Role of IKS in Decision Making for Two Hydropower Generation Projects in Uganda

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Indigenous Knowledge Systems (IKS) have for a long time been ignored as a source of knowledge, especially when applied in fields where scientific research, based on empiricism has produced "reliable knowledge." But in developing countries, where traditional institutions within local communities are still strong, indigenous knowledge systems continue to form a strong base for knowledge generation in resource use and management. Yet indigenous knowledge is often dismissed as a basis for decision making in development projects that are meant to create a livelihood substitution for the local people. IKS are useful because local people are familiar with indigenous practices and technologies and can draw on local resources, making people less dependent on outside supplies. This paper examines the role of IKS in decision making concerned with development projects focusing on two hydropower generation projects in Uganda.

Introduction

Development projects in Uganda have to undergo a process of Environmental Impact Assessment (EIA) to yield an environmental statement and to determine the extent and form of impacts that such a development project would have on the environment and socio-economic well-being of the population. This process is a legal requirement for all development projects that are screened before the EIA. This is because development is being pursued through a concerted effort to utilize natural resources endowed to Uganda in order to alleviate poverty. Rural areas are the most affected by persistent poverty, yet these same rural areas are the most reliant on natural resources. This implies that the extraction and utilization of natural resources at a scale that would considerably reduce those resources in pursuance of development can have a negative impact that would threaten the very well-being of the rural communities.

One of the significant sectors under consideration for development in Uganda is the energy sector, through which the Uganda government is pursuing a policy of rural electrification. Several appraisals have been undertaken to identify sites from which hydropower can be generated for distribution in rural areas with a view to a reduction in deforestation and restoration of the vegetation-degraded areas for a clean and healthy environment.

As a result of the appraisals, two sites were prioritized for development of hydropower, Budhaghali and Karuma. They are the focus of this paper in the analysis of the decision-

making processes that surrounded the development of these sites. Other potential sites that were identified included Kalagala, Muchison, and one in West Nile. EIAs were undertaken for both the prioritized sites and decisions reached for the development of hydropower for rural distribution. But significant in the studies was the incorporation of the knowledge of the local and resident populations that have lived with and on the resources endowed by the selected sites, including knowledge about the river dynamics, species, and value of species that largely is framed by indigenous religious practices and beliefs. This paper attests to the role of IKS in decision making for the two hydropower generation projects in Uganda, examining how IK was used to generate alternatives for the different sites and the extent to which it influenced decision making. It is based on an understanding that decisions are made for improvement in lives of the people whose livelihood has been and is dependent on the natural resources associated with their place of residence, in particular along the river system.

Understanding Indigenous Knowledge Systems

Grenier (1998) defined Indigenous Knowledge (IK) as the unique, traditional, and local knowledge existing within, and developed around, specific conditions of women and men indigenous to a particular geographic area. The development of IK systems, covering all aspects of life, including management of the natural environment, is a matter of survival to the peoples who generate the indigenous knowledge. IK systems do innovate from within and also internalize, use, and adapt external knowledge to suit the local situation. This implies that IK systems are dynamic, because new knowledge is continuously added, largely through the social networks and the relations between individuals and groups of individuals, and between the groups and nature.

The oral, rural, and "powerless" nature of indigenous knowledge has made it largely invisible to the development community and to the international scientific community. Only recently has it begun to receive significant attention for research purposes and awareness of indigenous peoples. Indigenous knowledge has often been dismissed as unsystematic and incapable of meeting the productivity needs of the modern world, yet indigenous knowledge is generated from a continuous process of experimentation, innovation, and adaptation that enables it to blend with science and technology. The World Conference on Science (Budapest, 1999) recommended that scientific and traditional knowledge should be integrated in interdisciplinary projects dealing with links between culture, environment, and development; including the conservation of biological diversity, management of natural resources, and an understanding of natural hazards and mitigation of their impact. It also recommended that local communities and other relevant players need to be involved in the inter-disciplinary projects.

Indigenous knowledge is an important part of the lives of the poor. It is a key element of their social capital and their main asset to invest in the struggle for survival, to produce food, to provide for shelter, or to achieve control of their own lives. These are very important aspects managed and provided on the basis of IK within the context of existing natural resources. For this reason, the potential contribution of indigenous knowledge to locally manageable, sustainable, and cost-effective survival strategies should not be neglected. As noted by Emery (2000), the characteristics of indigenous knowledge are:

- IK is generated within communities.

- IK is location and culture specific.
- IK is the basis for decision making and survival strategies.
- IK is not systematically documented.
- IK covers critical issues: primary production, human and animal life, natural resources management.
- IK is dynamic and based on innovation, adaptation, and experimentation.
- IK is oral and rural in nature.

Indigenous knowledge is generated around belief systems that hinge on traditional religious systems. Through these systems, what people supposed and believed is taken as true, and forms a knowledge base over time as more evidence is gathered. However, when new information from innovation/experimentation is added, the knowledge changes form to suit the prevailing circumstances of the local communities. Because IK is generated within communities, is culture specific, and is a basis for survival decisions of the local population, IK needs to be integrated in the decision-making processes that determine development projects intended for the people affected by such projects.

The utility of indigenous knowledge: For IK to be integrated into decision-making processes, there must be a basis for its use that lies in its utility. The utility of IK in decision making is based on what value IK holds for the people who generate and use it. Experience has shown that development efforts that ignore local technologies, local systems of knowledge, and the local environment generally fail to achieve their desired objectives. Examples abound of teams of researchers failing to consult properly with indigenous populations, with the resulting "advancements" quickly proving to be unsustainable or even destructive, although consultation may not necessarily guarantee success of the "advancements" either. With extensive research into IK in the 1990s, a wealth of information now exists on the different peoples, their relation to the natural resources and management practices for their own survival. Therefore working with Indigenous Knowledge can contribute to the improved design, delivery, monitoring, and evaluation of any development project. In particular, IKs are useful because local people are familiar with indigenous practices and technologies and can draw on local resources, making people less dependent on outside supplies.

Further, indigenous knowledge can help us in two ways in the development of project: First, through the generation of alternatives. Since decision making involves choosing between alternatives, an exhaustion of current and future alternatives is a requisite to effective decision making that can promote sustainability. Second, IK can be used as a foundation on which development project designs are built. There is no doubt that much of what we technically design in development relies on nature, about which a wealth of traditional knowledge exists. Building designs on such existing strategies and practices can make development projects more sustainable.

Development efforts are always intended for the local population, but the utility of IK is often ignored by information suppliers (usually scientists) and receivers (decision makers). This trend needs to be reversed so that IK can contribute to development of local communities by integrating it into the decision-making process.

Incorporating indigenous knowledge in decision-making processes: Decision making can be taken as a process of solving a problem. Sol's (1982) definition in which a problem is said to exist if "someone is in doubt as to which choice is best to remove his dissatisfaction with his present state." Such a person or, in this context, community can identify three aspects related to the choices: 1)one or more outcomes that he desires; 2) two or more unequally efficient or effective courses of action; and 3) an environment containing factors that affect the outcomes. In decision making there is a vision and intention of behaving objectively and rationally, where optimal courses of action are found and relevant information for the decision is readily available. But in practical terms decision makers usually do not have all the relevant information when making decisions. Collecting and checking information costs money and time. A decision maker usually stops looking for more information as soon as he feels comfortable with the information he has. At that moment, he does not think that more information will lead to yet better decisions. He often has to resort to procedures that lead to a solution that is not necessarily optimal.

It turns out that the process usually followed is the procedural rationality in which a course of action that the stakeholder thinks is "good enough" is taken; often the result of searching for a satisfying alternative rather than an optimal alternative. Simon (1960), Devey (1910), and Mitchell (1978) all recognize a phase of information search and evaluation in decision making where we have succeeded in ascertaining what we want to know about a problem. But in the case where evaluating a natural resource is part of the decision-making process, how do we capture that information and what methods do we use to evaluate such information? Much literature about information search in decision making focuses on "scientifically" collected and evaluated information (despite the fact that IK can be collected using scientific methods). This implies that "outsiders" search and evaluate information on a natural resource according to their perspective own perspective. But one has to note that, in many cases, where such information involves ethno-methods of collection, it is only transformed into "scientific" information by manipulation and was acquired as "local knowledge," since it came from the local people. In other words, "outsiders" collect information from "insiders" or else local people manipulate the data and turn it into "scientific" information. The issue here is that outsiders build on local knowledge.

Therefore, it is important not to fail to recognize the role of indigenous knowledge in decision making, especially in decisions that concern common-pool resources. It helps us generate alternatives, in addition to making us understand and structure the problem. Much emphasis is placed on the choice phase rather than the evaluation phase, as well as on deciding which information to include in the decision-making process.

Decision makers usually operate within a tight time frame with inadequate resources and information. They are buffeted by special-interest pleading, bureaucratic imperatives, and political forces whose vision extends no further than the next election cycle (Dye 1984). In such an atmosphere, greater technical expertise plays a leading role, but a significantly constrained one, at best. By failing to account for this, the researcher runs the risk of becoming irrelevant in the eyes of those whom he/she is trying to assist, namely, the user community that receives its output.

Having discussed the importance of decision making and the process itself, it is prudent to find the congruence of development sustainability and the process of decision making;

indeed, any resource extraction activity is a decision taken. While at its broadest definition, development sustainability hinges on the continuity of a designed project. So how do we make decisions that will ensure continuity of an acceptable status, particularly in natural resource management? It is a challenge for the world today to provide the requirements of human kind and still maintain nature, from which these requirements are derived, in an "acceptable" state. Thus it is important that all possible courses of action in problem solving are understood and evaluated. Likewise, all possible problem components need to be identified and appropriate information collected about them. This creates the entry point of IK, because it can generate knowledge about a local environment over a long time period. In the context of natural resource management, studies have shown that conservation and management practices have been applied by local communities throughout history. Thus, the place of IK in development projects that involve the use of a natural resource need not be doubted.

IKS, Natural Resource Use, and Management Regimes

Karuma Hydropower Project Area: The Karuma Falls project for hydropower generation is located 8 km downstream from Masindi port near the outlet of Lake Kioga. The project is located in a relatively small area along the river Nile at the Karuma Falls with an approximate area of 8.4 sq km. The area stretches along both the southern and northern shores of the river. It includes the villages of Awor, Bedmont, Karuma, Nora, and Kamdni. These settlements exhibit a long and enduring cultural mix. The area was a very important gateway both to the north and south of the river. It also includes the famous site known as Wangcoro where the explorers of the Nile, John Hannington Speke and Sir Smauel Baker, appear to have crossed the river. The Palwo, Banyoro, and Langi have lived in this area and practiced several land management regimes for natural resource management. The main economic activity is agriculture but little evidence exists of continuous cultivation on some parts along the river. This was also supported by the gazetting of the southern and northern parts of the river as controlled hunting areas.

The Karuma Falls project was first identified in 1957 after investigations of the Victoria Nile (Kennedy et al. 1957) as a northern alternative to the development of power generation project. Other sites identified included Ayago in Murchison Falls National Park (MFNP) and the Murchison Falls. The site was studied in greater detail in 1986 when an EIA was undertaken. At this time the scheme was conceived as a 180 MW station involving a dam upstream of the Karuma Falls. The site was re-appraised in 1997 for a dam. With all these alternatives on the table, in 1995 NORPAK Ltd. commissioned NORPLAN to prepare a project concept report and a preliminary EIA of the scheme. It was realized in the process that the dam was being located in a somewhat fragile environment (though not comparable to the other sites of Ayago and Murchison located in a national park), and so other alternatives were sought.

Intense consultations with the local people were held, especially on the history of the area and its cultural significance. The EIA study of 1999, which was the most extensive, took the local knowledge as an alternative source of information on the usage of natural resources. Several alternatives were identified through a blending of local knowledge and scientific knowledge.

For the two alternative sites for the project, there are important associated cultural sites

around which indigenous knowledge was built. The first site is at a place called *Otada*, named after a Palwo ancestor and located on the southern bank at the congruence of Juma River and the Nile. It is a place for religious rituals on both sides of the river. The spirit at the site is called *Manana*, to whom rituals for cleansing, propitiating the river gods, annual agricultural ceremonies, and praying for the sick were carried out. The belief systems around this place focused on potential resource availability (especially fish and agricultural outputs) and protection of the riverine vegetation. The attention paid to this IK greatly controlled the extraction of vegetation on the river banks and preserved a considerable number of tree species, including a traditionally important tree, the *Kibu* (a broad-leaved evergreen tree that, if allowed to mature, grows huge and can be used for boat making). Of late this riverine vegetation was found to host an estimated 120 species of birds, including several that had not previously been recorded in the National Park, (Atkins 1986).

The good quality of water at the section with no evidence of eutrophication (although activities in the area are less likely to generate nutrient wastes apart from pottery) is also partly explained by this form of conservation. The implication of this local knowledge was that if the alternative dam site downstream was chosen, over time siltation would choke the dam and it would increase the costs for maintenance of the infrastructure. Thus IK practices can have an implicit importance that requires interpretation beyond the obvious beliefs or thoughts.

The second site was at *Wangcoro*, located upstream from the Karuma Falls. It has rock engravings in form of *Coro* (African chess) in Palwo. History identifies this site as a meeting place of Palwo chiefs and those from across the river. Similarly, it has riverine vegetation that has been conserved, although it is outside the National Park area.

Project choice: With the reappraisal of 1997, impacts were identified as reduction in flow by $50m^3/s$ (which was considered to be the most significant during natural flow), riverine vegetation disturbance, and the displacement of people and animals in the National Park. One alternative available in the project area included a 20-meter-high dam and tunnels to the surface with a power house located below the falls. The second alternative, which was identified after a careful and critical analysis of the impacts and with strong adaptation of local knowledge, was the "run-off-river" scheme with an underground power station in which water would be diverted from the river through a tunnel system about 3 km long. The final choice was for the second alternative, which was definitely an environmentally friendly project that would have minimum and acceptable disturbances. The ritual site on the southern bank would be affected by construction of a switchyard, but minimal disturbances are expected although it will not be accessible by the local people.

From this case it can be noted that in all the environmental appraisals from 1957 through to 1986 and 1997, the dam option was high on the list. But after the fourth appraisal in which indigenous knowledge was used by NORPAK, the third alternative of a "run-off-river" scheme was arrived at and taken as the final choice. It can also be noted that the strongest local knowledge is that associated with the riverine vegetation, which indirectly affects the quality of flow of water. Siltation would be a problem not only to the dam but other countries that use the same resource if the riverine vegetation was not conserved. While it must be emphasized that it was not only local knowledge that led to the formulation of this alternative, its contribution can not be underestimated in blending with scientific knowledge.

The river with the associated physical environment is a source of livelihood to the local people, just like the international communities that use the same resource in their localities. The locals have adapted to the environment of controlled hunting, agriculture, and fishing. Thus, introducing a dam in the area would mean disturbance and displacement of the people, and their traditional source of livelihood would by substituted by one that does not give them benefits. The sacred places, the mythical stories (like that of Mucerebende, who was a local hippopotamus hunter) were control measures to maintain an environment that could sustain these communities. These aspects were recognized by the project company and compelled the developers to seek alternative options.

Budhagali Hydropower Project

The Bujagali site is located on the Nile River, 8.5 km downstream of the Owen Falls Dam and 2.5 km downstream of Bujagali Falls. Just like Karuma, it was also first identified as a potential site in 1956/57, and re-appraised in 1966 and 1986. Three alternative sites were considered, with Bujagali as the least cost generation project. The site is constrained within a narrow, steep-sided gorge varying in width between 150 m and 300 m. The river flows in a series of rapids down through two channels separated by Dumbbell Island. The local people, including the Baganda, Basoga, Bagisu, and Japadhola, have settled in this area only recently—about four decades back. The area was a forest reserve that was subjected to clearance and intense cultivation. But, despite this, cultivation along the banks of the river has only recently been undertaken.

The recommendation from the appraisals was made for a scheme at Dumbbell Island with an installation capacity of 270 MW. This site had two alternatives: site A at the Bujagali Falls with a dam, and site B at Dumbbell island where the Nile split into two channels. The second site was preferred on grounds of capital cost, geology, and access. An extensive EIA was carried out by AESNP in 1998 and the major impacts of the construction were identified as social, involving displacement of the local people. In addition, the reservoir that would be created by the dam would also submerge the Bujagali Falls, to which the local people had attached cultural importance associated with belief systems. These falls were named after a god called *Bujagali*, who used to enable the local person responsible for the shrine's upkeep sit on an animal's skin and float over water to cross the river.

In the assessment, the loss of the falls amenity and recreation interests were not considered to be an issue. Nor were the islands that would be submerged that previously provided breeding sites for birds and an increase in the risk of bilharzia considered to be significant. Local knowledge was gathered but was not considered to be important enough to require consideration of an alternative location. The issue of the god *Bujagali* was simply taken as a belief system with no grounded truth. But it was a belief system that had for a long time been adapted to the management and use of the river resources, controlling siltation, and conserving birds, primates and snake species on the Dumbbell Island. And on the island were three shrines for traditional worshiping and cleansing.

Project choice: Despite the adverse impacts that the project would have, the Bujagali site alternative was chosen and construction on the dam begun. This meant that the following uses for the locals would disappear:

- The irregular rock outcrops created relatively stable pools of water in which fish breed. These formed a major source of food for the local people. Although the reservoir created by the submerging would increase fishing, access by the locals would be restricted and their livelihoods would be reduced.
- Local sporting by the indigenous people as they challenge themselves to cross the rapids from either banks. This contributed to the attraction of white water rafters to this section of the river, which has become a popular tourist sport. This is an indication of local knowledge on risks and measures to the use of the resource, but which would be lost.
- Dumbbell Island was used as a place for worshiping and cleansing. Three shrines were identified during the EIA study and these had to be relocated. At a wider regional and continental level, the dam construction would also have an effect on the flow rate of the river.

In all the studies—Kennedy (1956), Karatunga (1997), AESNP (1998)—it was noted that water flow would be reduced from approximately 1200 m^3/s to 1118.5 m^3/s flow. This would mean that during natural flows, water would be reduced downstream, perhaps up as far as Egypt. This is an example of the dilemma of common pool resources. High magnitude changes are thus expected in this project area and beyond if the project is implemented. Several alternatives were explored, but perhaps not all the possible alternatives, including any that would maintain the rapids. Local community consultations were made but fell short of recognizing IK (initially there was inadequate information available). This led to a public outcry against the project that involved hereditary rulers, local administrators, the local population, and pressure groups from the international community.

Lessons Learned from the Projects

Some lessons can be drawn on the use of IK for decision making from consideration of the two hydropower projects. Information for decision making needs to be gathered not only from scientific sources but from indigenous systems as well. The search for knowledge that is useful for decision making needs to recognize traditional systems of knowledge generation and transcend its abstract appreciation to the actual use of such knowledge. In this way the process of decision making would then change from an emphasis on the procedural approach to finding an optimal solution derived from a range of options. It is also important for development practitioners to listen more to the local indigenous peoples in order to learn from them and to build on the practices and techniques formulated over a long period of practical experimentations. Appropriate translation of indigenous knowledge for guiding policy is another lesson for development projects. Similarly, project development needs to be balanced between development and resource conservation. It is prudent for development practitioners to integrate IK in the formulation, design, and implementation of projects. Therefore, one challenge of integrating IK in development for the Academy is the focus on integrating IK in curriculum of development studies programs.

Conclusions

In conclusion, the importance of IK can not be underestimated in decision making, especially

that which concerns natural resource management. The local people in a given area have generated it over a long period of time through enduring experiences, innovation, and experimentation. The knowledge generated around beliefs is a reflection of past problems, and partial or complete solutions in the control, management and use of resources, which can be used in assessment and the selection of future uses of these same resources. Thus, IK needs to be integrated in development projects as a complementary source of knowledge when searching for strategies to combat poverty while at the same time achieving sustainability in development. IK is useful in many ways, but the importance of its role in generating alternatives and its use as a basis for project design needs to be appreciated. In general IK can blend well with scientific knowledge, just as scientific knowledge can supplement IK. It enables development designs to be built on existing traditional practices that hold utility for IK. Where development projects involve change in livelihood systems, IK needs to be elicited and translated appropriately. The apparent collapse of the Budhagali project may not have been entirely a result of IK, but the consideration of IK can not be ignored. On the other hand, traditional institutional analysis and the generation of alternatives by the Karuma Hydropower Project offers lessons for future development projects not only in Uganda but in all countries, because reliance on natural resources for development is inevitable.

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