Integrating Gurara Dam with the Environment: Case Study Involving Planning, Construction and Operation of Dams Demonstrating Environmental and Socio-Economic Benefits

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Introduction

The global concern for improved access to safe drinking water and renewable energy has gained recognizable discuss in international and national programs. The common resolution to end the problem of poor water supply (quantity and quality) and energy deficits is to ensure all stakeholders work to achieve universal and equitable access to safe and affordable drinking water and renewable energy supply for all by 2030 (Central Statistical Agency of Ethiopia (CSAE), 2017).

Despite the current effort, a large percentage of the world's population still lack access to water in the right quantity and quality. In Nigeria, only about 48% of people living in urban and semi-urban areas have access to potable water, while only 39% have access to safe drinking water in rural areas

Introduction……

In order to achieve the Sustainable Development Goals (SDGs) , projects must be directed towards the energy sector for economic growth as well as on water and sanitation to ensure public health and food security. Most importantly, the SDGs mandated signatory States to ensure sustainability in all developmental projects from local to national levels.

In order to “end poverty in all its forms” and “leave no one behind,” national poverty alleviation projects are mandatory. Considering the Gurara Multipurpose Dam as a viable national project, it is envisaged that the outcome will improve the living conditions of the rural host community through rural infrastructural development, access to potable water supply, increase food production through the provision of reservoir for irrigation farming and boost overall economy through power availability.

Project Description

The Gurara Dam is a composite earth and rock-fill dam. The dam consists of the following components;

- A composite earth-fill and rock-fill dam with reservoir capacity of 880MCM and 61Km^2 surface area constructed across Gurara River, granting a regulated water flow of 36m^3/s annually;
- A 30 MW Hydropower plant equipped by 3 X 10 MW Kaplan turbines to produce about 115 GWh/year to national grid;
- An Irrigation Scheme comprising 2,000 hectares irrigation pilot perimeters downstream of the dam and 4,000 hectares of the Azara – Jere irrigation scheme; and
- A 75km long, 3m diameter steel pipeline for the water transfer to Lower Usuma dam in the Federal Capital Territory (Federal Ministry of Water Resource, 2004).

The Gurara dam has functioned as a multipurpose dam by boosting water supply, promoting agriculture through irrigation, improving electric energy supply, promoting tourism, fostering technology transfer, employment generation and stimulating rural transformation.

Project Description……

The Gurara dam is a Federal Government (Nigeria) owned dam executed through the Federal Ministry of Water Resources (FMWR), with the initial purpose for raw water transfer to FCT to solve its acute water supply shortage but later was expanded to include hydropower generation and irrigation, thus making the dam multipurpose (Federal Ministry of Water Resource, 2004).

The project is a roadmap to achieving a sustainable economic growth. However, the potentials of this project can only be achieved if the project is executed in an environmentally friendly manner. In this view, following the Environmental Guideline and Regulations of Federal Ministry of Environment, Environment Act, and other relevant national and international standards, the Environmental Impact Assessment (EIA) of Gurara Multipurpose Dam Project was carried out in 2001 to evaluate the project socioeconomic potentials (Federal Ministry of Water Resource, 2004).

Objectives of the Post Impact Assessment

In specific terms, the objectives of the PIA are to:

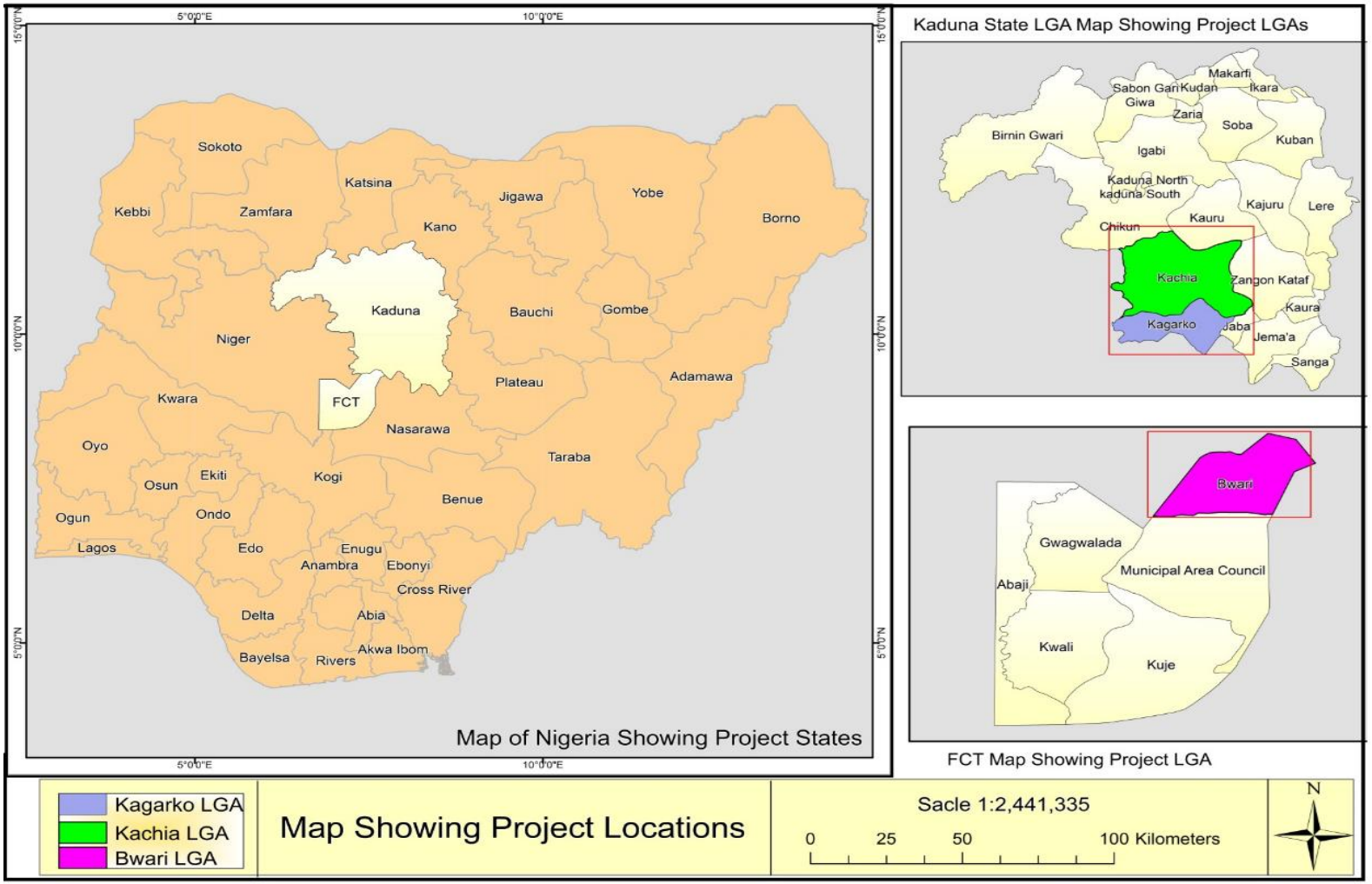
- Acquire all necessary data that will establish the existing environmental and socioeconomic conditions of the project area;
- Examine the affiliated impact of the dam to rural development projects;
- Evaluate the benefit of the Dam to economic livelihood;
- Determine adverse effect of the dam on the physical environment; and
- Establish overall concerns of the project on the social wellbeing of the host communities.
- Develop an Incident Response Plan (IRP) for mitigation plan and project monitoring.

Legal and Administrative Framework

The PIA of the dam was carried out in accordance with regulations, standards and guidelines of the relevant MDAs.

Description of Project Environment

The entire project area cuts across Kachia and Kagarko Local Government Areas (LGAs) in Kaduna State and Bwari Area Council in Federal Capital Territory (FCT).



Data Acquisition Methodologies

- *Literature Review/ Desktop Studies*
- *Field Survey*

Sampling Design/Field Procedures for Environmental Studies

All environmental studies were assessed based on observation as the earlier environmental baseline of the project site reported in the final EIA assessment (2004) were relied upon. The EIA sampling was randomized using standard procedures and appropriately geo-referenced using Global Positioning System (GPS) and the map of the study area. The overriding consideration in the selection of sample points included ecological features, areas impacted or likely to be impacted, geographical location of communities/settlements within the project area and accessibility

Sampling Locations, Method and size

A. Settlements around the Gurara Dam and Hydropower Plant					
S/No.	Name	S/No.	Name	S/No.	Name
1.	UnguwanToka	11.	AnguwanKagarko	21.	Awan
2.	Atara I*	12.	Maje	22.	Doka*
3.	Atara II*	13.	Igo I	23.	Afara
4.	Asawel	14.	Igo II	24.	Anturu
5.	Asawe II	15.	Kadah	25.	Tudun Wada
6.	Kwanta	16.	AkwanaDaji	26.	AkwanyanDaji
7.	UnguwanKankana	17.	Akwando*	27.	Allah Magani
8.	Akama I	18.	Asawe I	28.	Kadah I
9.	Akama II	19.	Asawe II	29.	Kadah II
10.	Ibiro*	20.	New Akwana		
*selected communities					

Results and Discussion

Positive Environmental Impacts

The Gurara multipurpose dam project is capable of providing major regional and local environmental benefits. Some of these benefits include:

- Generation of renewable energy.
- Regulation of water level and reduction of natural flood.
- Ecosystem stability.
- Improvement of water quality downstream during low flow periods in dry seasons.
- Increase in the population of aquatic fauna within the reservoir.
- Provision of water for domestic, industrial and agricultural uses

Negative Environmental Impacts

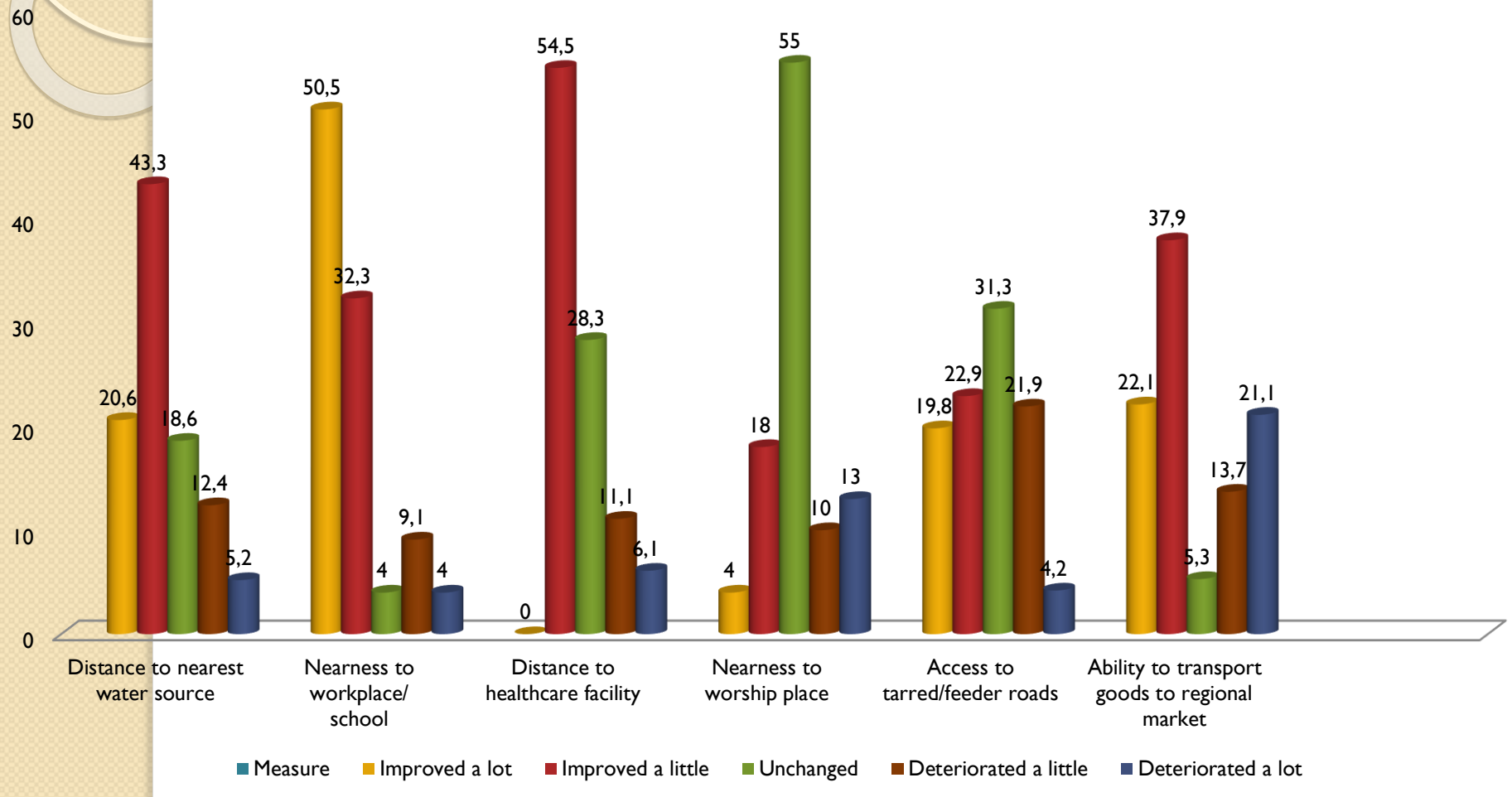
- Impact on Flora and Fauna
- Flooding of Natural Habitat and Physical Habitat Alteration
- Changes in Migratory Pattern of Aquatic Fauna
- Impact on Soil and Land
- Impact on Water
- Impact on Air Quality and Noise
- Waste Generation

pit created by rock excavation (L) and material borrow area (R) at the Gurara Dam Site

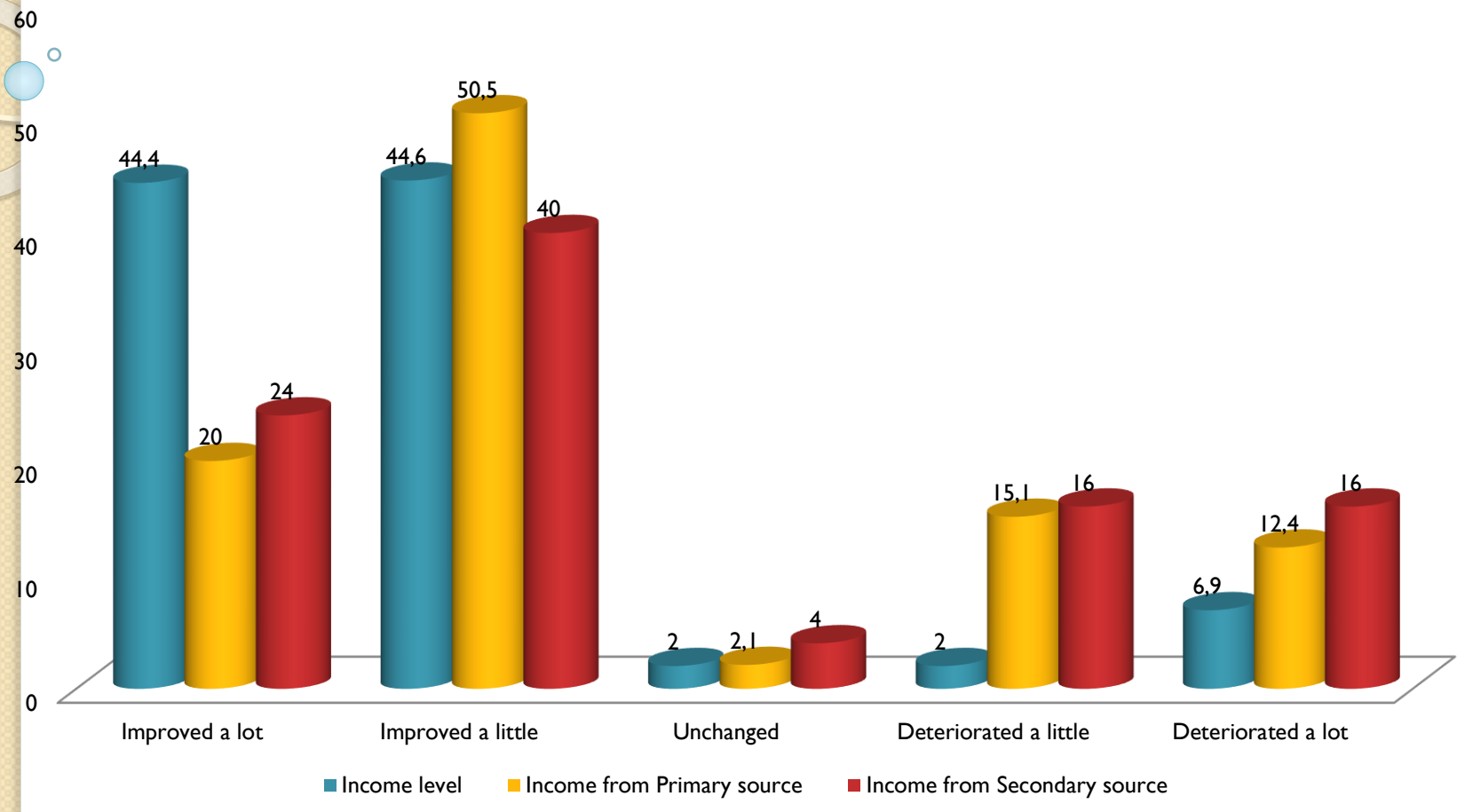
Social Impacts

S/No	Category	No of Communities	No of People*
	Reservoir Flooded Areas		
1	Relocated	3	341
2	Agricultural land lost (but not relocated)	6	159
	Within construction area (borrow pits, roads, construction site and construction camps)		
3	Relocated	-	-
4	Agricultural land lost (but not relocated)	-	-
5	Total	9	500

Accessibility to Social services in Communities around the Dam and Hydropower Plant Area



Economic Impacts



Socio-economic Impacts of Gurara Multipurpose Dam

Positive Socio-economic Impacts

- Stimulation of socioeconomic activities and the emergence of local markets.
- Provision of better social amenities (schools, boreholes, telecoms, roads etc) in reservoir areas due to resettlement of inhabitants.
- The opening up of access roads enhanced movement of people and goods and this offered new opportunities of exchange with other communities and to greater diversity and quality of available goods and services.
- Construction and full operation of healthcare centers within the dam facility for healthcare service delivery to the project workers and host communities members

Negative Socio-economic Impacts

- involuntary displacement,
- public health risks,
- livelihood vulnerable community groups, and mismanagement of community development benefits such as the provision of infrastructure and social amenities (electricity, access roads, potable water, heath facilities). These impacts are discussed below as either existing, or potential impacts under “Social” “Economic” Cultural” or “Health” components.

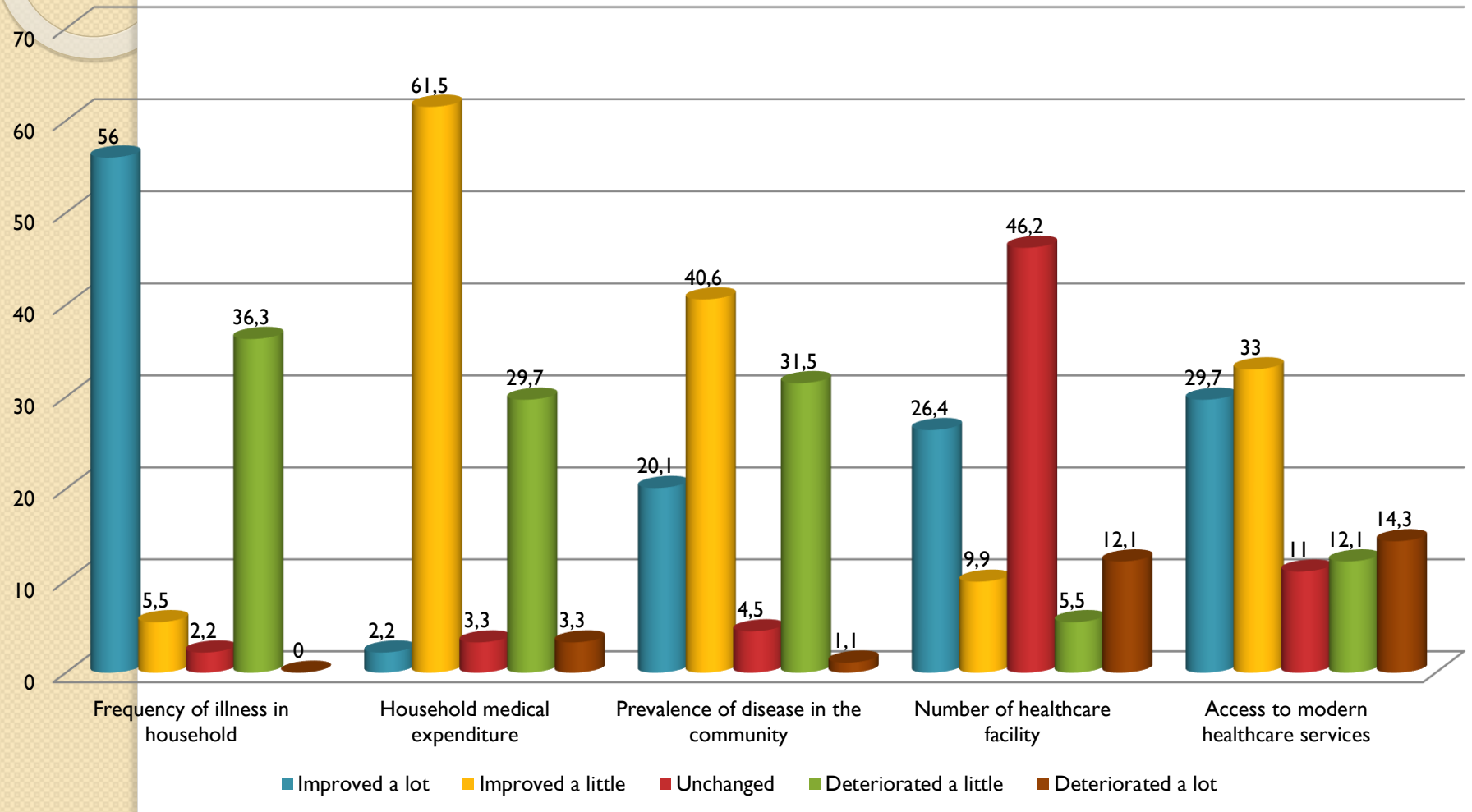
Cultural Impacts

- The existing negative cultural impact of the project at the time of the study is the loss of cultural/historical assets
- Loss of prized historical and cultural artifacts away from their homes before the impoundment and inundation.
- Abandonment of symbolic markers such as gravesites and ancestral land has severe linkages with the past and undermine the cultural heritage of these communities.
- Loss of social norms and cultural values due influx of people

Health Impacts

- The most palpable health impact of the construction of the dam on the health of communities especially those residing in the reservoir areas, is an increase in the frequency of occurrence of water borne diseases such as bilharziasis (schistosomiasis) and malaria.
- Field studies revealed an outbreak of bilharziasis especially amongst children living at the banks of the impoundment in Anturu, Atara and Ibiro villages.

Health Impacts..... Cont....



Conclusion

- From the overall assessment of the Gurara Multipurpose Dam Project execution and operation, there are significant positive impacts resulting in the improvement of the socio-economic lives of the people such as rural infrastructural development, improved access to potable water supply (both in quality and quantity), increase food production through the provision of bulk water reservoir for irrigation farming, hydropower generation and boosting the overall economy.
- However, there are also some adverse impacts especially on the immediate biophysical environment and the host communities. These existing adverse impacts were identified, characterised and evaluated with appropriate and cost effective measures proffered to restore the environment and socio-economic conditions of the people, thus the overall objectives of the project were achieved without significantly compromising the integrity of the environment

Recommendations

- Commission an external completion audit of the Resettlement Action Plan (RAP)/compensation packages to assess whether the provisions have been met.
- Develop and implement a stakeholder engagement plan that will be properly managed and driven by well-defined strategy, clear set objectives, timetable, budget and allocation of responsibilities.
- Build and maintain capacity within to manage processes of stakeholder engagement, track commitments and report on progress.
- Establish accessible and responsive means for stakeholders to raise concerns and grievances about the post construction impact of the project components and throughout the project lifecycle.
- Develop and implement an effective grievance mechanism (appropriately scaled to fit the level of socioeconomic risks and impacts identified) in order to address all outstanding issues regarding displacement, resettlement and compensation as well as facilitate early and prompt remediation for those who believe that they have been adversely impacted by the project.
- Facilitate active participation of all affected/aggrieved communities in re-establishing solutions and implementing them. Also ensure decisions that may affect their livelihoods are openly discussed with and approved by concerned community groups.
- Enter into good faith negotiations that satisfy the interests of all parties.