversity abundance will reduce the Elephant Marshes’ capacity to filter sediments if present trends continue. Studies of environmental and hydrological flows are needed to ensure that further water resources and land development take full account of natural systems and their role in delivering environmental services for livelihoods.

Annex 9: Incremental Cost Analysis for GEF and LDCF

MALAWI: Shire River Basin Management Program (Phase-I) Project

A. Background Context

1. GEF and LDCF funding enables support to a set of activities fully blended into the Shire River Basin Management Program (Phase-I) Project, which will demonstrate the contribution that enhanced natural habitat management can make to river basin management in terms of maintenance of catchment functions, diversification and sustainability of livelihoods, and climate resilience.

2. **Natural habitats are critical to the overall functioning of the Shire Basin**, but are increasingly threatened. High rural population densities and almost universal reliance on wood fuels have placed high pressure on natural resources in the Shire Basin. Larger wildlife and extensive areas of natural terrestrial habitat have virtually disappeared outside of reserves, even some forest reserves have been effectively cleared, and most remaining forest and wildlife reserves are affected by agricultural encroachment. Extensive wetlands in the lower Shire attenuate the floods that affect the area, and have historically provided rich fish and bird resources for the local population, but these areas too are under pressure from environmental and anthropogenic changes to hydrological flows, and increasing pressure on land and biological resources. Changes to the physical environment of the Shire Basin also accentuate vulnerability to climate change through erosion of the resource base for climate-resilient livelihoods and of the buffering of extreme weather events. In particular, the population within the lower Shire Floodplain is perhaps the most climate-vulnerable in Malawi, having been subjected to successive floods and droughts. Their resilience is undermined both by upstream changes to hydrological and sediment flows, and by degradation of local floodplain resources and habitats.

3. Management of natural systems is underfunded, but will be more cost-effective than restoring these once degraded or lost. Unfortunately, substantial under-investment in state-managed natural resources has contributed to their gradual fragmentation and loss¹ - a trend likely to continue. For example, at one of the forest reserves visited during the identification mission, the District Forest Office even lacked the resources to buy the fuel necessary to visit the reserve. Both Lengwe and Liwonde National Parks reported chronic underfunding to the extent that basic law enforcement activities and efforts to engage local community communities is severely compromised. These constraints occur in a context where illegal hunting, encroachment and unsustainable levels of wood extraction for biomass fuels (both charcoal and firewood) are prevalent. Relying upon over-stretched state resources to implement regulations is therefore unlikely to be successful in the medium to long term, and thus a gradual diminution in forest quality and land management sustainability can be expected if this issue is not addressed quickly.

4. Successful models for improving the sustainability of natural ecosystem management have been developed and piloted in Malawi and specifically, within the SRB – delivering

¹ This situation is typical for many African countries where one recent study found that public investment inputs are less than 40% of actual financing needs – see Bruner, A. G., Gullison, R. E. and Balmford, A. (2004) Financial costs and shortfalls of managing and expanding protected-areas systems in developing countries. *BioScience* 54: 1119–1126

economic benefits to both livelihoods and the broader economy (especially through tourism and fisheries). For example, community forest management pilots have been undertaken in a number of districts and the results appear to have been very positive. Community-based wetland and catchment management is ongoing in the Lake Chilwa catchment¹ and there are promising signs that Private Public Partnership models in national parks and wildlife reserves will deliver improved financing and management of terrestrial protected areas. Experience at Mulanje Mountain has improved institutional coordination at catchment level.

5. GEF and LDCF financing support is envisaged to strengthen the integration of sustainable ecosystem management into overall basin planning and management and to support the development of models for sustaining remaining natural systems as a means of protecting environmental services – including the conservation of globally-important biodiversity, improving natural resource dependent local livelihoods and improving resilience to climate variability and climate change.

6. The underlying design rationale is that:

- a) Improved information and stronger institutional capacity of agencies with a mandate to manage biodiversity will improve integration of ecosystem management at the basin planning level.
- b) These efforts will need to be supported by efforts to put in place sustainable models for the management and financing of key terrestrial and wetland natural systems at catchment and site level – that build on experience from recent and progressive approaches on forestry, wetlands management and private sector investment in protected areas management.
- c) Attention will also be required to identify and resolve policy conflicts that undermine sustainable management of natural systems, in order to build a platform for longer-term sustainable investments in ecosystem management, not least under the second phase of the project.

B. Fit with GEF and LDCF Strategic Priorities

7. *Eligibility for co-financing:* Malawi is a member of many International Conventions, including the Convention on Biological Diversity and the Ramsar Convention. Malawi is eligible for LDCF funding, and has developed a NAPA.

8. *Relevance to GEF STAR Strategic Priorities:* The project will mainstream natural habitat and biodiversity management within the SRBMP-I, a US\$125 million IDA credit and grant, which will form the first 5-year stage of a larger Adjustable Programmatic Loan. Activities enabled through GEF funding within the project will strengthen knowledge on the natural ecosystems of the basin, in order to allow this to be fully integrated into basin planning and management activities, and will strengthen the management of remaining natural habitat blocks in a cluster of National Parks, Wildlife Reserves and Forest Reserves. Alongside the parent project, this comprises a comprehensive catchment restoration approach that combines protection

¹ *Addressing Climate Change By Building Social and Ecological Resilience in the Lake Chilwa Basin.* WorldFish, Forest Research Institute of Malawi and Leadership for Environment and Development. For further details, see <http://ongoing-research.cgiar.org/factsheets/addressing-climate-change-by-building-social-and-ecological-resilience-in-the-lake-chilwa-basin/>

of natural habitats with improved land management in production landscapes. The project is therefore entirely consistent with:

- (i) the *Biodiversity Focal Area strategy* (BD#1) in that it will directly improve the sustainability of protected areas, forest reserves and floodplain wetlands covering roughly 3,072 km² (307,200 hectares) and much of the remaining lowland forest and wetland habitats in the lower Shire, and globally significant biodiversity;
- (ii) the *Land Degradation Focal Area strategy* (LD#3) through supporting a cross-sectoral basin planning and management approach that integrates management of natural habitat blocks and responsible agencies including the Department of Parks and Wildlife and the Department of Forestry, and (LD#1) through the substantial investments being made in improved land and water management within agricultural landscapes within the parent project; and
- (iii) the *Sustainable Forest Management Focal Area strategy* (SFM#1) through establishing community-based management within Forest Reserves in the lower Shire, following a nationally developed model. The project will also mainstream biodiversity conservation into landscape planning at both the basin and PA cluster levels.

9. *Relevance to LDCF Strategic Priorities:* The “Lower Shire Valley is vulnerable to floods that have ravaged the social and economic fabric of riparian populations as well as those dependent on their productive well-being for decades”¹. The Lower Shire is more highly impacted by weather-related disasters than any other region in Malawi, and is therefore the most climate-vulnerable area of the nation, at least in the near to medium future. In the last 15 years, there have been at least 6 major flood events that have each displaced at least 50,000 people. The economic impact of floods has not been systematically quantified, but is known to be extensive, resulting from displacement of up to 10% of the population of Chikwawa and Nsanje Districts, disruption of livelihoods, disease, loss of infrastructure, disruption of schooling, and also some loss of life. The Elephant Marsh and related ecosystems make a critical contribution to climate resilience of the local population via flood attenuation and provision of resilient off-farm livelihoods (see Annex 8 for more details), but its sustainability is threatened. Its fisheries are much less productive than previously, and local residents are increasingly being pushed by population pressure and a lack to dry season land to convert areas of the Marshes to agricultures. To improve effectiveness and sustainability, efforts to address these issues would need to be more systematic and based on an improved understanding of the marsh ecosystem and its relationship to climate variability and change and community vulnerability. LDCF funds will enable project activities designed to better understand the dynamics of the Marshes and establish co-management planning and pilot activities that will allow local people to use the wetlands in a more sustainable fashion. This will reduce their own vulnerability (farming within the Marshes is both vulnerable to flooding and extremely dangerous in its own right), as well as safeguarding the role that the Marshes play in protecting the wider population of the Lower Shire from floods. The LDCF support will enable integrated broader community flood resilience program in the lower Shire floodplain also involving flood warning systems, capacity building for community flood response, and small-scale flood protection infrastructure. These activities are fully consistent with the LDCF (CCA#1) objective through reducing vulnerability to extreme climate events.

¹ DNRDM (2008) Analysis of Lower Shire floods & a flood risk reduction and recovery programme proposal.

10. Malawi's NAPA identified 5 key areas for action – (i) community resilience through sustainable rural livelihoods, (ii) improving agricultural production under erratic rains and changing climatic conditions, (iii) restoring forests in the Upper and Lower Shire Valleys and other catchments to reduce siltation and associated water flow problems, (iv) improving preparedness to cope with droughts and floods, and (v) climate monitoring to enhance Malawi's early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources. As part of this Project, the LDCF-financed activities will, in particular, address NAPA priority areas (i) by enhancing flood protection measures under subcomponent C2 with co-management of important wetlands in the lower Shire, improving natural flood attenuation and resilient livelihoods of some of Malawi's most climate-vulnerable people. The overall SRBMP more broadly will contribute to all five NAPA priority areas: to (i), (ii) and (iii) through community land management and agro-forestry activities under Component B; to (iv) through flood preparedness activities under Component C; and to (v) through upgrading hydromet and early warning systems under Component A.

11. Although Malawi's existing NAPA does not refer directly to wetland management, it was produced in 2006, just before some of the largest floods in the country's history re-focused attention on the issue and the first flood risk analyses started to point to the role of Marshes in the hydrology of the system. The multi-donor supported National Program for Management Climate Change in Malawi is refining and detailing adaptation priorities, with considerable emphasis on the assessment options for improving climate resilience through improved land use. Improved management of the Elephant Marshes through more sustainable and resilient livelihoods of local communities is now recognized as a national adaptation priority by both the Environment Affairs Department (which was responsible for drafting the 2006 NAPA) and Development Planning & Cooperation (which is responsible for coordination of the National Climate Change Program. Many of the SRBMP project activities are consistent with emerging national adaptation priorities, including reforestation, increasing agricultural productivity and resilience through SLWM technologies, strengthening hydromet monitoring systems and upgrading water infrastructure for increased storage and flow regulation capacity.

C. Project approach

Baseline Scenario

12. *Routine government programs and existing donor-supported activities:* A previous World Bank supported project supported the development of a management plan at Lengwe National Park, but there was no subsequent investment. Other areas of natural ecosystems in middle to lower Shire, including forest reserves in Neno District, Mangochi Forest Reserve and the Elephant marshes have not benefitted from international support until recently. Chronic underfunding has served to undermine effective management at all these areas. Protected areas suffer from high levels of illegal hunting, encroachment, and forest harvesting for firewood and charcoal and there is considerable room for improvement in relations between park authorities and local communities. UNDP have a very modest amount of GEF funding available to support forestry activities in Mwanza and Neno districts, and it has been agreed with Government that in light of the SRBMP's activities in Neno, the UNDP funds will be concentrated on Thambani Forest Reserve in Mwanza, where they might have a more significant impact. Other than that, however, there is no current prospect for any of the natural ecosystem areas being targeted to receive additional support other than through the SRBMP.

13. *Baseline SRBMP*: The Shire River Basin Management Program (Phase-I) Project (SRBMP-I) has a duration of five and a half years and would: (a) strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems; (b) invest in water related infrastructure that sustainably improves water resources management and development; (c) reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing agricultural productivity and improving livelihoods; and (d) improve flood management in the Lower Shire and provide community level adaptation and mitigation support. Project components are as follows:

Component A: Shire Basin Planning will strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, management and decision support systems through (A1) basin survey and planning, (A2) institutional capacity development of various basin management agencies, (A3) improved hydrological monitoring systems, and (A4) overall project management.

Component B: Catchment Management will reduce erosion in priority catchments and sedimentation and flooding downstream, while enhancing agricultural productivity and improving livelihoods through (B1) development of sub-catchment management plans, guidelines and monitoring systems, (B2) SLWM investments in targeted sub-catchments, and (B3) technical assistance and community grants for more sustainable livelihood activities.

Component C: New Water Investments will invest in water related infrastructure that sustainably improves water resources management and development, and improves flood management in the Lower Shire, providing community level adaptation and mitigation support, through (C1) upgrading of the Kamuzu Barrage for improved regulation of flows in the Shire River, (C2) community flood management in the lower Shire floodplain, and (C3) identification of major new water infrastructure investments.

Scope of Analysis

14. Ecosystem and biodiversity survey and knowledge management activities will cover the entire Shire Basin. Sites selected for management support (profiled in Annex 8) are clustered in two areas providing opportunities for a landscape approach and synergy with other project investments : (1) Liwonde National Park and Mangochi Forest Reserve form a contiguous habitat complex in the Upper Shire and (2) the Neno forest reserves, Lengwe and the Elephant Marshes form part of a cluster of protected areas and habitat blocks in the middle and lower Shire. This complements SRBMP support for livelihoods and forest management in middle Shire where there will be a strong focus on support for livelihood interventions on customary land, including in areas of Neno adjacent to the forest reserves. Strengthening cluster-based management would improve cost-effectiveness by a) enabling the delivery of support packages that benefit multiple sites e.g. of wildlife-based tourism development or support for design and training of community-based NRM approaches, and b) by encouraging the development of resource and experience sharing strategies between sites. This could include cross-sharing of specialist staff resources, equipment and information (e.g. on forest fire surveillance, law enforcement operations and cost-sharing of satellite imagery and forest mapping services).

GEF / LDCF Alternative

15. The goal of GEF and LDCF support will be to strengthen sustainable management of remaining natural systems as part of the basin planning and catchment management approach in the Shire Basin to conserve globally important biodiversity and protect forests and wetlands essential for livelihoods, climate resilience and economic development. The incremental GEF- and additional LDCF activities would provide for the management of ecological infrastructure to be fully mainstreamed within the SRBMP. In all cases, GEF and LDCF financing as relevant will enable incremental and additional natural habitat knowledge or field management activities that will complement, enhance and leverage baseline investments in river basin management, laying the foundation for additional IDA investments in ecological infrastructure during the second phase of the APL. Key activities would: (i) address the current dearth of precise and systematic information on the ecological assets of the Shire Basin, allowing ecological infrastructure to be fully incorporated into basin-wide hydrological modeling, economic analysis and management planning; and (ii) provide proof of concept by investing in sustainable management of a number of habitat areas (especially Lengwe National Park, Liwonde National Park, Mangochi Forest Reserve, Neno Eastern Escarpment Forest Reserve, Tsamba Forest Reserve and the Elephant Marshes wetland system) which combine key biodiversity, watershed and climate functions.

16. **Project Development Objective, incorporating Global Environmental Objective (GEO):** Shire River Basin planning framework developed to improve land and water management for ecosystem and livelihood benefits in target areas.

D. Incremental Activities enabled through GEF and LDCF financing

17. **Component A of the SRBMP: Shire Basin Planning.** The overall aim of the GEF contribution to Component A is to recognize and integrate the role of ecological infrastructure and natural habitat management agencies (particularly the Department of National Parks and Wildlife and the Department of Forestry) within a comprehensive basin management planning and implementation framework. GEF and LDCF incremental resources are lending support only to subcomponents A1 and A2. Project management costs are budgeted under subcomponent A4, but will be entirely covered from IDA resources.

18. Incremental GEF resources (from LD focal area) under subcomponent A1 will provide technical assistance and operating costs for systematic natural habitat and ecological surveys, as well as technical services for the development of knowledge products based on that information. *Key outputs* will include: (i) site-level ecological survey reports for target areas; and (ii) basin-wide ecosystem knowledge products, including maps and a spatial database. The work will begin with collation of existing data, drawing in part on up-to-date vegetation mapping being conducted within the Department of Forestry with assistance from Government of Japan, which should be completed prior to the start of the project. Based on this information, a set of field surveys (and additional remote sensing analysis if necessary) will be structured to fill key knowledge gaps on the Basin's natural assets, involving technical agencies within Malawi and appropriate regional experts. Knowledge products will include a spatial meta-database to collate and provide easier access to ecosystem data, and a set of interpretive products (thematic maps, field guides, analytical reports) highlighting both biodiversity within eco-tourism locations and the broader value of ecological infrastructure to catchment and hydrological functions, and to

livelihoods. The ecological knowledge base will allow the catchment services flowing from ecological infrastructure to be properly evaluated and integrated into the IDA-funded basin knowledge base development, hydrological modeling, economic analyses and basin planning under subcomponent A1. The Ministry Water Development and Irrigation and other implementing agencies are highly receptive to integrating these elements, but currently lack the information base in order to do so.

19. Incremental GEF resources under sub-component A.2 (from LD focal area) will provide for targeted equipment, training and operating (travel) costs to extend capacity building to technical and academic bodies responsible for ecological knowledge generation and management, particularly the National Herbarium and the Forest Research Institute of Malawi. *Key outputs* will include the establishment and maintenance of electronic knowledge management systems, and increased collaborative research activities within forest and ecological research institutes. Activities will be focused on improving information management and sharing through establishing an electronic library at FRIM and installing internationally-used taxonomic database software at the National Herbarium, as well as providing vital field survey equipment and a competitive travel grant facility to support collaborative work with international experts. These investments will strengthen the engagement of key local technical agencies with the development and maintenance of the ecological knowledge base for the Shire Basin. This will also help complement the IDA-financed strengthening of other agencies related to the sustainable development and management of the Shire Basin under this sub-component.

20. **Component B: Catchment Management.** The overall aim of the GEF contribution to Component B is to strengthen management of remaining natural habitat blocks in two key areas of the Shire Basin, within a broader landscape management framework. GEF resources are leveraging support to subcomponent B4, over and above the parent project B1, B2, and B3.

21. Incremental GEF resources from SFM focal area will comprise: (i) technical assistance, training, equipment and operating costs for establishment of community forest co-management within two Forest Reserves covering around 150km² (Neno Eastern Escarpment and Tsamba) in Neno District and customary lands, according to a proven co-management model already endorsed and field-tested in other areas by the Department of Forestry; and (ii) modest investments in technical assistance, training, equipment and operating costs to strengthen planning, zoning, patrolling and monitoring within Mangochi Forest Reserve. *Key outputs* will include (i) community-based forest management agreements established and under implementation in 6 group village areas (including roughly 60 communities); and (ii) 5 sustainable charcoal production licenses issued.

22. Community forestry activities in Neno will form part of an integrated landscape management approach alongside the IDA-funded SLWM investments in surrounding agricultural lands under subcomponent B2. GEF resources will establish organized community management of extensive forest areas within both reserve and customary lands, whilst IDA resources will support comprehensive land use planning, and soil and water management with many of the same communities, as well as the development of sustainable livelihoods, including forest-based livelihoods that will provide a long-term incentive for natural resource management. The investments in Mangochi Forest Reserve recognize its importance as a critical wildlife corridor (not least for Malawi's largest elephant population) linking Liwonde National Park to large habitat blocks within Mozambique, and therefore sustaining the biodiversity and tourism base of surrounding areas. Mangochi is under pressure from encroachment and poaching, and the long-

term goal would be to establish sustainable benefit-sharing and co-management with surrounding communities, building on the limited support the Mangochi District Forestry Office is already giving to community forestry activities in areas around the Reserve. So as not to spread resources too thin, however, activities during the first phase of SRBMP will be limited to establishing some basic planning and management activities, from which to build at a later stage.

23. Incremental GEF resources from BD focal area will allow support to technical assistance, training and equipment to update management planning and to strengthen community relations, and patrolling and monitoring systems at Lengwe National Park, as well as strategic investments in access infrastructure and water-points for wildlife (possibly including small check dams with combined wildlife and erosion control benefits) to improve tourism potential. Liwonde National Park will also receive investments in all-weather stream crossings (to extend access for tourism and management) and some training activities. Incremental GEF resources will also support technical assistance, equipment and training for DPNW to strengthen regional planning and management coordination between protected areas. *Key outputs* will include (i) key tourism infrastructure provided and patrolling & monitoring systems strengthened in Lengwe and Liwonde; and (ii) Lengwe and lower Shire PA cluster management plans updated, including assessments of extension of conservation concession model, tourism development for sustainable financing and establishment of benefit-sharing arrangements.

24. Adopting a cluster-based approach offers opportunities for more cost-effective management strategies since resources can be shared and coordinated, and knowledge shared not just between DNPW sites, but also with DoF and knowledgeable NGOs involved in protected area management in the Shire, including the Mulanje Mountain Conservation Trust and African Parks. The main themes for these coordination and knowledge-networking activities would be: (i) development of a regional tourism strategy that links and markets various nature-based attractions in the Shire Basin together; (ii) sustainable financing, analyzing the potentials of tourism revenues and both tourism and management concessions¹; and (iii) development of regular benefit-sharing arrangements, building on existing activities at Majete and a recently-established community fund at Liwonde, and exploring potentials and initial relationship building activities to extend similar arrangements to areas such as Lengwe.

25. ***Component C: Water Related Infrastructure.*** The overall aim of the LDCF contribution to Component C is to establish the knowledge base and partnerships for long-term sustainable management of the Elephant Marshes as a vital component of climate resilient development. LDCF resources are lending support to only sub-component C.2.

26. Additional LDCF resources will support technical assistance, training, equipment and operating costs, and small community-assistance investments to establish participatory planning and initiate co-management activities for reducing flood risk via maintaining the hydrological functions of the 1200km² Elephant Marshes. *Key outputs* will include a management strategy for the Elephant Marshes and completion of pilot community management activities in 6 group village areas. Given the inaccessibility of and lack of information on the Marshes, significant investments will need to be made in initial analyses of ecology, hydrology and threats to the Marshes, as well as in the logistics of gaining regular access to them. The project will establish participatory management plans and pilot sustainable natural resource management systems with

¹ Malawi's first Park management concession has been awarded to Africa Parks to run the Majete Wildlife Reserve in the middle Shire, and this has provided a successful model to date, which DNPW is interested in extending.

local communities, which may also integrate support from the regional nature-based tourism planning under sub-component B.4. This will pave the way for future investments, not least through the second phase SRBMP and potentially gazettement of the wetlands within the Malawian protected areas system¹ that can help sustain the marshes as an instrument of climate resilience for future generations. Management of the wetlands will complement IDA-funded community preparedness and protective infrastructure investments within sub-component C.2 to form a comprehensive flood resilience program that integrates community preparedness, physical and ecological infrastructure investments, as well as enhancing natural-resource dependent livelihoods (e.g. fisheries, hunting, reed harvesting and potentially tourism).

27. ***Implementation of Components.*** Component A will be implemented by the Multi Sectoral Technical Team housed in the Ministry of Water Development and Irrigation, which has overall management responsibility for the project, with guidance from a technical sub-committee that will bring together natural habitat management agencies, as well as specialized NGOs and research institutions.

28. GEF and LDCF-supported activities under Components B & C will be implemented by DNPW within national parks and the Elephant Marshes, and by DoF within forest reserves, working with villages through the Village Natural Resource Management Committees (VNRMC) wherever appropriate. In the Elephant Marshes, DNPW has overall responsibility for management of the ecosystem, but would work closely with the Department of National Relief and Disaster Management, as well as NGOs working on community resilience.

29. The project will strengthen VNRMCs, and other relevant institutions such as producer associations and Civil Protection Committee (CPCs). Implementing agencies will be supported by long-term international and national advisors focused on protected area management and community participation respectively, as well as a range of specific technical assistance inputs. DNPW's regional presence and mandate will also allow them to facilitate coordination and cross-support across different conservation sites in the Shire, for example on training, use of spatial imagery, production of interpretive materials and development of a nature-based tourism strategy. Coordination and knowledge networking will also draw in a number of capable non-governmental organizations working on sustainable management of biodiversity, particularly those already working on site-based management of important wetland and terrestrial ecosystems, including the Mulanje Mountain Conservation Trust, LEAD International, the World Fish Center and African Parks.

E. Incremental and Additional value added by GEF & LDCF funding

30. Investments will significantly contribute to the river basin management objectives of the SRBMP and therefore hydrological regulation of an important branch of the Zambezi river system. They will provide additional global environmental benefits in the form of conservation of globally significant biodiversity, development of a promising and largely indigenous model for community management of East African forests, and maintenance of substantial carbon stocks, particularly the intact natural habitats of the cluster of sites that would be targeted in the

¹ DNPW intend to prepare a proposal for designation of the Elephant Marshes as a Ramsar Site. Under national protected areas legislation, the site could also be formally gazette as a Community Conservation Area.

lower Shire – comprising 3,027 km² of carbon-rich forests and wetlands which might otherwise be lost or degraded through land clearance, encroachment and erosion.

31. The GEF and LDCF investments represent particular value for money in that they will mainstream an ecological infrastructure approach within a much larger project, leveraging other phase 1 project resources and laying the groundwork for additional support under phase 2 of the intended APL. GEF and LDCF investments will specifically add value in terms of the following results:

- 1) *All relevant government agencies collaborating on SLWM in the Shire Basin through establishment of Basin management plan and framework, via*
 - Establishing a systematic knowledge base to identify the extent and locations of the ecosystem assets of the Shire Basin.
 - Development of a quantitative understanding of the role and value of natural ecosystems in maintaining Basin functions, hence providing a basis for (i) engaging natural ecosystem management agencies more fully in the Basin planning process and management support, and (ii) more efficient Basin management outcomes.
- 2) *43,700 ha of forest reserves under improved management, contributing an estimated enhancement of carbon storage of 2,400,000 t CO₂ equivalent, via*
 - Establishment of community forestry in 111 km² of forest reserves and extensive surrounding forests on customary lands in Neno District, providing for more enhanced livelihoods.
 - Strengthening basic protected area management systems (patrolling, monitoring, planning) in Mangochi, Neno Eastern Escarpment and Tsamba Forest Reserves.
- 3) *1,440 km² of protected areas under improved management, via*
 - Strengthening basic protected area management systems (patrolling, monitoring, planning) in Lengwe National Park.
 - Strengthening community engagement in sustainable management of Liwonde and Lengwe National Parks. Project technical assistance will support the implementation of the community development fund established to benefit 31 natural resources committees around Liwonde National Park, which will help galvanize efforts to improve relationships between the Park and local communities, help address wildlife human conflicts around the park and forest reserve, and provide a basis for long-term sharing of tourism revenues for re-investment in local development activities. Park authorities at Lengwe will also develop ways of better engaging local communities in park management, including through enforcement efforts, tourism guiding, habitat management and through construction and maintenance of trails, check dams and other infrastructure. Taken together, these approaches should contribute to improved relationships between Park authorities and local communities, will introduce new livelihood options for local residents around the Park boundary and ultimately should reduce pressures on the Park's natural resources.
 - Strengthening nature-based tourism within the Basin through: (i) investments to boost reliable access, water supply and wildlife carrying capacity in Lengwe and Liwonde; (ii) coordinated planning and marketing of multiple attractions with the region; (iii) development of guides and interpretation materials aimed at enriching tourist experience, based on the new biodiversity information base; and analysis of the potential for tourism to play a larger role in the sustainable financing of protected area management and community benefits, including potential extension of the successful management concession model beyond Majete Wildlife Reserve.
- 4) *Establishment of integrated flood management measures (early warning systems, small-scale infrastructure, wetland management, resilient livelihoods), via*

- Establishment of community-based wetland management within the 1,200 km² Elephant Marshes to enhance both their hydrological function for flood attenuation, and their potential for supporting climate-resilient livelihoods in the form of fisheries, tourism, etc. based on an improved understanding of the marsh dynamics and measures to promote their conservation.

32. These results would be an extremely useful contribution to, and a very useful complement to, overall project themes related to the enhancement of information, institutions, and investments in the Shire Basin as actions towards achieving the SRBMP PDO/GEO.

33. Women play a key role in management of a number of natural resources, including water and fuel wood collection and transport. Improved management of these resources will therefore be particularly beneficial to women, and the GEF/LDCF activities will follow gender-sensitive approaches developed under the main project.

34. The main stakeholders at local level will include communities that depend on forest and wetland resources in and around Mangochi and the Neno Forest Reserves, Liwonde National Park, Lengwe National Park and the Elephant marshes. These communities are mostly smallholder farmers with high dependency on natural resources and with limited access to basic services. It is envisaged that other parks and reserves will benefit indirectly since the project should diversify the options available for wildlife-based tourism in the middle and lower Shire Valley. Shire floodplain communities around the Elephant Marshes are particularly vulnerable due to the impact of recurrent floods. A number of NGOs are already working in this area, providing largely palliative support in the face of flood impacts. The project should help to direct this effort towards longer term solutions based on flood and livelihood resilience.

35. Private sector investors in wildlife-based tourism, including tour operators in Blantyre and concession holders such as African Parks (who manage Majete Wildlife Reserve adjacent to Lengwe) see this as an opportunity and are expected to contribute guidance and expertise. The approach in Lengwe will be to provide the basic tourist infrastructure (e.g. visitor information center, access tracks, water points) that will attract co-investment from the private sector in accommodation and tour facilities, and potentially even pave the way for a park management concession, as has been successfully implemented at Majete. Private sector partners should also provide means through which Liwonde and Lengwe National Parks and the Elephant Marshes can be better marketed to regional, national and international visitors.

Incremental Cost

36. Of the total \$125m IDA credit in support of the Shire River Basin Management Program (Phase-I) Project, approximately \$67m is expected to be utilized as direct co-financing of investments and technical assistance for the GEF and LDCF financed activities. Only the Government and community contributions to co-financing of the GEF/LDCF activities are included in the tables below. Hence the totals are lower than for the Government / community co-financing of the entire project shown in section IIIB of the PAD main text, which includes project activities not considered as direct GEF/LCF co-financing, such as rehabilitation of the Kamuzu Barrage. The baseline cost for activities is roughly US\$ 73 million and the GEF/LDCF alternative has been estimated at US\$79.346 million. These figures are budget figures, showing the incremental activities and objectives enabled with the GEF/LDCF co-financing. GEF and LDCF resources will be fully blended with the IDA financing for the project in the relevant disbursement category for project activities.

Table 1: Incremental Cost Matrix

Component	Category	Estimated Expenditures (US\$ million)	Local Benefit	Global Benefit
A. Shire Basin planning	Baseline scenario	IDA: 25.285 GoM: 1.234	Strengthened capacity of government agencies involvement in land and water management.	Improved planning and monitoring for management of a major part of the Zambezi basin.
	GEF/LDCF alternative	GEF: 1.082 IDA: 25.285 GoM: 1.234	Knowledge of Shire natural ecosystems significantly improved and incorporated into basin planning, leading to more effective basin management outcomes.	Future basin management investments provide much stronger environmental co-benefits in terms of enhancement of forests, carbon stocks and globally significant and biodiversity
	Increment	1.08		
B. Catchment management	Baseline scenario	IDA: 31.079 GoM: 1.643 Benef: 1.555	Land management investments focused solely on production landscapes. Only basic management activities funded in Liwonde, Lengwe & Mangochi Forest Reserve.	Some enhancement of carbon stocks, and regulation of international hydrological basin.
	GEF/LDCF alternative	GEF: 3.996 IDA: 31.079 GoM: 1.643 Benef: 1.791	More sustainable management of Lengwe & Liwonde NPs provides basis for increased tourism. Community forestry in Neno FRs provides for sustainable local use of forest resources.	Biodiversity management in Lengwe NP and Liwonde NP enhanced by increased park revenues, and safeguarding landscape connectivity. Improved conservation of protected areas provides much significant contribution to safeguarding biodiversity and carbon stocks.
	Increment	4.20		
C. Water-related infrastructure	Baseline scenario	IDA: 10.715 GoM: 0.277 Benef: 0.544	Community flood resilience increased via small infrastructure and response preparedness.	Community flood resilience increased via small infrastructure and response preparedness.
	GEF/LDCF alternative	LDCF: 1.500 IDA: 10.715 GoM: 0.277 Benef: 0.744	Climate resilience enhanced via management of wetland for natural flood attenuation and sustainable livelihoods.	Climate resilience enhanced via management of wetland for natural flood attenuation and sustainable livelihoods.
	Increment	1.70		
Total	Baseline scenario	IDA: 67.079 GoM: 3.154 Benef: 2.099		
	GEF/LDCF Alternative	GEF: 5.078 LDCF: 1.500 IDA: 67.079 GoM: 3.154 Benef: 2.535		
	Increment	6.578		

F. Role of Cofinancing

Table 2: GEF/LDCF Alternative - Breakdown of Funding sources by components (US\$ million)

Financing Plan								
Components	GEF LD	GEF BD	GEF SFM	LDCF	IDA	GoM	Community	Total
A. Shire Basin planning	1.082				25.285	1.234		27.601
B. Catchment management		2.727	1.269		31.079	1.643	1.791	38.509
C. Water-related infrastructure				1.500	10.715	0.277	0.744	13.236
Total	1.082	2.727	1.269	1.500	67.079	3.154	2.535	79.346

G. Donor Coordination

37. Component 1 of the SRBMP will support the establishment of a basin management entity on which the key central line ministries will be represented, and which will engage other key stakeholders, including traditional authorities, local authorities at district and regional level and civil society organizations. The precise design of this entity will be detailed during early project implementation, but its duties will include ensuring alignment of government policies and plans with overarching Shire Basin management plans, and complementarity of donor-supported activities, through establishing more systematic site-selection protocols and sharing of lessons. There are several current and planned rural livelihoods and environmental management projects within the Shire Basin, including the UNDP Sustainable Land Management Project, the FAO Food Security and Sustainable Rural Livelihoods Project, the EU Improved Forest Management for Sustainable Livelihoods Program, the JICA Community Vitalization and Afforestation project, and planned catchment management investments in the upper Shire by the Millennium Challenge Account. A coordination structure for the middle and lower Shire protected areas (wildlife and forest reserves) cluster will also be established to improve collaboration between the Department of Parks and Wildlife and the Department of Forestry, as well as with NGO and private sector entities involved in protected areas management, such as the Mulanje Mountain Conservation Trust, the Malawi Environmental Endowment Trust, and African Parks.

38. A number of related activities focus more specifically on climate change within Malawi. Management planning for the Elephant Marshes will learn lessons from the ongoing Lake Chilwa Basin Climate Change Adaptation Program, which covers the only part of southern Malawi outside of the Shire Basin, and includes community management of extensive wetland resources. DfID and IrishAID are developing a community climate resilience fund, which will be national and demand-driven in scope, but (given the population's vulnerability) is expected to focus largely on the lower Shire Floodplain, and should help to align the efforts of locally active NGOs with the longer-term community resilience approach being pursued under the SRBMP. The project will also coordinate with the upcoming Climate Adaptation for Rural Livelihoods and Agriculture project, financed through the AfDB, and the Climate Proofing Local

Development Gains project, for which UNDP is applying for LDCF funds. Both projects will focus on rural community vulnerability assessment and adaptation in limited parts of the Shire Basin, with field interventions likely to be focused on climate-smart agriculture. They will therefore form part of the general experience with sustainable land management in the Shire Basin which the SRBMP aims to collate and draw from. More broadly, the preparation of the SRBMP is closely coordinated with assessment of land use options and strengthening of the climate information base under the National Program for Management Climate Change in Malawi (CCP). The CCP (along with UNDP's related activities under the Africa Adaptation Program) is coordinating key climate agencies (primarily the Ministries of Development Planning & Cooperation, Natural Resources, Energy & Environment, and Irrigation and Water Development) and develop partners (UNDP, WB, FAO, DfID, Norway) to identify more detailed and actionable adaptation and mitigation investment, and potentially lay the basis for a climate SWAp. Coordination will ensure that the SRBMP and LDCF-funded activities responds to the most up-to-date national adaptation priorities.

39. The coordination of hitherto piecemeal land, natural resources and biodiversity management projects into an integrated basin management approach is a key outcome of the SRBMP, and critical to the subsequent scale-up of catchment management to effect significant impact on the hydrology of the Shire. Before the long-term basin management entity is established, coordination between agencies and with other projects and programs will be the responsibility of the project coordination unit in the Ministry of Irrigation and Water Development.

40. It is expected that the nature of this long-term Program on the Shire Basin that the country is embarking upon will be such as to strengthen the core relevant institutions to help develop a shared vision for the development and management of the basin. This will include putting in place the knowledge base, analytical tools, institutional coordination and stakeholder consultation mechanisms to help design, implement, monitor, and learn collectively from activities across a range of development sectors and financed by several development partners in the Basin.

Annex 10: Letter of Sector Policy

MALAWI: Shire River Basin Management Program (Phase-I) Project

Tel. No. (265) 01 778 513
Fax No. (265) 01 788 216



Ministry of Agriculture,
Irrigation and Water
Development
Capital Hill
P.O. Box 30134
Lilongwe
MALAWI

MINISTER OF AGRICULTURE, IRRIGATION AND WATER DEVELOPMENT

Ref. No. IWD/Conf/11/34

18th January, 2012

Country Manager for Malawi,
African Region,
The World Bank,
Mulanje House, City Centre,
P.O. BOX 30557,
Lilongwe 3.



Dear World Bank Country Manager,

Letter of Sector Policy

As you know, the Shire River Basin is critical for Malawi's economy and for the livelihoods of its dense population. There is a need for a new, collaborative long-term vision and enabling institutional and policy environment for a multi-sectoral approach to effectively and sustainably develop and use the Basin's resources.

The Basin faces several challenges, including degraded catchments that not only reduce upstream productivity, but also cause sedimentation and weed problems downstream for example in the river's hydropower generation stations that generate practically all the electricity in the country. The Lower Shire is subject to the most significant flooding in the country. The high vulnerability to climate variability is expected to be exacerbated by climate change. In addition, future water demands are projected to increase substantially, and competition for water across sectors and regions is expected to increase. Water quality concerns are on the rise, and aquatic biodiversity is threatened. Proposed water investments need to be considered in a holistic basin framework to ensure compatibility and viability.

In addition, there are many opportunities for us to benefit from the Shire Basin's resources. The Kamuzu Barrage, perhaps our country's most critical piece of water infrastructure given the critical role it plays in the country's electricity generation, irrigation, and water supply, is in urgent need of upgrading. In addition, the Basin requires a number of investments to improve its ability to provide and sustain water-related services. Well-managed watersheds could provide benefits both to upstream communities and downstream infrastructure. Climate resilience could be improved to protect communities both from drought and floods and better prepare for the additional uncertainties of climate change. System operations could be better coordinated and based on the best available information. Potential water conflicts could be reduced with an appropriate Basin planning framework and strengthening our water entitlement system. There are also opportunities to improve the environmental benefits from water resources management through consideration of environmental flows, ecosystems, and land and water sustainability.

We are committed to address the Shire River Basin's evolving challenges and realize its true potential for the benefit of Malawi and its growing population. However, we realize that this will be a long journey that cannot be addressed through just one short intervention, and will require many interventions over a long timeframe.

A set of phased activities over a 15-year timeframe is proposed on the Shire Basin to help work on information, institutional, and infrastructure aspects that would help improve the Basin development and management for significant progress in achieving socially, environmentally and economically sustainable development in the Shire Basin. An integrated approach/program would establish coordinated inter-sectoral development planning and coordination mechanisms, undertake the most urgent water related infrastructure investments, prepare additional infrastructure investments, and develop up-scalable systems and methods to rehabilitate sub-catchments and protect existing natural forests, wetlands and biodiversity. In the mid-term Basin planning would be consolidated and investment in Water Resources Investments and catchment rehabilitation for sustainable natural resource management and livelihoods would need to be upscaled.

We intend to strengthen three critical areas as part of a more comprehensive approach in our Shire River Basin Program:

- **Information:** Improving the knowledge base for planning, improve real-time hydro-meteorological monitoring, forecasting and early warning.

- ***Institutions & Policy:*** Strengthening the capacity of water and land related institutions as well as improved mechanisms for coordination, including a Shire Basin institution and supporting policies to improve shared-vision planning and management across sectors.
- ***Investments:*** Upgrading the Kamuzu Barrage; watershed management; and preparation and implementation of new investments to optimize the use of the Shire's resources.

This approach is aligned with the Malawi Growth and Development Strategy (MGDS) II, which sets out a strategy with respect to sustainable economic growth, social development, social support and disaster risk management, infrastructure development, improved governance, and cross-cutting issues. The Shire Basin plays a key role in helping realize the MGDS II's goals. The project also addresses priorities identified in the Malawi National Biodiversity Action Plan and for climate change – the National Adaptation Plan of Action (NAPA).

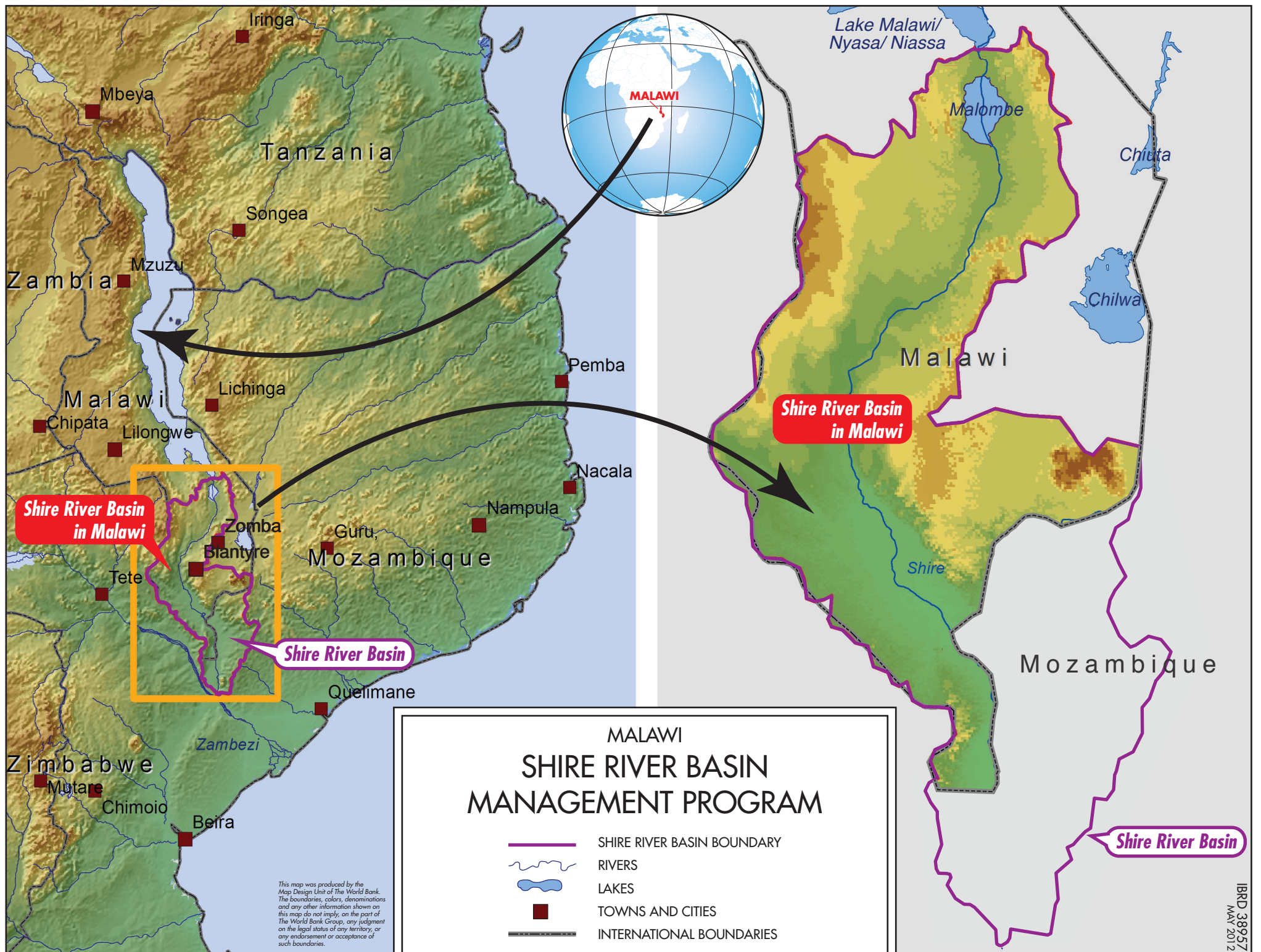
We are confident that with such a systematic and targeted approach, we can help provide a range of benefits to our future generations while reducing and managing evolving challenges in the Basin.

We are grateful to the World Bank for the proposed Shire River Basin Management Program to support us in our journey along this long path. As you know, we have already demonstrated our commitment to a multi-disciplinary approach in this regard by assembling a team from across many agencies in support of preparing and implementing this program. We further look forward to working closely with the Bank to help us realize our vision of a Shire Basin that is appropriately developed and managed to provide sustainable economic, social, and environmental benefits for our people.

Regards,



Hon. Professor P. Mwanza, MP



Iringa

Mbeya

Tanzania

Songea

Zambia

Mzuzu

Lichinga

Pemba

Lake Malawi/
Nyasa/ Niassa

Malombe

Chituta

Chilwa

Malawi

Shire River Basin
in Malawi

Shire River Basin
in Malawi

Nacala

Nampula

Mozambique

Shire River Basin

Zomba

Guru

Blantyre

Shire

Mozambique

Quelimane

Shire River Basin

Zambezi

Zimbabwe

Mutare

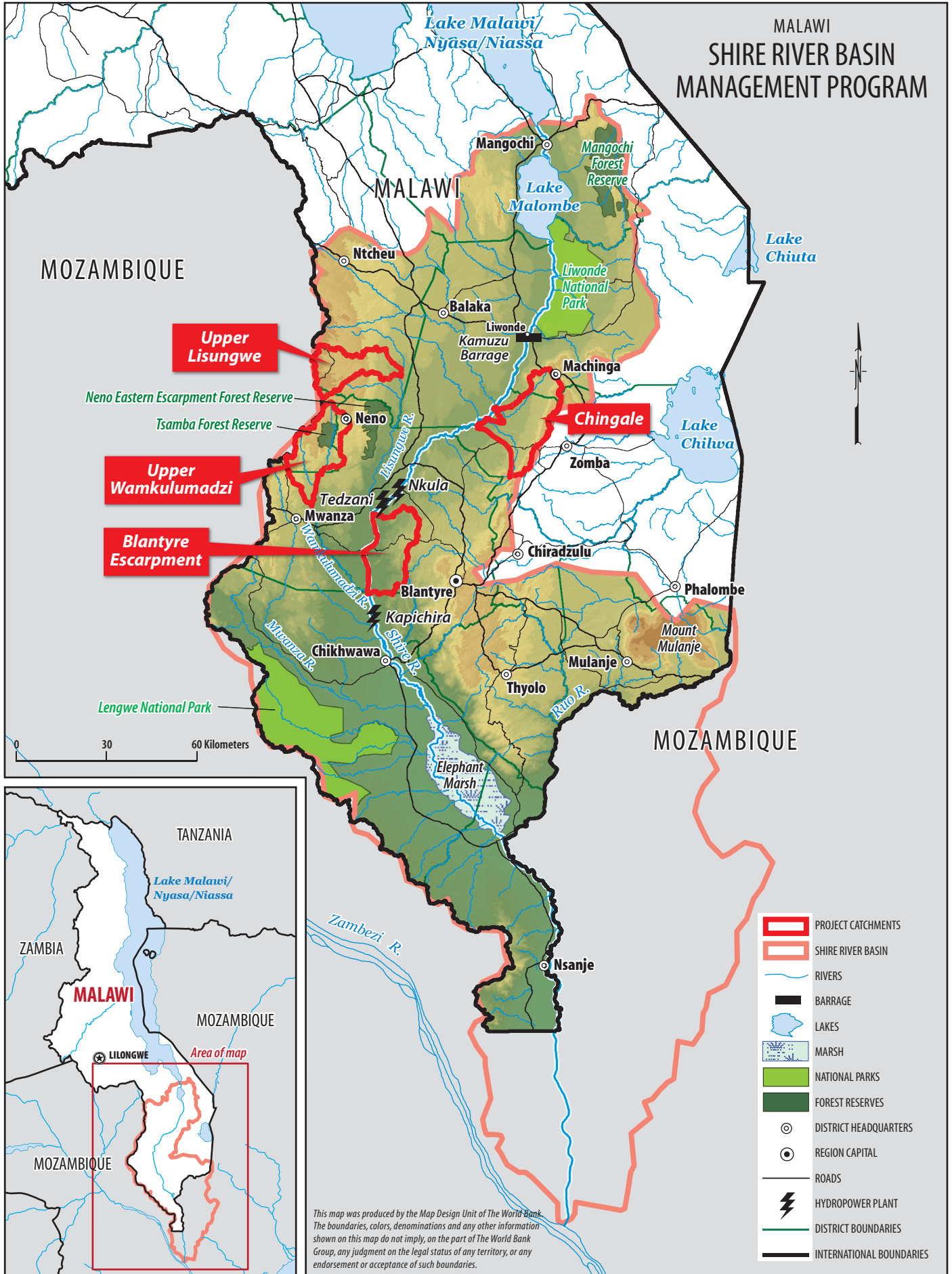
Chimoio

Beira

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IBRD 38957
MAY 2012

MALAWI SHIRE RIVER BASIN MANAGEMENT PROGRAM



0 30 60 Kilometers



- PROJECT CATCHMENTS
- SHIRE RIVER BASIN
- RIVERS
- BARRAGE
- LAKES
- MARSH
- NATIONAL PARKS
- FOREST RESERVES
- DISTRICT HEADQUARTERS
- REGION CAPITAL
- ROADS
- HYDROPOWER PLANT
- DISTRICT BOUNDARIES
- INTERNATIONAL BOUNDARIES

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