

Annex G

Biodiversity, Social and  
Cultural Heritage Baseline  
Data Collection  
Methodologies

This *Annex* provides the methodologies for the collection of baseline data related to Biodiversity, Social and Cultural Heritage. These methodologies were developed in line with the IFC Performance Standards.

Ecological studies for the Batoka Gorge ESIA process and surrounding areas were conducted and reported in 1993 and May 1998. These studies provided sub-reports on vegetation, wildlife and fisheries, were compiled to a high standard and provide a good baseline for the conditions at that time. Aspects that have changed since that time, such as the status of wildlife populations, crocodiles, and the status of key species of concern (e.g. Taita Falcons) have been addressed in detail in the current study. Habitat maps have also been extended to cover the entire area of influence in a consistent manner.

### G2.1

#### GAP ANALYSIS

ERM conducted a Gap Analysis on the 1998 Additional Studies. This Gap Analysis concluded that these sub-reports presented useful ecological data for the Project Area and surrounds over various seasons, and provided a comprehensive description of the diversity of floral and faunal species occurring there. Many species are identified and the seasonality of the site has been well represented. However, to meet international standard requirements and the IFC Performance Standard 6 in particular, the following broad data gaps were identified and needed to be addressed:

- **Conservation Issues** - Impacts on protected areas in their various forms and within the vicinity of the project area have not been comprehensively assessed during previous studies.
- **Habitat Assessment** - important habitats were identified, but were mapped over a limited area, which focussed largely on the Zimbabwean side. The habitats within the extent of the transmission lines were not described or assessed. There was no assessment of the transformation and habitats required a classification as Modified, Natural or Critical Habitat. Landuse changes, such as expansion of cultivation areas needed to be reflected in an up-to-date mapping exercise. The current report has aimed to address this gap through a consistent mapping of habitats over the entire area of influence.
- **Faunal Assessment** - a comprehensive representation of faunal species was presented, but landuse alterations and decimation of wildlife since the previous studies were conducted, were expected to have impacted the presence of wildlife. An overview of the current state of the large wildlife was therefore needed. An updated assessment of the state of Taita Falcons, Rock Pratincole and other sensitive bird species was needed, and an assessment of how the construction of a dam may affect these populations was required. The Batoka Gorge contains numerous caves, crevices and adits which provide roosting sites for several species of bats. Bat migrations have been observed and are thought to be feeding on

emerging aquatic invertebrates. Currently little is known about the species or their migrations, and a data search was needed.

## **G2.2**      *FIELD STUDIES*

Data on surrounding conservation areas was sourced based on the extent and state of protected areas within the project area from the *Zambian Wildlife Agency (ZAWA)* and the *Zimbabwe National Parks and Wildlife Agency (NPWA)*.

Field surveys were conducted collaboratively between *Black Crystal* and *ERM*. An *Ecological Area of Influence* was determined covering both *Zambia* and *Zimbabwe*, and habitats within that area mapped from available aerial imagery. The various habitat units in *Zambia* and *Zimbabwe* were ground-truthed by *Black Crystal* in *September 2014*, their dominant species composition and levels of transformation were assessed.

Faunal data were sourced from the *Zimbabwe Falconer's Club*, *CAMPFIRE* associations, the *Livingstone Natural History Museum*, local safari hunters and the *Crocodile Farmer's Association*.

The fish communities have been well described for the project area, but other aspects of the aquatic ecology have received little attention. The Present Ecological State (PES) of the aquatic habitats is an important component of an IFC-compliant ecological assessment. The PES is an important reference against which to maintain downstream conditions post construction of the dam wall, and has been assessed as part of an Environmental Flow assessment at two sites downstream of the proposed dam wall. The PES was assessed based on hydrology, geomorphology, vegetation sampling, aquatic macro-invertebrates sampling, expected fish response to harvesting levels and expected crocodile population response to current conditions.

The Aquatic ecology content in this document has been extracted from the Additional studies report presented in May 1998. The Fisheries report was compiled by John Munshell based on fieldwork he conducted in the Batoka Gorge in 1997/1998. The following methods were used at that time:

- Fieldwork involved the sampling of two pools in November 1997. Pool one was deep (>6m) and the total area was 30m<sup>2</sup>. The second pool (Pool Two) was small (10m<sup>2</sup>) and shallower (<1m). A third site which had been identified was not successfully sampled. The nets were set there overnight and raised the following morning for a total of seven days but no fish were caught using gillnets.
- A fish toxicant (rotenone) was used in the pools. These pools were isolated since the Zambezi was at low flow during the time of the sampling in November. There was no need to use a block net since the whole pool was poisoned.
- Examination of catches of local fishermen were recorded in November 1997 and March 1998. There were 10 part-time fishermen in the Batoka Gorge. A few occasional fishermen also visited the gorge. No professional fishermen were identified in the area. The fishermen used hand-nets and rod line to catch fish. Each fisherman has three hand-nets and four rod lines. Their catches were also examined.
- In February 1998 the Zambezi River was flowing quite fast and the pools that had been previously sampled were all covered. It was impossible to do any sampling in the Batoka Gorge. A tributary of the Zambezi flowing into the Batoka Gorge, DibuDibu, was sampled using the fish toxicant. The sampling areas that the National Museum in Zimbabwe had sampled were revisited.

G4.1 OBJECTIVES

The objectives of the EF assessment were:

- to evaluate the present day condition (i.e. the present structure and functioning) of the Zambezi River from upstream of BGHES to Kariba Dam;
- to evaluate how the condition of the river could change under different operational scenarios for the proposed BGHES.

G4.2 SCOPE OF WORK

Southern Waters', who conducted the Environmental Flow Assessment (EFA) on behalf of ERM, had the following Scope of Work:

- Delineate the river within the study area and select representative sites for the EF assessment.
- Provide input to the selection of scenarios for the EF assessment.
- Collect/collate primary and secondary data for the configuration of the DRIFT EF assessment model.
- Incorporate the hydrological data provided by ERM into the DRIFT model and select ecologically-relevant flow indicators.
- Model and incorporate the ecohydraulic relationships based on survey data from EF Sites 1 and 2 into the DRIFT model.
- Select of discipline indicators for the DRIFT model.
- Set up, populate and calibrate the DRIFT Decision Support System.
- Simulate of scenarios.
- Present results in a report.

The Scope of Work was restricted to an assessment of the riverine biophysical aspects of the BGHES, and did not include an assessment of the consequent social and economic impacts of the project.

All of the local and international EF team members visited the Zambezi River upstream and downstream of the proposed BGHES between the 1 and 5 of September 2014. Thereafter (27 -31 October 2014), the population and calibration of the DRIFT Decision Support System was completed in a workshop situation in Cape Town.

G4.3 THE EF ASSESSMENT PROCESS

DRIFT (Downstream Response to Imposed Flow Transformations) is an holistic EF assessment approach (Brown *et al.* 2013) that, in this project, was applied at the level of the direct influence of the proposed BGHES. This is

essentially the Zambezi River from the location of the proposed BGHES weir to Kariba Dam. The objective was to describe the present condition of the river ecosystem and then, through scenarios, to predict how this could change with different design and operation of the BGHES.

Changes in the hydrological regime drive the assessment process. Each scenario would change flow conditions along the river in a different way, with possible different repercussions for the river system. Once these hydrological changes have been simulated, then the DRIFT software provides predictions of the consequent changes in the biotic and abiotic aspects of the river.

A Social Area of Influence (SAoI) was determined through consideration of likely project impacts with the aid of available aerial imagery. A selection of communities (social study communities) were chosen in the SAoI for primary data collection purposes. Social study communities were chosen through random sampling by grouping communities together with likely similar Project impacts (eg impacts associated with transmission lines, impacts associated with access roads, impacts associated with restricted access to the Zambezi River and impacts associated by land take). Communities were chosen randomly from within these groupings and were chosen to provide a representative understanding of the social environment across the SAoI. Downstream impacts are not yet fully understood and although the parties that could be impacted on by changes to flow regime have been identified, baseline data was not been gathered for these communities. In addition, due to the lack of clarity on whether the transmission line from the dam site to Choma is to be included as part of the project in Zambia, communities along this proposed line were also not targeted at this stage.

### G5.1

#### *SECONDARY DATA COLLECTION*

Secondary data was reviewed on the social-economic profile of both Zambia and Zimbabwe for the national level context, as well as for the provinces and districts in which the proposed project will fall under. No data could be found for the local level / communities that the proposed project is likely to impact. As a result, these communities formed the target for primary data collection. Secondary data was sourced from various organisations, including the government statistical offices, development agencies, and NGOs.

### G5.2

#### *PRIMARY DATA COLLECTION ACTIVITIES*

Primary data was obtained from:

- focus group discussions with males and females;
- key informant interviews;
- household surveys; and
- site observations

Tools were prepared to guide all primary data collection activities. Village heads were notified by a member of the field team prior to the data collection activities were due to take place. They were informed of the purpose of the data collection exercise and were asked for permission for the exercises to go ahead.



### G5.2.1 *Focus Groups Discussions (FGDs)*

Semi-structured meetings were held with men and women (including male and female youth) to gain a good understanding of the socio-economic baseline in the local communities. In order to select participants for the focus groups and to capture the views of vulnerable groups (such as the elderly and those with disabilities), the field team, aided by the village head, gathered the community and requested for volunteers including representatives from the respective vulnerable groups. After volunteers had nominated themselves, the team selected a sample, generally ranging from 6-10 participants. Using this method, the field team were able to select various age groups and less able community members to participate in meetings.

**Figure G5.1** *Pictures of FGDs*



Source: ERM Social Survey. Left - Female FGD Borehole 126, Zimbabwe. Right: Male FGS, Chibule, Zambia

### G5.2.2 *Key Informant Interviews (KIIs)*

Key informants are individuals who have knowledge of a specific subject or are informed members of the community, such as government representatives, local leaders /village heads, religious leaders, school teachers, healthcare professionals, NGOs, etc.

The objectives of the key informant interviews were to solicit information regarding the local community, to identify potential impacts and mitigation measures and to discuss community needs.

**Figure G5.2** *Pictures of KIIs*



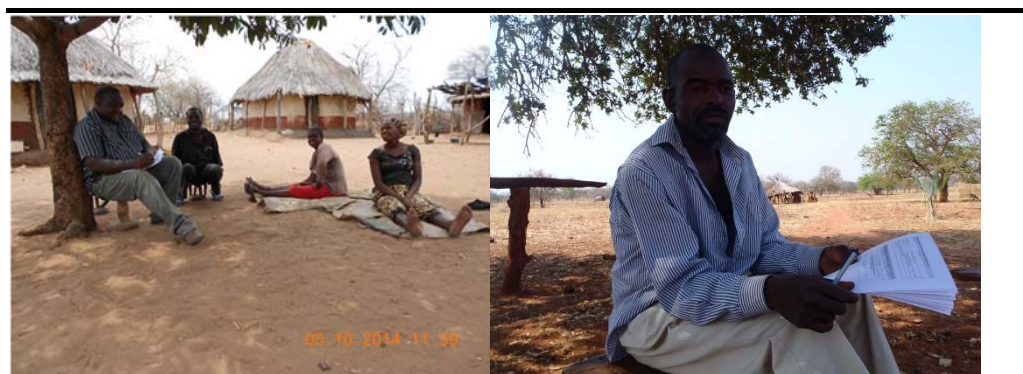
Source: ERM Social Survey. Left – Nurse at Mukuni Health Clinic, Zambia. Right – CAMPFIRE officers, Zimbabwe

### G5.2.3 Household Surveys

In Zambia and Zimbabwe, a household (HH) is defined as a person or group of persons related or unrelated who live together and make common cooking arrangements (i.e. sharing a cooking pot).

Household surveys was conducted to collect quantitative information including demographics, livelihoods and land use, income and expenditure, health at the household level. The field team used a random sampling strategy to select households for inclusion. On average, 30% of households per village were selected for inclusion as part of the household survey (calculations were based on population figures given by the village head). Data from the household surveys were entered into an excel database for analysis.

Figure G5.3 Pictures of Household Survey



Source: ERM Social Survey. Left – HH survey In Chisuma, Zimbabwe. Right – Administering HH survey N'gandu, Zambia.

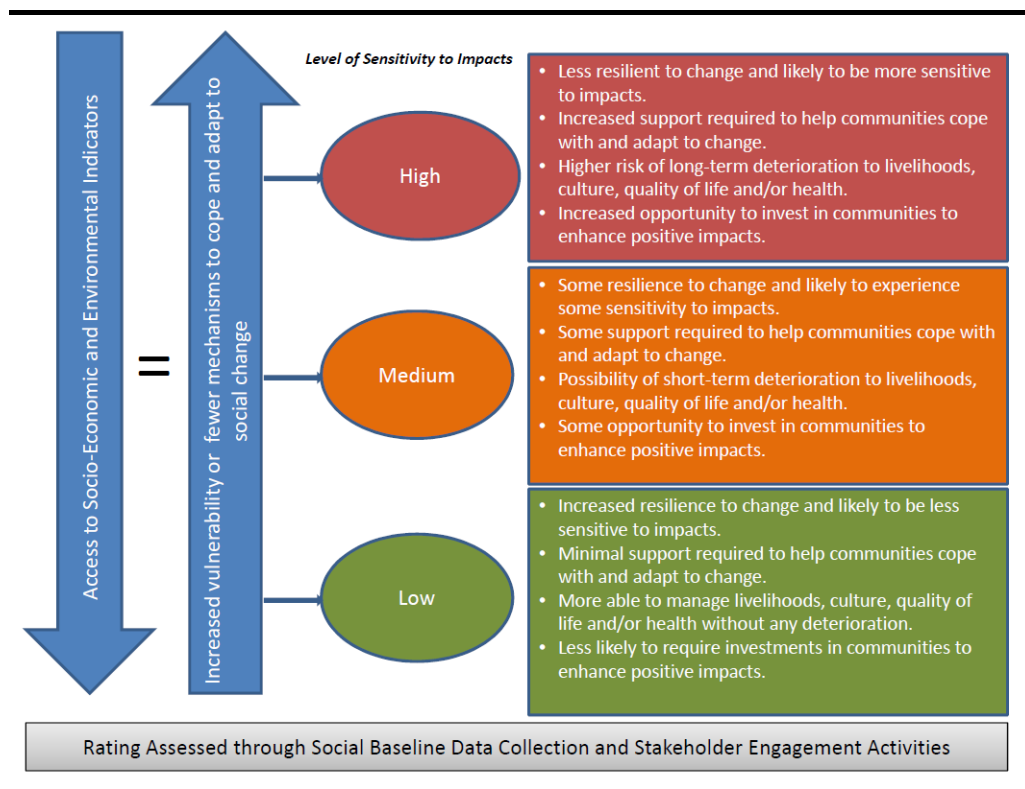
### G5.3 VULNERABILITY ASSESSMENT METHODOLOGY

*“Vulnerability’ describes the reduced ability of some communities or households to cope with the events and stresses to which they are exposed.”<sup>(1)</sup>*

Vulnerability of receptors to social impacts is dependent on the level of resilience of individuals to cope with socio-economic or bio-physical change. Vulnerable groups are more susceptible to negative impacts or have a limited ability to take advantage of positive impacts. Resilience is based on having access to the necessary resources (e.g. financial credit, assets such as crops, shelter, etc) and physical/mental capacity (e.g. strength to relocate, skills to rebuild a business, etc) to cope with change. Figure G5.4 shows how resilience to cope with change relates to vulnerability and therefore sensitivity to impacts.

(1) Green, P. (2008) *From Poverty to Power*. Oxford, UK: Oxfam. p 201

Figure G5.4 Vulnerability and Resilience to Change



Below is a framework that has been used in order to assess aspects considered during the identification of vulnerable groups.

Table G5.1 Characteristics that Underpin Vulnerability

Access / Status	Aspects to be considered	Sensitivity Indicators
<b>Human Receptors' (individuals, groups, households, communities etc) access to:</b>		
<b>Livelihoods</b>	<ul style="list-style-type: none"> <li>• Diversity of livelihoods</li> <li>• Legality of livelihood</li> <li>• Productivity of livelihood</li> </ul>	<ul style="list-style-type: none"> <li>• Reliance on one principal livelihood</li> <li>• Principal livelihoods are relatively unproductive</li> <li>• Principal livelihoods are unsustainable, fragile or illegal.</li> </ul>
<b>Resources</b>	<ul style="list-style-type: none"> <li>• Water</li> <li>• Non-Timber Forest Products</li> <li>• Land</li> </ul>	<ul style="list-style-type: none"> <li>• Access limited to few resources</li> <li>• Resource shortages are frequent and serious</li> <li>• Resources available are legally protected and use is illegal</li> </ul>
<b>Services and infrastructure</b>	<ul style="list-style-type: none"> <li>• Health</li> <li>• Education</li> <li>• Transport</li> <li>• Recreation</li> <li>• Savings and support networks</li> <li>• Fair Policing and Security</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal access to key services and infrastructure</li> <li>• Provision of key services and infrastructure is poor.</li> </ul>

Access / Status	Aspects to be considered	Sensitivity Indicators
<b>Participation in political and civil institutions and decision making</b>	<ul style="list-style-type: none"> <li>Freedom of association</li> <li>Freedom from corruption</li> </ul>	<ul style="list-style-type: none"> <li>Minimal ability to participate in orthodox governance and decision making systems</li> <li>Subject to high levels of corruption</li> <li>Restrictions on rights of association, ability to participate freely in governance</li> </ul>
<b>Community and social inclusion and cohesion</b>	<ul style="list-style-type: none"> <li>Security</li> <li>Freedom from inter and intra community cohesion</li> </ul>	<ul style="list-style-type: none"> <li>Subject to marginalisation and discrimination.</li> <li>Subject to violence and conflict.</li> </ul>
<b><i>Human Receptors' (individuals, groups, households, communities etc) status:</i></b>		
<b>Health</b>	<ul style="list-style-type: none"> <li>Health status including malnutrition, infectious diseases, disability etc</li> </ul>	<ul style="list-style-type: none"> <li>Acute illness</li> <li>Chronic illness</li> <li>Maternal mortality</li> <li>Child mortality.</li> </ul>
<b>Knowledge, skills and education</b>	<ul style="list-style-type: none"> <li>Levels of knowledge skills and education</li> <li>Ability to participate in orthodox economic and social systems.</li> </ul>	<ul style="list-style-type: none"> <li>Literacy</li> <li>School attendance</li> <li>Education levels achieved</li> </ul>
<b>Financial resources</b>	<ul style="list-style-type: none"> <li>Income generation</li> <li>Savings</li> </ul>	<ul style="list-style-type: none"> <li>Income levels relative to expenditure</li> <li>Ability to pay for food, key services, resources and infrastructure</li> </ul>
<b>Labour rights</b>	<ul style="list-style-type: none"> <li>Forced labour</li> <li>Child labour</li> <li>Right to association</li> <li>Health and safety standards</li> <li>Minimum wage etc</li> </ul>	<ul style="list-style-type: none"> <li>Subject to forced labour / slavery, indentured labour</li> <li>Subject to children labour</li> <li>Subject to inadequate occupational H&amp;S and accommodation standards</li> </ul>
<b>Independent cultural identity</b>	<ul style="list-style-type: none"> <li>Desire to maintain strong independent cultural identity.</li> <li>Desire to avoid all socio-cultural change</li> </ul>	<ul style="list-style-type: none"> <li>Desire to maintain strong independent cultural identity</li> <li>Desire to avoid all socio-cultural change</li> </ul>

The cultural heritage baseline has been developed through an analysis of both primary and secondary data. ERM commissioned Richard Mbewe of the Zambian National Heritage Conservation Commission (NHCC) and Rob Burrett, associate researcher at the Natural History Museum of Zimbabwe and of Black Crystal Consultants to undertake primary data collection. ERM drew together the reports submitted by both of the consultants in order to develop a consolidated cultural heritage baseline chapter.

### G6.1 *SECONDARY DATA COLLECTION*

Secondary data was reviewed for information relating to cultural heritage resources in the Project area of both Zambia and Zimbabwe. This included analysis of previous environmental studies undertaken for the proposed Batoka Gorge Hydroelectric Scheme, as well as other published reports on heritage in the two countries. In Zambia, the archaeological register (housed by the National Heritage Conservation Commission) and in Zimbabwe, the records of the Archaeological Survey of Zimbabwe (housed in the Zimbabwe Museum of Human Sciences, Harare) were also reviewed in order to gain a deeper understanding of the regional cultural heritage baseline.

### G6.2 *PRIMARY DATA COLLECTION*

Following the review of secondary data, field reconnaissance was conducted in both Zambia and Zimbabwe for the Project footprint <sup>(2)</sup>.

The key objectives of the field studies were to:

- Undertake interviews with key informants from local communities to identify sites of intangible value. This included discussions with chiefs and their representatives.
- Revisit the cultural heritage sites already recorded as part of the 1993 and 1998 studies in order to collect precise GPS readings and additional information on the site context and content. (GPS readings collected as previous studies were incomplete).
- Take digital photographs of cultural heritage sites.
- Investigate spatial gaps in the Project footprint. In Zambia these included the area around the proposed dam and the edges of the plateau beside the

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(2) Note: primary data collection was not undertaken for the transmission lines. The locations of the transmission line routings are not yet known (although a 3km wide corridor is currently being explored) hence, transmission line data was sourced solely from a review of secondary data.

Gorge to the west. In Zimbabwe, it included areas west of the Gorges Lodge, east of Kasikiri village, and in the vicinity of the dam wall.

Maps were developed for the Project Area with Project infrastructure imposed on them and areas of high and medium cultural sensitivity were highlighted for priority investigation. In Zambia the field reconnaissance was undertaken from 14 to 19 February 2015 and in Zimbabwe, from 15 to 24 August 2014.

In both countries field / pedestrian transects were used as sampling methods to identify cultural heritage sites.

### **G6.3**

#### ***SURVEY LIMITATIONS***

The surveys undertaken in support of this assessment have provided a clear and robust characterisation of the cultural heritage resources of the area, enabling the identification of significant impacts to be identified. However, given the preliminary nature of the BGHES designs at this point - as well as practical and logistical constraints to the ESIA surveys (eg gorge access, minefields) - they should not be understood as a definitive documentation of the heritage resources likely to be affected by the development. It is important to make it clear that additional archaeological investigation and documentation of traditional sites will be essential ahead of the commencement of construction in order to avoid unintended impacts.