



Assessing the Bujagali Hydropower Project in Uganda

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Abstract

The development of great dams and hydropower plants increases power supply and access. However, the process is considered a threat to livelihoods, ecosystem and biodiversity because in most cases it brings about human displacement and natural resources degradation. This paper seeks to assess the development of the Bujagali Hydropower Plant in Uganda (BHP) and its compliance with IWRM principles based on water knowledges, societal values, and inter-disciplinary approach. The paper develops a set of strategic interventions for the dam and the BHP based on SWOT analysis, XLRM framework, Multi-sectoral and interdisciplinary development approach, and sustainable management. These measures are deemed socially and ecologically acceptable by all stakeholders including the cultural and historical institutions, societal actor groups, including mega-hydraulic bureaucracies, the private sectors and national politicians. The results show that project developers should always carry out Environment and Social Impact Assessments (ESIA); develop timely 'Resettlement Action Plan'; carry out informed consultation and participation; promote transparency; and communicate project's risks, potential impacts and probable mitigation actions to attain sustainability. The paper proposes some policy interventions to be implemented along the project's lifetime. Furthermore, it presents a sustainable development plan for such projects based on the IWRM principles.

Keywords: Transparency; participation; mitigation measures; policy intervention; conflicts; IWRM

Abbreviations: BHP: Bujagali Hydropower Plant; ESIA: Environment and Social Impact Assessments; GDMHID: Great Dams and Mega Hydraulic Infrastructure Development; LV: Lake Victoria; NB: Nile Basin; AES: Applied Energy Services; WCD: World Commission on Dams; BEL: Bujagali Energy Limited; EIA: Environmental Impact Assessment; SWOT: Strength, weakness, opportunities and threats; PPP: Public-Private-Partnership; ERA: Echelons of Rights Analysis; CDAP: Community Development Action Plan; HEP: Hydro-Electric Power; KOSMP: Kalagala Offset Sustainable Management Plan; NAPE: National Association of Professional Environmentalists; WPC: Water Policy Committee; DWD: Directorate of Water Development; WRR: Water Act and Water Resources Regulation; NEMA: National Environment Management Authority

Introduction

Great Dams and Mega Hydraulic Infrastructure Development (GDMHID) projects usually benefit the most influential stakeholders outside the project zone specifically in major cities while deleteriously impacting the vulnerable communities in a given river basin [1]. Such dams alter hydrological regimes while impacting local community livelihoods. Globally, most large hydropower projects result in dispossession, expropriation, and resettlement without compensation [2]. Despite large dam contribution to green economy and climate change impacts, several countries including Uganda, Colombia and most Latin American countries

have not learned from previous mistakes of prioritizing industrial and urban areas' interests over those of indigenous communities reflected in local food insecurities [1-4]. The development of great dams increases power supply and access [2-4]. However, the process is a threat to the livelihoods, ecosystem and biodiversity because it brings about human displacement and natural resources degradation [5]. Moreover, mega-hydraulic projects tend to yield terrible severe socio-environmental impacts, with burdens and benefits disproportionately distributed among several social groups, regions, and scales triggering socio-environmental conflicts. Uganda is located within the Lake Victoria (LV) and the

Nile basins. Victoria, the world's second largest freshwater lake, besides fisheries and water supply, is also the source of nearly all the country's hydro-electric-power demands [6]. Nile river starts from Jinja at the LV through Uganda and then stretches downstream to Sudan and Egypt before pouring to the Mediterranean Sea, which This offered Uganda a chance to share both upstream and downstream experiences [7].

In Uganda, water resource works and writings are spread and scattered in policy papers, strategic plans and reports developed by consultants and institutions [8,9]. Water resources in Uganda are estimated at 66 km³/year equivalent to about 2800m³/person/year [10]. These hydrological resources were estimated to produce about 2500 MW power, 2000 MW of which are concentrated at the Nile River while, the rest are scattered in the country. By 2005, nearly 10% of this power potential was exploited [10]. Since 1990s, Uganda has set several strategies towards adopting the IWRM principles [11,12]. The recent national water resource reform strategy was in 2011 when the Uganda Government's Directorate of Water Resource Management recommended a paradigm shift from a centralized to a decentralized catchment-based management [13].

The development of Bujagali Hydropower Plant (BHP) increased power supply and access, but it was associated with: sectoral development approach; delays due to corruption cases; hiked costs; opposition from local and international NGOs; knowledge gap regarding risks, information and data disclosure; poor stakeholder involvement; inadequate legal and financial support towards technical capacity building; uncovered gap between the principles, policies and the practice [2,14-16]. The project was expected to: displace up to 5,732 inhabitants; degrade ecosystem and biodiversity; result in frequent flooding that could destroy crop land among. However, several project documents indicated that the project developers identified that 8,700 inhabitants are directly affected by the project, with 714 physically displaced [17].

It should be noted that the construction of BHP has hardly contributed to the affordability of electricity in Uganda and the dam is considered the most expensive in Africa. As a result, the electricity costs were unaffordable by many Ugandans. Besides, the BHP drowned the treasured cascading Bujagali Falls and also submerged the indigenous peoples' spiritual and cultural place of worship. Most importantly, the BHP together with the changing climate have detrimentally decreased LV's water level. Given the fact that more water is released from Lake Victoria through the Owen Falls complex than originally planned according to the Agreed Curve, the original long-term projected BHP energy output is no longer valid. This Lake's drop-in water level further sparked BHP future performance threats [15].

This paper is vital for the Uganda's development strategies and can contribute to the knowledge of sustainable great dams, hydropower plants, mega-hydraulics infrastructure development

in the Nile Basin (NB). Understanding the uncertainties and sensitiveness at the case level is also important in making informed decisions. The BHP project evaluation results have been based on displaced communities and resettlement plans reports. However, based on the Bujagali case, increased participation and stakeholders' involvement is likely to improve and quicken negotiations at national and regional levels when planning similar projects. Therefore, the proposed approach herein focuses on the substantial investigation of the GDMHID features' aspects for instance: national policy design; human, people and property rights; stakeholders' participation; and incentives. This provides basis to sustainable mega hydropower plants planning, design development and management.

A rational and sustainable GDMHID can be based on the total project area of influence in relation to socio-environmental impacts rather than the economic dimensions. To stress the multi-sectoral and interdisciplinary development approach, Uganda should aim at promoting sustainable GDMHID while maintaining the project area [18]. During the GDMHID planning process, the developers should promote all concerned stakeholder participation besides ensuring the most important information access at all project levels. Additionally, the project developers should consider and adopt consultative and communication mechanisms and procedures empowering the locals to acquire information regards the current project status, intended objectives and probable actions to externalities. The main goal of this paper is to develop and validate several strategic measures, policies interventions to the government of Uganda to avoid previous great dams' development mistakes. To achieve this goal, BHP was assessed, SWOT and the XLRM framework were performed, which was the base for proposing a Multi-sectoral and interdisciplinary development approach and developing a set of strategic interventions to control similar projects.

Study Area and Overview

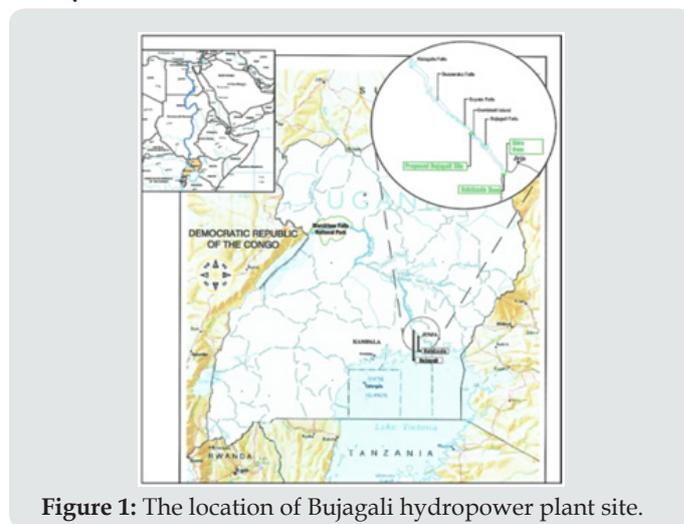


Figure 1: The location of Bujagali hydropower plant site.

BHP was constructed at the Bujagali Falls along the Nile River approximately 8 km downstream of the already constructed

Nalubaale and Kiira Hydropower plants with headwaters originating from Lake Victoria [2,19]. The BHP, whose facilities required 238 ha, comprises an electricity system of 5 MW generators each comprising 50 MW amounting to a gross 250 MW installed capacity [5-6,14,16,20] (Figure 1).

In 1999, the Applied Energy Services (AES), an American power company, signed a contract with the Ugandan authorities to construct and develop the storage dam and the powerhouse. At that time, the dam controversy was at its peak, before the World Commission on Dams (WCD) was set up in 2000 [17]. Initially, during the planning stage, the World Bank had approved to financially support the implementation of the project. However, due to economic crisis and opposition from various socio-environmental groups besides corruption related charges against key officials, the AES was forced to pull out from participating in the project's infrastructure investment [19]. Later, in April 2005 upon the re-bidding by Ugandan authorities, the Bujagali Energy Limited (BEL) was chosen for sponsoring the construction, operation and maintenance of the hydropower generation facility [14,19,21]. According to [17,22], the project construction commenced in June 2007 and completed in August 2012. 79% of the project investment cost came from a collective loan financed by the World Bank/IFC, the African Development Bank, and the European Investment Bank [2,23]. The project was the first independent power project and the largest in Uganda [24].

Methods

The reviewed literature focused on policy and legal frameworks supporting GDMHID in Uganda using secondary data sources. The National Water Policy of 1999, the 1995 Constitution of Uganda, among other statutes related to IWRM, were studied to establish burdens to the country's GDMHID. This paper is also significantly founded on the analysis of several reports including the 2002 and 2008 Inspection Panel findings focusing on the Bujagali case. Besides, comprehensive analysis of recent supplementary documents such as review reports enabled drawing of lessons and establishing an analytical framework regarding policy gaps to guide future GDMHID. The following are the approaches that have been employed to achieve the main objectives:

Assessing the Hydropower Plant from Iwrm Perspective

Based on the six IWRM principles, the performance of BHP developers was rated, the dam response to ensure secure entitlements on water allocation for sustaining the ecosystem was assessed, protecting the rural poor areas and the minority/indigenous communities besides dealing with transboundary issues were analyzed. Additionally, the assessment of the project's water requirement and the dam's impact on long-term changes on water availability were considered. This related the potential of economic implications of building hydropower plants based on unreliable river flow data. Similarly, the evaluation of GDMHID for

likely impacts on Nile River water was assessed and whether such designing evaluations were prioritized by the project developers. Based on the Environmental Impact Assessment (EIA) reports, the level of stakeholders' participation and collaboration was studied; the availability of an enabling environment and effective communication of project progress was critically checked; and a risk assessment was carried out.

The SWOT Analysis of the Plant

Strength, weakness, opportunities and threats (SWOT) aids in the decision-making process. The analysis involves: categorizing the collected data into strengths, weaknesses, opportunities, and threats; development of a SWOT matrix for individual alternative considered; integrating the analysis into the decision-making process to achieve the strategic plan [25]. Regarding to GDMHID, such plans should: integrate socio-environmental aspects and should consider the relationship between GDMHID and related impacts on community natural resources; locally incorporate of downstream, upstream and basin effects. Moreover, the proposed plan and framework are based on analysis of prevailing legislation and regulations regarding GDMHID, besides existing documents, organizational and operational procedures. For the purpose of this research, the analysis primarily focused on planning of GDMHID based on laws, rules, regulations and plans.

The XLRM Framework

For sustainable applicability by all involved stakeholders, including planning, developing and management authorities such as BEL, the government of Uganda, ministries and agencies, funding and lending institutions, this study is presented in the XLRM Framework. The most important players should include politicians, public officials, market actors such as Public-Private-Partnership (PPP), Banks, consumers and regulatory agencies.

X=Uncertainty

X factor is one that may impact the outcome one wants to achieve. This study aimed at evaluating the impact of great dams' development and mega-hydraulics infrastructure establishment on human rights with major emphasis on the social and environmental/ecological benefits and havoc.

L = Lever

This is usually termed as policy lever and represents strategies or management plans to achieve the objective. These can be pulled to change individual or group behavior. To comprehensively cater for L factor, the authors point out a clear legal framework, with bodies accountable for strategic policy design. Moreover, there should be an adequate plan for compensating the great dams hosting communities and sites' areas of influence. However, this calls for cooperation with water resources institutions and other implementing and monitoring organs and sectors.

R = Physical and Economic Relationships.

This represents a model relating input/system/output.

M = System Performance Metrics.

This specifies the objective to be met and the performance metric that is used to quantify these objectives. The objective was based on the satisfaction of the displaced communities and the river flow regimes discharge volumes. The performance metrics can be subdivided into 3 categories: Reliability; Resilience; and Vulnerability. Both reliability and resilience determine the average success rate or how quickly the system rebounds when faced with adverse conditions, without actually looking at the consequence of those unsatisfactory events. Vulnerability measures the consequence of these unsatisfactory conditions or expected values of deficits, if they were to transpire.

The Multi-sectoral and Interdisciplinary Development Approach

The paper focused on the project stakeholders' sensitization, mobilization and participation at all project stages. The level of PPP was another key factor that has taken some attention, highlighting the enabling environment given to the project developers besides ownership of infrastructures. In a similar manner, GDMHID in relation to dominant and non-dominant knowledges was also analyzed.

Strategic Interventions to Control the Dam

To examine water conflict along the Bujagali falls, the paper employed the four interlinked Echelons of Rights Analysis (ERA) [1]. The first echelon focuses on the main resources and the associated technologies. The second echelon focuses on conflicts regarding the rules and guidelines essential for water apportionment, contamination and risks. The third echelon focuses on the authority and legitimacy when defining rules and norms of water allocation, contamination, and risk management. The fourth echelon encompasses the conflicting discourses and the international views for justifying explicit water realities and policies. This echelon links the preceding ones and aids in the evaluation of conflicting water policies, theories, and models. It discloses strategic use of discourses to contest water allocations among users [1].

For the sustainability of further GDMHID, the proposed strategic interventions focused on the establishment of well-planned electric power allocation, regulation and revenue structures. Future GDMHID sponsors were thus encouraged to prevent risks and implement reconstructive strategies; employ people-centered strategies enabling the displaced to actively engage in the livelihood transformation activities. This can be effectively achieved through: development assistance programs; creating the necessary framework for private investors in hydro, management of the related risks; increasing media and public awareness of the environmental and economic benefits of carefully planned projects; Community Development Action Plan (CDAP) aimed at

creating income opportunities and improving living standards of the displaced communities [8].

Besides GDMHID, through established suggested strategies, obligations and incentives, can: promote competitive interest from several developers; establish technical ethics and values for local communities' protection. This will further contribute to: future great dams public acceptance; inclusive options assessment; catchment-based and sustainable livelihoods promotion [26].

Strategically, the steps and procedures considered for future GDMHID can include:

- a) Definition of current and future scenarios (system characterization, preliminary gap and criticalities analysis);
- b) Objective and target setting (definition of environmental and socio-economic objectives and measures);
- c) Mechanisms and actions (identification of alternative actions, definition of alternative options, structural and regulatory measures and actions);
- d) Priority setting;
- e) Action plan development and implementation;
- f) Institutional plan (formal approval procedures, implementation of action measures through the actors involved);
- g) Steps (definition of a monitoring plan, periodical impact assessment, information and consultation of citizens, active stakeholder involvement and periodical review).

Results

Reviewing the literature showed:

- a) A strategic misrepresentation of the project's cost due to the political interest of the Ugandan government during the feasibility phase.
- b) Poor planning that unnecessarily prolonged the dam construction.
- c) Lack of consultation when developing the social and environmental mitigation planning budget.
- d) The sponsors did not fulfil all the promised opportunities.

For instance, establishing a market for the affected communities to sell their production and constructing a technical school for the communities, the project developers had planned to compensate for resettlement at a budget of 12 USD/m². However, due to much pressure from environmentalists, the cost was revised to 25 USD/m² [2]. Additionally, instead of constructing a technical school in the community as the project sponsor promised, the latter hand-picked a few community members to attend a nearby technical school. The marketplace that the women had been promised was never constructed [21,27].

The proposed policy and legal frameworks should therefore protect the interests of people, ecosystem and natural resources. The 2008 Inspection Panel Report found that there was no clear way of identifying the promises that had been made or to whom they had been promised, who should fulfil the promises, and when they would be fulfilled [5]. It was noted that BHP work was commenced without respecting the people rights as recognized in Uganda's Constitution. The project obtained its environmental license without consulting the public [4], while large landowners, fishermen and cultural institutions among others negotiated with the developers behind closed doors to get their rights claims materialized [14]. Conflicts over rules and rights are crucial in the NB.

The paper suggests that the drafted policy implicitly draws a line between mandatory obligations and non-mandatory. The "must do" list can consist of resettlement and/or compensation. The country should plan for other possible and capable great project financiers beyond banks. Some financiers could not be having a resettlement and restoration policy, yet existing national domestic laws are not reliably sufficient. When planning and designing the national resettlement and reallocation policies, planners can be equipped with information about the likely risks and mitigation strategies based on Bujagali and related experience; the approach aims at dealing with power struggles between all involved parties in the project's lifetime, which can strengthen the administration of resettlement initiatives by project developers and financiers especially through supervision.

The SWOT Results

[21] noted that the BHP had not been financed by the Bank, the requirements for compensation would almost certainly had been restricted to cash compensation, since that was what domestic legislation demanded. Worse still, that compensation would have been at market price-not the replacement costs [5] emphasized that policies recognizing the impoverishment risks of displacement without safeguard mitigate measures to the risks invariably contribute to project sustainability failures. SWOT analysis promoted: an enhanced understanding of barricades to change, innovation, and developmental projects; improved project outcomes; and sustainable allocation of project resources [20].

The strengths of the BHP included the rise in Hydro-Electric Power (HEP) generation and supply besides increasing the development projects. There was a strong political commitment from the government of Uganda and the international actors; fairly good management of project developers. Weaknesses included the increase in electricity prices, the lack of stakeholders' engagement, worship places were not respected; negative public perception towards the project; inadequate assessment of the project financial feasibility; and no proper monitoring of project progress. Opportunities under consideration included: the possibility to use the large project expenditure to invest in more sustainable

energy sources; availability of evidence from previous great dams' project that led to cancellation of the first Bujagali project. Threats can comprise of serious project's impact on water resources, environment, surrounding populations and the development of more sustainable energy sources.

That highlighted the necessity to re-pattern the distribution of future mega water-related projects with benefit priorities given to the communities around project site such as job opportunities besides the improvement of public services in the surrounded areas. This together with re-settlement action plans are deemed beneficial to general progress and development to the project communities. Such actions could promote the acceptance of similar future projects in Uganda. A good initiative could be the design of alternative projects to compensate for the negative effects of the GDMHID projects.

Moreover, there is a vital need to bridge the wide gap between policy and practice through strong and realistic implementation mechanisms of the domestically based policies during the relocation schemes. Besides the policies should respond to both direct (tangible) and indirect (intangible), short-term and long-term impacts of displacement and re-allocation. With the policies proposed herein, the "land-for-land" can be adopted as the preferred resettlement option compared to cash-compensation. However, this calls for intensive consultations among all stakeholders.

Conflicts Over the Redistribution of Water-related Resources

BHP reduced the Nile river water volumes and flows, which affected the downstream communities. Bujagali has also slightly influenced the river's ecological base flow regime [12]. This is reflected in fishermen and farmers water related complaints and reduced livelihoods. However, the BHP was fully supported by most powerful political groups from the government of Uganda at all its stages from planning to implementation. This further instilled fear among local communities as they felt side-lined during the negotiations. The project developer promised several resources instead of concrete livelihood improving alternatives. One particular example is the number of compensation options that were offered at individual level provoked indirect divisions and conflicts within the community especially over access to the promised resources. Economic and social compensations for the affected societies were not appropriately appreciated. For instance, the monetary compensations were considered too meagre in the eyes of the local communities and besides, no clear compensations were made for the social, cultural, and ecological harm caused by the alterations of the natural flow dynamics of the river.

Struggle Over and Among Discourses: In Uganda, mega-hydraulic dams are considered infrastructure of progress. The media, politicians, public institutions, and many academicians presented diverse views on BHP contribution to the region's general

development. The developing company and the government emphasized that the discourse of transforming backwardness served to exclude local people and expropriated the assets of those who could not negotiate in the name of development. At the end, local communities were dispossessed of their customary rights, yet the hydropower plant was constructed under a discourse of social welfare. Simultaneously, the project was sold to the community as a development alternative that would bring livelihood improvements through the creation of job opportunities, socio-economic projects, roads, upgraded housing and public services [28]. Discourses of inclusion, participation, and recognition of local residents can be strategically deployed to minimize opposition by local communities [3,29,30]. However, the process requires social organization and local communities' inclusion in work commissions. This can increase formal community participation accelerating project negotiations. We therefore recommend the establishment of democratic mechanisms of community inclusion for future GDMHID. This calls for recognizing the role of NGOs, local government programs among other key players in hydropower projects.

Improvement in PPP: It should however be noted that Uganda's electricity production has more other sectors than just electricity generation thus a necessity to involve private agencies in other sectors of electricity provision such as transmission and distribution. In this regard, PPP can overcome the challenges such as those experienced during the Bujagali project through reducing overall project costs and time and thus enhancing project efficiency and effectiveness. A better enabling environment of PPP in GDMHID will promote access to private sector resources, technology, managerial skills, long-term financing; planning for risk offset, an integrated approach to project completion, increasing stakeholders participation and probably project legitimization, a remedy to monopoly, externalities and inequalities [28]. Throughout the partnership, there should be clear service assignment modes among both public and private actors; clear guiding principles for contracting authorities; well-anticipated GDMHID duration; a democratic selection process of project developers; legally enabling procedures for local public firms' participation; evaluation of capital base of local public and private companies; properly defined project area of influence [31].

These are actions spelled out in the Kalagala Offset Sustainable Management Plan (KOSMP)-a socio-environmental and safeguard instrument launched by the Government of Uganda on May 5, 2011, covering important ecosystems in the Kyoga catchment. They included afforestation and reforestation, restoration, conservation and protection of vegetation, habitats and river banks, promotion and enhancement of sustainable livelihood strategies and potential of the regional and countrywide entities responsible for implementation of the management plan. The actions were meant to support an integrated approach to the Nile catchment area and related ecosystems, promote environmental management plan execution.

However, although the KOSMP was developed through a highly consultative process that involved catchment stakeholders, its financial sustainability was ignored right from planning stages. Therefore, new mechanisms should be established for multi-purpose offset areas of GDMHID projects [32]. In 2012, while the Plan has been finalized, the implementation budget was unavailable, which calls for a responsible management that controls all tasks through an effective coordination and involvement at all project stages in future.

Great Dams/ Mega Hydraulic Structures Development Plan Based on the IWRM Principles

Finite and Vulnerable Nature of Fresh Water Resources: According to the Power Planning Associate (PPA) report, BHP was expected to contribute on the country's economy, poorly assessed and addressed the environment and social impacts [7]. According to the 1995 Constitution, section XIII, "the state shall protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda" [33]. However, the same government is legally accorded power by the Land Acquisition Act to obtain any portion of land provided the planned developments on the land is in interest of Ugandans.

There were no predicted hydrological risks from higher than "agreed curve" water releases. In case such risks occur, there is likely of deleterious flood effects on the downstream ecosystem. This may not only modify the water species but also vulnerably affect the livelihood of the downstream communities. The BHP did not employ an independent environmental professionals panel and there was hardly any planned funding for supporting the technical capacity building for socio-environmental assessment [21,34]. Additionally, the electricity transmission lines from the Bujagali site pass through residential areas, wetlands, and Mabira Forest [35]. However, the project developers did not plan for mitigation strategies to lessen the socio-environmental effects of these lines on the communities and ecosystem.

The Kalagala Falls was offset to capture the natural habitats from inundation of Bujagali falls [36,37]. However, the Kalagala site had not been by project completion subjected to suitable conservation, mitigation and management means to promote sustainability of the ecosystem [31]. Furthermore, the proposed Environmental Mitigation and Monitoring Plan did not mention the need for monitoring of development and had not included plantings/replacement plantings in the ToR of the BHP. While carrying out the economic study, the BEL did not pay the required attention to the assessment of damages due to other pollutants other than CO₂ including particulate, Sulphur, nitrogen oxides as well as noise [34].

Participatory Approach in Water Resources Development and Management: Users, Planners and Policy-Makers: Fostering sustainability of mega hydropower projects, it is essentially vital

to actively and meaningfully involve and engage all stakeholders in the decision-making processes at all levels. This not only enables smooth progress of the planned activities but also minimizes conflicts and disputes while ensuring justice and democratic means of reaching consensus. The project developer did not fully disclose information and data regarding the risks associated to the project including impacts of climate change and the cumulative effects [34,38,39]. Like in most African countries, Uganda was on the onset of the project time and to a big extent is even still associated with lack of good will and mistrust. Due to poor and untimely communication of planned projects, local people lacked confidence in their leaders, experts and other interest groups.

It is clear that the repeated critics and demonstration against the development of mega projects including the Bujagali indicates and underlines a knowledge gap due to, among other causes, inefficient communication and the lack of stakeholders' participation. This can also to some degree be attributed to the increased tension among water and energy projects developers all over the country. Bujagali dam was also intensified by the conflicts within the Uganda ministries especially those among Ministry of Water and Environment and the Ministry of Agriculture Animal Industry and Fisheries. One of the notable incidences was when Uganda High Court ruled in favor of Greenwatch Non-Government Organization ordering the release of the Bujagali Power Purchase Agreement to the public [7]. The author further notes the objection of the Bujagali project by the National Association of Professional Environmentalists (NAPE) based on its predicted impact on biodiversity. NAPE emphasized the project failure to cater for tremendous impacts of hydrology. However, due to decentralization of water resources, since 2011, there has been reasonable monitoring of the Lake [38].

Considering Uganda's entire water resources management structure, during the project time, management was already under a decentralized system with a Water Policy Committee (WPC) and the Directorate of Water Development (DWD) [39]. It has been often noted that the water and environmental sectors just like most other essential sectors have not been accorded the necessary support and goodwill by the government enterprises among other allied stakeholders. This does not only paralyze the sectors ability to grow but has also placed stumbling blocks to the sectors capacity development.

Most importantly, it should also be noted that during the early project planning and implementation period (specifically 2005-2007), the composition of WPC determined by the Water Act and Water Resources Regulation (WRR) never included the two important ministries (Ministry of Finance Planning and Economic development, and the Ministry of Foreign Affairs) [40]. The two ministries, the private sectors and the NGOs were only involved at Sub-Committee level, yet they significantly contributed to Hydro-Electric Power discussions, dialogues, negotiations and campaigns all over the country. In the same manner the Water Act by then

provided for the Minister of Water and Environment to delegate power and execute power delegated [7] thus further complicating the reliability, evenness, and communication among stakeholders. Additionally, due to sectoral/fragmented water resources development and management, the Bujagali project development group faced challenges including: untimely access to adequate information/data; delays due to corruption cases, hiked costs, opposition from local and international NGOs among others [2,]. This hindered sustainable coordination and cooperation putting the transparency of the system in suspense and also leading to construction works kick off in 2007 and accomplishment in 2012 [20,41,42].

The EIA of the BHP just like most previous projects regarding water resources development presents an uncovered gap between the theory (principles and policies) and the reality (the practice). The entire process was more of consultative involving the National Environment Management Authority (NEMA) public hearing, memorandum writings and eventual approval. Therefore, most stakeholders and interest groups have disapprovingly criticized the process as being biased and prejudiced for lobbying for fruitful notions and critics. Some Bujagali stakeholders were quoted claiming that "the practice is that you get a letter addressed to you requiring your response within few days. No matter if you disagree with some concept, if your views are considered or not, tomorrow your name appears among the list of stakeholders that have actively and entirely participated in the development course" [7].

Several studies [34,43] point out that there is a growth in the rate of local public and experts'/ professionals' involvement in the EIA process promoted by NEMA and accelerated by advocacy and activism roles of the NGOs, the CBOs among other interest groups. However, it is emphasized that more legal and financial support towards capacity building and awareness programs [44] are needed to ensure efficiency and effectiveness of the EIAs. [45] attributed the loss of anti-Bujagali group to: their small number compared to the overall stakeholders that participated in the negotiations resulting in insignificant votes and ideas; lack of adequate funds, logistics, framework to sensitize and coordinate crowds at grassroots level to support their campaigns; non-permanency of tourist and International River Network were considered as a group not directly affected by power outages, joblessness, and poverty thus were considered to have different interests.

Gender Perspectives: Women as Central Players in the Provision, Management and Safeguarding of Water Resources: Legally, ownership of land in the country is a responsibility of the men in most cultures throughout the country. It is a must for men to consult their women and any adult children in a family to be involved in sale or compensation of family property. However, by project time only 7% of women had land ownership titles registered in their names [31]. This implied that even the few conducted community consultation meetings were obviously unlike

to attract women. In Uganda, such meetings are encouraged to be attended by households. Different consultation clauses by the BHP were superiorly encouraging men to be relied on disseminating information to other family members. This left most men with one option of making final decision over family land. Traditionally, in most cultures women are not perceived as potential customary owners of land. There were a few registered challenges of women claiming compensation for their land. Some men took it as an advantage to work as brokers between these women and the project developers.

There was no clear indication of gender involvement in BHP project. For such a project, one would think of women involvement at all levels putting emphasis on several project planning and management activities including appointment of WPC members and dam construction employment. However, just like most national development programs and projects there were several mixed political feelings regards employment during Bujagali project. There have been several cases of individuals/ crowds opposing government projects on grounds that they are not originating from their political affiliations. On the other side, some leaders from the ruling government discerned and mistreated those from opposition. This made screening of people's capabilities, qualifications and ideas on basis of their political background living gender balanced as a non-issue throughout the project time. There were no clear indicators that the Bujagali benefits and potentially expected benefits were/will be shared equitably among both men and women amongst the indigenous communities and at national level.

Treating Water as Economic Good with Economic Value:

The initial contradiction between the government of Uganda and the initial BHP developers led financial losses besides extension and delay of planned progress thus accumulated costs than previously projected [2]. According to [7], the panel set by the world Bank to inspect Bujagali project found out that the project did not comply with 5 World Bank Group safeguard policies that is "economic evaluation of investment operations, involuntary resettlement, environmental assessment, natural habitats, and information disclosure". The economic study terms of reference (ToR) concentrated on comparatively big grid plants offering less room for assessing small-scale or off-grid options [46]. [34] noted that a country with about 5 percent of the inhabitants connected to the grid needed to draw more attention small-scale alternatives to address power outages, poverty and unemployment.

Comparing the project with Karuma, the Karuma Dam seemed to offer better economic benefits.

[43] further quoted a 2003 NGO letter that states: "Karuma appears to have fewer costs and more benefits than Bujagali". However, considering the broader picture of increasing power access in Uganda, most East-African countries and/ or majority of the NB countries electricity shortages. Uganda zealously wanted

to take advantage of this opportunity by developing all potential hydropower sites including Bujagali despite the tremendous effects that could be/ could have been associated with these power development projects. Another important assessment considered for most mega water resources development projects is the economic value including the associated costs, contribution to electric power demands and supply and affordability by the different users. The PPA evaluation report indicated substantial project support towards the then Uganda's economy, electric power supply and demand.

PPA further noted that forecasted climate change impact on hydrological processes of lake Victoria's and its effect on operation of the BHP was insignificant in addition to the project being a more cost-efficient option compared to Karuma dam [7,31]. On a contrary [34] noted that no evaluation was carried out regarding the probable impacts of the BHP on the fluctuating stages of Victoria. Moreover, the high investment cost per megawatt was unaffordability by the low Ugandans income, thus partial contribution of the project towards the country's electric power demands, supply and affordability [47].

Adopting a Holistic Approach in Water Resources

Management: Considering the Energy Sector, Uganda's major electricity sector challenges include: low and uneven access to electricity; electricity supply is often unreliable (not accessible on demand); bulky capital necessities, long lead times to develop, socio-environmental impacts alarms; and the climate variability and change impacts on water resources. While strategically seeking various solutions to these challenges, the energy sector in the past and recent years has been significantly investing and supporting developers to meet the power demands. In several cases, there has been no clear tradeoffs assessments to avoid the socio-environmental effects and risks.

Analyzing the stake of different parties regarding HEP project development along transboundary water resources, the World Conservation Union quoted the President of Uganda Republic as follows "Nobody should interfere with our project of hydropower or electrification of Africa. Hydropower is the solution that will save the biomass that is currently being destroyed for firewood" [47]. This evidenced by the continued critics from environmental, local and downstream communities. Furthermore, there was and there is still fear about the Bujagali dam impact on the country's tourism industry. Due to the possibilities of some development sites falling within a national park or areas gazette for wildlife conservation, Uganda Wildlife Authority technical team reported that the tourism site should to relocated and supported for development. Since then, less efforts have been implemented towards achieving this thus intensifying pressure from the countries different tourism promoters and developers' sections (NGOs and CBOs), which is against the Uganda's 2002 energy policy goal "to meet the energy needs of Uganda's population for social and economic development

in an environmentally sustainable manner” as stipulated in the 1995 constitution. Despite the need for unbiased analysis of trade-offs between economic and social development, most mega projects in Uganda tend to underestimate the risks associated with the projects thus attach a small weight during the evaluations.

Considering the different local NGOs associated with protecting environmental, promoting tourism, preserving culture in the country, there was a consensus that “the people of Uganda are so tired and frustrated with the power crisis that they can nearly with all their feet in the air support any move to see that the situation changes for the better” [7]. Given the fact that there were several contradictions involved in the project, but one realizes that most of the disputes were peacefully settled. An example is the group of representatives from Busoga kingdom. These people had cultural and spiritual attachments to the Bujagali falls [27] claiming that the site was “a source of happiness, a shrine where the elders can make peace with nature to bring good health and harvest to the people” [7]. However, for the interest of the big project picture, the group was compensated and then approved the project with an agreement of shifting the Bujagali falls shrine to alternative site. From the transboundary point of view and basing on the “Agreed Curve”, most of the water flowing from the Uganda power stations registers insignificant impacts on the downstream communities particularly as the high flows of White Nile from Uganda are lost from Sudan by evaporation. For this matter, there were written agreements between the governments of Uganda and Egypt approving Bujagali construction as the project had/has no intentions of water abstraction.

Planning Strategies for Sustainable and Rational Utilization, Protection and Management of Water Resources:

Regards sustainable planning, there has been/are questions and queries being raised doubting the credibility of the BHP's Environment and Social Impact Assessments. To summarize it all, the BHP EIA ToR in June 2006 released the framework that was to be followed while conducting the assessment. However, on 26 April 2007, the World Bank approved/ gave a go-ahead of the project activities. This implied the whole process took a few months (less than a year) leaving behind a number of doubts among the different stakeholders' regards credibility of the process and thus the project's sustainability. Basing on Bujagali project, there has been issues raised regarding choice of project site. As clearly indicated in the Water Act, vital stakeholders such as wildlife, tourism and fisheries normally represented on sub-committees came in at EIA stage. This left the possible BHP related risks unexhausted thus deepening the awareness gap among the different stakeholders.

It was/is however important always to engage key stakeholders (users, policy/decision makers) at the onset of the projects (site selection). This not only enable timely and inclusive planning from technical teams of several stakeholders at site selection-a precautionary approach. In summary since Bujagali site had been

selected without involvement of key stakeholders, most of the risks and associated challenges raised by the technical teams such as NAPE have been considered as being bullying and discouraging the Uganda government development plans and efforts. It's been notably documented that Bujagali initial resistance and failure for general public to accept the project was based on indoor planning involving only a few experts and professionals [45]. According to 2001 EIA report, a total of 682 resident and non-resident households (5732 people) were anticipated to be affected by the BHP at different scales [7]. Generally, most of the affected people were compensated.

For instance, the Kalagala offset area for the inundated area by Bujagali Falls lacked sufficient support to protect it from intruders. Besides, insufficient monetary resources for the area management were allocated by the government. Moreover, there was lack of organized coordination mechanisms between different government agencies responsible for the administration of the area. Regards rural electrification, no formal commitment was made to connect individual households to the power lines in resettlement villages. [22] reports unresolved spiritual concerns related to disagreements about roles among spiritual leaders.

Discussion

The following key points are deduced from the study:

a) The existing GDMHID guiding and regulatory policies play a limited role towards ensuring human and property rights protection. The Uganda's constitution and Water Act among other national policies prioritizes increased energy to related impacts on surrounding communities.

b) The proposed interventions though costly are useful. Like most ecosystem and environment protection measures, the financial implications of the sustainable policy interventions can be expectedly high. Many of these interventions can be considered as obligations to be met irrespective of the expected possible benefits, for the purpose of maintaining the required ecosystem services. A detailed plan, based on the IWRM principles, has been presented in this paper. The activities described and presented in this research article directed to all stakeholders. For an effective implementation of these strategies, multi-sectoral coordination between several bodies is essential [48-50] including related ministries, authorities, NGOs and other public associations.

c) This paper emphasized comprehensive GDMHID and management. Besides, upgrading existing hydropower plants and timely assessment of possible alternative energy sources (such as renewables off-grid, small-medium hydropower plants). Based on SWOT, cost-benefit among other analytical mechanisms are needed to highlight information on the proposed project payback period, rate of return among other economic data for comparison purposes before financing the future hydro power projects in question. Based on BHP case, power supply priorities should first consider the

project site local communities especially the poor, rural and urban societies. This will not only reduce poverty levels but can also reverse the detrimental impacts usually resulting from industrial users.

d) Uganda should consider supplying its citizens before exporting it to the neighboring countries. Considerable proportions of hydropower plants profits can be used to offset further negative impacts resulting from the GDMHID. This can be one of the social corporate responsibility or some of the CDAPs all aiming at poverty and climate risk reduction among project areas of influence. In summary, the GDMHID should consider inclusive stakeholders' participation from planning throughout all stages so as: to safeguard appropriate ESIA to cater for possible cumulative impacts on communities, ecosystems, land and related natural resources; to avoid project imposition, minimize displacement. This can be boosted with capacity development and strengthening hence fostering reliable implementation and independent monitoring of project effects [29].

Despite a few weaknesses in Uganda's previous water policies, the country presently has better institutions, laws and regulations in regard to hydropower projects development. However, most of the institutional management planned to be bottom-up is implemented on a top-down basis. Due to different various stakeholders' interests, there are always challenges regards disputes and conflicts handling and management [39]. Bujagali project was allied with several sagas including: abuse of office; manipulations and political differences; public recognition as well as struggle for power. This brought up queries among neutral parties claiming that some environmental activists had different aims rather than good faith. This study therefore calls on all Ugandans and well-wishers of most mega development projects to put politicking aside when handling national development schemes including hydropower dams. Regards transboundary issues, Uganda's effort to sustainably exploit HEP potential is frightened by the current colonial agreement of the "Agreed Curve" policy. It is therefore recommended that better and independent regulations of Lake Victoria with a more scientific responsive policy in addition to Joint Institution Management should be emphasized [10,15].

Uganda puts greater emphasis on IWRM in water resources development and management for most of the water related sectors [9]. For sustainability and sovereignty, Uganda can consider relying on her own funds for water resources development because foreign aid and donor funds usually come with conditions especially regards award of mega project development contracts. A higher level of cooperation, coordination, integration, political will and commitment is still required for successful IWRM in shared and interconnected water basins such as the Nile. Additionally, the gap between the theory and the practice can be bridged especially through water sector institutional reforms and establishment of joint institution management committees.

For sustainability, efficient and resilient hydropower infrastructures should be planned and developed in a very participatory approach. During needs and option assessment, alternative green energy technologies such as solar could be given the required attention [21,24,28]. Uganda has already decentralized her water resources management at catchment level. However, for effective and integrated water resources management the country can also consider allocating sufficient resources and support especially in institutions, human and financial support towards capacity building and development. There is need for more public awareness in order to encourage participation and involvement rather than consultation at all project levels. This will not only make the entire hydropower planning, coordination, management and development process transparent but will probably create a conducive atmosphere for conflicts and disputes resolution among stakeholders in case they arise. Additionally, joint institutional management can lead to proper representation of the different tiers/ sectors or departments at committee level allowing for reliable and adequate information and data sharing or exchange.

Additionally, compensation and resettlement action plans should consider the detrimental socio-environmental impacts towards the local residents' livelihoods besides benefits and burdens equitable sharing models. Policy developers and decision makers in Uganda's national development plans and agenda find hard times in drawing trade-offs especially between economic progress and ecosystem safeguard. The authors contend that modern water resources management policies should not contradictory hamper the countries development.

Conclusion

This research article demonstrates how the Bujagali hydropower development in the affected ecological base local affected communities among other institutions. The paper proposed possible policy interventions along the project's life time to ensure its sustainability. And developed sustainable strategies to minimize the socioeconomic and environmental impacts of GDMHID projects based on the IWRM principles. The Authors highlighted how the globally adopted IWRM frameworks that promote stakeholder consultation and participation can be employed in Uganda's mega-hydropower development. The proposed strategic approaches in this paper can provide social legitimacy for great dams' development and democratic resettlement plans. Mega-hydropower development projects interlink water resources, water technology, water users, and water governors within particular basin involving political contestation, negotiation, and struggle. Examining the BHP interventions, the paper showed how the strategically formal inclusion and recognition of local communities could ultimately promote participation due to perception of rights and rules respect by highlighting the needed contribution from the diverse public and private actors at local, national, and global levels.

It was noted that power development projects are a key to Uganda's national economic growth. The strategy can significantly and undoubtedly contribute to the country's poverty eradication thus livelihoods improvement. Basing on the reviewed literature, the authors notes that Bujagali hydropower construction generally conducted the needs and options assessment. However, like most previous mega developmental projects, the Bujagali dam construction focused on the bigger picture of improving the countries power supply. The project developers underestimated the project risks and, in some cases, ignored some stakeholders giving room to several critics regards the dam.

This study notes that on deciding best hydropower development or alternative projects, it is always necessary to conduct a needs and options study illustrating and evaluating all expected project costs, benefits and associated risks. Several criteria can be employed to exploit project benefits and offset the impact level of the expected projects risk effects. The Authors proposes consideration of basic assessment elements including: legal compliance with both local and national laws of the country; human and property rights-appreciating ownership and use rights and policies for land, natural resources; benefit sharing guided by equity, transparency and democracy; livelihood sustainability through establishing frameworks involving economic strengthening, poverty reduction so as to improve community livelihoods; environmental conservation focusing on natural ecosystems such as wetlands, forests and ecosystem services; participation of communities and all stakeholders; monitoring and transparency highlighting and availing progress environmental and social impact assessment as well as evaluation reports and related documents while ensuring their timely accessibility by all stakeholders; governance involving management structures basing on existing and revised/reviewed policies, legislations and guidelines.

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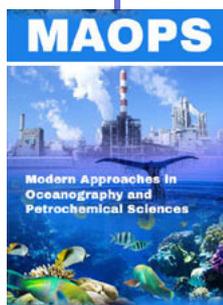
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