

Application of the **Hydropower Sustainability Assessment Protocol** in the Zambezi River Basin

Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized

Public Disclosure Authorized



Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin

© 2018 International Bank for Reconstruction and Development / The World Bank
Telephone: 202-473-1000; Internet: www.worldbank.org
1818 H Street NW, Washington, DC 20433

Disclaimer

This work is a product of the staff of The World Bank with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

The report reflects information available up to May 31, 2018.

Rights and Permissions

The material in this work is subject to copyright. Because The World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for noncommercial purposes as long as full attribution to this work is given.

Please cite the work as follows: World Bank. 2018. "Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin." World Bank, Washington, DC.

Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; e-mail: pubrights@worldbank.org.

Cover photo: Trees and clouds reflected in the water of the Zambezi River, Namibia. ©EcoShot. Used with permission.

Cover design: Bill Praguski, Critical Stages, LLC.

Contents

<i>Acknowledgments</i>	vii
<i>Executive Summary</i>	ix
<i>Abbreviations</i>	xiii
Chapter 1 Introduction	1
1.1. Background	1
1.2. Program Objectives	3
1.3. The Hydropower Sustainability Assessment Protocol	4
Chapter 2 Program Description	11
2.1. Program Objectives	11
2.2. Assisted Self-Assessment	11
2.3. Participating Operators and Projects	13
2.3.1. ZESCO and the Itezhi-Tezhi Hydropower Project	13
2.3.2. The Zambezi River Authority and the Batoka Gorge Hydroelectric Scheme	14
2.3.3. Hidroeléctrica Cahora Bassa and Cahora Bassa North	15
2.4. Program Activities and Schedule	17
2.4.1. Inception	19
2.4.2. Introduction Workshop	19
2.4.3. In-Depth Training	19
2.4.4. Self-Assessments	19
2.4.5. Reporting	20
2.4.6. Experience-Sharing Workshops	21
2.4.7. Action Planning	21
2.4.8. Questionnaire Survey	21
2.4.9. Basin-Level Reporting Tool	22
2.4.10. Official Assessment of Cahora Bassa Hydroelectric Scheme	22
Chapter 3 Objectives and Process for the Self-Assessments	23
3.1. Self-Assessment Process for ZESCO–Itezhi-Tezhi Hydropower Project	23
3.2. Self-Assessment Process for the Zambezi River Authority–Batoka Gorge HES	23
3.3. Self-Assessment Process for Hidroeléctrica de Cahora Bassa–Cahora Bassa North	25
Chapter 4 Program Results	27
4.1. Self-Assessments	27
4.1.1. Preparation Stage Tool	27
4.1.2. Operation Stage Tool	27

4.1.3. <i>Results by Topic</i>	29
Communications and Consultation (P-1 / I-1 / O-1)	29
Governance (P-2 / I-2 / O-2)	31
Demonstrated Need and Strategic Fit (P-3)	32
Siting and Design (P-4)	33
Environmental and Social Impact Assessment and Management / Issues Management (P-5 / I-3 / O-3)	33
Integrated Project Management (P-6 / I-4)	34
Hydrological Resource (P-7 / O-4)	35
Asset Reliability and Efficiency (O-5)	36
Infrastructure Safety (P-8 / I-5 / O-6)	36
Financial Viability (P-9 / I-6 / O-7)	37
Project Benefits (P-10 / I-7 / O-8)	38
Economic Viability (P-11)	39
Procurement (P-12 / I-8)	40
Project-Affected Communities and Livelihoods (P-13 / I-9 / O-9)	41
Resettlement (P-14/I-10/O-10)	42
Indigenous Peoples (P-15/I-11/O-11)	42
Labor and Working Conditions (P-16/I-12/O-12)	43
Cultural Heritage (P-17 / I-13 / O-13)	43
Public Health (P-18 / I-14 / O-14)	44
Biodiversity and Invasive Species (P-19 / I-15 / O-15)	45
Erosion and Sedimentation (P-20 / I-16 / O-16)	46
Water Quality (P-21/I-17/O-17)	47
Reservoir Planning / Filling / Management (P-22 / I-19 / O-18)	48
Downstream Flow Regimes (P-23 / I-20 / O-19)	48
Climate Change Mitigation and Resilience (P-23/I-21/O-20)	49
4.1.4. <i>Gap Analysis of Project Performance</i>	53
4.2. Official Assessment–Cahora Bassa Hydroelectric Scheme	53
Chapter 5 Improving Development and Operation of Hydropower in the Zambezi	55
5.1 Action Planning at the Project Level	55
5.2. ZESCO and the Itezhi-Tezhi Hydropower Project (Self-Assessment)	56
5.3. ZRA and the Batoka Gorge Hydroelectric Scheme (Self-Assessment)	56
5.4. HCB and the Cahora Bassa North Bank Power Station (Self-Assessment)	58
5.5. Official Assessment of the Cahora Bassa South Bank Power Station	60
5.6. Action Planning at the Basin Level	62
5.6.1. <i>Consultative Mechanisms for Improving Communications</i>	62
5.6.2. <i>Infrastructure Safety</i>	63

5.6.3. <i>Optimization of Operations</i>	64
5.6.4. <i>Basin-Level Reporting Tool</i>	65
Chapter 6 Conclusions, Lessons Learned, and Recommendations	69
6.1. Conclusions	69
6.2. Lessons Learned	69
6.2.1. <i>Auditing or Self-Assessment?</i>	69
6.2.2. <i>Objectivity and Enhancing Capacity</i>	71
6.2.3. <i>Dedicated Effort and Resources</i>	72
6.2.4. <i>Importance of Information and Engagement</i>	73
6.2.5. <i>A Program Approach or Not?</i>	73
6.3. Recommendations	74
6.3.1. <i>Recommendations for Operators</i>	75
6.3.2. <i>Recommendations for Regional Actions</i>	75
6.3.3. <i>Recommendations on Further Development and Application of the Protocol</i>	76
Appendix A Project and Basin Level Reporting Tools	79
Appendix B Survey Questionnaire	83
Appendix C Summarized Survey Results	87
Appendix D Interview Guidance for Protocol Assessments	93
References	97
Boxes	
1.1. Ways of Using the Protocol	5
1.2. The World Bank and the Hydropower Sustainability Assessment Protocol	8
6.1. Results of Participants Survey	70
B.1 Survey Questionnaire for Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin	83
Tables	
1.1. Topics in the Tools of the Protocol	6
2.1. Details of Projects Included in the Self-Assessments	12
2.2. Key Program Events	18
2.3. Training Course Agenda	20
3.1. Participants and Overview of Assessments	24

4.1. Results of Assisted Self-Assessments	28
4.2. Topics Meeting Basic Good Practice	50
4.3. Topics with Gaps Against Basic Good Practice	51
5.1. Action Plans to Address Significant Gaps: ZESCO–Itezhi-Tezhi	57
5.2. Action Plans to Address Significant Gaps: ZRA–Batoka Gorge	59
5.3. Action Plans to Address Significant Gaps: HCB–North Bank Extension	61
5.4. Zambezi River Basin Hydropower Sustainability Reporting Tools	67
A.1. Zambezi Basin Sustainability Reporting Tool	79

Figures

1.1. Hydropower Resources in the Zambezi River Basin	3
1.2. Tools of the Hydropower Sustainability Assessment Protocol	4
1.3. Topics for Early Stage Tool	7
1.4. Relative Rigor of Protocol Uses	8

Photos

2.1 Itezhi-Tezhi Spillway	13
2.2 Site of the Batoka Gorge HES	15
2.3 Downstream Face of Cahora Bassa Dam	16
4.1 Cahora Bassa Post-Assessment Workshop	29
4.2 Community Interviews for Batoka Gorge HES Self-Assessment	30

Map

1.1 Hydropower Facilities in the Zambezi River Basin	2
--	---



Acknowledgments

This Technical Assistance is part of a broader World Bank program of support in the Zambezi River Basin. The program provides regional financing and analytical work that brings together the various commitments within a World Bank-financed portfolio to facilitate dialogue among the Riparian States and further strengthen the cooperative development and management of water resources in support of sustainable, climate-resilient growth.

The Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was led by a team from the World Bank Global Water Practice, including: Marcus Wishart (Team Leader and Senior Water Resource Specialist), Kimberly Lyon (Co-Team Leader and Water Resources Analyst), Cecil Nundwe (Water Resources Specialist), and Rikard Liden (Senior Hydropower Specialist).

Technical services for the program were provided by the International Hydropower Association, led by Doug Smith (Accredited Assessor) and including Aida Khalil (Accredited Assessor), Frank Faraday (Sustainability Program Manager), Joao Costa (Sustainability Specialist), and Cameron Ironside (Former Sustainability Director).

The Joint Operations Technical Committee of Zambezi River Basin Water Resources Managers and Dam Operators (ZAMDO-JOTC) is acknowledged for providing a forum for regional collaboration on issues relating to hydropower sustainability in the Zambezi River Basin. The program was only possible because of the interest and enthusiasm of the members of the ZAMDO-JOTC, including the participating dam operators: the Zambezi River Authority, ZESCO, and Hidroeléctrica Cahora Bassa, along with other contributing stakeholders in the basin, including: the Zambian Water Resources Management Authority (WARMA), Zimbabwe Power Company (ZPC), Zimbabwe National Water Authority (ZINWA), Administração Regional de Águas do Zambeze (ARA-Zambeze) in Mozambique, and the Zambezi Watercourse Commission (ZAMCOM) Secretariat.

The team from the Zambezi River Authority who participated in the training and carried out the self-assessment for the Batoka Gorge Hydroelectric Scheme comprised Boniface Mfula (Senior Manager, Water Resources and Environmental Management), Pherry Mwiinga (Hydrologist), Mavis Nawa (Water Resources Office), Chrispin Namakando (Water Resources Engineer), and Samuel Mwale (Hydrologist Technician), with the support and guidance of Munyaradzi Munodawafa (Chief Executive) and Christopher Chisense (Director, Water Resources and Environmental Management).

The team from ZESCO who participated in the training and carried out the self-assessment for the Itezhi-Tezhi Hydropower Project comprised Sonny Musakabantu (Senior Environmental Scientist), Robam Musonda (Principal SHEQ Officer), Temwani Chirwa (Economist), Andrew Mabula (Hydrologist), and Shepherd Ndhlovu (Hydrologist), with the support and guidance of Romas Kamanga (Senior Manager, Generation Support Services) and Kale Prabhakar (Chief Executive Officer, Itezhi-Tezhi Hydropower Station).

The team from Hidroelétrica Cahora Bassa who participated in the training and carried out the self-assessment for the Cahora Bassa North Project comprised Aida Mabjaia (Deputy Manager), Adelino Manuel (Head of Health and Safety Department), Binte Insa (Environmental Officer), Bruno Matsinhe (Dam Safety Coordinator), Celma Cuaira (Head of Operation Department), Chico João (Maintenance Engineer), David Chirindza (CBN Management Unit Coordinator), Edite Nhantumbo (Environmental Officer), Ivo Pene (Legal Counsel), Ilídio Tembe (Dam Safety Engineer), José Matola (Senior Hydrologist), Jeremias Manjate (Head of Mechanical Maintenance Department), Nico Savaio (Environmental Officer), Pamella Saunguene (Senior Buyer), Pedro Conhaque (Community Liaison Officer), and Rosaque Guale (Senior Hydrologist), with the support and guidance of Nelson Beete (Executive Director).

The team wishes to thank SWECO and the team of Accredited Assessors who conducted the official assessment of Cahora Bassa South: Bernt Rydgren (Lead Assessor and Principal Environmental Consultant, SWECO International and Energuide AB), Doug Smith (Accredited Assessor and Independent Consultant), and Simon Howard (Accredited Assessor and Senior Environmental Consultant, Mott MacDonald).

The World Bank team thanks William Rex (Lead Water Resources Specialist) for his review and guidance, along with the peer reviewers who provided feedback on the draft Program Report: Ruth Tiffer-Sotomayor (Senior Environmental Specialist), Chris Saunders (Senior Energy Specialist), and Pravin Karki (Senior Hydropower Specialist).

This Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was made possible by a grant from Sweden to the Kariba Dam Rehabilitation Project, administered by the World Bank, and the Water Partnership Program as part of the broader Zambezi River Basin Program convened through the multi-donor trust fund for Cooperation in International Waters in Africa (CIWA).



Executive Summary

The objective of the technical assistance program on the “Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin” was to assist the Riparian States in development and utilization of the hydropower potential of the basin in a sustainable and responsible way.

The Hydropower Sustainability Assessment Protocol is a methodology for measuring sustainability of hydropower projects across a range of more than 20 environmental, social, technical, and business topics. The program sought to promote the development and use of the Protocol as a guiding framework for sustainability that can help balance mutual dependencies among different water users across the basin. This was implemented in collaboration with the members of Zambezi River Basin Water Resources Managers and Dam Operators (ZAMDO) and in coordination with the Zambezi Watercourse Commission as part of a broader program of support in the basin.

The program supported three dam operators: (i) ZESCO in Zambia, which is a co-owner of the Itezhi-Tezhi Hydropower Station; (ii) the Zambezi River Authority (ZRA), which is a bi-national entity owned by Zambia and Zimbabwe responsible for the Kariba Hydroelectric Scheme (HES) and development of the shared sections of the Zambezi River, including the Batoka Gorge HES; and (iii) Hidroeléctrica de Cahora Bassa (HCB) in Mozambique, which is responsible for the operation of the Cahora Bassa HES.

The program was based on an assisted self-assessment approach consisting of assessments conducted internally by a team from within the developer or operator organization with the assistance of IHA-Accredited Assessors, who advised in the interpretation and application of the Protocol. This was the first use case of the assisted self-assessment approach and the first use of the Protocol at the basin scale with multiple operators.

The program commenced with introductory training by Accredited Assessors followed by longer on-the-job training with each organization separately as well as site visits and interviews. Each of the developers or operators prepared a full report based on their self-assessments. These were presented in a similar style as an official assessment, reporting against the Protocol’s basic good practice and proven best practice requirements on all topics. Accredited Assessors provided comments on the substance of the findings, including significant gaps. Each operator developed an action plan based on the gaps, with recommended management actions and a proposed timeline for closing the gaps.

The internal assessors generally tended to over-score on the initial attempt. However, subsequent to receiving feedback from the Accredited Assessors, the reports were updated and much more critical. Based on the review of the reports by the Accredited Assessors, five topics met or exceeded basic good practice for the Preparation stage tool used in the assessment of the Cahora Bassa North Bank (CBN); 17 for the Preparation stage tool used in the assessment of the Batoka Gorge HES; and 10 for the Operation stage tool used in the assessment of the Itezhi-Tezhi Hydropower Project (ITT). In a few cases, the Accredited Assessors

did not have enough information on which to base a judgment. Several criteria were deemed not relevant to the individual projects, and none of the projects recorded any topics meeting proven best practice.

Each of the operators articulated an action plan based on their priorities for addressing gaps, focusing first on those at the basic good practice level. In addition to the management actions at the individual project level, the operators identified potential actions to be implemented at the basin scale as part of the efforts to improve hydropower sustainability. These include (i) improving dam safety assurance, building on the joint dam break analysis being carried out for the Zambezi River; (ii) moving toward joint operations to optimize hydropower operation through the ZAMDO-JOTC; and (iii) development of a basin-level reporting tool to encourage operators in the basin to continually assess their sustainability performance and share the findings in a transparent manner.

An official assessment of the existing Cahora Bassa HES (Dam and South Bank Power Station) was carried out using the Operations stage tool as one of the follow-on actions identified by HCB from the self-assessments. A team of three independent Accredited Assessors carried out the assessment between March and June 2018 with the onsite visit taking place from April 17 to 26, 2018. The assessment concluded that the project met basic good practice on seven topics and proven best practice on three topics. Of the remaining topics, five were considered not relevant, primarily due to a lack of commitments made during project preparation and implementation. The remaining three topics were assessed with gaps against basic good practice. In addition to the official assessment report, the results of the Cahora Bassa HES assessment were presented using the new Environmental, Social and Governance (ESG) Gap Analysis tool under development by the Protocol Governance Committee. This important test case will serve to inform further refinement of the ESG tool before it is officially launched.

The program is judged to have met its objectives and made an important contribution to the sustainable development and management of water resources in the Zambezi River Basin. Through a structured process of training, self-assessment, engagement, and reflection, representatives from a range of operators and water resources managers have developed the skills to apply the key principles enshrined within the Protocol.

Among the lessons learned from the program are that some degree of objectivity is sacrificed in the self-assessment approach, but there are ways to partially mitigate this. These include using staff from other parts of the organization to carry out the assessment instead of those staff working directly on the project, to use a peer-to-peer process among the different operators within the basin, and to have the results verified independently by Accredited Assessors. Using the Protocol for self-assessment, though less rigorous, still requires significant resources, especially staff time to carry out the assessments in addition to their other duties. The Protocol is also highly dependent on timely information, and it requires skillful interviewers to extract useful feedback from external stakeholders.

A number of recommendations based on this experience are also provided. These include lessons for three main audiences: (i) ZESCO, HCB, and the ZRA, which participated in the

program; (ii) regional stakeholders with an interest in improving hydropower development and management in the Basin; and (iii) stakeholders involved in the further use and development of the Hydropower Sustainability Assessment Protocol.

Operators are recommended to use the Protocol's Preparation-stage tool for self-assessment together with independent verification early in project development. Reviewing the environmental and social management systems against the Protocol and designating focal points from within the organizations to monitor and follow-up on specific actions could enhance performance. Consultation and communication was identified as a recurring gap in all the assessments and could be addressed through a coordinated effort with a basin level initiative. Further development of the regional reporting tool by the JOTC, the Zambezi Watercourse Commission (ZAMCOM), and other regional stakeholders could provide a foundation for continuous improvement and facilitate the process toward phasing in of joint operations.

In terms of the Protocol tools and their governance, there should be further efforts to make the Protocol as useful as possible across a range of environments, capacity constraints, and development contexts. This should include rethinking assessment logistics to provide more hands-on guidance and testing more flexible ways of using the Protocol. Future programs embarking on a similar self-assessment approach should consider strengthening the verifier role of Accredited Assessors and structuring the program in a phased manner to ensure high-quality responses to action plans by way of just-in-time advisory services.

Abbreviations

AfDB	African Development Bank
ARA-Zambeze	Administração Regional das Águas do Zambeze
BASC	Basin-wide Stakeholder Coordination Committee
BCR	benefit cost ratio
CBN	Cahora Bassa North Bank
CIWA	Cooperation in International Waters in Africa
CBS	Cahora Bassa South Bank
CSR	corporate social responsibility
DRIFT	downstream response to imposed flow transformations
EAP	emergency action plan
EIA	environmental impact assessment
EIRR	economic internal rate of return
EPP	emergency preparedness plan
ESAP	environmental and social action plan
ESIA	environmental and social impact assessment
ESG	Environmental, Social and Governance
ESMP	Environmental and Social Management Plan
ESMS	environmental and social management system
GCM	general circulation model
GDP	gross domestic product
GHG	greenhouse gas
HCB	Hidroeléctrica de Cahora Bassa
HES	hydroelectric scheme
HSAF	Hydropower Sustainability Assessment Forum
IFC	International Finance Corporation
ICOLD	International Commission on Large Dams
IHA	International Hydropower Association
IRR	internal rate of return
ITPC	Itezhi-Tezhi Power Company
ITT	Itezhi-Tezhi Hydropower Project
IUCN	International Union for Conservation of Nature
JOTC	Joint Operators' Technical Committee of ZAMDO
KPI	key performance indicators
LIC	low-income country
LMIC	low- and middle-income country
LRC	lower rule curve
NASC	National Stakeholder Coordination Committee
NPV	net present value

OHS	occupational health and safety
PFMA	Public Financial Management Act
PGC	Protocol Governance Committee
PMU	Project Management Unit
RAP	Resettlement Action Plan
RCC	roller compacted concrete
RPF	Resettlement Policy Framework
SADC	Southern Africa Development Community
SAPP	Southern African Power Pool
SARCOF	Southern Africa Regional Climate Outlook Forum
SHEQ	Safety, Health, Environment, and Quality
SPV	special purpose vehicle
WARMA	Water Resources Management Authority
WHO	World Health Organization
WWF Zambia	World-Wide Fund for Nature Zambia
ZAMDO	Zambezi River Basin Water Resources Managers and Dam Operators
ZAMCOM	Zambezi Watercourse Commission
ZAMWIS	Zambezi Water Resources Information System
ZEMA	Zambia Environmental Agency
ZINWA	Zimbabwe National Water Authority
ZPC	Zimbabwe Power Company
ZRA	Zambezi River Authority

1.1. Background

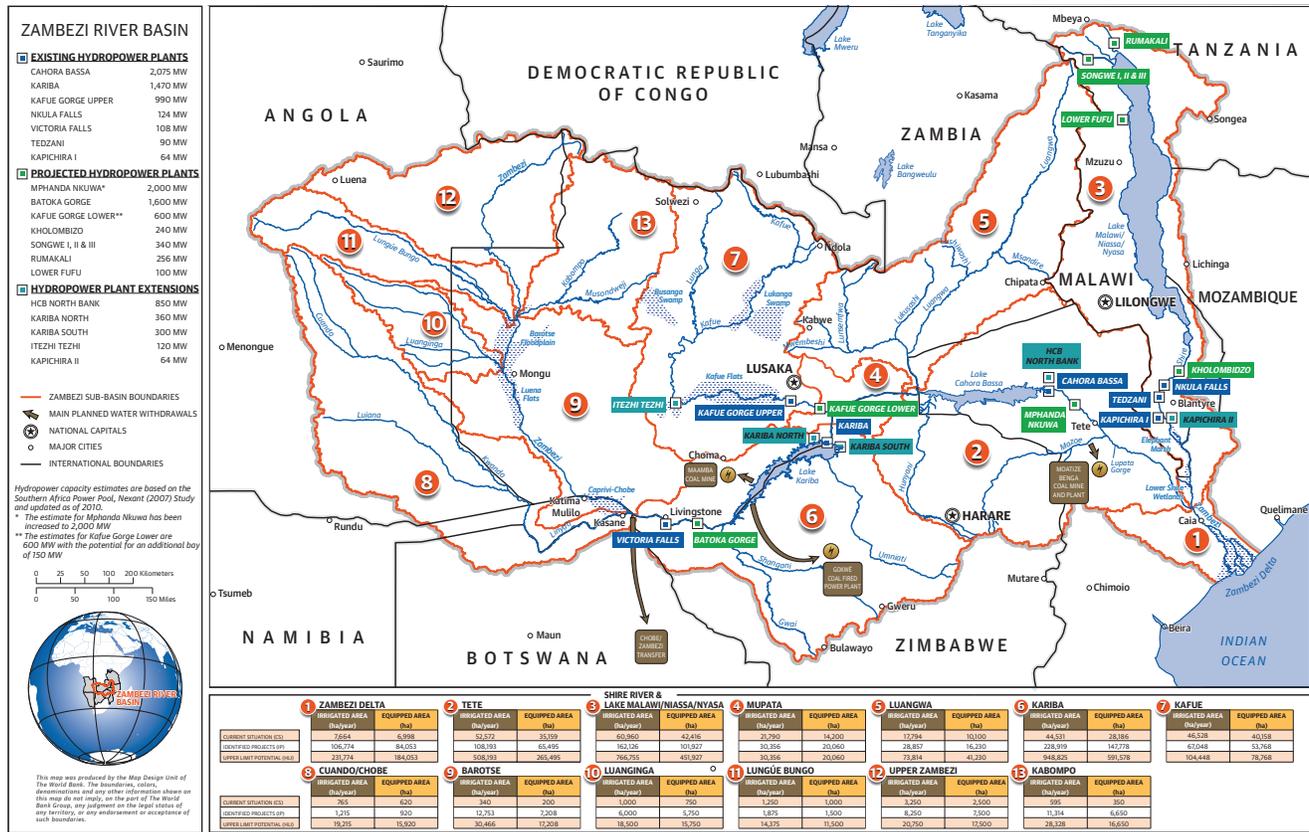
The hydropower resources of the Zambezi River Basin (see map 1.1) are central to sustaining economic development and prosperity across southern Africa. The Basin has close to 5,000 megawatts of installed hydropower generation capacity, with the potential approaching 15,000 megawatts. Development of the full hydropower potential according to the generation plan of the Southern Africa Power Pool (SAPP) would include more than 50 projects over more than 15 years. If developed, the full hydropower potential of the Zambezi River Basin would have the potential to double the production of firm energy to around 43,000 gigawatt hours per year and average energy production to around 60,000 gigawatt hours per year. This would be sufficient to meet all or most of the estimated demand of the Riparian States.¹

Improved basin-wide coordination of new and existing capacity has the potential to increase generation. Existing capacity is dominated by the Kariba Dam Hydroelectric Scheme (HES) between Zambia and Zimbabwe and Cahora Bassa in Mozambique, with their associated plants contributing 75 percent of installed capacity. Other operating plants include the Kafue Gorge Upper Power Station and the upstream Itezhi-Tezhi scheme on the Kafue River in Zambia, and the Nkula, Tedzani, and Kapichira plants on the Shire River in Malawi. Of the basin's installed capacity, 45 percent is in Mozambique, 36 percent in Zambia, 14 percent in Zimbabwe, and 5 percent in Malawi. Improving coordination of these existing hydropower facilities could increase firm energy production by seven percent to 24,397 gigawatt hours per year. The economic value of this basin-wide cooperation in terms of additional generation, with minimal investment, is estimated at US\$585 million over a 30-year period. In addition, there are a number of projects under various levels of preparation on the main stem river (see figure 1.1) and in the wider basin (see map 1.1), including the Batoka Gorge HES (Zambia and Zimbabwe), Kafue Gorge Lower (Zambia), Mpanda Nkuwa (Mozambique), and Lower Fufu and Mpatamanga (Malawi). Development of the capacity outlined in the SAPP generation plan and coordination among all of the plants across the basin could provide 23 percent more generation over uncoordinated operations.

The transboundary, common pool context of the resources within the Zambezi River Basin presents a number of challenges to effectively, equitably, and sustainably harnessing their socioeconomic benefits. Issues of sovereignty, historical tensions, difficulty in determining reasonable and equitable use, as well as differences in the technical and financial capacity of the Riparian States introduce inherent complexity to water resource development. Accentuating these challenges is a lack of confidence that greater economic benefits can be gained from cooperation and that the benefits can be equitably distributed. These issues often culminate in long project development timelines and high transaction costs involved in cooperative approaches.

Increasing cooperation in the Zambezi River Basin provides the basis for improving development opportunities. Recognizing the challenges of cooperative management and development of the water resources within the basin, the eight Riparian States established the

MAP 1.1. Hydropower Facilities and Irrigation in the Zambezi River Basin

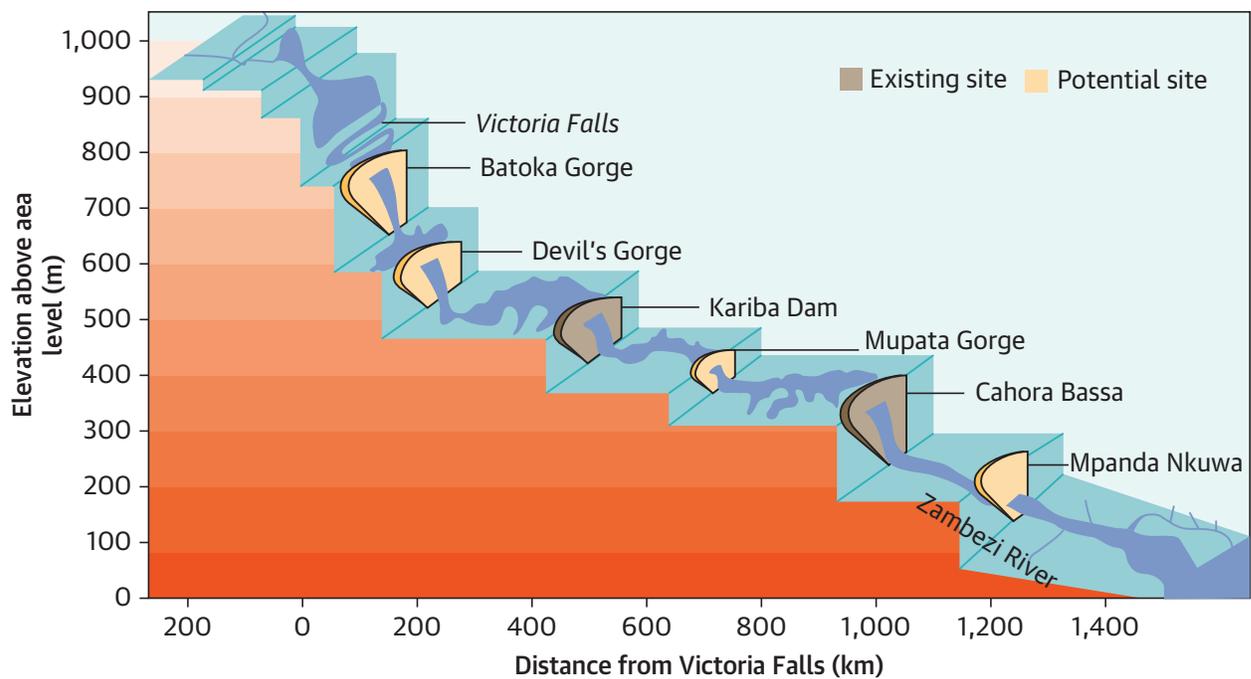


Source: World Bank 2010.

Agreement on the Establishment of the Zambezi Watercourse Commission (ZAMCOM). Through this, ZAMCOM provides a framework for promoting the equitable utilization, efficient management, and sustainable development of the Zambezi River Basin. Realizing the vision within this agreement requires a combination of strong institutions to drive the process, information sharing to inform decision making, and infrastructure investments to provide for people’s basic needs and boost economic growth. In addition, the dam operators and water resource managers in the basin have established the Joint Operations Technical Committee (JOTC) under the auspices of the Zambezi River Basin Water Resources Managers and Dam Operators (ZAMDO) to improve and inform the management of dams and water resources through the exchange of information on dam operations and hydrometeorological data. The JOTC member institutions include Administração Regional de Águas do Zambeze in Mozambique; Hidroeléctrica de Cahora Bassa (HCB); the Zambian Water Resources Management Authority; the Zambezi River Authority (ZRA); ZESCO; the Zimbabwe National Water Authority; and the Zimbabwe Power Company (ZPC).

The development of hydropower projects needs to be part of an overall system for water management and energy development that is integrated within basin and regional planning.

FIGURE 1.1. Hydropower Resources in the Zambezi River Basin



Source: Adapted from SADC/ZRA 2007.

This planning needs to be embedded within a process that engages a diverse group and complete set of stakeholders to consider the range of available options and alternatives. While acknowledging the benefits derived from the development of large hydropower projects and their contributions to society at large, it is also important to recognize that they embrace a broad range of complex social, environmental, and political choices on which the human aspiration to development and improved well-being depend (WCD 2000). This is particularly important in the Zambezi River Basin where new investments in large infrastructure co-exist alongside a subsistence economy that is reliant upon environmental services provided by the river. This dual nature of the regional economy requires appropriate measures to balance these mutual dependencies among different users within a sustainable guiding framework.

1.2. Program Objectives

The overall objective of the technical assistance program on the Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was to assist the Riparian States in development and utilization of the hydropower potential of the basin in a sustainable and responsible way to ensure its benefits for present and future generations.

The program sought to promote the development and use of the Hydropower Sustainability Assessment Protocol as a guiding framework for sustainability that can help balance mutual dependencies among different water users across the basin. This was implemented

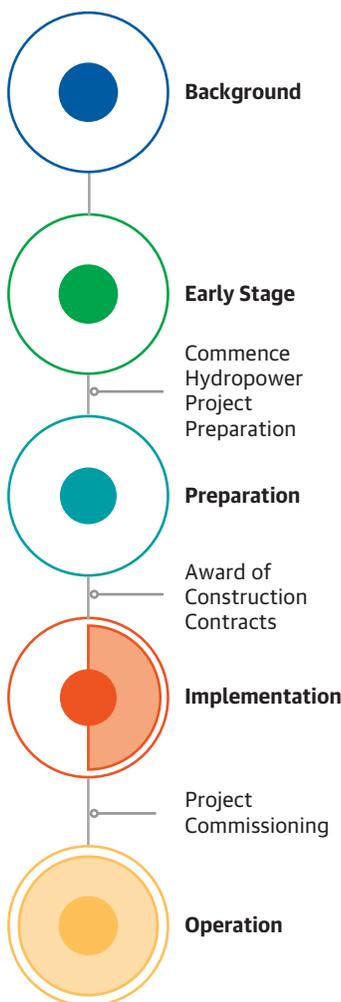
in collaboration with the members of ZAMDO and in coordination with ZAMCOM to improve the understanding, use, and adoption of the Protocol as a capacity building tool to inform the development and operation of hydropower in the Zambezi River Basin.

1.3. The Hydropower Sustainability Assessment Protocol

The Hydropower Sustainability Assessment Protocol is a framework to compare the performance of hydropower projects using a defined set of globally applicable sustainability criteria. These criteria encompass a range of environmental, social, technical, and financial issues and provide a shared language for improved dialogue on sustainable hydropower.

The Protocol is the product of an intensive and transparent dialogue by the multi-stakeholder Hydropower Sustainability Assessment Forum (HSAF). Formed in 2007, the HSAF included representatives from industry, civil society, donors, low- and middle-income country (LMIC) governments, and commercial and development banks. Stakeholder views were solicited from more than 20 countries involving 1,300 participants and pilot assessments carried out in 20 countries on six continents to reach consensus on the inclusion of aspects of sustainability and the definition of good and best practice. After completion of the Protocol, the Hydropower Sustainability Assessment Council was established along with a Management Entity for day-to-day implementation of the Protocol.

FIGURE 1.2. Tools of the Hydropower Sustainability Assessment Protocol



After completion of the Protocol, the Hydropower Sustainability Assessment Council was established along with a Management Entity for day-to-day implementation of the Protocol.

The Hydropower Sustainability Assessment Council consists of seven sectoral chambers. Each chamber represents a segment of stakeholders and ensures continuity in the multi-stakeholder approach that was used to develop the Protocol. The Chambers all elect two representatives to a Protocol Governance Committee (PGC) that provides oversight to the Protocol and its management. The International Hydropower Association (IHA) serves as the Management Entity.

To reflect the different stages of hydropower development, the Protocol includes four assessment tools (figure 1.2). These can be used separately with each corresponding to stages of project development: (i) Early Stage, (ii) Preparation Stage, (iii) Implementation Stage, and (iv) Operation Stage. Each tool is made up of a set of sustainability topics of most relevance to that stage of the project, containing definitions of basic good practice and proven best practice for more than 20 sustainability topics that

BOX 1.1. Ways of Using the Protocol

Official assessment. This is an assessment conducted by a team of independent IHA-Accredited Assessors. Assessments rely on evidence to support findings that are factual, reproducible, objective, and verifiable, and deliver a report using an approved format including a set of scores indicating performance in relation to basic good practice and proven best practice. Reports are delivered in English, but can be translated.

Informal self-assessment. This is an assessment conducted internally within the organization. If the Protocol is used informally in this way, the report can be in any language, a shorter version of the report could be used, or only specific topics assessed. If made public, the report is required to carry a disclaimer stating that it is not an official assessment, in keeping with the Protocol's Terms and Conditions.

Assisted self-assessment. This is an informal self-assessment, but Accredited Assessors work with the developer or operator to advise them on how to interpret and use the Protocol. Using the findings of an assisted self-assessment, assessors can work with the developers to identify an action plan setting out the actions they will take to improve sustainability. This approach is very useful for capacity building, or when the project may have many gaps compared to the Protocol's basic good practice.

Verification. An alternative to the assisted self-assessment is for Accredited Assessors to provide a verification of an internal self-assessment. This would require translation of the report into English and stakeholder interviews carried out by the Accredited Assessor, and would deliver a critical review of the assessment report and verification of its findings.

ESG Gap Analysis. IHA and its partners in the PGC have recently developed ESG Gap Analysis tools. These focus on the basic good practice scoring statements of only the environmental, social, and governance topics. The intention is that assessments can be conducted systematically, and more efficiently, without losing the rigor of a full assessment or the identification of gaps. These tools (for preparation, implementation, and operation stages) also include an Environmental and Social Action Plan setting out the actions necessary to remove the gaps.

Checklists. A further option is to develop and use shorter checklists based on the Protocol that can be applied quickly and with minimal effort.

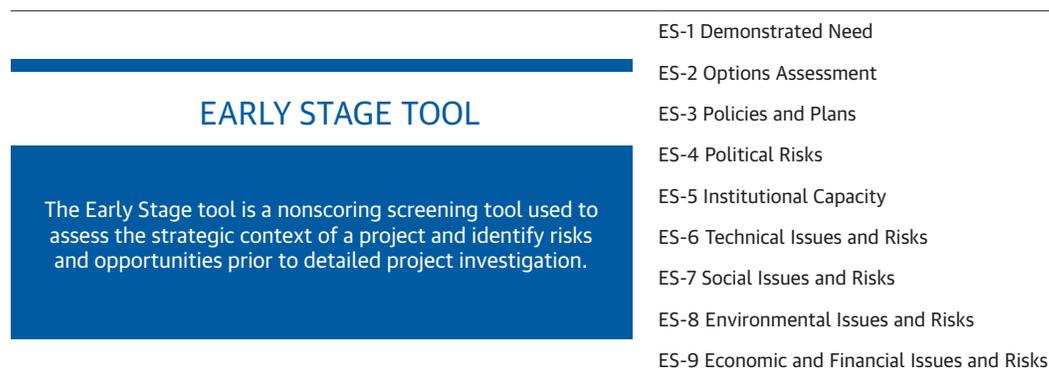
Guidance. At the most basic level, the Protocol can be used as a guidance document. For example, government agencies can use it to understand the range of hydropower sustainability issues, or the operator's personnel can refer to it in their day-to-day work, such as in developing terms of reference for an environmental and social impact assessment.

TABLE 1.1. Topics in the Tools of the Protocol

	Sustainability topics	Preparation	Implementation	Operation
Technical	Siting and Design	•	n.a.	n.a.
	Hydrological Resource	•	n.a.	•
	Demonstrated Need and Strategic Fit	•	n.a.	n.a.
	Infrastructure Safety	•	•	•
	Asset Reliability and Efficiency	n.a.	n.a.	•
Environmental	Environmental and Social Impact Assessment and Management	•	•	•
	Erosion and Sedimentation	•	•	•
	Water Quality	•	•	•
	Waste, Noise, and Air Quality	n.a.	•	n.a.
	Reservoir Planning / Preparation and Filling / Management	•	•	•
	Downstream Flow Regimes	•	•	•
	Biodiversity and Invasive Species	•	•	•
	Climate Change Mitigation and Resilience	•	•	•
Social	Communications and Consultation	•	•	•
	Project Benefits	•	•	•
	Project-Affected Communities and Livelihoods	•	•	•
	Cultural Heritage	•	•	•
	Indigenous Peoples	•	•	•
	Resettlement	•	•	•
	Public Health	•	•	•
	Labor and Working Conditions	•	•	•
Business and Economic	Financial Viability	•	•	•
	Economic Viability	•	n.a.	n.a.
	Procurement	•	•	n.a.
	Governance	•	•	•
	Integrated Project Management	•	•	•

Note: n.a. = not applicable.

FIGURE 1.3. Topics for Early Stage Tool



combine environmental, social, technical, and economic or financial perspectives (shown in table 1.1 and figure 1.3).

A Protocol assessment identifies gaps that can be addressed, promoting the continuous improvement of sustainability performance. It also provides a platform for dialogue with a range of stakeholders, either through the sharing of results or their involvement in the assessment. These may be official assessments carried out by independent IHA-Accredited Assessors or through informal assessments or self-assessments, as shown in box 1.1. To date, almost 30 official assessments have been carried out of projects with capacities from 3 megawatts to 14,000 megawatts, in all regions of the world.

The World Bank was an observer during the development of the Protocol and since its launch has facilitated numerous assessments in its client countries (box 1.2). The World Bank’s first use of the published version of the Protocol was an official assessment of the Trung Son project in Vietnam using the Implementation stage tool (Liden and Lyon 2014). This process recognized the Protocol as a valuable tool for improving the sustainability of hydropower projects but identified institutional capacity as a potential hurdle in low- and middle-income countries (LMICs). Based on this experience it was suggested that an emphasis on continuous improvement, rather than an absolute measure of performance, would be key to building a constituency for the Protocol among World Bank client countries. It was recommended that the World Bank explore ways in which its clients could use the Protocol beyond official assessments, acknowledging that there would be a tradeoff between the flexibility gained in unofficial uses of the Protocol and the reputational advantages that would come from an official assessment (figure 1.4). The report introduced the concept of self-assessment to strengthen internal processes and foster incremental project improvements. The program in the Zambezi River Basin represents the first application of the Protocol through this approach of an assisted self-assessment, with a similar approach subsequently applied in Vietnam.

There have been deliberate efforts to diversify the ways in which the Protocol can be used in order to meet the needs of a wider range of stakeholders. One of the new derivatives

BOX 1.2. World Bank Support in Application of the Hydropower Sustainability Assessment Protocol

Since the launch of the Protocol in 2011, the World Bank has facilitated official assessments and unofficial, innovative uses of the Protocol in eight client countries:

World Bank Group–Financed Projects

- Trung Son Hydropower Project, Vietnam (Official Assessment: Implementation)
- Kabeli-A Hydropower Project, Nepal (Official Assessment: Preparation)
- Reventazón Hydropower Project, Costa Rica (Official Assessment: Implementation)
- Tina River Hydropower Project, Solomon Islands (Unofficial ESG Gap Analysis: Preparation)

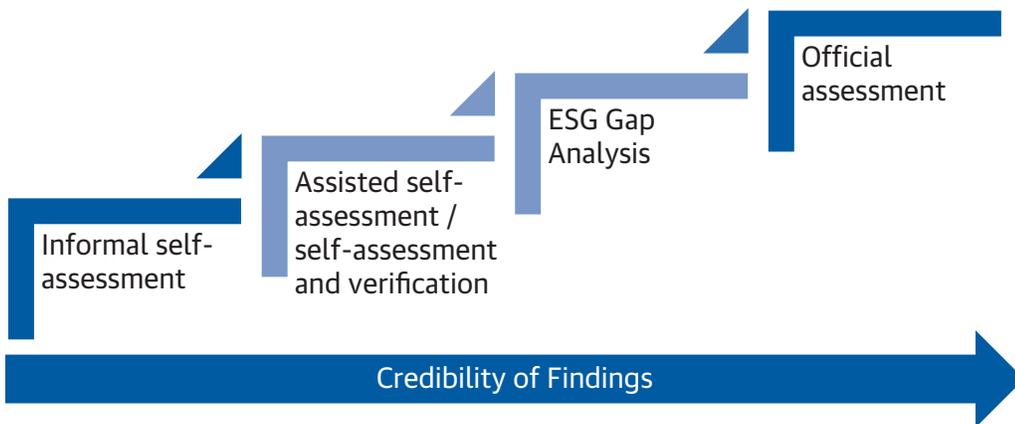
World Bank Group Technical Assistance

- Batoka Gorge HES, Zambia and Zimbabwe (Assisted Self-Assessment: Preparation)

Non-World Bank Group Financed Projects

- Mangdechhu Hydroelectric Project, Bhutan (Official Assessment: Implementation)
- Itezhi-Tezhi Hydropower Project, Zambia (Assisted Self-Assessment: Operation)
- Cahora Bassa North Bank Extension, Mozambique (Assisted Self-Assessment: Preparation)
- Cahora Bassa HES, Mozambique (Official Assessment: Operation)
- Cahora Bassa HES, Mozambique (Unofficial ESG Gap Analysis: Operation)
- A Young Hydropower Project, Vietnam (Assisted Self-Assessment: Operation)
- Dai Ninh Hydropower Project, Vietnam (Assisted Self-Assessment: Operation)

FIGURE 1.4. Relative Rigor of Protocol Uses



of the Protocol is the Environmental, Social and Governance (ESG) Gap Analysis Tool. This is a streamlined version of the Protocol that can be used to more rapidly assess the sustainability of a hydropower project. A key feature of the ESG Gap Analysis Tool is that it is complemented by an Environmental and Social Action Plan to address issues identified during the assessment. This makes the ESG Gap Analysis Tool a potentially useful capacity building instrument. The Zambezi River Basin Program has contributed to the initial development of the ESG Gap Analysis Tool with an early test case of the Cahora Bassa Hydroelectric Scheme (HES). This follows the development of the initial version of the tool, used in an assessment of the Tina River Hydropower Development Project in the Solomon Islands.

Note

1. The Riparian States to the Zambezi River Basin are Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe.

The program on the Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was based on an approach of assisted self-assessment through which developers or operators of projects were supported in conducting their own assessments. This was different from the usual official assessment approach of a Protocol assessment, which is conducted by a third-party team of Accredited Assessors. This is the first use case of the assisted self-assessment approach and the first use of the Protocol at the basin scale with multiple operators. The program supported three dam operators: (i) ZESCO in Zambia, which is a co-owner of the Itzeh-Tezhi Hydropower Project (ITT); (ii) the Zambezi River Authority (ZRA), which is owned by Zambia and Zimbabwe, and is responsible for the Kariba Hydroelectric Scheme (HES) and development of the shared sections of the Zambezi River, including the Batoka Gorge HES; and (iii) Hidroeléctrica de Cahora Bassa (HCB) in Mozambique, which is responsible for the operation of the Cahora Bassa HES. The details of the three projects are summarized in table 2.1. The program ran over two years, commencing with an introductory launch workshop in June 2016 and culminating in a post-assessment workshop of the official assessment of the Cahora Bassa project in May 2018.

2.1. Program Objectives

The specific objectives of the program were to:

- Provide a team of Accredited Assessors to conduct introductory and in-depth training in the application of the Protocol in the Zambezi River Basin.
- Support the main hydropower operators in the Zambezi River Basin in doing an internal assessment of one hydropower scheme (under development or operation) within their jurisdiction.
- Support the main hydropower operators to develop management systems and actions plans to address gaps identified in the internal assessments.
- Provide means through workshops and conferences to communicate and share experiences of the application of the Protocol, among operators, to other low- and middle-income countries (LMICs), and to the Protocol Governance Committee (PGC).
- Provide recommendations and Terms of Reference for a full Protocol assessment to be conducted by independent Accredited Assessors as an optional choice for the main operators following the end of training.

2.2 Assisted Self-Assessment

The assisted self-assessment is conducted internally by a team from within the developer or operator organization with the assistance of Accredited Assessors who advise them on how to interpret and use the Protocol. Using the findings of an assisted self-assessment,

TABLE 2.1. Details of Projects Included in the Self-Assessments

Self-assessor	ZESCO	Zambezi River Authority	Hidroeléctrica Cahora Bassa
Project	Itezhi-Tezhi	Batoka Gorge	Cahora Bassa North Bank Extension
Developer or Operator	Power Station: ITPC Dam: ZESCO	ZRA	HCB
HSAP Tool	Operation Stage	Preparation Stage	Preparation Stage
Country	Zambia	Zambia and Zimbabwe	Mozambique
Location	On Kafue River, in Itezhi-Tezhi District, directly upstream of the Kafue Flats	On the Zambezi River, downstream of Victoria Falls	On the Zambezi River, Cahora Bassa District, and Maravia District, Tete Province
Capacity	120 MW	2,400 MW	1,245 MW
Annual generation (GWh/year)	Up to 1,000 GWh per year	10,215 GWh per year	15,575 GWh (CBS), total generation of both stations to be determined
Dam height	65 m	181 m	171 m
Crest length	1800 m	720 m	303 m
Reservoir area	350 km ²	23 km ²	2,665 km ² (existing reservoir), expanded reservoir area to be determined
Units (number, type, MW)	Two Kaplan turbines of 60 MW each	6 x 200 MW turbines in two plants	Three Francis turbines of 415 MW each
Associated infrastructure: road(s) (length)	Existing road, connecting Itezhi-Tezhi to the Lusaka-Mongu Road	Site access roads in Zambia and Zimbabwe	No additional roads
Associated infrastructure: transmission line(s)	A 220 kV transmission line to Mumbwa town, and 330 kV double-circuit transmission line to Lusaka	330 kV in Zambia and 400 kV in Zimbabwe	No additional transmission line other than a line passing over the dam crest to the Songo substation

Note: CBS = Cahora Bassa South Bank Power Station; CBN = Cahora Bassa North Bank Power Station; HCB = Hidroeléctrica Cahora Bassa; HSAP = Hydropower Sustainability Assessment Protocol; ITPC = Itezhi-Tezhi Power Company; ZRA = Zambezi River Authority.

Accredited Assessors work with the developers to identify an action plan to improve sustainability.

The assisted self-assessment broadens the manner in which the Protocol can be used and exposes a greater number of users to the tool—users who may otherwise be intimidated by an independent audit. It also introduces a comprehensive checklist and a systematic way of thinking about project-related issues. This can help in building capacity among hydropower developers and operators.

Assisted self-assessments provide a learning-by-doing experience, which can strengthen internal quality assurance units and prepare users for future assessments, including official assessments. This can be particularly helpful in situations where a project may have significant gaps compared to the Protocol’s basic good practice criteria to engender continuous improvement without the pressure of having external auditors.

An assisted self-assessment can aid the process of refining important project documents by identifying any gaps and providing an opportunity to address these before their finalization. This could include, for example, improvements to environmental and social impact assessments, their associated management plans, or Resettlement Action Plans (RAPs) close to the end of project preparation, or operation manuals at the start of operations.

Given the assisted self-assessment is an informal use of the Protocol, the report can be in any language, a shorter version of the report could be used, or only specific topics can be assessed. If made public, the report is required to carry a disclaimer stating that it is not an official assessment, in keeping with the Protocol's Terms and Conditions.

2.3. Participating Operators and Projects

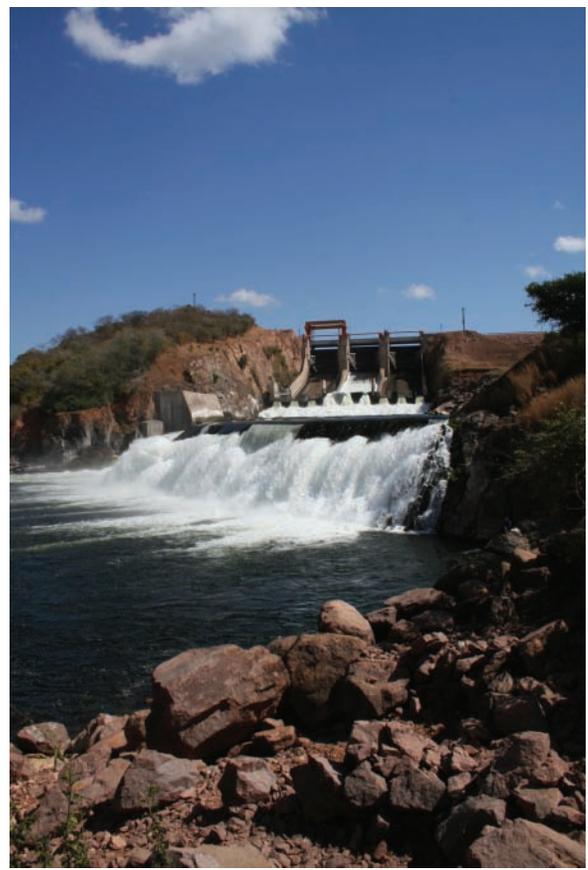
2.3.1. ZESCO and the Itezhi-Tezhi Hydropower Project

ZESCO applied the Operation stage tool to carry out a self-assessment of the 120-megawatt Itezhi-Tezhi Hydropower Project (ITT).

ZESCO is a state-owned electricity utility responsible for the generation, transmission, and distribution of electricity in Zambia. ZESCO's generation is 99 percent based on hydropower from nine hydropower stations with a combined capacity of 2,337 megawatts. This includes Kariba North Bank (1,080 megawatts), Kafue Gorge Upper (900 megawatts), and Victoria Falls (108 megawatts).¹

The earth and rockfill dam at ITT (photo 2.1) was constructed in the 1970s to provide additional water storage for the Kafue Gorge Upper Power Station, which lies around 260 kilometers downstream. Provisions were included at the time of the original construction for a hydropower station but this was not initiated until more than 30 years later and eventually commissioned in February 2016. The Itezhi-Tezhi Dam is operated and maintained by ZESCO, while the power station was developed and is operated by the Itezhi-Tezhi Power Company (ITPC). ITPC is a joint venture between ZESCO and Tata Africa Holdings in equal shares.

PHOTO 2.1. Itezhi-Tezhi Spillway



© Marcus Wishart/World Bank.

ITT is located on the right bank of the river at the southern end of the dam. The original design and construction of the dam included facilities, such as the intakes, spillway gates, tunnels, and the regulation gate, to allow the future development of a power station. Upon completion of dam construction, a diversion tunnel on the south bank was closed to flow by a concrete seal plug, and a radial regulation gate was installed on the diversion tunnel on the north bank to provide a low-level outlet for the reservoir.

With the development of the power station, the southern diversion tunnel was unplugged and extended to connect to the power station. Water is drawn through the southern diversion tunnel to the turbines, and the flow is discharged to the Kafue River, approximately 100 meters downstream of the northern diversion tunnel outlet. The power plant was planned to provide base load with a roughly constant rate of discharge over a 24-hour period. The increased discharge associated with the operation of the power plant is coupled with an associated decrease in discharge through the main spillway to ensure overall flow patterns and water available at the Kafue Gorge Upper Hydropower Plant are not significantly altered.

2.3.2. The Zambezi River Authority and the Batoka Gorge Hydroelectric Scheme

The ZRA applied the Preparation stage tool to a self-assessment of the proposed 2,400-megawatt Batoka Gorge HES.

The ZRA is a corporation jointly and equally owned by the governments of Zambia and Zimbabwe with responsibility for the development and management of the shared sections of the Zambezi River between the two countries, and currently operates the Kariba Dam. ZRA is governed by a Council of Ministers consisting of four government ministers. This includes the Ministers responsible for finance and energy from Zambia and Zimbabwe. A Board oversees operations and is comprised of the Permanent Secretaries of the Ministries of Energy and Finance, along with two independent Board members from each of the contracting states. The Act also establishes ZRA's responsibilities in investigating new dams on the Zambezi River, managing hydrological and environmental data, and making recommendations to ensure the effective and efficient use of the waters and other resources of the Zambezi.

The Batoka Gorge HES is one of a number of hydropower investments conceived as part of a cascade along the main stem of the Zambezi River and would be situated approximately 50 kilometers downstream of Mosi-oa-Tunya (Victoria Falls) and upstream of the existing Kariba Dam HES. It is proposed as a 181-meter high, 720-meter long roller-compacted concrete (RCC) gravity arch dam with a radial-gated spillway and an installed capacity of 2,400 megawatts. This would include two surface power plants on either side of the river, each with an installed capacity of 1,200 megawatts. It would operate as a run-of-river scheme, allowing more effective use of the storage in Lake Kariba and maximizing secure power delivery at the system level.

The Batoka Gorge is a bilateral project and would extend across the international boundary between Zambia and Zimbabwe (photo 2.2). A split development model such as the Kariba HES is proposed, including a publicly financed dam under the ZRA and two Special

PHOTO 2.2. Site of the Batoka Gorge HES



© Kimberly Lyon/World Bank.

Purpose Vehicles (SPVs) for the power plants: one on the north bank under the Zambian power authority, ZESCO, and one on the south bank under the Zimbabwe Power Corporation (ZPC). ZRA has appointed consultants to review and update the engineering feasibility study for the proposed scheme in parallel to an Environmental and Social Impact Assessment (ESIA) and Transaction Advisory services. These studies are being executed by ZRA in collaboration with ZESCO in Zambia and the ZPC, and with support from the World Bank through the multidonor trust fund for Cooperation in International Waters in Africa (CIWA) (World Bank 2014).

2.3.3. Hidroeléctrica Cahora Bassa and Cahora Bassa North

Hidroeléctrica de Cahora Bassa applied the Preparation stage tool to a self-assessment of the proposed 1,245-megawatt Cahora Bassa North Bank (CBN) Power Station Extension.

HCB was established on June 23, 1975, just two days before Mozambican independence and six years after an electricity contract was signed between the Portuguese government and South Africa's Eskom. It is responsible for the operation and maintenance of the Cahora Bassa HES and was originally majority owned by the Government of Portugal until the Mozambican Government became the majority shareholder in 2007.

The Cahora Bassa HES was built between 1969 and 1974 on the main stem of the Zambezi River in Mozambique. The dam is a 171-meter high, double-curvature arch dam with a crest

length of 303 meters, which forms a 55.8 billion cubic meter reservoir with a surface area of 2,739 square kilometers at full supply level. The original construction included provision for two power stations, one on the south bank and a second on the north bank.

The Cahora Bassa South Bank (CBS) Power Station was built at the time of dam construction and is situated in a 220-meter long, 29-meter wide, and 57-meter high cavern on the south bank of the Zambezi River. The power station includes five 415-megawatt Francis turbines providing a total installed capacity of 2,075 megawatts.

The CBN Power Station is proposed as an extension to the existing Cahora Bassa HES and would be developed in an underground cavern on the north bank of the Zambezi River. The project would use the dam, reservoir, and other facilities of the existing installation, with three additional Francis turbines of 415 megawatts each, extending the total installed capacity by 1,245 megawatts from 2,075 megawatts to a total of 3,320 megawatts. Two new tunnels would be built with a maximum discharge capacity of 2,000 cubic meters per second, along with a 140-meter long bridge downstream of the dam to provide access to the north bank during construction. Access during operation would be through a tunnel from the crest of the dam while transmission lines would pass over the dam wall and connect to the existing Songo substation.

The existing dam (photo 2.3) was built to accommodate the extension, so there is no requirement to raise the dam height, and some structures for the intake are already in place.

PHOTO 2.3. Downstream Face of Cahora Bassa Dam



© Kimberly Lyon/World Bank.

However, the operating level of the reservoir would be raised to provide additional water for the North Bank Power Station. This would result in the expansion of the reservoir area. Preparation of the CBN project resumed between 2011 and 2013 with studies on the hydrological, geotechnical, and geological conditions along with social and environmental impact assessments. Financial and economic analyses are yet to be carried out.

The CBS and CBN plants would be operated jointly, with coordination of power generation, water storage, downstream discharges, and flood control. While CBS will continue to provide base load generation, CBN would be operated as a peaking plant during the high demand periods from 08h00 to 16h00 daily.

2.4. Program Activities and Schedule

The program was aimed at promoting the development and use of the Hydropower Sustainability Assessment Protocol as a guiding framework for sustainability in the Zambezi River Basin and was based on the following activities:

- Inception stage to develop the work program and establish the collaborative mechanisms for the program
- Introductory workshop to introduce the Protocol to participants and stakeholders in Zambezi River Basin
- In-depth training for each developer or operator on the Protocol by IHA-Accredited Assessors
- Facilitation of self-assessments by each operator, during which Accredited Assessors observed interviews and gave guidance on interview style and the interpretation of the Protocol
- Preparation and finalization of self-assessment reports
- Preparation of action plans to address the gaps identified in the self-assessment reports
- Experience-sharing workshops and evaluations throughout the program

In addition, the program supported an official assessment of the Cahora Bassa HES operating project. Table 2.2 presents the schedule and key aspects or innovations of each stage. The schedule was established to provide a sequence of intense engagement followed by periods of reflection and internal activities within the different organizations. The participating organizations and teams were encouraged to deliberate on the requirements, address any potential shortcomings, and make the necessary internal arrangements for the subsequent phases. This sequence was intended to provide a facilitated process focused on consolidating the internal capacity of the teams within each of the organizations through topic introductions and learnings, remote support and guidance, followed by supported reflections and self-assessments.

TABLE 2.2. Key Program Events

Event	Location and dates	Further details
Introduction workshop	Livingstone, May 31 to June 01, 2016	The agenda covered an introduction to the Protocol; business benefits of using the Protocol; case studies; action planning arising from Protocol assessment; and a briefing on assessment planning.
In-depth training	ZESCO: Lusaka, July 12-14, 2016 ZRA: Lusaka, August 02-04, 2016 HCB: Songo, September 21-23, 2016	ZESCO: attended by 8 participants, including the Senior Manager Generation Support Services, the team of five ZESCO assessors, and three project-level representatives ZRA: attended by 15 participants including the Director of Water Resources and Environmental Management, the Project Manager of the Batoka HES, and a ZESCO representative. HCB: attended by 24 participants, including two external participants from ARA-Zambeze
Mid-assessment visits	ZESCO: November 07-11, 2016 ZRA: January 30 to February 03, 2017 HCB: February 27 to March 03, 2017	Each mid-assessment visit consisted of an opening meeting, interviews with external and internal stakeholders, site visits, daily debriefs to discuss interview style and findings, and a closing discussion. During all mid-assessment visits, Accredited Assessors <ul style="list-style-type: none"> • Observed teams carrying out interviews • Visited the site • Gave advice on planning questions for the interviews • Gave feedback on interview techniques • Answered any questions on the Protocol's scoring statements • Discussed preliminary findings • Gave advice on writing findings • Agreed on a schedule for writing findings
Mid-assessment experience-sharing workshop	Songo, January 27, 2017	Linked to a ZAMDO-JOTC meeting. The agenda included a briefing for JOTC, with an update on program timeframes; short presentations from each of the assessment teams on their assessment objectives, who is involved, the interviewees and documents identified as evidence, the value of the process, challenges, and (in ZESCO's case) initial findings.
World Hydropower Congress	Addis Ababa, May 2017	Each participating organization was provided with support for representatives to attend the World Hydropower Congress, including presentations at a dedicated session on new ways of applying the Protocol.
End-of-assessment experience-sharing workshop	Lusaka, August 30 to September 01, 2017	This focused on the findings of the assessments and the preparation of action plans. Participants were restricted to ZESCO, ZRA, HCB, World Bank and IHA.
Official assessment of the Cahora Bassa project	Kick-off, January 2018	Participating organizations offered the opportunity of an independent official full Protocol assessment by a team of Accredited Assessors. HCB took this opportunity in late 2017, followed by a kick-off in January 2018.
	Planning visit, March 19-23, 2018	A team of Accredited Assessors visited HCB to assist with planning the official assessment.
	On-site assessment, April 17-26, 2018	A team of Accredited Assessors conducted an on-site assessment, holding more than 70 stakeholder interviews.
	Post-assessment workshop, May 30, 2018	HCB brought together internal and external stakeholders in a workshop to discuss the draft results of the official assessment.

Note: ARA-Zambeze = Administração Regional das Águas do Zambeze; HCB = Hidroeléctrica Cahora Bassa; IHA = International Hydropower Association; JOTC = Joint Operations Technical Committee of ZAMDO; ZAMDO = Zambezi River Basin Water Resources Managers and Dam Operators; ZRA = Zambezi River Authority.

2.4.1. Inception

The inception phase included a series of one-on-one consultations with utilities, dam operators, water resource managers, and other stakeholders in the basin. These were used to outline the program objectives and confirm the participating organizations and their focal points, along with the projects that would be the subject of the self-assessment.

2.4.2. Introduction Workshop

The program was formally launched with a two-day Introduction Workshop, held on May 31 and June 01, 2016, in Livingstone, Zambia. Seventeen participants from a range of organizations attended, including ZRA, ZESCO, HCB, the Water Resources Management Authority (WARMA), the World-Wide Fund for Nature Zambia (WWF Zambia), the International Hydropower Association (IHA), and the World Bank. Administração Regional das Águas do Zambeze (ARA-Zambeze), the Southern African Power Pool (SAPP), the Zambezi Watercourse Commission (ZAMCOM), the Zimbabwe National Water Authority (ZINWA), the Zimbabwe Power Company (ZPC), and Escom Malawi were also invited but were not able to attend.

2.4.3. In-Depth Training

A series of four-day trainings on the Protocol were carried out with each participating organization from July to September 2016. This training was targeted explicitly at the internal teams that would conduct the self-assessments and was designed to engage them not only in the content of the Protocol but also in the practical planning of their assessments. The typical agenda (table 2.3) included: an introduction to the Protocol; planning the assessment; and auditing and interviewing skills. All participants were provided with a reference pack including set of slides and exercises, a hard copy of the Protocol, electronic templates, and tools for planning the assessments.

The training courses were used to establish the necessities for planning of the self-assessments, including

- Setting objectives for the assessments
- Identifying the self-assessment teams
- Allocating roles (i.e., Protocol topics) within the teams, including Lead Assessors and a single point of contact
- Confirming the project to be assessed and the Protocol tool to use
- Developing lists of documentary evidence and proposed interviewees
- Planning the schedule for the assessment and next steps

2.4.4. Self-Assessments

Self-assessments were carried out by staff from within each of the participating organizations with support from Accredited Assessors. The assessors were provided with guidance

TABLE 2.3. Training Course Agenda

Day 1	Day 2	Day 3	Day 4
Introduction	Assessment planning	Planning assessment	Advanced skills
Key features of the Protocol	Benefits of applying the Protocol	Objectives for the assessment	Auditing principles
Evolution and governance	The Protocol and financial institutions	Roles in the assessment	Auditor personal attributes
Protocol documents	Assessment phases and roles	Interviewees and documentary evidence	Understanding the Protocol
Scores and significant gaps	Case study: process	Key documentary evidence	Assessing significance
Exercise: scoring a project	Assessment planning, scheduling and tools	Topic-by-topic documentary evidence	Visual evidence
Case study	Reporting and action planning	Key interviewees	Interview skills and challenges
Protocol content	Resource requirements	Topic-by-topic interviewees	Exercise: interview flaws
Exercise: self-assessment		Scheduling the assessment	Exercise: interview practice
		Next steps	Reporting skills and challenges

on the preparation and conduct of interviews, the tools used by Accredited Assessors, such as the Evidence Register, along with templates for the assessment schedules and itineraries.

Based on the training sessions, each team proceeded to plan and conduct its self-assessment. These assessments included an initial desk-based review of relevant documents and headquarters-based interviews. In all cases the key part was a mid-assessment event during which Accredited Assessors and representatives from the World Bank attended to observe interviews, advise on interview style and approach, advise on the content of the Protocol, and discuss initial findings.

The self-assessments carried out by ZRA and HCB were true self-assessments in that the team conducting the assessment was drawn from specialists involved in the preparation of the project. This contrasted with ZESCO's approach of using a more external corporate auditing team that was not involved in operations of ITT (either the dam or the power plant). The size and composition of the teams also varied among the participating organizations. HCB engaged a large internal team in which each assessor focused on one or two topics with support from a second assessor. In contrast, ZESCO and ZRA had smaller teams with assessors working jointly across all of the individual topics.

2.4.5. Reporting

Topic reporting templates were developed and shared with the ZESCO, ZRA, and HCB assessment teams for review and feedback in a tailored, iterative approach. The reporting templates focus on basic good practice and break each scoring statement into separate clauses, thereby prompting the assessor to cover all of the requirements and assist reporting. The

tools also include guidance on important concepts and what the assessors should look for as evidence that the project satisfies each clause.

In practice, all of the participating teams prepared full self-assessment reports. These reports address both basic good practice and proven best practice, using a similar structure to that of an official assessment report. Detailed comments were provided on each of the self-assessment reports, including overall observations, comments on the internal assessors' conclusions on the gaps and their significance, any additional gaps, and criteria (parts of the scoring statements) that may not have been addressed.

2.4.6. Experience-Sharing Workshops

A series of experience-sharing workshops were held so assessment teams could benefit from peer-to-peer learning. The first was a mid-assessment workshop held after ZESCO's mid-assessment interviews but before those of ZRA and HCB. Apart from presenting details of the process with the Joint Operations Technical Committee (JOTC), this workshop gave assessors an opportunity to discuss questions related to planning their assessments and to share experiences of and planning for the interviews.

A second experience-sharing workshop was held in Lusaka following the completion of the draft self-assessment reports. Prior to the workshop, Accredited Assessors provided feedback on the draft reports. During the three-day workshop, participants from all three self-assessment teams presented summaries of their findings, the findings were discussed and interrogated by the Accredited Assessors and participants, constructive feedback and guidance was provided, and lessons of the process were considered.

2.4.7. Action Planning

Action Plans were developed during the second experience-sharing workshop by the teams to address the priority gaps (against basic good practice) identified in the draft self-assessment reports. Subsequent to the workshops, these actions plans were further developed with support and comments from the Accredited Assessors. These were intended to identify the actions required to address the specific gaps and establish a work plan for addressing each of the significant gaps. The action plans specify who has responsibility, the timeframe for each action, advisory support that may be required, cost estimates, and measurable indicators of completion success.

2.4.8. Questionnaire Survey

A survey of all participants was carried out using an online surveying tool toward the end of the program (appendix B). The objective was to gather feedback on the overall program and identify opportunities to improve on the format for future basin-wide capacity programs. It also included questions on the Protocol, how best to promote its continued use and application in the region, and what measures would help in promoting improved coordination at the basin level.

2.4.9. Basin-Level Reporting Tool

An opportunity emerged to adapt the Protocol to a tool to help foster increased cooperation in the Zambezi River Basin. Within the basin context the Protocol could provide a framework for facilitating the exchange of information and enhancing the transparency around the sustainability of hydropower performance.

2.4.10. Official Assessment of Cahora Bassa Hydroelectric Scheme

An official sustainability assessment of the operating CBS project was conducted using the Operation stage tool of the Protocol.

A competitive procurement process was carried out to appoint a team of independent Accredited Assessors to carry out the assessment. A series of initial meetings were held prior to the Accredited Assessors traveling to Cahora Bassa for the first planning visit. During the initial visit an evidence register was compiled, refresher training was provided on the Protocol to a broader group of HCB staff, and a schedule for the assessment agreed. The onsite assessment took place from April 17 to 26, 2018, with interviews conducted in Songo, Tete, and around the reservoir with affected communities, as well as in Maputo. A post-assessment workshop with HCB staff and external stakeholders was held from May 28 to June 01, 2018, during which the draft report was discussed and additional clarifications were provided to the Accredited Assessors. In addition to the official assessment report, the findings were delivered in the format of the Environmental, Social and Governance (ESG) Gap Analysis Tool.

Note

1. See ZESCO's website, <http://www.zesco.co.zm/ourBusiness/generation>.

Objectives and Process for the Self-Assessments

Each of the developers or operators prepared a full report on their self-assessments in a similar style as an official assessment, reporting against the Protocol's basic good practice and proven best practice requirements on all topics. Accredited Assessors provided comments on the substance of the findings, including significant gaps. This chapter describes the process that was followed in each assessment. Table 3.1 presents an overview of the process for all three assessments.

3.1. Self-Assessment Process for ZESCO—Itezhi-Tezhi Hydropower Project

The ZESCO assessment team consisted of officers from ZESCO's headquarters. This meant that the assessment strongly resembled an internal audit by a corporate auditing team. They were a fully external audit team in relation to the power station managed by the Itezhi-Tezhi Power Company (ITPC). This gave the assessors the opportunity to be more objective than a self-assessment team would be. However, the nature of the project's ownership, consisting of both the ITPC Hydropower Station and the ZESCO-managed dam, presented a challenge to the team as it required additional interviews and effort.

ZESCO used the Operation stage tool for the Itezhi-Tezhi Hydropower Station (ITT) assessment as the project has been operating since 2015. This had the advantage in that the team could identify gaps that could be addressed on ITT. In any case, it would have been impossible to apply the Implementation stage tool to the whole project, considering that the dam was built in the 1970s.

ZESCO's objectives for the assessment were the following:

- Build capacity within ZESCO in the use of the Protocol as a guideline for assessing future projects.
- Use the Protocol to embrace best practices in the industry, benchmarking with international practices.
- Evaluate the sustainability of the Itezhi-Tezhi Hydropower Project using the Protocol.
- Develop an action plan to address possible gaps.

3.2. Self-Assessment Process for the Zambezi River Authority—Batoka Gorge HES

The Zambezi River Authority (ZRA) conducted a self-assessment of the Batoka Gorge Hydroelectric Scheme (HES) using the Preparation stage tool of the Protocol. With the team conducting the assessment comprising specialists involved in the preparation of Batoka Gorge, ZRA's assessment was a true self-assessment. The assessment team conducted interviews in Lusaka, Livingstone, Kazungula, Victoria Falls, and Hwange. Interviews covered

TABLE 3.1. Participants and Overview of Assessments

	ZESCO Itezhi-Tezhi	Zambezi River Authority Batoka Gorge	Hidroeléctrica Cahora Bassa Cahora Bassa North
Internal client for the assessment	Romas Kamanga (Senior Manager, Generation Support Services)	Christopher Chisense (Director for Water Resources and Environmental Management)	Eng. Nelson Beete (Executive Director)
Lead assessor	Sonny Musakabantu (Environmental Scientist)	Boniface Mfula (Senior Manager, Water Resources and Environmental Management)	Aida Mabjaia (Deputy Manager)
Assessors	Andrew Mabula (Graduate Hydrology Technologist), Temwani Violet Chirwa (Economist), Shepherd Ndhlovu (Senior Hydrology Technologist), Robam Kankomba Musonda (Principal SHEQ Officer, Environmental Compliance)	Mavis Nawa (Water Resources Officer), Samuel Mwale (Hydrology Technician), Pherry Mwiinga (Hydrologist), and Chrispin Namakando (Water Resources Engineer)	Adelino Manuel (Head of Health and Safety Department), Binte Insa (Environmental officer), Bruno Matsinhe (Dam Safety Coordinator), Celma Cuaira (Head of Operation Department), Chico João (Maintenance Engineer), David Chirindza (CBN Management Unit Coordinator), Edite Nhantumbo (Environmental officer), Ivo Pene (Legal Counsel), Ilídio Tembe (Dam Safety Engineer), José Matola (Senior Hydrologist), Jeremias Manjate (Head of Mechanical Maintenance Department), Nico Savaio (Environmental Officer), Pamella Saunguene (Senior Buyer), Pedro Conhaque (Community Liaison Officer), and Rosaque Guale (Senior Hydrologist)
Interviewees	14 interviews with ITPC and ZESCO site-based staff and local stakeholders including upstream and downstream communities, as well as interviews in ZESCO headquarters	About 12 interviews were held in Zambia and Zimbabwe in local communities, with local government representatives, and with local stakeholders such as tourism authorities	At least 15 interviews including with senior internal and external representatives, and communities in Songo and Maravia
Accredited Assessors	Doug Smith (Independent Consultant), and Aida Khalil (Sustainability Specialist, IHA)	Doug Smith (Independent Consultant)	Doug Smith (Independent Consultant) and Aida Khalil (Sustainability Specialist, IHA)
Observers	Jones Nguluwe (Station Manager, ITPC), Kale Prabhakar (Chief Executive Officer), Kimberly Lyon (Water Resources Management Analyst, World Bank)	Kimberly Lyon (Water Resources Management Analyst, World Bank)	Kimberly Lyon (Water Resources Management Analyst, World Bank)

Note: IHA = International Hydropower Association; ITPC = Itezhi-Tezhi Power Company.

the views of the developer, employees, local government, and affected communities. A site visit was conducted of the project on the Zambian side in Livingstone.

In a Preparation stage assessment, the project's environmental impact assessment, environmental management plans, and resettlement or land acquisition plans are key items of documentary evidence. The availability of the yet-to-be-completed Environmental and Social Impact Assessment (ESIA), management plans, and resettlement plans may have affected the findings or the team's ability to provide in-depth findings in the case of Batoka Gorge.

ZRA's objectives for the assessment were the following:

- Benchmark the proposed project implementation activities to international Basic Good Practice or Proven Best Practice that will ensure the sustainable implementation of the Batoka Gorge HES.
- Enhance the risk identification and management mechanism as well as capture opportunities offered by the project to optimize corporate image and maximize stakeholder support.
- Build internal capacity for the implementation of the Protocol.
- Utilize the Protocol in reviewing the implementation and management of the Batoka Gorge HES ESIA studies with a goal of developing a robust and sustainable environmental and social impact plan that ensures stakeholder support, regulatory approval, and environmental and social sustainability of project activities.
- Utilize the Protocol to enhance corporate governance in ZRA for the development and implementation of the Batoka Gorge HES.

3.3. Self-Assessment Process for Hidroeléctrica de Cahora Bassa—Cahora Bassa North

Hidroeléctrica de Cahora Bassa (HCB) conducted an assessment of the Cahora Bassa North (CBN) project using the Preparation stage tool of the Protocol. HCB's assessment was also a true self-assessment, having an assessment team drawn from specialists involved in CBN's preparation.

The assessment was well-planned. There were a series of internal and external interviews conducted at HCB offices in Songo and other local communities as well as with regulators in Tete. Interviewees shared their opinions and knowledge openly and professionally, and the established interview schedule allowed for daily feedback from Accredited Assessors on interview technique and findings.

HCB's objectives of the assessment were the following:

- Understand sustainability and evaluate the CBN project in its preparation phase, using the Protocol.
- Identify improvement opportunities and indicate the positive aspects of project performance in the preparation phase.

- Ensure transparency and commitment of stakeholders.
- Analyze regulatory compliance performance against the requirements established under the Protocol to understand the synergies that exist.
- Disseminate evaluation information, benefits, and results to stakeholders.

4.1. Self-Assessments

Each of the developers or operators prepared a full report on its self-assessments in a similar style as an official assessment, reporting against the Protocol's basic good practice and proven best practice requirements on all topics. The Accredited Assessors provided comments on the substance of the findings, including significant gaps. This chapter describes the results of the assessments which are summarized further in table 4.1.

The results are based on the findings of assisted self-assessments carried out by dam operators within the Zambezi River Basin as part of a capacity building exercise and broader program of support to the Riparian States. These self-assessments do not represent the views of the World Bank Group. The assessments are unofficial and do not meet the requirements of an official assessment as articulated in the Terms and Conditions of the Protocol. While Accredited Assessors facilitated and provided feedback on the self-assessments, the results have not been subject to independent verification. Thus, the results of the self-assessments cannot be considered an accurate reflection of the sustainability of the assessed projects.

4.1.1. Preparation Stage Tool

The Preparation assessment tool assesses the preparation stage of a hydropower project, during which investigations, planning, and design are undertaken for all aspects of the project. The awarding of construction contracts marks the end of the preparation stage. A preparation stage assessment determines whether all assessments have been completed and are satisfactory, management plans are in place, and commitments are appropriate and binding. A preparation stage assessment *early* in this stage is very useful for guiding the planning of designs and assessments (environmental, social, and other). An assessment *late* in this stage can be used to check whether all requirements are met before moving forward with project implementation.

The assessment of the Cahora Bassa North Bank (CBN) extension by Hidroeléctrica de Cahora Bassa's (HCB) was carried out early in its preparation, without a full feasibility study, though a draft Environmental and Social Impact Assessment (ESIA) had been completed. The Zambezi River Authority's (ZRA's) assessment of the Batoka Gorge HES was carried out later in preparation with detailed feasibility studies and a draft ESIA under preparation.

4.1.2. Operation Stage Tool

The Operation assessment tool assesses the operation of a hydropower facility, determining whether it is operating on a sustainable basis, with active measures in place on monitoring, compliance, and continuous improvement. Recognizing that hydropower facilities can be in operation for decades, the tool is designed to be flexible for a broad set of circumstances, ranging from newly commissioned projects to those that have been in operation for as long as a century. The tool does not assess performance against the pre-project baseline, except

TABLE 4.1. Results of Assisted Self-Assessments

Sustainability topics		Preparation		Operation
		HCB NB	ZRA	ZESCO
Technical	Siting and Design	☹️	😊	n.a.
	Hydrological Resource	☹️	😊	😊
	Demonstrated Need and Strategic Fit	☹️	😊	n.a.
	Infrastructure Safety	☹️	😊	☹️
	Asset Reliability and Efficiency	n.a.	n.a.	😊
Environmental	Environmental and Social Impact Assessment and Management	☹️	☹️	😊
	Erosion and Sedimentation	😊	😊	😊
	Water Quality	😊	😊	😊
	Waste, Noise, and Air Quality	n.a.	n.a.	n.a.
	Reservoir Planning / Preparation and Filling / Management	😊	😊	☹️
	Downstream Flow Regimes	☹️	😊	☹️
	Biodiversity and Invasive Species	😊	😊	😊
Social	Communications and Consultation	☹️	☹️	☹️
	Project Benefits	☹️	😊	☹️
	Project Affected Communities and Livelihoods	☹️	😊	t.b.c.
	Cultural Heritage	n.r.	😊	t.b.c.
	Indigenous Peoples	n.r.	n.r.	n.r.
	Resettlement	n.r.	t.b.c.	n.r.
	Public Health	☹️	😊	😊
	Labor and Working Conditions	😊	☹️	😊
Business and Economic	Financial Viability	t.b.c.	😊	😊
	Economic Viability	t.b.c.	😊	n.a.
	Procurement	☹️	😊	n.a.
	Governance	☹️	😊	😊
	Integrated Project Management	☹️	☹️	n.a.

Note: Self-assessment results are based on the review carried out by IHA-Accredited Assessors of the operators' assessment reports. In a few cases, there was insufficient information for the Accredited Assessors to base a judgment on; in such cases, the findings from the internal assessors are presented as is. HCB = Hidroeléctrica de Cahora Bassa; NB = North Bank; n.a. = topics not included in this tool; n.r. = not relevant for this project; t.b.c. = to be confirmed and not assessed because studies are ongoing; ZRA = Zambezi River Authority; 😊 = meeting basic good practice; ☹️ = gaps against basic practice; ★ = meeting proven best practice.

on specific topics in which documented commitments and a baseline from the time of its development are available. It focuses on ongoing issues, some of which may be long term (for example, legacy issues) or emerging, such as changes to policies, stakeholder expectations, or changes in the environment.

Not all topics in the Operation assessment tool will be relevant for every operating hydropower facility. For example, if there are no cultural heritage issues associated with the operating facility, the Cultural Heritage topic is not relevant. Three topics are relevant only if there were well-documented commitments made at the time of project approval, and data on the pre-project baseline against which to compare post-project: O-8 Project Benefits, O-9 Project-Affected Communities and Livelihoods, and O-10 Resettlement.

PHOTO 4.1. Cahora Bassa Post-Assessment Workshop



© Doug Smith/International Hydropower Association.

4.1.3. Results by Topic

Communications and Consultation (P-1 / I-1 / O-1)

This topic addresses the identification and engagement with project stakeholders, both within the company as well as between the company and external stakeholders (e.g., affected communities, governments, key institutions, partners, contractors, and catchment residents). The intent is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes establish a foundation for good stakeholder relations throughout the project life.

For the Itzhi-Tezhi Hydropower Project (ITT), ZESCO assessed that during the construction phase of the project there was a mechanism for consultation with local stakeholders and a Stakeholder Engagement Plan was developed. After commissioning, ITPC conducted fresh stakeholder mapping and developed a new Stakeholder Engagement Plan suitable for the operation stage. At the time of the assessment, the new stakeholder engagement plan was still being developed. ITPC communicates with local stakeholders through letters, public notices, radio announcements, meetings and site visits, and consults through meetings when the need arises. The power plant manager participates in a District Development Coordinating Committee, District Disaster Mitigation Committee, District Agriculture and Commercial Show, and meetings with chiefs and the local communities. However, stakeholders in villages downstream of the power plant reported that there has been insufficient communication between ITPC and the fishermen and farmers, who want to be informed about changes in river flows in advance.

For the Batoka Gorge HES, the ZRA has undertaken scoping workshops in both Zambia and Zimbabwe to identify the interests of various stakeholders on the project. The ESIA consultants have also developed a mapping of stakeholders and their interests. Key

PHOTO 4.2. Community Interviews for Batoka Gorge HES Self-Assessment



© Doug Smith/International Hydropower Association.

stakeholders, affected directly and indirectly, include traditional leaders, tourism stakeholders, community and development organizations, interest groups (nongovernmental organizations [NGOs], international organizations) and affected communities in both countries. The project has developed a Public Participatory Process (PPP) concerning social risks and impacts, disclosure of relevant project information, and informed consultation and participation. Ongoing communications and consultations with project stakeholders will be guided by a Stakeholder Engagement Plan developed by the ESIA consultant. However, during interviews with stakeholders for the assessment, the ZRA has found that a number of questions raised during ESIA consultations had not been resolved, and interviewees have raised issues around the lack of feedback (e.g., on employment opportunities, potential resettlement, economic displacement, and compensation).

For the CBN, HCB assessed that all interested parties affected by the CBN project were involved in the consultation process. However, at this stage of preparation, HCB concludes that there are no ongoing processes in place for them to raise issues and receive feedback, including feedback on ESIA results.

Governance (P-2 / I-2 / O-2)

This topic addresses corporate and external governance considerations for the project. The intent is that the developer has sound corporate business structures, policies and practices; addresses transparency, integrity, and accountability issues; can manage external governance issues (e.g., institutional capacity shortfalls, political risks including transboundary issues, public sector corruption risks); and can ensure compliance.

The ITPC is the special purpose vehicle (SPV) created to develop and operate the ITT, and is a joint venture owned equally by Tata Africa Holdings (SA) and ZESCO. A Board of Directors is appointed by the two partners, comprising four Directors (two from each partner), and is ultimately responsible for corporate governance. The ITPC has clear policies, procedures, roles, and values. The company is divided into six departments (Operations and Maintenance, Environment and Safety, Legal, Human Resources, Administration, and Procurement), and each department has a clear understanding of its role. Safety, Health, Environment and Quality (SHEQ) systems are being put in place, providing consistent and integrated policies, procedures, guidelines, regulations, management plans, registers, checklists, and forms, etc. Compliance is addressed through the SHEQ officers' review and communication of SHEQ system requirements. Procurement is guided by the Zambia Public Procurement Act (ZPPA).

The ZRA was formed by the Zambezi River Authority Act of 1987, and is governed by a Council of Ministers consisting of four members (i.e., energy and finance ministers from each country). The ZRA has formed a Project Steering Committee (PSC) for the Batoka Gorge HES project, encompassing the Council of Ministers and ZESCO, the Zimbabwe Electricity Supply Authority (ZESA), the Zimbabwe Power Company (ZPC), and the Zimbabwe Electricity and Distribution Company (ZETDC). A Project Management Unit (PMU), comprising representatives from the ZRA and utilities, is the operating arm of the PSC, responsible for day-to-day matters on the development of the project.

The Transaction Advisors to the ZRA for the development of the Batoka Gorge HES are responsible for all legal, financial, political, economic, and project-related policy matters and risks, and have delivered a Risk Assessment Report (a comprehensive risk assessment and framework, informing the choice of commercial structure and associated agreements) and a Legal Framework and Diagnostic Report. In addition, there is an Audit Committee, and both Zambia and Zimbabwe have anti-corruption laws and policies that are applicable to the project.

HCB was established on June 23, 1975, and is responsible for the operation and maintenance of the Cahora Bassa HES. HCB was established two days before Mozambican independence

and six years after an electricity contract was signed between the Portuguese government and South Africa's Eskom. It was originally majority-owned by the Government of Portugal until the Mozambican Government became the majority shareholder in 2007. Although efficient internal and external communication mechanisms exist within the company, HCB identifies a need to disseminate more information about the CBN project internally and externally. It is noted that the CBN still does not have a definitive corporate structure.

Demonstrated Need and Strategic Fit (P-3)

This topic addresses the contribution of the project in meeting demonstrated needs for water and energy services, as identified through broadly agreed local, national, and regional development objectives and in national and regional policies and plans. The intent is that the project can demonstrate its strategic fit with development objectives and relevant policies and plans can be demonstrated, and that the project is a priority option to meet identified needs for water and energy services.

For the ITT, ZESCO used the Operations stage tool, which is not applicable for this particular topic.

For the Batoka Gorge HES, the ZRA concluded that the introduction of new generation projects such as the Batoka Gorge HES will be critical to meeting the projected demand in both countries. Analysis of the need for the project is set out in the Batoka Gorge HES Project Overview Document (Zambezi River Authority 2017), developed for an investor conference held in Livingstone, Zambia, in 2017. Between 1998 and 2015, the Zambian economy expanded at an average rate of six percent per annum, and reached five percent in 2014. In Zimbabwe, despite a prolonged period of low and negative growth, growth rates have been strong in recent years. According to a demand forecast undertaken by Studio Pietrangeli of Italy in support of an analysis of options for development of the Batoka Gorge HES, Zambia's demand is forecast to grow from 1,911 megawatts in 2015 to 5,508 megawatts in 2035 (a compound annual growth rate of 5.4 percent). Current installed generation capacity in Zimbabwe is approximately 1,960 megawatts, and is predominately coal generation facilities. Zimbabwe's demand is forecast to grow from 2,116 megawatts in 2015 to 5,301 megawatts in 2035.

For the CBN, HCB assessed that the North Bank Project is well framed in the national and regional strategy to respond to increasing demand. This is based on a review of national studies, policies, and plans, combined with the socio-economic growth studies of Mozambique and the Southern Africa Development Community (SADC) led by governments and their national and international partners (Energy Master Plan, Water Development Plan, environmental assessments, energy demand forecast, national and regional development assessments, climate adaptation studies, policy review reports and relevant plans, government's five-year program, human development study), which shows that there is a strong demand for energy and water services. However, there are risks related to the Zambezi River hydrological scenario and issues related to the reduced transportation capacity of the future energy generated by this project for large consumers.

Siting and Design (P-4)

This topic addresses the evaluation and determination of project siting and design options, including the dam, powerhouse, reservoir, and associated infrastructure. The intent is that siting and design are optimized as a result of an iterative and consultative process that has taken into account technical, economic, financial, environmental, and social considerations.

For the ITT, ZESCO used the Operations stage tool, which is not applicable for this particular topic.

For the Batoka Gorge HES, the ZRA assessed that design optimization has been comprehensive, addressing a range of alternatives for turbines, dam site location and project configuration, dam-axis alignments along the gorge, access roads, power evacuation, borrow areas, and locations for spoil-material deposits. Social, environmental, and economic arguments and considerations have been considered, resulting in an optimal design for the site.

For the CBN, HCB assessed that all the national requirements for the project have been followed. HCB has carried out all the necessary studies for the realization of the project, including environmental impact, geological, geotechnical, hydrological, and public consultations. However, feasibility studies have not been developed. Environmental impact studies have shown that no major environmental impacts are expected, since the North Bank Power Station will use the existing dam, hence the areas to be flooded with the increase in the exploration quota are already part of the HCB concession. The latest technical studies define that the optimal format of the new plant would be an arrangement of three generator sets with 415 megawatts each and operating in peak periods of electricity demand. To support this conclusion, several aspects have been taken into consideration, namely: available head, water availability, site conditions for the implementation of water intakes, and estimated costs for each option, among others. Finally, the site's geotechnical and geological characteristics have been confirmed as being good for the installation of the power station.

Environmental and Social Impact Assessment and Management / Issues Management (P-5 / I-3 / O-3)

This topic addresses the assessment and planning processes for environmental and social impacts associated with project implementation and operation throughout the area of impact of the project. The intent is that environmental and social impacts are identified and assessed, and avoidance, minimization, mitigation, compensation, and enhancement measures are designed and implemented.

For the ITT, ZESCO assessed that the ITPC has engaged sustainability experts to develop environmental procedures and systems aimed at monitoring and addressing identified and emerging problems. The ITPC also draws on expertise from institutions such as the Departments of Fisheries and Forestry and the Department of National Parks and Wildlife. Environmental inspections are undertaken by designated environmental personnel, and periodic checks are conducted as part of the interim SHEQ system. Monitoring of waste

management and water quality is conducted at the plant, and a number of other programs are under consideration. Environmental and social impacts are largely avoided, minimized, and mitigated.

For the Batoka Gorge HES, the ZRA is currently undertaking an ESIA. The contract was signed in February 2014 and builds on earlier assessments carried out in the early 1990s. There have been delays in preparation of the ESIA against the original schedule. A series of consultations have been carried out, but there is a need to improve on the process for providing feedback on how issues raised in the ESIA have been addressed and ensuring continuous feedback loops.

For the CBN, HCB has carried out an ESIA in line with the Mozambican legal requirements and World Bank Safeguard Policies. The project will implement a series of measures to avoid, minimize, and mitigate socio-environmental impacts, such as (i) use of the same areas used at the time of construction of the dam, such as the old concrete plant, camp site, storage of materials, old quarry; (ii) use of excavated material for the production of concrete, which will prevent impact from the acquisition and transportation of gravel; and (iii) use of existing access roads. However, the social impacts of the project on the community of Chipera (Maravia) have not been addressed. Finally, HCB concludes that there is a need to disclose more information about the ESIA to interested stakeholders (most institutions that were interviewed, including key regulators, stated that they had no access to the ESIA).

Integrated Project Management (P-6 / I-4)

This topic addresses the developer's capacity to coordinate and manage all project components, taking into account project construction and future operation activities at all project-affected areas. The intent is that the project meets milestones across all components, delays in any component can be managed, and one component does not progress at the expense of another.

For the ITT, ZESCO used the Operations stage tool, which is not applicable for this particular topic.

For the Batoka Gorge HES, the ZRA has established governance structures to guide preparation of the project. A PSC and PMU are responsible for the integrated management of the project. A proposed commercial structure has been developed around the components that have to be put in place for successful implementation, so the contracts with the civil works contractor, and SPVs for the North and South Bank power plants will facilitate coordination between and within these components. In addition, the transaction advisors appointed by ZRA have identified all risks associated with planning, implementation, and operation stages of the project, and management measures have been proposed.

For the CBN, HCB has not yet developed any plans or processes for integrated project management. There is an intention to draw up the project management plan, but integrated management plans are expected to be developed during the technical, economic, and financial feasibility study process and other complementary studies.

Hydrological Resource (P-7 / O-4)

This topic addresses the level of understanding of the hydrological resource availability and reliability to the project, and the planning for generation operations based on these available water inflows. The intent is that the project's planned power generation takes into account a good understanding of the hydrological resource availability and reliability in the short and long term, taking into account other needs, issues, or requirements for the inflows and outflows as well as likely future trends (including climate change) that could affect the project.

For the ITT, ZESCO has assessed that there is good understanding of the hydrological resource. Several hydrological and water resources studies have been undertaken by a number of researchers on the Kafue catchment, and a number of models have been used for power forecasting and planning. Operations are based on inflow data and hydrological analysis, collected and prepared by ZESCO's Hydrology Department, whose staff also attend the Southern Africa Regional Climate Outlook Forum (SARCOF) to gather predictions of rainfall and climate. The inflow monitoring station at Kafue Hook Bridge Hydrometric station has a long history of hydrological data on which to base operational decisions. A reservoir Lower Rule Curve (LRC) is used to reduce spillage and increase average secondary energy generation, and a weekly rule curve derived from the monthly rule curve is used for short-term generation planning.

For the Batoka Gorge HES, the ZRA concluded that it has prepared a good assessment of the issues relating to availability and reliability of water, both in the short and long term. There is a considerable amount of historical flow data available, because monitoring of water levels and discharge of the Zambezi River at Victoria Falls Power Station, just upstream, has been conducted since the beginning of the last century. One major risk identified is climate change. The effects of climate change on generation have been analyzed based on numerical calculations of the general circulation models (GCMs) using a range of emission scenarios and different baseline scenarios. However, at the time of the assessment, reservoir operating rules with regard to the peaking regime and white water rafting were under consideration and yet to be finalized.

For the CBN, HCB concluded that the evaluation of the water resource was done at a high level by an internationally renowned consultant with extensive experience in the region. The study has a detailed and in-depth analysis of a long series of data (over 100 years). Scientifically accepted models and detailed statistical analysis have been used. Climate change and future developments were also analyzed. In this regard, the most unfavorable scenario implies a 20 percent reduction in flows. The operating plans are under consideration but not fully elaborated yet. Detailed studies on operational management will be developed in the future. CBN's operation will be synchronized with the existing Cahora Bassa South Bank (CBS) power station. At the time of the assessment, HCB believes that there will be better efficiency in the use of water because the current excess with the CBS operation will be used by the CBN.

Asset Reliability and Efficiency (O-5)

This topic addresses the reliability and efficiency of the hydropower facility and associated network assets. The intent is that assets are maintained to deliver optimal performance in the short and long term in accordance with the overall electricity generation and supply strategy of the owner or operator.

For the ITT, ZESCO assessed that the monitoring of project assets is carried out on a regular basis, for example in the powerhouse, SCADA is used to monitor, collect, and store instantaneous data on the generating equipment, and these performance-related data are analyzed by the shift engineer on duty and by the Operations Engineer. The condition of parts to be replaced or maintained is monitored more frequently to assess their condition, with a view to scheduling routine and planned maintenance together. Operation and maintenance reviews are planned to be undertaken annually on each machine to review performance. However, adherence to maintenance key performance indicators (KPIs) is low, due to the lack of availability of maintenance materials and extended outage on one of the units. As a result, the plant capacity has not been fully available in line with the operator objectives: at the beginning of the period, plant availability was set at 96 percent but it dropped to 80 percent as of November 2016.

For the Batoka Gorge HES, the ZRA used the Preparation stage tool, which is not applicable for this particular topic.

For the CBN, HCB used the Preparation stage tool, which is not applicable for this particular topic.

Infrastructure Safety (P-8 / I-5 / O-6)

This topic addresses planning for dam and other infrastructure safety during project preparation, implementation, and operation. The intent is that life, property, and the environment are protected from the consequences of dam failure and other infrastructure safety risks.

For the ITT, ZESCO assessed that the project monitors a range of parameters on a daily, weekly, monthly, quarterly, bi-annual, and annual basis. This includes the condition of the rock and earth structure of the dam, concrete infrastructure, radial gates, vertical and horizontal movements of the dam, rate of seepages, and groundwater, etc. There are no formally approved safety rules in place, but the Water Resources Management Act and Electricity Act provide legal guidance on requirements to dam operators and proprietors of power plants. In addition, a set of rules originally developed by the dam designers for inspection, measurements, and operation have been revised and enhanced. An Emergency Action Plan (EAP) has been developed by the project in line with legal requirements as well as strategy of action in case of an incident. All these guidelines provide a basis for dam and other infrastructure structural safety.

For the Batoka Gorge HES, the ZRA has an operational dam safety program for the Kariba Dam, which will be adopted and improved upon for the operation of Batoka Gorge HES. The

existing program is guided by the International Commission on Large Dams (ICOLD) dam safety standards, and the Standing Operating Procedures (SOP) are drafted in line with international standards for maintenance of large dams. Other guiding procedures include an Emergency Preparedness Plan (EPP), and a five-year dam inspection plan. At the time of the assessment, the Feasibility Study engineers were continuing work on dam safety plans to meet the World Bank Dam Safeguard Policy (OP/BP 4.37), including a construction supervision and quality control plan, an instrumentation plan, an operation and maintenance plan, and an updated EPP. In addition, a dam break analysis is being conducted for all dams in the Zambezi River Basin.

For the CBN, HCB assessed that the existing dam has already been designed to accommodate the two plants. Over the years, five-year inspections have been carried out (last inspection was made by Tractebel in February 2017). Additionally, the due diligence carried out by Nippon Koei UK states that the dam can store the quotas necessary to supply the North Bank Power Station. Manitoba is also an external advisor and provides reports on the dam safety. HCB notes that mitigation measures are already being implemented that will benefit the CBN, including the modern and efficient monitoring system in the dam and with slopes consolidation. Finally, to verify and recommend the ideal vibration level for the dam during the implementation of the North Bank project, uni and triaxial accelerometers have been installed in the dam. HCB concludes that the project is still in an early stage, hence feasibility studies have not yet been carried out. Furthermore, studies such as the interaction with other projects (cascade failure) and public safety risks will be carried out after the feasibility study.

Financial Viability (P-9 / I-6 / O-7)

This topic (preparation) addresses both access to finance and the ability of a project to generate the required financial returns to meet project funding requirements, including funding of measures aimed at ensuring project sustainability. The intent is that projects proceed with a sound financial basis that covers all project funding requirements, including social and environmental measures, financing for resettlement and livelihood enhancement, delivery of project benefits, and commitments to shareholders and investors.

This topic (operation) addresses financial management of the operating hydropower facility, including funding of measures aimed at ensuring project sustainability, and the ability of the project to generate the required financial returns to meet funding requirements as well as to optimize its financial opportunities. The intent is that the operations of the hydropower facility are proceeding on a sound financial basis that covers all funding requirements, including social and environmental measures and commitments, and that it is aware of and responding to market trends that may influence its long-term viability.

For the ITT, the revenues are predetermined by the power purchase agreement between the ITPC and ZESCO: generation is dispatched and sales are coordinated through the management of the existing power purchase agreement. Expenditures depend on the scale of

planned operation and maintenance, but the power plant had been operating for less than a year at the time of the assessment, and the use of the existing dam infrastructure reduces the costs and risks for the ITPC. The operating facility enjoys a wide margin of financial surplus under a range of scenarios, and can service its debt and pay for all socio-environmental plans and commitments.

For the Batoka Gorge HES, the ZRA has developed a preliminary financial model with support from the Transaction Advisors and confirmed by the ESIA, calculating the required water payment to cover the dam's financing and operational costs. This amount has been included as an expense in the calculation of the North Bank and South Bank power stations' "power capacity charge", which is calculated to cover the water payment, operational costs, taxation, and financing costs (debt repayments and equity returns). The financial assessment shows that the project is financially feasible, with an Internal Rate of Return (IRR) of 28 percent, a Benefit Cost Ratio (BCR) of 4.71, and a Net Present Value (NPV) of over US\$11 billion. ZRA has concluded that it is highly likely that the project, under a range of different scenarios, will be able to generate sufficient revenue to meet all required social and environmental costs, service its debt, and pay for all legal and contractual obligations.

For the CBN, HCB has yet to carry out a financial evaluation of the project as this phase has been postponed due to shifting priorities in the energy sector. The hydrological study shows different scenarios related to the operation phase of the CBN regarding the use of water. Complementary studies commissioned by HCB in 2007 through Nippon Koei have assumed that the CBN will operate as a mid-merit plant for a period of eight hours. However, more recent assessments commissioned in 2012 conducted by Knight Piesold assume that the CBN will operate on average merit for 16 hours per day. Therefore, the future feasibility study will define which scenario is most appropriate for implementation. According to the ESIA, the increase in the generation capacity of the CBN project will increase Cahora Bassa's energy production by more than 50 percent, which will result in a large increase in energy sales, most of which will be exported, making a significant contribution to the gross domestic product (GDP) of Mozambique. However, the economic impact of the project will be addressed in other studies, particularly in the future Feasibility Study.

Project Benefits (P-10 / I-7 / O-8)

This topic addresses the additional benefits that can arise from a hydropower project, and the sharing of benefits beyond one-time compensation payments or resettlement support for project-affected communities. The intent is that opportunities for additional benefits and benefit sharing are evaluated and implemented, in dialogue with affected communities, so that benefits are delivered to communities affected by the project.

For the ITT, ZESCO assessed that a number of commitments to project benefits were made at the time the new plant was developed. These included renovations to the district hospital, investment in recreational activities in the district, acquiring a fire engine, a 10-megawatt

distribution transformer to enable electricity distribution to local communities, and the distribution of 0.5 percent of profits for social projects. Most of the commitments have been met (e.g., a water treatment plant, sewerage system, a diesel generator provided to the district hospital, and the 10-megawatt distribution transformer), and others are on track to be delivered. However, there is no monitoring of the delivery of project benefits, or their effectiveness in meeting objectives. The proposal to use 0.5 percent of profit for community benefits has not been addressed: it was based on an assumption that communities would bring forward proposals, but they have not done so because they are unaware of the opportunity.

For the Batoka Gorge HES, the ZRA concluded that the assessment of opportunities to increase the development contribution of the project through additional benefits will be undertaken through negotiations with affected communities. The ZRA has already put in place the Zambezi Valley Development Fund to address the legacy of the Kariba project. The ZRA has requested that the ESIA consultant consider the performance of and lessons from this fund so as to propose a framework that will support self-sustaining initiatives. The ESIA and the Resettlement Action Plan (RAP) will establish a baseline against which the effectiveness of benefit sharing will be monitored.

For the CBN, HCB concluded that the ESIA provides a comprehensive and detailed assessment of the potential negative and positive environmental and social impacts of the project, and mitigation measures have been considered to avoid or minimize negative impacts and maximize benefits. The evaluation has focused on the districts of Cahora Bassa (Margin Sul) and Maravia (Margin Norte), specifically the administrative posts of Songo and Chipera. These administrative posts are directly affected by the project and will derive various benefits from implementation of the project, and it is anticipated that local communities will also benefit. During construction, the project will have a major impact on employment. Local services will also benefit through, for instance, the provision of food, communications, security, and maintenance of equipment, etc. It will also benefit the education, health, and other facilities in Songo because the community will have the opportunity to expand the training of labor for the CBN project (e.g., employment, education, improvement of access roads, and health, etc). However, there has been no assessment of opportunities to increase development contribution of the CBN beyond the benefits provided by the CBS.

Economic Viability (P-11)

This topic addresses the net economic viability of the project. The intent is that there is a net benefit from the project once all economic, social, and environmental costs and benefits are factored in.

For the ITT, ZESCO used the Operations stage tool, which is not applicable for this particular topic.

For the Batoka Gorge HES, ZRA has assessed the preliminary economic benefits with support of their Transaction Advisors. The results show that net benefits are expected to exceed potential costs, and the project would have a net positive impact on the national economies

of both Zambia and Zimbabwe over the 30-year lifetime of the project. In aggregate, the project will have added a cumulative value of over US\$1.45 billion to the GDPs of the two countries by the end of construction, and over US\$45.7 billion by 2035. The ZRA has also been working with the World Bank on a Macroeconomic Assessment of Public Investment Options that shows the Batoka Gorge HES provides a robust financial and economic investment option with a net positive impact on the national economies in both Zambia and Zimbabwe. The model base case assumptions generate an Economic Internal Rate of Return (EIRR) of 20.6 percent for Zimbabwe and 26.7 percent for Zambia, with the Financial Internal Rate of Return (FIRR) estimated at 16.1 percent and 17.2 percent, respectively, with limited impacts on prices and imports. The impact on the governments' fiscal accounts is expected to be modest, due to the concessional nature of the debt and the introduction of an innovative split development model. The estimates are considered conservative and the returns remain robust when subjecting the model to extreme assumptions to test the sensitivity of the results.

For the CBN, HCB concluded that an economic feasibility study has not yet been carried out due to changes in the country's priorities for the energy sector.

Procurement (P-12 / I-8)

This topic addresses all project-related procurement including works, goods and services. The intent is that procurement processes are equitable, transparent and accountable; support achievement of project timeline, quality and budgetary milestones; support developer and contractor environmental, social and ethical performance; and promote opportunities for local industries.

For the ITT, ZESCO used the Operations stage tool, which is not applicable for this particular topic.

For the Batoka Gorge HES, ZRA has proposed that construction be managed through four packages, including construction of the dam, an SPV for the North Bank power plant; an SPV for the South Bank power plant; and an integrated owners' engineer and project manager. The SPVs would potentially include design, construction, financing, operations and maintenance, transmission, and any other associated infrastructure. At commissioning, the transmission infrastructure will be transferred to the respective utilities, which will then operate and maintain these assets. The guidelines on procurement relevant to the project will include those of the ZRA, the nations of Zambia and Zimbabwe, and any requirements from the respective financing partners.

For the CBN, HCB assessed that there is a commitment to ensure that the procurement of works, goods, and services in large project components are fair, efficient, transparent, accountable, and ethical, and that contracts are signed within the approved budgets and the changes are duly justified. The procurement of works, goods, and services in main components of the project is done as evidenced by the procedures and practices currently in force, and as evidenced in public tenders in the previous large projects. During the procurement

cycle of project works, goods, and services, it is necessary to improve the efficiency of the time from the approval of the budget to the award of the tender. Each tender is budgeted and the budget must be approved at the level of the Executive Committee. All technical changes are justified to the superior management and require its approval; when there are financial adjustments implied by these changes, they receive written approval by the Board of Directors. Thereafter, the contract management department will make an addendum to the contract original. The addendum shall be signed by the members of the Board of Directors and subsequently by the contractor. However, there is no procurement process for the CBN construction phase.

Project-Affected Communities and Livelihoods (P-13 / I-9 / O-9)

This topic addresses impacts of the project on project-affected communities, including economic displacement, impacts on livelihoods and living standards, and impacts to rights, risks, and opportunities of those affected by the project. The intent is that livelihoods and living standards impacted by the project are improved relative to pre-project conditions for project-affected communities with the aim of self-sufficiency in the long term, and that commitments to project affected communities are fully delivered over an appropriate period of time.

For the ITT, ZESCO concluded that no commitments to project-affected communities were made during the project's development, other than those discussed under Project Benefits (O-8), so this topic is Not Relevant. However, during the assessment, ZESCO interviewed community members around the reservoir and downstream of the power plant, finding concerns that the operations of the dam and the power station have had adverse impacts on the livelihoods of fishing communities, and that the community around the reservoir has had to travel long distances to find good fishing grounds due to the drawdown of the reservoir.

For the Batoka Gorge HES, the ZRA concluded that in both countries, local communities are principally subsistence farmers: approximately 85 percent and 91 percent of households in the Zambian and Zimbabwean social study communities, respectively, own livestock and require access to land for grazing purposes; 95 percent and 92 percent collect forest products to sustain their livelihoods in Zambia and Zimbabwe, respectively. Local communities have been engaged through the ESIA process, and informed of potential economic displacement due to the project. Through public meetings, downstream communities were equally engaged; for example, community meetings were held approximately 45 kilometers downstream in Zimbabwe, and 193 kilometers downstream in Zambia. The ESIA will deliver Environmental and Social Management Plans (ESMPs) and monitoring plans for various social issues. However, the ZRA has noted delays in the development of the RPF and RAP.

For the CBN, HCB concluded that the assessment process was satisfactory. However, small challenges have been identified due to the long period since the ESIA was carried out, resulting in the need to revisit some of the issues previously raised and addressed. HCB has verified the existence of formal mechanisms established for the contact between the community

and HCB, including feedback, but this mechanism has been established only in the Songo Administrative Post (Cahora-Bassa District). Other riverside communities have no formally established mechanism, but communication is sporadic, especially when it is in the company's interest. The plans are designed to improve the living standards and livelihoods affected by the project, and ensure that economic dislocations are fairly compensated, preferably through the provision of comparable goods, property, or services. The ESIA has not taken into account specific aspects of the communities on the northern bank of the river, which are probably the most vulnerable.

Resettlement (P-14/I-10/O-10)

This topic addresses physical displacement arising from the hydropower project development. The intent is that the dignity and human rights of those physically displaced are respected; that these matters are dealt with in a fair and equitable manner; and that livelihoods and standards of living for resettles and host communities are improved.

For the ITT, ZESCO assessed this topic as Not Relevant as there was no physical displacement at the time of the power plant's development, and no documented commitments to displaced people from the time of the dam's earlier development.

For the Batoka Gorge HES, the ZRA did not assess this topic, as it was waiting for the conclusions from the development of the RAP on whether there would be any physical displacement. If there were any physical displacement, it would be minimal, related to access roads and the transmission line, because there are no residential structures in the gorge. No significant physical displacement is expected in the reservoir area, as it has no permanent settlements. Associated infrastructure around the dam and reservoir may require land acquisition and may affect some economic activities, but low population densities should allow for routing to minimize any physical displacement.

For the CBN, HCB concluded this topic is Not Relevant because no physical displacement is expected.

Indigenous Peoples (P-15/I-11/O-11)

This topic addresses the rights, risks, and opportunities of indigenous peoples with respect to the project, recognizing that as social groups with identities distinct from dominant groups in national societies, they are often the most marginalized and vulnerable segments of the population. The intent is that the project respects the dignity, human rights, aspirations, culture, lands, knowledge, practices, and natural resource-based livelihoods of indigenous peoples in an ongoing manner throughout the project life.

For the ITT, ZESCO assessed this topic as Not Relevant because there are no people meeting the definition of Indigenous Peoples affected by the project.

For the Batoka Gorge HES, the ZRA assessed this topic as Not Relevant because there are no peoples meeting the definition of Indigenous Peoples in the project area.

For the CBN, HCB assessed this topic as Not Relevant as there are no peoples meeting the definition of Indigenous Peoples in the project area.

Labor and Working Conditions (P-16/I-12/O-12)

This topic addresses labor and working conditions, including employee and contractor opportunity, equity, diversity, health, and safety. The intent is that workers are treated fairly and protected.

For the ITT, HCB assessed that the ITPC has 41 employees. The ITPC has adopted an organizational structure and human resources policy, encompassing such features as the recruitment process, entitlements for employees, staff development and training, grievance mechanisms, retirement, termination, and leave etc. The SHEQ Manager is responsible for the management of occupational health and safety (OHS) issues, and identification of emerging OHS risks and the provision of the appropriate personal protective equipment and signage. All employees are provided with personal protective equipment and are not allowed on the work site without it. There is no labor union, but steps are being taken to enable employees to join an existing union at the time of the assessment.

For the Batoka Gorge HES, the ZRA assessed that human resources and OHS will be managed through existing ZRA policies, meeting national requirements. ZRA's human resources policy will be applied with additional recommendations of the ESIA. Examples include a comprehensive training needs assessment to understand skills levels in the local area, identifying the training needs of youth and women; mechanisms to train local people to meet the project's needs; on-the-job and formal training to local and regional contractors; and "certification" or reference letter provisions to assist retrenched employees to find employment following construction.

For the CBN, HCB assessed that the human resources policies to be adopted in the CBS operational phase will be extended to the new infrastructure. Where there is need for improvement, it will also be done at both plants. HCB concluded that its health and safety policies, plans, and practices are consistent with internationally recognized work rights and compliant with Mozambican law. Mozambique has ratified all eight ILO fundamental conventions and three of the four priority conventions. It has also ratified the UN Convention on the Rights of the Child and the International Convention on the Protection of All Migrant Workers and Members of their Families. Interaction continues with the workers and union body as an important tool for sharing and transmitting ideas.

Cultural Heritage (P-17 / I-13 / O-13)

This topic addresses cultural heritage, with specific reference to physical cultural resources, at risk of damage or loss by the hydropower project and associated infrastructure impacts (e.g., new roads, transmission lines). The intent is that physical cultural resources are identified, their importance is understood, and measures are in place to address those identified to be of high importance.

For the ITT, ZESCO concluded that no physical cultural heritage is affected by the project, and therefore this topic is Not Relevant.

For the Batoka Gorge HES, the ZRA is carrying out an assessment of the potential cultural heritage impacts as part of the ESIA. The area has a rich and wide-ranging cultural heritage,

ranging from Stone Age and Iron Age sites to rain-making shrines that are still in use. The assessment has been based on existing records, predictive modeling, archaeological investigations, and contributions from local cultural heritage experts; it includes “living” tangible and intangible heritage as well as historical physical sites and artifacts. Archaeological studies have confirmed that the Iron and Stone Age sites in the area are outside of the gorge and, therefore, out of danger of inundation by the reservoir. ESMPs for implementation and operation stages include measure for cultural heritage including chance-finds management.

For the CBN, HCB concluded that no physical cultural heritage will be affected by the project, and therefore this topic is Not Relevant.

Public Health (P-18 / I-14 / O-14)

This topic addresses public health issues associated with the hydropower project. The intent is that the project does not create or exacerbate any public health issues, and that improvements in public health can be achieved through the project in project-affected areas where there are significant pre-existing public health issues.

For the ITT, ZESCO assessed that there is a district hospital nearby and 10 rural health centers providing curative and preventive health care services. A District AIDS Task Force is also active. Major diseases include malaria, diarrhea, cryptococcal meningitis, and skin infections, and communities in the Kafue Flats are at a high risk of HIV/AIDS due to high levels of mobility and migration. According to the district hospital, the only identified public health concern directly related to the project is the proliferation of mosquitoes, and the risk of malaria, due to the dam. The ITPC intends to contribute to public health management through its corporate social responsibility program; for example, it has donated an electricity generator that the hospital may use during grid outages.

For the Batoka Gorge HES, the ZRA assessed that the ESIA has considered health needs, issues, and risks for different community groups. Project ESMPs and monitoring plans have been developed for the project implementation and operation stages including addressing health awareness training for employees (e.g., malaria; sexually transmitted infections, including HIV/AIDS tuberculosis; and other diseases); pre-employment health screening; awareness-raising activities in communities considered to be at higher risk; monitoring of the emergence of major pandemics through World Health Organization (WHO) alerts; agreements with health clinics or hospitals that the project intends to use; forbidding the use of prostitution and the sale, purchase, or consumption of drugs and alcohol; and community investment funds for public health initiatives.

For the CBN, HCB concludes that the communities in Songo have more facilities than those in Chipera, which face several difficulties and adversities due to the severe lack of infrastructure, from access roads, means of transport, health unit with populations, the media, electricity, and drinking water, etc. The level of resources available to attend to the health of the populations is basic, and it cannot meet the demands of the North Bank Project. The actions in practice now meet the needs; however, those interviewed recognize the need to expand

health services to respond to future needs. The Chipera communities have also shown great enthusiasm for the startup of the North Bank Project with a view to improving livelihood conditions, particularly in the provision of electricity, potable water, and other resources essential for the promotion of public health.

Biodiversity and Invasive Species (P-19 / I-15 / O-15)

This topic addresses ecosystem values, habitats, and specific issues such as threatened species and fish passage in the catchment, reservoir, and downstream areas, as well as potential impacts arising from pests and invasive species associated with the planned project. The intent is that there are healthy, functional, and viable aquatic and terrestrial ecosystems in the project-affected area that are sustainable over the long term, and that biodiversity impacts arising from project activities are managed responsibly.

For the ITT, ZESCO assessed that the project exists in an environment rich in biodiversity, particularly owing to the number of protected areas in the region. The areas include the Nkala Game Management Area and the Kafue Flats, which is very high in biodiversity and designated as an “Important Bird Area”. The Itezhi-Tezhi Dam was commissioned in 1978 as a reservoir providing flow releases to the Kafue Gorge Power Station; since then, flows through the Kafue Flats have been governed by the Itezhi-Tezhi Dam operations. This has resulted in a change in the flow regime, with inevitable impacts on the ecological system of the Flats. Operation rules have been amended in subsequent years to more closely mimic the natural flow of the river. Biodiversity issues were assessed through the ITPC ESIA in 2012. Monitoring is conducted by a number of organizations, such as the Zambia Environmental Agency (ZEMA), the Department of National Parks and Wildlife, Bird Watch Zambia, and the World-Wide Fund for Nature Zambia (WWF Zambia). There is no evidence that the project has adversely affected biodiversity, except when the dam was built in the late 1970s and a few years that followed. To mitigate the impacts arising from operations of the dam, the operations rules have periodically been changed.

For the Batoka Gorge HES, the ZRA assessed that biodiversity in the project area has remained relatively intact due to the inaccessibility of the area. The fish communities within the Batoka Gorge are considered to be in a natural state with minimal utilization, though downstream of the gorge there is evidence of heavy utilization. The ESIA indicates that water quality impacts may have repercussions for aquatic biodiversity, and that the habitats of some bird species – the Taita Falcon (*Falco fasciinucha*, International Union for Conservation of Nature (IUCN) status “vulnerable”) and the Rock Pratincole (*Glareola nuchalis*; IUCN status “least concern”) – could be lost due to reservoir filling. The Taita Falcon prefers to nest in crannies high on the vertical cliff faces of the gorge, and there are few suitable nesting sites in the area. The ESIA has considered project impacts on fish passage for spawning and recommends the inclusion of fish ladders in project designs, although this is highly unfeasible for a project of this size and type. ESMPs have been drafted addressing all biodiversity impacts, and ESMPs will be supported by monitoring plans.

For the CBN, HCB concludes that because there is no construction of a new dam, impacts on biodiversity will be minimal. Aspects such as a barrier to the passage of aquatic species and the appearance of invasive species are not deemed relevant. Nevertheless, the environmental impact study report has an exhaustive survey of the aquatic and terrestrial ecology of the reservoir and downstream of the dam, which will detect any changes caused by the project and consequent implementation of the mitigation measures. However, there are no management plans capable of addressing aspects beyond the impacts caused by the project, such as conservation areas.

Erosion and Sedimentation (P-20 / I-16 / O-16)

This topic addresses the management of erosion and sedimentation issues associated with the project. The intent is that erosion and sedimentation caused by the project is managed responsibly and does not present problems with respect to other social, environmental, and economic objectives, and that external erosion or sedimentation occurrences that may have impacts on the project are recognized and managed.

For the ITT, ZESCO assessed that various institutions have carried out studies to assess the extent of erosion and sedimentation in the Kafue River, as well as that associated with water-level fluctuations both upstream and downstream of the dam. All conclude that issues arising from erosion and sedimentation are insignificant and are unlikely to have an impact on reservoir capacity, and that there are no known new sources of erosion and sedimentation problems. Slope stabilization during construction has been effective, including a retaining wall to prevent landslips around the power house. Following construction, the ITPC has implemented a Site Restoration Plan, involving revegetation and tree-planting activities.

For the Batoka Gorge HES, the ZRA assessed that there are very few direct sediment discharge measurements available for the Zambezi River above Victoria Falls. Most studies conclude, however, that sediment transport rates are very low due to deposition in wetland areas upstream in the Barotse Plain and Chobe Swamps. Erosion rates at the Victoria Falls are estimated to be around 1,000 cubic meters of rock material per year, which is very small in comparison to a volume of the Batoka Reservoir of more than 1,390 million cubic meters at full supply level. However, an additional comprehensive erosion and sedimentation study was added to scope of work for the ESIA consultant and any measures for the management of sedimentation and erosion will be included in the resulting environmental and social management plans.

For the CBN, HCB assessed that most sediments are retained before reaching the reservoir due to the existing large storages upstream of the Cahora Bassa (Kafue and Kariba). In addition, the Mazowe Basin, whose discharges flow directly into the Cahora Bassa reservoir, is heavily regulated, with multiple small dams and reservoirs that capture sediments. The main source of sedimentation in the Cahora Bassa Reservoir is the Luangwa River, which is laden with sediment during the rainy season. HCB concludes that the ESIA is still preliminary with regard to the identification and management of impacts related to erosion and

sedimentation, both for direct and indirect impacts. Hence, a specific study on the evolution and dynamics of sedimentation upstream of the Cahora Bassa reservoir is still considered necessary for the joint operation the CBN and CBS.

Water Quality (P-21/I-17/O-17)

This topic addresses the management of water quality issues associated with the project. The intent is that water quality in the vicinity of the project is not adversely impacted by project activities.

For the ITT, ZESCO concluded from a recent assessment of water quality in the river basin by the Zambia Environmental Management Agency that the state of water quality entering the middle catchment of the Kafue River, and more specifically inflows and outflows at the reservoir, are good. Potential pollution from mining activities upstream, sedimentation in the reservoir, dissolved oxygen, and possible oil spillages have been identified as possible issues that could affect the quality of water in the reservoir and downstream. Staff from the ITPC and ZESCO collect monthly water samples from the reservoir and immediately downstream of the dam and analyses are carried out at the University of Zambia laboratory. Any leakages from the power plant are channeled to a drainage pit and pumped through an oil-water separator, and wastewater effluent is monitored. The operation of the project has not negatively affected the quality of water within the hydropower generating area or beyond.

For the Batoka Gorge HES, the ZRA has carried out a comprehensive environmental monitoring program that stretches from Chavuma (almost at the source of the Zambezi River) to Luangwa, covering the project site. The ESIA has assessed potential impacts of the project on water quality, and mitigation and management measures have been incorporated in the draft ESMPs for construction and operation stages. A program for water quality monitoring in the Batoka Reservoir will developed for incorporation into ZRA's wider program.

For the CBN, HCB concludes that the studies included in the Environmental Impact Assessment have identified and proposed management measures for the direct and indirect project-related impacts; in parallel, the measures envisaged cover satisfactorily the expected adverse impacts. However, the involvement of state institutions responsible for the study and safeguarding of water resources, such as the Administração Regional das Águas do Zambeze (ARA-Zambeze) and the Fisheries Research Institute, could add value, since these institutions could cooperate with HCB in monitoring water quality for uses downstream of the project, as well as for preserving characteristics of the Zambezi River effluents, taking into account shrimp production in the Sofala Bank, tilapia along the river, among other existing and future uses. HCB notes that the project does not involve major works, which favors the absence of significant changes in water quality. In addition, studies carried out in the EIA framework indicate there would be a positive environmental impact resulting from increased water body dynamics and oxygenation of water, which benefits the aquatic ecosystem.

Reservoir Planning / Filling / Management (P-22 / I-19 / O-18)

This topic addresses planning for management of environmental, social, and economic issues within the reservoir area during project implementation and operation. The intent is that the reservoir will be well managed, taking into account power generation operations, environmental and social management requirements, and multi-purpose uses where relevant.

For the ITT, ZESCO assessed that the reservoir was developed to provide seasonal regulation of flows in the Kafue River and generation expansion of the Kafue Gorge Power Station. It is managed by ZESCO, which uses a guide curve with monthly reservoir levels to regulate flows. The performance of the reservoir is weighed against the monthly reservoir rule curves, while weekly operations for short-term generation are determined by interpolating monthly rule curve values. In addition to power generation, the reservoir is used for the abstraction of water supplies for the Itezhi-Tezhi community, and fishing is widely undertaken. Security personnel guard the dam infrastructure and restrict unauthorized access to reservoir areas close to the intake and the main spillway, but there have been fatalities of fishermen in the wider reservoir and from proximity to the spillway.

For the Batoka Gorge HES, the ZRA assessed that the hydropower station will operate primarily as a run-of-river scheme because the storage capacity of the reservoir is relatively small compared to inflows, allowing only daily, or in the dry season weekly, regulation of inflows. The ESIA has made recommendations for reservoir management during preparation, filling, and operations, including selection of a full supply level of 762 meters above sea level to avoid backwaters reaching the base of the Victoria Falls or the tailrace of the existing Victoria Falls Power Station during periods of high inflows; and operations to avoid flooding rapids used by whitewater rafters during their peak season. After impoundment to full supply level, the reservoir surface area will be approximately 23 square kilometers.

For the CBN, HCB highlights the need to carry out a revision of the reservoir planning, specifically related to resettlement of persons residing within the concession area of the reservoir, who would be affected by the probable increase in the reservoir level to the level originally envisioned for the project. It has also acknowledged a need to develop a risk assessment considering the likely reduction in water availability resulting from climate change.

Downstream Flow Regimes (P-23 / I-20 / O-19)

This topic addresses the flow regimes downstream of hydropower project infrastructure in relation to environmental, social and economic impacts and benefits. The intent is that flow regimes downstream of hydropower project infrastructure are planned and delivered with an awareness of and measures incorporated to address environmental, social and economic objectives affected by those flows.

For the ITT, ZESCO notes that key issues are the effects of the project on the Kafue Flats, which is important for biodiversity and livelihoods, and downstream impacts on

communities in the immediate downstream reach. ITT operates within the same flow regimes as before the power station was developed to avoid any additional impacts on Kafue Flats. There is a minimum flow of 40 cubic meters per second (25 cubic meters per second intended for environmental maintenance, and 15 cubic meters per second for consumptive demand), and a mandated discharge (“freshet”) of 300 cubic meters per second of water in March. A number of consultative and stakeholder meetings have been held to discuss reservoir operations, involving government agencies, ZESCO, and WWF Zambia. Water level fluctuations have been observed by nearby communities downstream of the power station owing to the switching of outflow between the power station and the dam management unit. To address this concern, an operation procedure has been created to effect gate adjustment in case of a station trip coordinated between the power station, dam management, and the hydrology departments.

For the Batoka Gorge HES, the ZRA notes that the scheme is intended to operate conjunctively with the proposed Devil’s Gorge HES, the Kariba HES, and other power plants in the basin. Studies have indicated that the proposed downstream impacts of the Batoka Gorge HES are expected to be low, limited to impacts arising from a reduction in sediment load, provided that it is operated as a purely run-of-river scheme. However, a study on environmental flows was carried out to inform the design of a downstream flow regime, using the DRIFT (Downstream Response to Imposed Flow Transformations) model. This examined three scenarios and two geomorphologically- and biologically-representative sites downstream of the project. The scenarios were: (i) run-of-river with no defined flow conditions, matching outflows to inflows at all times, with no sediment flushing; (ii) outflows peaking over a three-hour period every morning and evening, with reservoir storage being balanced over a 24-hour period, with four alternative minimum releases during the dry season; and (iii) as the second scenario but with balancing over a weekly period with run-of-river operations at the weekends.

For the CBN, HCB notes that the assessment of the downstream flow regime has not been properly explored in the project studies carried out to date. However, there is recognition that operation of the North Bank Power Station could affect the river ecosystem downstream of the Cahora Bassa Dam. Information obtained from two interviews suggests that the ecological flow regime will undergo both positive and negative dynamics; therefore, it is necessary to evaluate the sustainable balance during the project’s operation phase. It was stressed, however, that fluctuations in the flow regime of the Cahora Bassa effluent flow from the CBN operation will be attenuated by the proposed Mphanda Nkuwa project. These projected outcomes are expected to establish a balance in relation to the environmental, social, and economic interests that can be affected by the adopted ecological flow regime.

Climate Change Mitigation and Resilience (P-23/I-21/O-20)

This topic addresses the estimation and management of the project’s greenhouse gas (GHG) emissions, analysis and management of the risks of climate change for the project, and the

TABLE 4.2. Topics Meeting Basic Good Practice

Topic	Significant gaps to achieving proven best practice
ZRA – Batoka Gorge HES	
P-3 Demonstrated Need and Strategic Fit	<ul style="list-style-type: none"> There is no evidence the project is a priority option.
P-4 Siting and Design	<ul style="list-style-type: none"> Engagement on siting and design issues has not included all directly affected stakeholders.
P-7 Hydrological Resource	<ul style="list-style-type: none"> Reservoir operating rules with regard to peaking regime and whitewater rafting, though currently under consideration, are yet to be finalized.
P-11 Economic Viability	<ul style="list-style-type: none"> The economic viability analysis is not publicly disclosed.
P-17 Cultural Heritage	<ul style="list-style-type: none"> No processes are in place to anticipate and respond to emerging risks and opportunities. There are no plans to contribute to addressing cultural heritage issues beyond those impacts caused by the project.
HCB – Cahora Bassa North Bank Extension	
P-19 Biodiversity and Invasive Species	<ul style="list-style-type: none"> There is no assessment of potential impacts on red-listed species, and on the Mâgoe Park and the wetlands of the Zambezi Delta, which are designated conservation areas. There is no assessment of the downstream ecological impacts resulting from the change in the flow regime. There are no processes to anticipate risks and opportunities.
P-20 Erosion and Sedimentation	<ul style="list-style-type: none"> There is no assessment of erosion and sedimentation risks arising from joint CBS and CBN operation, including sedimentation upstream and downstream erosion and sedimentation.
P-21 Water Quality	<ul style="list-style-type: none"> No water quality assessment was carried out in the Zambezi Delta region; any significant change in water quality resulting from the project could have significant impacts on this (sensitive) area. There are no plans for enhancements to pre-project conditions or contributions to address issues beyond project impacts.
ZESCO – Itezhi-Tezhi Hydropower Project	
O-2 Governance	<ul style="list-style-type: none"> There are no routine processes for the assessment of political and public sector governance issues and corporate governance requirements. The project has no plans to report publicly on issues of high interest to stakeholders during operations. Non-conformance with ESMP or CSR commitments to date is an unresolved governance issue.
O-3 Environmental and Social Issues Management	<ul style="list-style-type: none"> There are no systematic processes to identify and respond to emerging risks and opportunities. Plans and processes are not yet embedded within an internationally recognized environmental management system that is third-party verified, such as ISO 14001.
O-4 Hydrological Resource	<ul style="list-style-type: none"> Scenarios, uncertainties, and risks are not evaluated over the long term. There is a risk that power station operations do not maximize efficiency of water use.
O-5 Asset Reliability and Efficiency	<ul style="list-style-type: none"> Non-compliance with maintenance KPIs, resulting in lower plant availability than planned. The supplier of electro-mechanical equipment has not met expected performance.
O-14 Public Health	<ul style="list-style-type: none"> There are no measures to control mosquitoes in the reservoir, and therefore no measures to address the risk that the project contributes to malaria incidence (including cerebral malaria), which is higher than would otherwise be.
O-15 Biodiversity and Invasive Species	<ul style="list-style-type: none"> It is not clear how ongoing biodiversity issues (or risks and opportunities) would be identified, and there is no monitoring of potential project impacts or to determine whether management measures are effective.
O-16 Erosion and Sedimentation	<ul style="list-style-type: none"> There is no mechanism for the identification of emerging risks and opportunities. There is alleged downstream erosion.

Note: The gaps set out in this table are identified on the basis of the self-assessments, in addition to the advice and observations of the Accredited Assessors. CBS = Cahora Bassa South Bank Power Station; CBN = Cahora Bassa North Bank Power Station; CSR = corporate social responsibility; ESMP = Environmental and Social Management Plan; HCB = Hidroeléctrica de Cahora Bassa; KPI = key performance indicator; ZRA = Zambezi River Authority.

TABLE 4.3. Topics with Gaps Against Basic Good Practice

Topic	Significant gaps to achieving basic good practice
ZRA – Batoka Gorge HES	
P-1 Communications and Consultation	<ul style="list-style-type: none"> • Ongoing processes to provide feedback are not in place. The Public Participatory Process has not reached all stakeholders, including new stakeholders such as newly appointed local administrations, and it is not clear it will continue beyond the ESIA. • It is not clear that the Public Participatory Process addresses implementation and operation stages.
P-5 Environmental and Social Impact Assessment and Management	<ul style="list-style-type: none"> • Delays against the original schedule of project studies (e.g., Engineering Feasibility and Environmental and Social Impact Assessment). • There isn't an effective process to provide feedback on how issues raised in the ESIA have been addressed.
P-10 Project Benefits	<ul style="list-style-type: none"> • There are no plans to consult beneficiaries on the benefits mechanisms proposed.
P-13 Project Affected Communities and Livelihoods	<ul style="list-style-type: none"> • Delays in the development of the Resettlement Action Plan. • It is not clear that there has been assessment of the potential impacts on businesses, especially tourism, in the wider area. • Stakeholder support is yet to be established.
HCB – Cahora Bassa North Bank Extension	
P-1 Communications and Consultation	<ul style="list-style-type: none"> • There are no ongoing processes in place for stakeholders to raise issues and get feedback, including feedback on the ESIA results.
P-2 Governance	<ul style="list-style-type: none"> • There is a need to disseminate more information about the North Bank extension project internally and externally. • Although HCB has sound corporate governance policies and procedures, there are significant shortcomings related to stakeholder assessment and engagement. • CBN does not have a definitive corporate structure because it is in a design phase managed by HCB (South).
P-3 Demonstrated Need and Strategic Fit	<ul style="list-style-type: none"> • There is no clear evidence of studies on energy and water needs, options or alternatives to address these needs, and the existence of national and regional policies and plans.
P-4 Siting and Design	<ul style="list-style-type: none"> • There is no feasibility study for the project.
P-5 Environmental and Social Impact Assessment and Management	<ul style="list-style-type: none"> • Disclosure of the ESIA is not clear; most institutions interviewed, including key regulators, state that they have no access to the ESIA. • The ESIA needs to be revised to include social impacts on the population of Chipera (Maravia).
P-7 Hydrological Resource	<ul style="list-style-type: none"> • Plans for operations are not yet developed.
P-8 Infrastructure Safety	<ul style="list-style-type: none"> • There are no studies on dam safety with other projects (cascade failure). • There is not yet a plan for CBN emergency situations and the bridge to be built.
P-10 Project Benefits	<ul style="list-style-type: none"> • A benefit management plan has not yet been drawn up, in which the responsibilities, the costs involved, the implementation schedule, and plans to monitor the effectiveness of the plan will be allocated.
P-12 Procurement	<ul style="list-style-type: none"> • There is no assessment of sources of corruption associated with the CBN project.
P-13 Project Affected Communities and Livelihoods	<ul style="list-style-type: none"> • The ESIA does not take into account specific aspects of the communities on the northern bank of the river, which are probably the most vulnerable. • No involvement of tour operators in the Chissete area, whose areas may be directly affected by the project.
P-18 Public Health	<ul style="list-style-type: none"> • The lack of access roads and adequate means of transport for the communities of Chipera.

table continues next page

TABLE 4.3. continued

Topic	Significant gaps to achieving basic good practice
P-22 Reservoir Planning	<ul style="list-style-type: none"> • The need to revise planning in relation to the resettlement aspects of communities that may be affected by the likely increase in the level of the reservoir. • The need to elaborate the energy risk in relation to the probable reduction in available water due to climate change.
P-23 Downstream Flow Regime	<ul style="list-style-type: none"> • Need for active participation of local authorities, district governments, ARA-Zambeze, and other stakeholders, including WWF Zambia with long experience and interests in ecological flows downstream of Cahora Bassa.
ZESCO – Itezhi-Tezhi Hydropower Project	
O-6 Infrastructure Safety	<ul style="list-style-type: none"> • Emergency Action Plan is still in draft form and is yet to be approved by management. • No emergency preparedness training has taken place for the stakeholders. • No adequate measures are in place on the upstream section of the dam for public safety.
O-1 Communications and Consultation	<ul style="list-style-type: none"> • There is no regular, periodically updated process for determining communications and consultation approaches, involving stakeholder mapping. • There are no plans that outline communication and consultation needs and approaches for various stakeholder groups and topics. • There are no formal processes in place for all stakeholders to raise issues.
O-8 Project Benefits	<ul style="list-style-type: none"> • Measures to deliver all commitments have not been put in place; commitments have not been sufficiently publicly disclosed. • There is no monitoring to assess if commitments are being delivered or are effective.
O-9 Project-Affected Communities and Livelihoods	<ul style="list-style-type: none"> • Ongoing or emerging issues related to potential effects on downstream communities have not been identified. • There are no measures in place to manage potential social impacts of operations (noise, traffic, reservoir safety, downstream flows). • There are no ongoing processes in place for project-affected communities to raise issues and get feedback.
O-12 Labor and Working Conditions	<ul style="list-style-type: none"> • ITPC has not yet put an OHS management system in place, and there is no formal identification or monitoring of emerging issues or OHS management effectiveness. • Mechanisms for worker engagement are limited (meetings only), and there is no formal mechanism in place for feedback.
O-17 Water Quality	<ul style="list-style-type: none"> • An ESMP commitment, to establish a Water Quality and Management Plan has not been implemented.
O-18 Reservoir Management	<ul style="list-style-type: none"> • There is no reservoir management other than the adherence to permitted reservoir levels using rule curves.
O-19 Downstream Flow Regime	<ul style="list-style-type: none"> • The risk of no down stream flows for 30-40 minutes during the changeover from power plant to spillway when there is a forced outage. • Downstream flow regimes are not publicly disclosed.

Note: The gaps set out in this table are identified on the basis of the self-assessments, in addition to the advice and observations of the Accredited Assessors. ARA-Zambeze = Administração Regional das Águas do Zambeze; CBN = Cahora Bassa North Bank Power Station; EAP = emergency action plan; ESIA = Environmental Social Impact Assessment; ESMP = Environmental and Social Management Plan; HCB = Hidroeléctrica de Cahora Bassa; OHS = occupational health and safety; WWF Zambia = World-Wide Fund for Nature Zambia; ZRA = Zambezi River Authority.

project's role in climate change adaptation. The intent is that the project's GHG emissions are consistent with low carbon power generation, the project is resilient to the effects of climate change, and the project contributes to wider adaptation to climate change.

This topic was still in development by the Protocol Governance Committee at the time of these self-assessments and were not assessed by ZESCO, the ZRA, or HCB. At the time of this report, the topic for the Preparation stage tool had been developed and approved while those for the other tools were still being refined.

4.1.4. Gap Analysis of Project Performance

The topics meeting “basic good practice” (level 3 criteria) based on the self-assessments are shown in table 4.2 together with the corresponding gaps against “proven best practice” (level 5 criteria). The topics that did not meet “basic good practice” are shown in table 4.3 with the corresponding significant gaps.

4.2. Official Assessment—Cahora Bassa Hydroelectric Scheme

Following the self-assessment of the CBN extension, HCB requested support to carry out an official assessment by Accredited Assessors of the existing Cahora Bassa project, i.e., the dam with the operating South Bank power plant. The program consisted of planning of the assessment, an on-site assessment of interviews of nine days' duration, and a post-assessment workshop in which the results were discussed by HCB and its stakeholders. This official assessment offers a further opportunity for HCB to build its understanding of the Protocol and to identify steps to improve basin-level operations.

The results of the assessment are owned by HCB. If HCB decides to publish the assessment report, it will be uploaded and made available for a round of public comment at the Protocol Assessment website, the repository for official assessments using the Hydropower Sustainability Assessment Protocol.¹

According to the assessment report, [the] project tends to score better in areas that are core concerns to the business such as management of the hydrological resource, assets and financial aspects. It also scores well in areas in which HCB has made a particular effort to improve in recent years such as safety, for example. Where HCB management chooses to invest, the Cahora Bassa project tends to be effective in meeting high performance criteria.

In contrast, the project does not perform as well in areas that “are new concerns or concepts for the project's management, such as social aspects, biodiversity, and climate change, for example.”

Note

1. See the Protocol Assessments website, <http://www.hydrosustainability.org/Protocol-Assessments.aspx>.

Chapter 5

Improving Development and Operation of Hydropower in the Zambezi Basin

The Protocol provides a framework with which to compare the performance of hydropower projects using a defined set of globally applicable sustainability criteria and provides a shared language for improved dialogue on sustainable hydropower. While the Protocol provides the closest thing to an objective and comparable assessment, individual projects are inevitably evaluated within a broader situational context, including the regional integration dynamic.

The development of hydropower in the Zambezi River Basin takes place within the broader context of the development challenges of the riparian states. The combined gross domestic product (GDP) among the Riparian States is estimated in excess of US\$100 billion. However, despite increasing prosperity, poverty is persistent across the basin, and coefficients of inequality for some of the riparian states are among the highest in the world.

Of the gaps identified, some can be attributed to the development challenges shared in common by the Riparian States, regional socio-cultural norms, and the geopolitical history of the countries. For all the projects, for example, insufficient communications and consultations was identified as a recurring gap. Though attitudes toward transparency and openness in government are evolving in the region, lack of public disclosure of important documents remains an issue as is the failure to close feedback loops and respond promptly to stakeholder concerns. This set of issues were readily identified by the operator's assessment teams and highlighted in their action planning.

Infrastructure in the region is also limited, and much of it is decades old, having been developed by colonial authorities. As a result, many agreements have been inherited. Projects were also developed during a time when less attention was paid to impacts on the environment and project-affected communities. As operators work to modernize systems and address historical issues, gaps persist. While some of these can be addressed at the project level, others require higher-level interventions.

Some of the issues identified through these assessments and the actions being taken to address them have relevance to the sustainable management of the basin. In addition to these, there are proposals to develop a reporting tool to facilitate enhanced basin-wide cooperation on operations and other issues. Recognition of the importance of a shared prosperity and increasing commitments toward regional integration within the Southern African Development Community provides significant potential for collective development of the region's rich natural endowments.

5.1 Action Planning at the Project Level

Under this program, ZESCO, the Zambezi River Authority (ZRA) and Hidroeléctrica de Cahora Bassa (HCB) have developed initial action plans to address the priority gaps identified during the self-assessments. These action plans focus on gaps against basic good practice and were

shared during the second experience sharing workshop. They were subsequently discussed with the Accredited Assessors, who provided advice on how to refine them, including resource requirements in terms of internal staff time, external consulting needs, and an estimated cost to implement the actions. While operators were encouraged to develop action plans to address the gaps identified during the assessment, the recommended actions do not necessarily reflect the views or represent an endorsement by the World Bank.

5.2. ZESCO and the Itezhi-Tezhi Hydropower Project (Self-Assessment)

ZESCO recorded gaps for Itezhi-Tezhi Hydropower Project (ITT) at the level of basic good practice for five topics: Infrastructure Safety; Environmental and Social Issues Management; Project Benefits; Labor and Working Conditions; and Downstream Flow Regimes. While ZESCO and the ITPC would consider measures to close all of the gaps identified, ZESCO's team members decided that for the period immediately following the assessment, they would focus on the gaps related to Infrastructure Safety.

This has included updating and ascertaining approval for the Emergency Action Plan, which has been in draft status for an extended period, ensuring that project stakeholders have necessary emergency preparedness training; and implementing measures for the upstream section of the dam to improve public safety, especially for fishermen.

In addition, ZESCO shows interest in enhancing its Environmental and Social Management System (ESMS) by integrating the criteria of the Protocol. A potential follow-on action from this program is to facilitate a review of ZESCO's ESMS to determine how best the Protocol requirements could be used to strengthen the ESMS, thereby enabling ZESCO to integrate aspects of the Protocol methodology across its portfolio.

Refer to table 5.1 for a summary of the action plan.

5.3. ZRA and the Batoka Gorge Hydroelectric Scheme (Self-Assessment)

The Batoka Gorge HES has been through a series of development attempts. These date back to the colonial era. Efforts to revive the project in the early 1990s stalled due to an impasse between Zambia and Zimbabwe. These impediments were resolved in 2012 and a series of studies was launched in 2014 to update the baseline and outline the necessary next steps for advancing development of the Batoka Gorge HES. Various delays due to a range of different reasons have highlighted the need to maintain a predictable and transparent process with an improved project management framework.

For this project, ZRA prioritized gaps at basic good practice on four topics: Communications and Consultation, Environmental and Social Impact Assessment and Management, Erosion and Sedimentation, and Integrated Project Management. Given that the project was in active preparation at the time of the self-assessment, this presented an opportunity to raise issues that could be addressed before the preparatory studies were finalized.

TABLE 5.1. Action Plans to Address Significant Gaps: ZESCO—Itezhi-Tezhi

ZESCO/ITPC—Itezhi-Tezhi					
Topic	Significant gaps	Actions	Responsibility	Timeline	Measurable indicators of completion
O-6 Infrastructure Safety	Emergency Action Plan is still in draft form and is yet to be approved by management	<ul style="list-style-type: none"> Updating the EAP Engage approving authority for approval 	ZESCO	2017	Stakeholder analysis developed and agreed by ZESCO and ITPC by December 2017
	No emergency preparedness training has taken place for stakeholders	<ul style="list-style-type: none"> Conduct periodic sensitization workshops on the EAP Physical orientation to stakeholders of the facility Conduct drills for some selected stakeholders 	ZESCO and ITPC	2017	Procedures written and adopted as part of ITPC and ZESCO EMS systems by December 2017
	No adequate measures put in place on the upstream section of the dam for public safety	<ul style="list-style-type: none"> Install safety barriers with signage at the power station intake, main spillway, and emergency spillway for the dam Sensitization of fishermen and other users of the lake on safety on water and importance of the above installations 	ZESCO and ITPC	2017	Communications Plan 2018 developed and formally adopted by ITPC and ZESCO by December 2017 Report on plan implementation, June 2018 and December 2018
O-3 Environmental and Social Issues Management	Plans and processes not yet embedded within an internationally recognized environmental system, which is third-party verified, such as ISO 14001	Verify that SHEQ is in place at the dam	TBD	TBD	TBD
	Environmental management system for the dam not in place	Include dam and environmental management in the ZESCO SHEQ	TBD	TBD	TBD
	No systematic processes to identify and respond to emerging risks and opportunities	Include procedures for re-evaluating environmental and social issues on a regular basis in the SHEQ	TBD	TBD	TBD
O-8 Project Benefits	Monitoring of delivery of CSR projects	Establish an internal ZESCO/ITPC monitoring mechanism that will generate reports to stakeholders	TBD	TBD	TBD
O-12 Labor and Working Conditions	<ul style="list-style-type: none"> No formal systems for identification of on-going and emerging labor OHS issues, or for monitoring the effectiveness of the labor or OHS measures No formal mechanism in place for feedback 	Verify the union is in place and OHS inspections by local labor office are taking place	TBD	TBD	TBD
O-19 Downstream Flow Regime	Risk of no downstream flows for 30–40 minutes during the changeover from power plant to spillway when there is a forced outage	<ul style="list-style-type: none"> Develop a procedure that would minimize the time of no flow downstream Automate operations of the low regulation gate 	TBD	TBD	TBD

Note: CSR = corporate social responsibility; EAP = Emergency Action Plan; ITPC = Itezhi-Tezhi Power Company; OHS = Occupational Health and Safety; SHEQ = Safety, Health, Environment, and Quality.

To address the gaps on communication and consultation, ZRA committed to developing a stakeholder engagement framework that goes beyond the ESIA process, reviewing the adequacy of the stakeholder map for the project, and reviewing the existing stakeholder engagement plan with respect to the available mechanisms for stakeholders to provide and receive feedback.

The assessors from ZRA also found a gap related to Stakeholder Engagement on the topic Environmental and Social Impact Assessment and Management with some stakeholders not receiving responses to concerns raised during the ESIA consultation process. ZRA also indicated interest in having the full ESIA report reviewed by Accredited Assessors to identify any inconsistencies with international good practice as defined in the Protocol criteria. This is another potential follow-on item from this program.

To address the gap on Erosion and Sedimentation, ZRA proposed to carry out a bathymetric survey to confirm sedimentation profiles, which would form the basis of any plan to avoid, minimize, mitigate and compensate on issues related to erosion and sedimentation arising from the project.

Lastly, ZRA committed to actions to improve Integrated Project Management. The assessors found conflicting timelines for inter-dependent deliverables for the technical, environmental and social studies, contributing to delays in their finalization. The challenges with Integrated Project Management can be traced, in part, to the bilateral nature and split development model of the project, which has necessarily introduced a complex governance arrangement with transboundary implications.

Refer to table 5.2 for a summary of the action plan.

5.4. HCB and the Cahora Bassa North Bank Power Station (Self-Assessment)

At the time of the self-assessment, the Cahora Bassa North Bank Power Station was very early in its preparation process with a number of studies and plans incomplete or not yet carried out. The self-assessment, thus, provided HCB with an opportunity to think through a wide range of issues that could be addressed over the course of project preparation, but due to an uncertain timeframe for project implementation, HCB decided to focus its action plan on items that would be beneficial to the operations of the South Bank station.

Similar to the findings for Batoka Gorge HES, the HCB assessors found that feedback to stakeholders regarding concerns they had raised was lacking, and to address this, HCB committed to updating its stakeholder map and revising the policies and procedures that govern its interaction and communications with project stakeholders. HCB has also planned to strengthen its internal communications and introduce a social responsibility policy to improve two-way communications with project stakeholders, public health officials in particular.

HCB assessors determined that the studies and hydrological simulations for the reservoir were adequate but that they should be enhanced with the consideration of climate change

TABLE 5.2. Action Plans to Address Significant Gaps: ZRA—Batoka Gorge

ZRA—Batoka Gorge HES					
Topic	Significant gaps	Actions	Responsibility	Timeline	Measurable indicators of completion
P-1 Communications and Consultation	No program to maintain and sustain stakeholder engagement	Review 2014 stakeholder engagement plan with respect to feedback mechanism (including review of interim notification plan and process) Develop a stakeholder engagement framework that goes beyond the ESIA process to cover the project life span	Project Manager	2017	Stakeholder engagement review report submitted Stakeholder engagement framework developed and agreed by ZRA by December 2017
	No plans that outline communication and consultation needs and approaches for various stakeholder groups and topics	Review adequacy of stakeholder mapping report (stakeholder engagement plan, public participation and identifying interests of specific groups)	Project Manager	2017	Assessment of stakeholder mapping report submitted
P-5 Environmental and Social Impact Assessment and Management	ESIA review deliverables not benchmarked and aligned with HSAP practice	Review ESIA report on whether it adequately addresses the HSAP topics under the project preparation stage	Accredited Assessors	2018	
P-6 Integrated Project Management	Conflict of timelines for interdependent deliverables under the ESIA and Engineering Feasibility Studies.	Review project governance structure and synchronize interdependent activities	Project Manager	2017	Project activities synchronized by December 2017
P-20 Erosion and Sedimentation	No framework to avoid, minimize, mitigate, and compensate erosion and sedimentation issues due to project activities	Carry out bathymetric survey and confirm sedimentation profiles	Project Manager	2018	Bathymetric report submitted to authority

Note: Bakota Gorge HES = Bakota Gorge Hydroelectric Scheme; ESIA = Environmental and Social Impact Assessment; HSAP = Hydropower Sustainability Assessment Protocol; ZRA = Zambezi River Authority.

aspects to better understand the risks to operations as well as downstream impacts associated with long-term changes to water availability. HCB, thus committed to reviewing and revising the engineering design of CBN and the CBS rule curve to include these considerations.

Given that Cahora Bassa is the lowest downstream facilitate among the large hydropower facilitates in the Zambezi River Basin, the hydropower facility is highly dependent upon upstream operations. This is the reason for HCB including actions that involve other operators and stakeholders in the basin. For example, HCB includes the dam break analysis study

being carried out for the whole basin to understand and mitigate the risk of cascade failure. HCB has also committed to reviewing its operating procedures in light of opportunities for joint operations with other projects on the river.

Refer to table 5.3 for a summary of the action plan.

5.5. Official Assessment of the Cahora Bassa South Bank Power Station

The preparation for the North Bank Extension project faces an uncertain timeline due to the decision by Mozambican authorities to focus first on the preparation and implementation of Mphanda Nkuwa, which would be downstream of the existing Cahora Bassa Dam and Power Station. As a result, HCB prioritized those actions to address the gaps identified in the self-assessment, which would have general applicability to the existing Cahora Bassa HES and the corporate governance of HCB. One of the key actions arising from this was to carry out an official assessment of the existing Cahora Bassa Dam and South Bank Power Station.

This assessment used the Operation stage tool of the full Hydropower Sustainability Assessment Protocol as well as the newly developed Environmental, Social, and Governance (ESG) Gap Analysis Tool. The topic list for the ESG Gap Analysis is organized to be consistent with the International Financial Corporation (IFC) and World Bank Performance Standards. It has 12 sections that cover all but a few criteria found in the full Protocol tools at basic good practice:

- Environmental and Social Assessment and Management
- Labor and Working Conditions
- Downstream Flows, Sedimentation, and Water Quality
- Project-Affected Communities and Livelihoods
- Resettlement
- Biodiversity and Invasive Species
- Indigenous Peoples
- Cultural Heritage
- Infrastructure Safety
- Climate Change Mitigation and Resilience
- Communications and Consultation
- Governance and Procurement

is accompanied by an environmental and social action plan (ESAP), which lays out actions that can be taken to close the significant gaps. These are proposed by the Accredited Assessors. For projects seeking financing through climate bonds, the developer or operator must be able to close all the significant gaps within 24 months in order to be eligible.

TABLE 5.3. Action Plans to Address Significant Gaps: HCB—North Bank Extension

HCB - North Bank Extension					
Topic	Description of gap	Planned actions	Responsibility	Timeline	Measurable indicators of completion
P-1 Communications and Consultation	No ongoing processes in place for stakeholders to raise issues and get feedback, including feedback on ESIA results	<ul style="list-style-type: none"> Map update of the main stakeholders for CBN and CBS, both internal and external Benchmark with other institutions (national and international) Revise relation with communities document Improve communication process and procedure (fluxograma) with community engagement Verify existence or develop policy on public disclosure of documents 	Communication Manager	2018	List of main stakeholders developed by June 2018 Communication procedure updated by June 2018 Policy for document publication written and adopted as part of integrated management system by June 2018
P-8 Infrastructure Safety	Issues such as the interaction with other projects (cascade failure) and public safety risks have not been analyzed	<ul style="list-style-type: none"> Dam break analysis study being carried out for the whole basin Develop and implement a project concept for disaster management (coordination mechanism) Check PFMA report and EPP (downstream response, responsibility) 	ZRA, HCB, ZESCO: Infrastructure Safety	2017 2018 2018	Report on dam break analysis study done by December 2017 Procedures written and adopted as part of HCB systems by December 2018
P-22 Reservoir Planning and P-23 Downstream Flow Regimes	Need to consider aspects related to climate change and its implications on the availability of water for the purposes of electricity production	<ul style="list-style-type: none"> Review and update engineering design of CBN infrastructure to cover downstream uses Review operation optimization in view of opportunity for joint operation, climate change, and downstream uses Review/upgrade Cahora Bassa (CBS: existing project) reservoir operation plan (new rule curve and exploration plan) 	Water management JOTC, with ZRA and ZESCO involvement Water management	2017 2018 2018	Report on plan implementation, June 2018 and December 2018
P-2 Governance	Internal communication	<ul style="list-style-type: none"> Reinforce internal communication on strategic plan 2018-22 Timely information sharing on to be useful 	Public relations and communications/ planning and development	2018-20	Communications plan developed and formally adopted by December 2018
P-10 Project Benefits and P-13 Project-affected Communities and Livelihoods	Chipera (Maravia) does/ will not receive additional benefits	<ul style="list-style-type: none"> Include Chipera on database of potential/beneficiary communities Get number of people that might be affected 	Community relation manager: Office of the Board of Directors	2018	Chipera included in database by December 2017 Number of people affected by raising reservoir estimated by June 2018
	Engagement with public health officials' two-way, ongoing processes to raise issues and get feedback	<ul style="list-style-type: none"> Introduce social responsibility policy, Marávia public health aspects 	Community relations manager: Office of the Board of Directors	2018	Social responsibility policy revised and adopted as part of integrated management system by June 2018

Note: CBN = Cahora Bassa North Bank; CBS = Cahora Bassa South Bank; EPP = Emergency Preparedness Plan; ESIA = Environmental and Social Impact Assessment; HCB = Hidroeléctrica de Cahora Bassa; PFMA = Public Financial Management Act.

5.6. Action Planning at the Basin Level

When applied across a number of hydropower projects within a basin, the evaluation of the Protocol criteria can help identify regionally systemic issues and differentiate these from individual project or organizational issues. While many of the issues are situation- and design-specific, and will vary depending on the structural components, socio-economic factors, and the environment within which the individual project is being developed and will operate, the outcomes of a programmatic approach to application of the Protocol can help provide a sustainable framework to enhance longer-term economic outcomes and re-enforce the cooperative agenda in transboundary basins.

Differentiating systemic issues within a regional or basin context from those individual project or specific organizational issues can inform the development of action plans aligned with appropriate institutional roles and responsibilities. For many low- and middle-income countries (LMICs), reconciling the often disparate context between the broader socioeconomic development context within which the individual hydropower projects are being implemented requires broader considerations. Addressing systemic issues through broader regional or basin initiatives can help capitalize on economies of scale, ensure consistent approaches, and create a more holistic approach that positions the project within this broader development context.

There is a long history of cooperative efforts within the Zambezi River Basin. The Zambezi Watercourse Commission (ZAMCOM) was established within the context of the SADC and enabled through the Protocol on Shared Watercourses,¹ which aims to foster closer cooperation for protection, management, and use of shared watercourses in the region. The Protocol on Shared Watercourses provides a framework for cooperation on projects and the exchange information, consulting, and collaborating on initiatives that balance development of watercourses with conservation of the environment and provide an institutional framework for joint protection and development of shared watercourses. While the ZAMCOM provides an inter-governmental platform for the Riparian States to engage on issues of mutual concern, the Joint Operations Technical Committee (JOTC) compliments this with a forum for dam operators and water resource managers to engage in efforts to operationalize these principles and initiatives.

The individual self-assessments and action plans highlight a number of areas in which a common collective response at the basin and or regional level could be advantageous for the longer-term sustainable management of the basin. Broader programs at the basin and or regional level could also help improve citizen engagement, the oversight of infrastructure safety, and in re-enforcing institutional roles, responsibilities, and oversight mechanisms. A number of illustrative actions have been identified that could be implemented through the JOTC, ZAMCOM, or the auspices of SADC.

5.6.1. Consultative Mechanisms for Improving Communications

The engagement of external stakeholders (e.g., potentially affected communities, governments, key institutions, partners, contractors, and catchment residents, etc.) and

communication of hydropower-related issues around water resources management in the Zambezi River Basin remains a challenge for many developers. There are various mechanisms employed by the different developers and operators for project-specific issues, including communications through letters, public notices, radio announcements, meetings, and site visits, and most of the developers and operators participate in local government to facilitate coordination and consultation. However, there are concerns among a number of stakeholders around the frequency of communications and the details provided to make informed decisions. Many of the issues are common across the developers and operators, raising the possibility of a joint communication effort that can ensure consistency in messaging and take advantage of economies of scale and regional context.

Under the auspices of ZAMCOM, National Stakeholder Coordination Committees (NASCs) have been established in all of the eight Riparian States. The functions of the NASCs are to (i) ensure multi-stakeholder participation within riparians; (ii) disseminate ZAMCOM decisions and values; (iii) represent major stakeholder institutions; (iv) represent at Basin-wide Consultative Forums; (v) manage the National Consultative Forums; and (vi) convene at least quarterly in a year. Representatives from the NASCs are expected to provide feedback to the operations of the Commission annually through a Basin-wide Stakeholder Coordination Committee (BASC) with the following functions: (i) constituting representatives from riparian NASCs and other strategic regional stakeholders; (ii) ensuring stakeholder participation at basin level; (iii) disseminating national-level decisions and values; (iv) facilitating stakeholder outreach at basin level; (v) representation at National Consultative Forums; and, (vi) supporting Basin-wide Consultative Forums. While these cannot replace project-specific consultations with concerned stakeholders and potentially affected people, they can provide a broader framework for improving the communication, consultation, awareness, and dissemination of information with stakeholders in the basin around key issues pertaining to hydropower development.

The SADC Multi-Stakeholder Water Dialogue is another regional forum that could provide an opportunity to increase awareness around the development and operation of hydropower in the Zambezi River Basin. This is a biennial event that provides a platform for regional stakeholders to discuss and share experiences on different aspects of water resources. Its focus is to reach out to other sectors that influence or are influenced by water, especially in the development agenda in which water is an engine or catalyst for development. Within this context, the Water Dialogues are held under the overall theme of Watering Development in SADC and highlight how approaches can address key aspects of socioeconomic development and poverty reduction in Southern Africa.

5.6.2. Infrastructure Safety

The Protocol highlights the need to address planning for dam and other infrastructure safety during project preparation, implementation, and operation. This is intended to ensure that life, property, and the environment are protected from the consequences of dam failure and other infrastructure safety risks. While Emergency Preparedness Plans

(EPPs) exist, the self-assessments have identified the lack of an analysis of cascade failure as a potential gap.

A dam break analysis for the basin is being implemented under the auspices of the JOTC through grant financing provided as part of the Kariba Dam Rehabilitation Project. The analysis aims to (i) improve emergency preparedness; (ii) improve communication among dam operators; (iii) improve quality of information; (iv) manage potential flood impacts; and (v) improve communications with stakeholders. This is informed by high-resolution spatial and topographic LiDAR data that has been acquired over large parts of the basin to help the Riparian States prepare for and manage flood events.

The JOTC has identified specific actions to improve disaster risk management related to dam safety in the basin. The foundations established through the dam break analysis coupled with the high-resolution topographic data provide important information inputs to efforts aimed at improving the disaster preparedness and response mechanisms. Further support to extend cross-border communication beyond dam operators to a broader group of stakeholders—including disaster management agencies among the Riparian States, local government authorities, humanitarian response agencies, and potentially affected local communities—would improve early warning systems and disaster risk management. Specific activities could include participatory hazard mapping and risk assessments, development of locally centered, people-driven early warning systems, and the prioritization of village, district, and provincial action plans.

Improving the overall framework for dam safety assurance could also be enhanced through regional initiatives. While there are over 1,500 large dams across SADC registered with the International Commission on Large Dams, 90 percent of these are located in South Africa and Zimbabwe. All of the other SADC Member States each have less than 20 large dams registered. These relatively small portfolios can make it difficult to develop and sustain comprehensive legal and institutional capacity for ensuring dam safety assurance, particularly when coupled with other contributing factors such as financial capacity or competing external demand for highly qualified professionals etc. The SADC should consider the establishment of a regional dam safety authority that can take advantage of the economies of scale to help provide oversight and guidance to Member States on issues of dam safety assurance. A regional dam safety authority established under the auspices of SADC would leverage the economies of scale across the Member States required to sustain the development and implementation of the necessary legal, institutional, and financial capacity to enhance dam safety assurance.

5.6.3. Optimization of Operations

The Protocol topics indirectly highlight the potential issues associated with optimization of hydropower projects within a single basin. When these are in a cascade, the issues of the Hydrological Resource (P-7 / O-4) and Infrastructure Safety (P-8 / I-5 / O-6) are clear. Understanding the availability and reliability of the hydrological resource, along with safety risks, are dependent on other projects within the basin. Looking at these in isolation can

have implications for the Economic Viability (P-11) of the project, underestimating the potential net benefits or failing to factor all of the economic, social, and environmental costs and benefits.

These issues highlight the importance of Communications and Consultation (P-1 / I-1 / O-1) to identify and engage project stakeholders, including those within the company as well as external stakeholders. This can include project-affected communities, government agencies, and key institutions, partners, contractors, and catchment residents, among others. The intent is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes establish a foundation for good stakeholder relations throughout the project life. Within the transboundary context, this introduces an additional layer of complexity that requires communications and consultations among Riparian States and their representative agencies.

The JOTC has identified the optimization of operations among hydropower projects in the Zambezi River Basin as a priority action. Such an initiative could have a number of substantial benefits, including, but not limited to, increased economic and financial returns, better flood management and resilience, improved environmental sustainability along with increased cooperation and regional integration. Operational procedures for dams across the basin are currently optimized to satisfy the single primary purpose. This is primarily the storage of water for hydropower production, but also includes a number of dams for irrigation, water supply, and mining purposes. Many of the operating rules are governed by long-term historical agreements. Altering these could have financial implications.

Conceptual analyses suggest optimized operations have the potential to increase long-term generation by as much as 23 percent through improved coordination. Revising the operating rules of existing hydropower projects to improve efficiency and resilience, as well as the availability of water for other uses, would need to be done within a comprehensive framework. A basin-wide flow forecasting system is being developed by the Riparian States through ZAMCOM. This would provide the foundations but would need to be complemented by a series of institutional mechanisms that could address the financial implications of optimizing for economic and environmental benefits.

5.6.4. Basin-Level Reporting Tool

The overall objective of the program was to assist the Riparian States in development and utilization of the hydropower potential of the basin in a sustainable and responsible manner. The program sought to promote the development and use of the Protocol as a guiding framework for sustainability that can help balance mutual dependencies among different water users across the basin by informing the development and operation of hydropower in the Zambezi River Basin.

Stakeholders showed interest in the development of a basin-level reporting tool that could integrate the project-level assessments to help inform the development and operation of hydropower at the basin level. Such a tool could have the added advantage of facilitating

better coordination among individual operations and fostering greater cooperation across the basin. The purposes of the tool would include the following:

- Facilitate exchange of consistent information on performance against the criteria of the Protocol
- Provide templates to enable regular reporting on the performance of individual projects
- Establish the necessary systems for rapid self-assessment or peer-to-peer assessment
- Benchmark performance and facilitate available to developers and operators in the basin
- Allow year-on-year comparisons to monitor continuous improvements

The development of a basin-level reporting tool would contribute to enhancing the institutional mechanisms for the efficient management and sustainable development of the basin. Members of the JOTC would prepare a basic summary of the performance for each project based on an appropriate set of environmental, social, technical, and financial issues aligned with the criteria used in the Protocol. This rapid assessment would be carried out on an annual basis, allowing the members of the JOTC to identify any gaps, agree on appropriate interventions, and monitor the continuous improvement in overall performance using a set of globally applicable sustainability criteria.

The basin-level reporting tool would not only provide a shared language for improving the dialogue on sustainable hydropower but also provide a benchmark to inform development and operation over time. A dashboard to compile and display the results of the annual summaries across the basin could be used to improve citizen engagement and enhance transparency among participants and stakeholders. This would contribute to the principle objectives of the ZAMCOM Agreement around promoting the equitable and reasonable utilization of the basin's resources. The tool is proposed to be based on a basic summary for each project prepared by the developers and operators of their performance against the requirements of the Protocol.

Two Excel-based reporting templates have been developed. The first is a project-level tool to be used by the main developers and operators on an annual basis for each project. This summarizes performance against the topics aligned with the Protocol, actions being undertaken to address any gaps, and those actions proposed for the basin level. Each project-level report would allow a set of key data to be easily copied to the second report template for the basin level. The basin-level report would automatically summarize the results for all hydropower projects in the basin, highlighting their performance and providing a summary of the actions being taken at a basin level along with their current status. Key features of the reporting tools are provided in table 5.4 and the tool templates are provided in appendix A.

Templates to facilitate the preparation of self-assessment reports could be similar to those of the ESG Gap Analysis Tool, developed by the Protocol Governance Committee (PGC) for global use, or a more streamlined checklist-style approach. This approach could be used to

TABLE 5.4. Zambezi River Basin Hydropower Sustainability Reporting Tools

Project-level reporting tool	Basin-level reporting tool
<ul style="list-style-type: none"> • Completed annually for each project • Includes basic project details • For each Protocol topic, it presents whether there are significant gaps that are not being addressed, significant gaps that are being addressed, or no significant gaps • Summary table of the number of topics in each category • Includes an Action Plan setting out the actions being taken to address significant gaps • Highlights priority actions relevant to the basin in two groups: those being addressed by the project operator; and those that are proposed for other developers or authorities • Includes a summary table of the status (no progress, ongoing, completed) of basin-level actions • Copies key data automatically to a worksheet for transfer to the Basin-level tool 	<ul style="list-style-type: none"> • Compiled and updated annually using the data from project reports • Provides a rolling year-on-year indication of the performance of the reporting projects in each Protocol topic • Year-on-year summary of the number of topics in each category (e.g., significant gaps, action plan, no significant gaps etc.) • Lists all actions being taken or proposed to move toward improved basin-level coordination and operation • Lists actions being taken by operators/developers and actions proposed or being taken by others • Year-on-year summaries of the status of the listed actions by status (no progress, ongoing, completed)

facilitate the long-term monitoring of performance and improvements and provide a simple system to facilitate peer-to-peer assessments among operators within the basin. This would have the additional benefit of facilitating cooperation and consolidating the creation of a professional cadre of developers and operators around a common vision for the basin.

Note

1. Passed on August 28, 1995, and revised on August 7, 2000; see the SADC website, <https://www.sadc.int/documents-publications/show/1975>.

Conclusions, Lessons Learned, and Recommendations

6.1. Conclusions

The objective of the program was to improve the understanding, use, and adoption of the Hydropower Sustainability Assessment Protocol as a capacity building tool to inform the development and operation of hydropower in the Zambezi River Basin. This is part of a series of measures supporting the Riparian States in the development and utilization of the hydropower potential of the basin in a sustainable and responsible manner.

Through a structured process of training, self-assessment, engagement, and reflection, representatives from a range of operators and water resources managers have developed the skills to apply the key principles enshrined within the Protocol to the promotion of equitable utilization, efficient management, and sustainable development of water resources in the Zambezi River Basin.

The Protocol has proven a useful mechanism to foster cooperation and knowledge sharing among hydropower developers and operators, enhance transparency in the dissemination of information on sustainability performance, and promote the sustainability of projects through assessments using the Protocol.

Sustained efforts to realize the implementation of activities and continued efforts to ensure the sustainable development and operation of hydropower in the basin will have significant long-term benefits. The templates for regular self-assessments coupled with the basin-wide reporting tool provide the foundations for realizing a system of continuous self-improvement.

Continued dissemination of the experiences and lessons learned among the wider members of the Joint Operations Technical Committee (JOTC), Zambezi Watercourse Commission (ZAMCOM), Southern African Power Pool (SAPP), and other decision makers in the basin will provide further support to the broader objectives of the Riparian States for the basin. In addition, the lessons learned from the self-assessment process involving operators from different countries, with different economic conditions, in an international transboundary basin provides valuable lessons for extending the benefits of the Protocol.

6.2. Lessons Learned

The process of implementing the program over an extended period has helped identify a number of lessons concerning self-assessments, the program approach, and for the Protocol itself. Some of the key lessons here have been derived from the reflections and interrogations of the self-assessments, through structured interviews with a range of participants and through anonymous surveys of those involved in the program (see box 6.1).

6.2.1. Auditing or Self-Assessment?

There are a range of options in application and assessment of the Protocol. These include an Official Assessment, Informal Self-Assessment, Assisted Self-Assessment, Verification of

BOX 6.1. Results of Participants Survey

A survey questionnaire was developed to solicit anonymous feedback on the program outcomes via a web-based service. The survey was extended to participants of the self-assessment teams, including six participants from ZESCO, two participants from the Itzhi-Tezhi Power Company (ITPC), eight participants from the Zambezi River Authority (ZRA), and seven participants from Hidroeléctrica de Cahora Bassa (HCB), along with two participants from the Water Resources Management Authority (WARMA) for a total of 25 participants invited to the survey. Nine responses (36 percent response rate) were received.

The survey questions are presented in appendix B, and quantitative summaries of the responses to each question are provided in appendix C. Key findings include the following:

- High satisfaction with the overall program and the various events held throughout the program
- The overall program is appreciated as a capacity-building opportunity, and the self-assessments should be seen in the context of pressing responsibilities
- Assessments lacked institutional backing in many cases
- Action plans would need institutional commitment to be taken forward
- A high degree of interest in using the Protocol in the future through all methods
- Strong demand for further support, especially through guidelines, checklists, and simplified reporting tools
- Enthusiasm for using the Protocol to promote sharing of information and improved coordination, and high support for the concept of using an annual report to prompt this

Responses to an open request for comments and suggestions point to the demand for simplified tools that will ease and shorten the length of an assessment.

internal self-assessments by Accredited Assessors, and more recently the Environmental, Social and Governance (ESG) Gap Analysis Tool. The Protocol can also be used to develop and use shorter checklists that can be applied quickly and with minimal effort, or to simply be used as a guidance document to understand the range of hydropower sustainability issues.

Selecting the way in which to use the Protocol depends on the context and the objective. The choice should be fit for purpose. An official assessment is typically carried out over a relatively short, intense period, placing significant demands on the organization for documentation and data. This provides limited opportunity to support development of capacity. In contrast the longer-term internal self-assessments do not always have the rigor and objectivity envisaged for a formal assessment.

The operators involved in the program used different approaches. The self-assessment teams from both the ZRA and HCB were drawn from specialists within the organizations involved in the preparation of the project, reflecting a “true” self-assessment. In contrast, ZESCO approached the self-assessment in a manner similar to an external corporate audit with a team whose members are not involved in day-to-day operations of the dam or the power plant at Itezhi-Tezhi Hydropower Project (ITT). Both approaches are equally valid and have advantages and disadvantages. The lesson for future self-assessments is to understand the implications of different alternatives and to plan the team composition accordingly. This should consider the time and cost implications, and issues with co-ordination and in reaching consensus among the team.

In each of the self-assessments, the assessors found the judgment of gaps and their significance challenging. HCB addressed this challenge through a large team in which each assessor focused on only one or two topics, with backup from a second assessor. In contrast, ZESCO and ZRA had smaller, compact teams. The approach by ZESCO and ZRA of using smaller teams was more akin to the way Accredited Assessor teams are organized for official assessments and may be more likely to lead to specialization of an internal team of auditors formed from the experience. The larger team approach by HCB increased the impact of the capacity building and created a greater sense of importance to the initiative. However, HCB’s first self-assessment was considered to be relatively positive about performance when reviewed by an independent Accredited Assessor while the second draft responding to these comments was considered by the assessors to be too negative. The key to successful self-assessment is ensuring continuous calibration through comprehensive introductory training, sustained guidance from Accredited Assessors and the inclusion of sufficient review and feedback.

6.2.2. Objectivity and Enhancing Capacity

The Protocol is intended to provide an objective framework with which to evaluate the performance of hydropower projects using a defined set of globally applicable sustainability criteria. These are intended to reduce or eliminate, as far as possible or practicable, biases, prejudices, or subjective evaluations by relying on verifiable data for a set of criteria that encompass a range of environmental, social, technical, and financial issues. However, the need for independence needs to be evaluated against the objectives of the assessment to ensure that the selected approach is ultimately fit for purpose.

While a self-assessment or internal audit has less objectivity compared to an independent official assessment, it is better positioned to provide a sustained engagement that allows the time required to build capacity around the Protocol and calibrate the assessment process. Having self-assessment teams drawn from specialists within the organizations working directly on the project helps those involved to understand the criteria for each of the topics, apply these within the context of their day-to-day responsibilities, and so have a direct impact on the operations. However, this can compromise the independence and undermine objectivity. In contrast, engaging an external corporate auditing team whose members are

not involved in day-to-day operations, such as the approach taken by ZESCO, can increase independence and objectivity but does not have the same direct link to implementation of potential follow-up activities, and in the absence of formal recognition or responsibilities may result in a lower sense of ownership in the outputs.

In the initial round of self-assessments, there was a tendency among all teams to over-score across all topics. An iterative process of review by Accredited Assessors of the draft reports and subsequent revision by the self-assessment team helps to understand the requisite information required to calibrate the assessment for each topic. HCB team members also benefitted from internal peer review of initial draft reports by a second internal assessor. An important determinant of objectivity with a self-assessment is empowering teams by ensuring there is a clear indication from senior management that critical findings are welcome and seen as an opportunity to improve the performance of the project within a culture of continuous improvement.

Objectivity will be most important toward the end of the preparation stage when the developer may want to use the results for discussions with potential financiers. The process of self-assessment during early stage preparation can help the organization understand the range of technical, financial, environmental, and social issues that need to be assessed for a successful and sustainable hydropower project that can balance the mutual dependencies among different water users across the basin. Early stage self-assessments during preparation can therefore be useful in building the systems, understanding, and capacity to respond to more formal, external independent assessments that are required to provide greater objectivity and credibility required when moving toward development and mobilizing resources.

6.2.3. Dedicated Effort and Resources

Experience from the program re-affirms the use of the Protocol as a valuable tool for developers and operators and as a means to foster greater basin-wide cooperation. However, the level of effort required to carry out the self-assessments required significant time and effort on the part of the self-assessment teams. Though the teams were not required to produce lengthy reports as part of the process, all chose to develop full-scale assessment reports, similar to those produced at the end of an official assessment. This effort was over and above the regular responsibilities of the staff involved, and internal assessors often only had time to focus on the assessments during the visits of the supporting Accredited Assessors. Despite this, the quality of the self-assessments and the success of the program reflect the level of commitment and professionalism of the staff and teams involved. The experience, however, raises important limitations for conducting regular assessments and reporting in the future.

While a full assessment is not needed on a high-frequency or an annual basis, there is a need to make time and resources available to follow up on the recommendations of the assessment as part of the organization's continuous improvement process. Instead, annual *reporting* can provide a system for monitoring important milestones and incremental improvements aligned with the topics under the Protocol. This would need to be integrated into the roles and responsibilities of appropriate staff with appropriate resourcing, including dedicated resources for

closing any identified gaps. These frequent updates can be coupled with a full assessment every five years (for operating projects), linked or aligned with the regular dam safety inspections that are carried out on a similar schedule. This would provide a good opportunity to bring in a new team with a new perspective to carry out a Protocol assessment.

There are opportunities to take advantage of economies of scale and collaboration. For companies operating several projects, a dedicated team could be established to carry out regular audits against the Protocol and other requirements, such as action plan monitoring, as part of its internal auditing functions or continuous improvement measures. Extending this same principle, a jointly funded and collaboratively staffed team could be constituted to assess a range of projects managed by more than one developer or operator across the Zambezi River Basin or Southern African Development Community (SADC). More Accredited Assessors are needed to support these efforts. However, to create greater professional incentive and provide a regional pool of experts to carry out peer-to-peer assessments within the basin and more broadly, more hydropower professionals from the region need to be trained and certified to use the Protocol.

6.2.4. Importance of Information and Engagement

The Protocol relies on high-quality, timely information for the assessment. The self-assessment relies on the internal assessors being able to solicit this information from their colleagues, involving both superiors and senior management along with subordinates and peers. This can create a complex operating environment and requires a specific set of skills to solicit the right information and effectively manage the interpersonal dynamics.

The internal assessors initially did not find it easy to interview and ask questions of colleagues, especially superiors. Asking questions in areas of their own expertise presented the risk of embarrassment for the assessors because it could give the impression to their colleagues and superiors that they do not already know the answers. It can be especially difficult to ask critical questions, particularly of superiors.

Despite this, some assessors proved that they were excellent interviewers by conducting interviews courteously, preparing questions related to the Protocol's criteria in advance, asking follow-up questions, identifying documentary evidence during the interviews, and summarizing the key points carefully at the close of the interview. Continuing reference to the guidance on interviewing provided by the Accredited Assessors will be useful in future assessments (see appendix D).

It can also be a challenge for staff of the operator or developer to interview external stakeholders because these stakeholders can be genuinely confused why the assessors are interested in their views. The assessor needs skill and maturity to explain the purpose of the interview and to encourage the interviewee to openly express their views.

6.2.5. A Program Approach or Not?

The program of support was designed specifically around a series of interventions over an extended period of time coupled with individual workshops to interrogate the findings and

group workshops to share experiences. This was intended to allow sufficient time for training and reflection, followed by periods of work within the self-assessment teams, a self-critique, and collective learning. This design built on earlier experiences in piloting the Protocol, through both official independent assessments and capacity building initiatives, as well as consultations with experts and clients experienced in its development and application. The contrast between the different approaches reflects the extremes of a continuum, and there are a range of applications that should be tailored to the specific context and objectives to ensure that it is fit for purpose. This contrast does provide some useful lessons learnt to help inform future endeavors.

Timing is critical. There was a long-elapsing period between the initial provision of training and the mid-assessment visit by Accredited Assessors (which coincided with site-based interviews), and a long period between the mid-assessment and delivery of the self-assessment reports. While there was some intentional spacing of the program components to permit the developers and operators to prepare and work internally between support visits, most of the work was carried out during these visits by the Accredited Assessors. This resulted in a loss of momentum during some key phases. This was due to combination of factors, including the need for more guidance using a new tool, the pressure of the additional duties combined with day-to-day responsibilities, and the degree to which senior management communicated the importance of the program. This was further compounded by extending the time between visits due to scheduling conflicts and the differing states of readiness among the participating developers/operators.

In future programs with self-assessments, it may be more effective to conduct an initial round of interviews (internal interviews that can be arranged quickly) immediately following training on the Protocol. Site visits and interviews with external stakeholders can be arranged at a later date. This would help to reinforce training just received and maintain momentum of the assessment. There is also a need to balance the needs of the different projects, the Protocol tools being applied, and the pace of the different organizations. The approach to engaging at the basin level provides a number of benefits, in terms of economies of scale, cooperation, and peer-to-peer learning.

6.3. Recommendations

The program has provided sustained support in promoting the development and use of the Hydropower Sustainability Assessment Protocol as a capacity building tool to inform the development and operation of hydropower in the Zambezi River Basin. The program experience involving a number of different stakeholders within an international, transboundary context provides a number of lessons from which recommendations can be derived to inform: (i) specific actions to improve the development and operation of individual hydropower projects; (ii) the development and application of the Protocol as a useful tool for guiding the development of hydropower within the basin, and (iii) lessons for application of the tools by the World Bank in supporting the client projects and the International Hydropower

Association (IHA) in further development of tools applicable to sustainable hydropower development.

While the program was successful, the following recommendations could contribute to the Protocol and its application to the Riparian States in development and utilization of the hydropower potential of the basin in a sustainable and responsible way to ensure its benefits for present and future generations. These recommendations have originated from or have been reinforced through the consultative process, self-reflections by the assessors, and interaction among the teams and stakeholders involved, along with responses to the user survey circulated to program participants.

6.3.1. Recommendations for Operators

- Projects in the pipeline for development (such as Mpanda Nkuwa) should consider an early self-assessment using the Preparation stage tool with some verification and capacity building from Accredited Assessors. Developers should consider following up with a formal independent assessment during later stage preparations to align with the independence and objectivity needed toward financial closure.
- Operators should review their current environmental and social management systems against the provisions of the Protocol to identify any significant gaps and consider integration of specific provisions.
- Assessments can be used by developers and operators to improve important project documentation. An assisted self-assessment can aid the process of refining important project documents by identifying gaps that can be addressed before their finalization. This could include, for example, environmental and social impact assessments and management plans, or Resettlement Action Plans during project preparation, or operation manuals at the start of operations.
- The members of the JOTC should consider designating dedicated focal points for monitoring follow-up actions aligned with the findings of the self-assessments and establishing a dedicated cadre of professionals within the individual organizations or regional bodies who can carry out self-assessments and facilitate peer-to-peer assessment and learning.

6.3.2. Recommendations for Regional Actions

- Economies of scale and benefits can be derived in consistency of messaging around the development of hydropower resources within the Zambezi River Basin through a broader regional consultative and communications program. This could be embedded within the ZAMCOM mechanisms, such as the National Stakeholder Coordination Committees (NASCs) and the Basin-wide Stakeholder Coordination Committee (BASC).
- The basin-level reporting tool should be further elaborated through a consultative process with the members of the JOTC, ZAMCOM, and other regional stakeholders to facilitate the consistent exchange of information on performance against the criteria of the

Protocol and provide a template for regular reporting on the performance of individual projects.

- The JOTC has established an effective forum for improved communication among operators that provides the foundation for a series of phased activities toward joint operations. It is recommended to carry out a series of enabling legal, institutional, financial, and economic assessments as well as to understand allocation implications associated with joint operations.
- There is an opportunity to extend the outputs from the basin-level dam break analysis to address an enhanced framework for resilience and disaster risk management.

6.3.3. Recommendations on Further Development and Application of the Protocol

- The organization of assessments can be improved. There is currently little difference in the way the first official Protocol assessments were conducted with high-capacity “Sustainability Partners” (IHA members) and the way they are carried out now across a wide range of different development settings. The World Bank has introduced inclusion of a “readiness visit” between the training visits and the on-site assessment it has supported.
- However, in nearly every jurisdiction where the Bank has supported using the Protocol, a lot of the preparatory work for the assessment happens during this readiness visit (and not before). This suggests the need for a more hands-on approach for clients in low-capacity environments. While it is not practical for the whole process of a Protocol assessment (self-assessment or official) to be carried out during one visit, an alternative schedule should be considered where the process is carried out in fewer, but longer hands-on engagements in low capacity environments.
- Self-assessments can inform a number of objectives, and the approach needs to be clearly aligned. For example, self-assessments can be used to support establishment or strengthening of internal audit or quality assurance units, in which case an independent set of internal assessors is better positioned. If the objective is to strengthen the capacity of project staff to improve project performance, then an internal team of assessors derived from the project team is better positioned.
- Involving “verifying” Accredited Assessors in self-assessments could improve the quality of the outputs. This would represent a halfway approach between a self-assessment and an official assessment, in which an Accredited Assessor takes the initial findings, interrogates them, and engages the developer or operator until there is consensus. Sufficient time needs to be incorporated into such an approach. The Accredited Assessors would need to carry out a shadow assessment of the project, which requires immersing themselves in the project documentation. Consideration should be given to using time-based elements in the contract provisions rather than the traditional lump sum approach.

- More alternative approaches to using the Protocol should be developed. For self-assessments, developers and operators can use whichever parts of the Protocol offer the most value added for their purpose. For example, a developer early in the preparation process could focus only on the Assessment and Management criteria at basic good practice to ensure the fundamentals are in place before looking for opportunities to move toward proven best practice. They could also, for example, combine the Protocol's approach with a framework of their own environmental and social standards.
- The Protocol, though logically organized, presents a steep learning curve to new users unaccustomed to its many nuances. This points to the need for a range of approaches, including clearer checklist-style reporting, rather than a long, wordy assessment report, as well as continued efforts at capacity building.
- For future activities built on this model of assisted self-assessments, it may be prudent to treat the first part of the program as a training and diagnostic, keeping resources in reserve to carry out shorter, separate, just-in-time advisory services to address the gaps. Such an approach may garner more institutional backing among the operators, provide more flexibility to hire outside expertise, and ensure interventions go through an internal quality assurance process to check their appropriateness and clarify measurable indicators.
- The World Bank, the Protocol Governance Committee, and the IHA should make a concerted effort to encourage knowledge sharing and reflection on experiences within the hydropower community on the Protocol. There have been many assessments to date and several instances of innovative uses of the Protocol. These experiences should be better socialized across regions and the development spectrum to increase knowledge among users and those involved with further refinements of the Protocol and its derivatives.

Appendix A Project and Basin Level Reporting Tools

TABLE A.1. Zambezi Basin Sustainability Reporting Tool



ZAMBEZI BASIN SUSTAINABILITY REPORTING TOOL			
Project-level report (to be completed annually)			
This report was completed on:		Reporting Year:	
Completed by:		Position:	

Section 1. Project details	
Project:	
Developer / Operator:	
Capacity (MW):	
Stage:	
Date of assessment:	
Type of assessment:	

Section 2. Does the project have any Significant Gaps compared to the Basic Good Practice requirements of the Protocol?				
Communications and Consultation		Financial Viability		Cultural Heritage
Governance		Project Benefits		Public Health
Demonstrated Need and Strategic Fit		Economic Viability		Biodiversity and Invasive Species
Siting and Design		Procurement		Erosion and Sedimentation
Environmental and Social Issues Management		Project Affected Communities and Livelihoods		Water Quality
Integrated Project Management		Resettlement		Waste, Noise and Air Quality
Hydrological Resource		Indigenous Peoples		Reservoir Planning / Filling / Management
Asset Reliability and Efficiency		Labour and Working Conditions		Downstream Flow Regimes
Infrastructure Safety				

KEY	Total number of topics in each category		
Significant gaps against basic good practice	Significant gap/s	0	
Significant gaps but an action plan is underway	Action plan	0	
No significant gaps against basic good practice	No significant gaps	0	
This topic is not relevant or is not in this tool	Not relevant	0	

ZAMBEZI BASIN SUSTAINABILITY REPORTING TOOL			
Basin-level report (to be completed annually)			
This report was completed on:		Reporting year:	
Compiled by:		Position:	

Section 1. Significant Gaps Against Basic Good Practice		Zambezi												Kafue											
		Mpond a Nkuwa		Cahora Bassa		Cahora Bassa N		Kariba		Batoka Gorge		Project X		Project Y		Kafue Gorge		Itezhi-tezhi		Project Z					
Developer / Operator:		HCB		HCB		ZRA/ZESCO/ZPC		ZRA/ZESCO/ZPC						ZESCO		ITPC									
MW		2045																							
Stage:		2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
Communications and Consultation																									
Governance																									
Demonstrated Need and Strategic Fit																									
Siting and Design																									
Environment and Social Issues Management																									
Integrated Project Management																									
Hydrological Resource																									
Asset Reliability and Efficiency																									
Infrastructure Safety																									
Financial Viability																									
Project Benefits																									
Economic Viability																									
Procurement																									
Project Affected Communities and Livelihoods																									
Resettlement																									
Indigenous Peoples																									
Labour and Working Conditions																									
Cultural Heritage																									
Public Health																									
Biodiversity and Invasive Species																									
Erosion and Sedimentation																									
Water Quality																									
Waste, Noise and Air Quality																									
Reservoir Planning / Filling / Management																									
Downstream Flow Regimes																									

KEY	
Significant gaps against basic good practice	
Significant gaps but an action plan is underway to remove the gaps	
No significant gaps against basic good practice	
This topic is not relevant or is not in this tool	

Total number of topics in each category						
	2017	2018	2019	2020	2021	2022

Section 2. Basin-level actions, to move towards improved operations							
2(a). Basin-level actions copied from Operators and Developers' Action Plans							
Action	Operator/ Developer	Type of action	Partners	Status			
				2017	2018	2019	2020

Total number of Actions in each status category						
	2017	2018	2019	2020	2021	2022
No progress						
Ongoing						
Completed						

Section 2. Basin-level actions, to move towards improved operations							
2(a). Basin-level actions copied from Operators and Developers' Action Plans							
Action	Operator/ Developer	Type of action	Partners	Status			
				2017	2018	2019	2020

Total number of Actions in each status category						
	2017	2018	2019	2020	2021	2022
No progress						
Ongoing						
Completed						

Appendix B Survey Questionnaire

BOX B.1. Survey Questionnaire for Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin

The objective of the Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was to support the members of ZAMDO and other key associations (ZAMCOM and SAPP) to understand, use and adopt the Hydropower Sustainability Assessment Protocol as a tool for development and operation of hydropower in the Zambezi River basin. This is part of a broader program of support from the World Bank to the Riparian States.

This brief survey of participants in the program is being conducted to gather feedback on the overall program, including on how best to promote continued use of the Protocol in the region and to improve our approach to similar programs in the future.

Please complete the questions below. The survey takes no longer than 5 minutes to complete. Many thanks for your feedback!

A. Satisfaction with the Overall Program and with the Following Elements of the Program?

1. The program

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

What are the reasons for your rating?

2. Internal Protocol self-assessments

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

What are the reasons for your rating?

3. The development of action plans to address significant gaps

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

What are the reasons for your rating?

4. Opportunity to participate in the World Hydropower Congress, Addis Ababa 2017

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

box continues next page

BOX B.1. continued**B. Satisfaction with the Following Events during the Program?**

5. Introductory training (Livingstone, 31st May to 1st June 2016)

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

6. Detailed training (ZESCO: Lusaka, 12th to 14th July 2016; ZRA: Lusaka, 2nd to 4th August 2016; HCB: Songo, 21st to 23rd September 2016)

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

7. First experience-sharing workshop (Songo, 27th January 2017)

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

8. On-site assessments (ZESCO: 7th to 11th November 2016; ZRA: 30th January to 3rd February 2017; HCB: 27th February to 3rd March, 2017)

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

9. Second experience-sharing workshop (Lusaka, 30th August to 1st September 2017)

Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
<input type="checkbox"/>				

Did not attend

What are the reasons for your rating?

BOX B.1. continued

C. Using the Hydropower Sustainability Assessment Protocol

10. How do you expect to use the Protocol in the future?

	Definitely NOT	Probably not	Neutral	Probably will	Definitely WILL
Official assessment	<input type="checkbox"/>				
Informal self-assessment	<input type="checkbox"/>				
Assisted self-assessment	<input type="checkbox"/>				
As guidance or checklist	<input type="checkbox"/>				
Other	<input type="checkbox"/>				

What are the reasons for your responses?

11. What would help you to use the Protocol more in future?

	Definitely NOT	Probably not	Neutral	Probably will	Definitely WILL
Further training	<input type="checkbox"/>				
Guidelines on specific topics	<input type="checkbox"/>				
Checklists on specific topics	<input type="checkbox"/>				
Simplified reporting tools	<input type="checkbox"/>				
Guidance on using the Protocol in ESIA	<input type="checkbox"/>				
Other	<input type="checkbox"/>				

What are the reasons for your responses?

D. Using the Protocol to Promote Improved Operations in the Zambezi Basin

12. Please indicate whether you agree or disagree with the following statements.

	Agree	Don't know	Disagree
The Protocol could be used to promote the sharing of information between the developers and operators in the Zambezi Basin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Protocol could be used to promote improved coordination between the developers and operators in the Zambezi Basin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developers and operators would be willing to share an annual summary on each project, based on the Protocol with other developers and operators in the basin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Developer and operators want to move towards joint operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What are the reasons for your responses?

BOX B.1. continued

13. What would be most important in an annual report at the basin level?

	Important	Don't know	Not important
Latest versions of any assessment reports prepared using the Protocol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Red-Amber-Green indicator on status related to key areas under the Protocol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Written summary of current performance in key areas related to the Protocol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actions taken in the past year to improve performance in key areas related to the Protocol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actions to be taken in coming years to improve performance in key areas related to the Protocol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What are the reasons for your responses?

E. The Final Experience-Sharing Workshop

The final workshop in the program on the Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin is scheduled for January 2018.

14. Please rank the following potential sessions in order of your preference

	1 st	2	3	4	5 th
Presentations on assessment results from ZESCO, ZRA, HCB	<input type="checkbox"/>				
Presentation on the program report from IHA	<input type="checkbox"/>				
Discussion on your future uses of the Protocol	<input type="checkbox"/>				
Discussion on using the Protocol to Promote Joint Operations	<input type="checkbox"/>				
Testing of a draft tool for annual reporting at a basin level	<input type="checkbox"/>				

Please give any further comments or suggestions for the agenda of the final workshop.

F. Your Details and Final Comments and Suggestions

15. Please provide the following details. Your name is optional.

Name (optional) _____

Organisation ZESCO ZRA HCB Other

Were you a ZESCO/ZRA/HCB Assessor during this program? Yes No

16. Final comments and suggestions

Please give any further comments or suggestions.

Appendix C Summarized Survey Results

Survey for Participants—Summary of Results, January 16, 2018

Introduction

The objective of the program on the Application of the Hydropower Sustainability Assessment Protocol in the Zambezi River Basin was to support the members of the Dam Operators in the Zambezi River Basin (ZAMDO) and other key associations (Zambezi Watercourse Commission [ZAMCOM] and SAPP [Southern African Power Pool]) to understand, use, and adopt the Hydropower Sustainability Assessment Protocol as a tool for development and operation of hydropower in the Zambezi River Basin. This is part of a broader program of support from the World Bank to the Riparian States.

A brief survey of participants in the program was conducted to gather feedback on the overall program, including on how best to promote continued use of the Protocol in the region and to improve our approach to similar programs in the future.

The survey questionnaire was distributed via a web-based survey service, on December 22, 2017, with a follow-up reminder distributed on January 05, 2018. It was circulated to six ZESCO participants, two Itzhi-Tezhi Power Company (ITPC) participants, eight Zambezi River Authority (ZRA) participants, seven Hidroeléctrica de Cahora Bassa (HCB) participants, plus additional HCB participants via internal distribution, and two Water Resources Management Authority (WARMA) participants (total 25, plus additional HCB participants).

Nine responses were received: one from ZESCO; two from ZRA; five from HCB; one from WARMA. The following provides a summary of responses, following the same order of questions as presented in the survey.

A. Satisfaction with the Overall Program and with the Following Elements of the Program?

	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Did not attend
1. The program	0	0	2	4	3	–
2. Internal protocol self-assessments	0	0	1	8	0	–
3. The development of action plans to address significant gaps	0	0	5	3	1	–
4. Opportunity to participate in the World Hydropower Congress, Addis Ababa 2017	0	0	1	1	0	7

Note: – = not applicable.

This data reflects high satisfaction with the program, slightly less satisfaction with the internal self-assessments, and least satisfaction with the development of action plans. The comments made on the reasons for their responses reveal that the program is appreciated as a capacity-building opportunity, that the self-assessments should be seen in the context of competing responsibilities, and that the assessments and action plans need wider institutional commitment if they are to be taken forward.

Responses to the question "What are the reasons for your rating?"	
1. The program	<ul style="list-style-type: none"> • The program seemed more of an academic exercise whose outcomes give no obligations to nobody—this is my view! • We had opportunity to evaluate the gaps on our process using the protocol • This is when am being introduced to this program, the one who was in-charge at our institution was moved to another institution • It is very useful • The essential elements were considered • This program used the best practices to assess sustainability of the projects. The gap analysis is done in compliance with standards used by a huge group of people • The program brought out real sustainability issues. It was so well structured that understanding, appreciating and application was easy. The insights are applicable to many aspects
2. Internal protocol self-assessments	<ul style="list-style-type: none"> • Helps improve coordination and holistic view of projects • For a first experience I think we gave the best of us • The key stakeholders were involved and demonstrated commitment • Some gaps still remain in the team: we have to do efforts to overcome this situation • Protocol was useful but its execution was hampered by assessors' commitments to other works • I feel it was satisfactory for first timers. Would have been very satisfactory had the ITT Power Plant been in operation for a long time. That way there would have been more data, and deeper and wider analysis to better determine performance.
3. The development of action plans to address significant gaps	<ul style="list-style-type: none"> • No obligation seems to be required to implement action plans • The Project assessed will not go ahead • A lot of internal homework still to be done to reach the stage where significant gaps will be addressed. • The action plans are clear and in my opinion possible to be implemented. The point is that some depend on other projects, which can slow down the process. • The action plans have been drawn up but their implementation depends on the availability of financial resources • Some gaps still remain in the team: we have to do efforts to overcome this situation • It provided an opportunity for addressing the gaps in a very practical manner
4. Opportunity to participate in the World Hydropower Congress, Addis Ababa 2017	<ul style="list-style-type: none"> • We gain knowledge on hydropower

B. Satisfaction with the Following Events during the Program?

	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Did not attend
5. Introductory training	0	0	1	2	1	5
6. Detailed training	0	0	1	2	3	3
7. First experience-sharing workshop	0	0	1	5	2	1
8. On-site assessments	0	0	1	3	2	3
9. Second experience-sharing workshop	0	0	1	3	2	3

These responses also show a high degree of satisfaction, although they are from a limited sample of participants. There were fewer responses given to “What are the reasons for your rating?” than in section A of the survey, but those given indicate that the first experience-sharing workshop was more greatly appreciated than expected (perhaps indicating that some aspects of the approach of that workshop, for example, being held alongside the JOTC meeting, were particularly useful).

Responses to the question “What are the reasons for your rating?”	
5. Introductory training	• (None)
6. Detailed training	• Useful tools for evaluation of projects
7. First experience-sharing workshop	<ul style="list-style-type: none"> • ZESCO's lead was inspiring • Very informative interaction with other participants • It was very useful • It was an opportunity for learning based on the experience of other similar institutions.
8. On-site assessments	<ul style="list-style-type: none"> • Great opportunity to meet the sampled targets; a more thorough work could have been done if, for instance, a questionnaire was sent in advance, and if a larger sample was selected • Moving from theory to practice was a very good experience. Errors during the interviews were corrected by the experts.
9. Second experience-sharing workshop	• It was an opportunity to share the experience and challenges of the CBN project evaluation.

C. Using the Hydropower Sustainability Assessment Protocol

10. How do you expect to use the Protocol in the future?

	Definitely NOT	Probably not	Neutral	Probably will	Definitely WILL
Official assessment	0	1	0	2	6
Informal self-assessment	0	0	1	2	6
Assisted self-assessment	0	0	2	2	5
As guidance or checklist	0	0	1	1	7
Other	0	0	2	1	3

These results show a high degree of interest in using the Protocol in the future, through all ways of using the Protocol, at least among the respondents to this questionnaire. No further comments were given against “Other,” but the survey provides space for that only under the

question “What are the reasons for your responses?” Responses to that question include the following:

- I fail to see firm commitment to the program!
- It’s a detailed tool which covers almost all areas of assessment for an organization that is contemplating the implementation of a hydropower project.
- The evaluation of the CBN project showed us essential aspects that were not considered in the implementation phase of the CBS project, which in the future may represent challenges.
- To use this tool means to perform best practices in the gap analysis.
- Self-assessment may lack objectivity, hence there may be need to carry out a formal assessment.
- Its very useful, and very much a part of my career.

11. What would help you to use the Protocol more in future?

	Definitely NOT	Probably not	Neutral	Probably will	Definitely WILL
Further training	0	0	0	4	5
Guidelines on specific topics	0	0	0	2	7
Checklists on specific topics	0	0	0	2	7
Simplified reporting tools	0	0	0	2	7
Guidance on using the Protocol in ESIA	0	0	0	3	6
Other	0	1	1	1	3

These results show significant demand for all types of further support, but specifically the responses on guidelines, checklists, and simplified reporting tools show very strong demand. Responses to “What are the reasons for your responses?” include the following:

- There are some gaps which I identified and considered as significant, but other assessors might not agree (and vice versa). I believe further training and/or more practice in the use of the tool will significantly help in understating the tool itself, as well as how to use it correctly.
- As I have said before, to use this tool means to perform best practices in the gap analysis.

D. Using the Protocol to Promote Improved Operations in the Zambezi Basin

12. Please indicate whether you agree or disagree with the following statements.

	Agree	Don’t know	Disagree
The Protocol could be used to promote the sharing of information between the developers and operators in the Zambezi Basin	9	0	0
The Protocol could be used to promote improved coordination between the developers and operators in the Zambezi Basin	8	1	0
Developers and operators would be willing to share an annual summary on each project, based on the Protocol with other developers and operators in the basin	7	2	0
Developer and operators want to move towards joint operations	7	2	0

These results indicate enthusiasm for using the Protocol to promote sharing of information and improved coordination, and high support for the concept of using an annual report to prompt this. Comments made include the following:

- It is currently not easy-flow [of information] for existing scheme—Kariba.
- The activities of the operators on the Zambezi basin have in/direct effect on one another, hence information sharing on a regular basis is essential.
- Improves interpersonal and institutional knowledge among key stakeholders in the Zambezi water exploration and management.
- To use this tool means to perform best practices in the gap analysis.
- It's the objective of JOTC to achieve the aforementioned. In addition, the experience sharing exercise is proof that basin joint efforts can be attained using the Protocol.

13. What would be most important in an annual report at the basin level?

	Important	Don't know	Not important
Latest versions of any assessment reports prepared using the Protocol	6	3	0
Red-Amber-Green indicator on status related to key areas under the Protocol	5	4	0
Written summary of current performance in key areas related to the Protocol	7	2	0
Actions taken in the past year to improve performance in key areas related to the Protocol	8	1	0
Actions to be taken in coming years to improve performance in key areas related to the Protocol	8	1	0

These results do not strongly differentiate between the options, with the possible exception that there may be more importance given to the reporting of actions being taken to improve performance. Comments on this question include the following:

- The Protocol needs a lot more vigorous marketing/publicity.
- To use this tool means to perform best practices in the gap analysis.
- The objective of reporting is to inform decision making. The reports would be used for formulating a monitoring and evaluation system for identifying, addressing, and following up on issues and opportunities.

E. The Final Experience-Sharing Workshop

14. Please rank the following potential sessions in order of your preference.

	1st	2	3	4	5th	Overall rank
Presentations on assessment results from ZESCO, ZRA, HCB	4	3	0	1	0	1 st
Presentation on the program report from IHA	2	4	2	0	0	2 nd
Discussion on your future uses of the Protocol	1	1	1	1	4	4 th
Discussion on using the Protocol to promote joint operations	2	0	4	1	0	3 rd
Testing of a draft tool for annual reporting at a basin level	0	1	0	4	3	5 th

These findings contradict the previous question's findings, because they place more emphasis on presentations on the assessment results and the program report than on testing of a draft tool. Only one of the respondents gave a response to the request for further comments or suggestions for the agenda of the final workshop: "Simplifying the tool/reporting."

F. Your Details and Final Comments and Suggestions

Seven respondents answered the final request for comments and suggestions. These generally point to the demand for simplified tools that will ease and shorten the length of an assessment:

- The assessment is too large—I believe it can be simplified for easy uptake/comprehension.
- The protocol is the tool that we will apply on our internal small projects.
- I look forward to be fully aware on this program.
- The process of evaluation and interaction should not have long intervals.
- At organization level, the protocol can be unbundled by picking up topics that can be used as a management tool on a day-to-day basis.
- The program has been great, looking forward to more such experiences.
- Many thanks.

Appendix D

Interview Guidance for Protocol Assessments

Interview Guidance

1. General Guidance

Interview the right person. Discuss whether he/she is the right person with them. He/She might suggest an additional or alternative interviewee.

Prepare the interviewees beforehand. Brief them on what the Protocol is and what you are doing. Tell them that they can bring documents as evidence. A workshop or meeting to brief all the internal interviewees is a good idea.

Avoid bias. Interview a range of interviewees. Interviewees will have their own opinions and biases. You should not challenge these, but listen to them to understand their points of view. Interviewing a range of interviewees who you expect to have a diversity of opinion is useful to avoid bias.

Be prepared. We give some suggestions on how to prepare the interview in the following sections. Ahead of the interview, prepare a list of things **you should not leave the interview without** (or without asking for). Avoid these regrets and excuses:

- I forgot to ask that question;
- I ran out of time;
- Why didn't I ask for a document on that issue?
- I wasn't sure he/she was right person to ask.

2. How to Phrase Your Questions

Avoid leading questions. This is when you give the answer in the question, and the interviewee replies "yes" because it is easiest to do so. For example: "The company consulted with you regularly, is that right?" Instead ask: "When did the company consult with you?" The following table gives examples of leading questions and open questions:

Leading question	Better alternative
Did the project result in lower fish yields?	How did the project affect fish yields?
The company provided a contact number for anyone to raise issues, but did you use it?	How would you contact the company to raise issues?
How generous is the compensation? How high is it?	What was the amount of compensation that you will receive?
Is the hydrological model based on field measurements?	Can you describe the hydrological model? What data is the model based on?

Avoid asking questions that use Protocol language that they may not understand. For example: "Was the negotiation carried out in good faith?" or "Did you assess interrelationships between issues?" Use simple language that the interviewee will understand instead.

Judgment. Do not leave the responsibility of judging whether the scoring statement is met to the interviewee! For example: “Can the project manage financial issues under a broad range of scenarios?” It is your responsibility to make this judgment.

You may find it most relevant to direct questions on assessment, management, and stakeholder engagement to project staff, and questions on stakeholder engagement, stakeholder support, and outcomes to external stakeholders.

Do not be afraid to ask stupid questions. Do not feel that you have to demonstrate your professional expertise through your questions. Do not ask very detailed questions, or assume that the interviewees understand technical details. Their answers can be very revealing if they think you have no knowledge of the subject.

Do not give advice. Sometimes it is tempting to show your expertise and give them advice through the interview. That is not your role.

Introduce your questions carefully. Introduce your questions politely and sensitively, using a short preamble. For example:

1. “May I ask you your view on ...?”
2. “I’m sorry this is a really silly question, but ... ”
3. “I am not sure if this is your area, but may I ask about ... ”
4. “I realize this is a controversial issue, but please feel free to give your honest opinion ...”
5. “Do you feel comfortable answering questions about ...”
6. “Would you feel more comfortable speaking to me alone ...?”

3. How to Structure the Interview

Plan the interview to get the most out of the time available. If you have 45 minutes, and you know you will have questions on assessment, management, and outcomes, move onto management after 15 minutes, and onto outcomes after 30 minutes.

A typical structure for an interview is:

Suggestion	Time length
Clarifying their names, positions, and how they relate to the project, and recap what you are doing	5 minutes
Questions related to the scoring statements	25 minutes
New questions that you think of during the interview	10 minutes (make sure you have time for these)
Closing	5 minutes
Total	45 minutes

Close the interview by giving them an opportunity to make further points. A good question to ask is, “Are there any further points you would like to raise? Feel free. You can raise any points at all, not just related to my questions.”

4. How to Prepare Your Questions

Some assessors find it helps to prepare questions in advance. You can use the scoring statements to help you do this. In addition, you may have questions that arise from the documents you have read, and the gaps that you already expect to find.

For example, the following table shows a checklist of questions for topic P-19 Biodiversity and Invasive Species, showing how you can derive questions from the scoring statement.

	Scoring statement	Questions
Assessment	An assessment of terrestrial biodiversity; aquatic biodiversity including passage of aquatic species and loss of connectivity to significant habitat; and risks of invasive species has been undertaken with no significant gaps.	<ol style="list-style-type: none"> 1. Has anyone undertaken an assessment of terrestrial biodiversity? 2. Has anyone undertaken an assessment of aquatic biodiversity? 3. Has anyone undertaken an assessment of the passage of aquatic species and loss of connectivity? 4. Do the assessments cover the full project area? 5. Do the assessments establish baseline conditions and potential changes that could occur? 6. Has anyone undertaken an assessment of risks of invasive species? 7. Who did these assessments and how?
Management	Plans and processes to address identified biodiversity issues have been developed for project implementation and operation with no significant gaps.	<ol style="list-style-type: none"> 8. Do you know if there any plans to address the biodiversity issues identified by the assessment? 9. Can you please describe these plans. 10. Do the plans address both implementation and operation stages? 11. In your view, are there any gaps in the plans? What are they?
Outcomes	Plans avoid, minimize, mitigate, and compensate negative biodiversity impacts arising from project activities with no significant gaps.	<ol style="list-style-type: none"> 12. In your view, are these plans adequate to manage biodiversity impacts? 13. What do you think will happen in reality?

Don't avoid level 5 questions during an interview: be prepared to move from a score of 2 to a score of 4 or 5 when you prepare your findings!

5. Triangulation

Triangulation refers to the way you should base your findings on as many sources and types of evidence as possible.

Ask for proof. During the interview, don't be afraid to ask for proof of what they are saying. Ask to be pointed to visual or documentary evidence.

Repeat questions. Ask the same questions, or similar questions, repeatedly in a range of interviews.

Prepare questions based on the documentary evidence and visual evidence. For example: "I saw employees working on-site without helmets. Can you tell me more about the worker's use of helmets?" or "This document describes a policy on environmental responsibility. Can you tell me how the company meets these policy commitments?"

6. Do's and Don't's

Here are some useful do's and don't's for interviews:

Do	Don't
1. Ask short simple questions	1. Don't talk too much
2. Wait for answer	2. Drift off
3. Allow interviewees to do the talking	3. Don't ask more than one question at one time
4. Listen to the answer	4. Don't give advice
5. Stick to criteria	5. Don't ask leading questions (only use leading questions for final verification)
6. Focus assessment on the exact wording of the scoring statements	6. Don't make judgments in interviews (or following interviews)
7. Ask for evidence	
8. Always be polite	
9. Structure your time, ensure you get through all your questions, and finish on time	

7. Interviews in Communities

Verbal evidence from communities is very important. Here are some suggestions for handling community interviews. These principles can apply to workers too.

Avoid community leaders or only men dominating. Arrange separate, smaller interviews with different groups with the community.

Avoid interviews with very many people at once. Sometimes, everyone in the village will attend. Try to arrange the interview in a private area, so it is clear that it is a private meeting. Or, if an open meeting is unavoidable, arrange it as a community meeting, giving everyone a chance to speak.

Understand cultural sensitivities. Understand any cultural issues beforehand. Check that interviewees feel comfortable in the venue for the interview, for example, if they are invited to a project office. Ask them if they would like to be accompanied by someone they trust.

Sensitivity. Be sensitive to the interviewees' predicament (for example, if they are going to be resettled). Also, **avoid raising expectations**—do not make promises about an issue that is not your responsibility.

Do not take photos or videos without permission, especially not of people. Do not include pictures of people in the report without their permission.

Do not attribute findings to individuals in the report. Community members do not need to be listed as interviewees by name.



References

Liden, Rikard, and Kimberly Lyon. 2014. "The Hydropower Sustainability Assessment Protocol for Use by World Bank Clients: Lessons Learned and Recommendations." Water Partnership Program Water Papers. World Bank, Washington, DC. <http://documents.worldbank.org/curated/en/870411468336660190/The-hydropower-sustainability-assessment-protocol-for-use-by-World-Bank-clients-lessons-learned-and-recommendations>.

SADC/ZRA (Southern Africa Development Community/Zambezi River Authority). 2007. "Rapid Assessment Report: Integrated Water Resources Management Strategy for the Zambezi River Basin." SADC Water Division, Gaborone, Botswana.

World Bank. 2010. "The Zambezi River Basin: A Multi-Sector Investment Opportunities Analysis." World Bank, Washington, DC.

Zambezi River Authority. 2014. "Zambezi River Basin Development Project." World Bank Project Appraisal Document. World Bank, Washington, DC. <http://projects.worldbank.org/P133380?lang=en>.

—. 2017. "Development of the Batoka Gorge Hydro-Electric Scheme: Project Overview Document." Lusaka, Zambia, Zambezi River Authority. http://www.zaraho.org.zm/sites/default/files/BGHES_Project%20Overview%20Document.pdf.

