

THE BAKUN HYDRO ELECTRICAL PROJECT (HEP), SARAWAK, MALAYSIA: THE MANIFESTATION OF ISLAMIC SYSTEM BETWEEN ENVIRONMENT AND DEVELOPMENT

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ABSTRACT : Some argues that environment and development are different. Therefore, as the manifestation of Islamic system towards enhance the balance and needs between environment and development. To explain this manifestation, the Bakun HEP has been chosen to elucidate the needs between environment and development. It is important to highlight that Islamic system has provided the basic guidelines. The guidelines as drawn by Islamic system are able to manifest that between environment and developments have the points that agree and disagree.

1. INTRODUCTION

The aim of this section is to study the practice of environmental ethics from the Islamic perspective and therefore this specific case study has been chosen to highlight such a relationship. The Bakun Hydro Electrical Project (HEP), Sarawak, Malaysia, is surrounded by controversy, thus the researcher intends to analyse the arguments between the groups who support the Bakun BHEP and the groups who oppose this project. At the same time the researcher will analyse the Islamic point of view regarding a method of solving the dispute. It is felt that a study of this case will emphasise the differences of interest between the development and the environment.

2. THE BAKUN HYDRO ELECTRICAL PROJECT (HEP), SARAWAK, MALAYSIA

2.1 A Historical Perspective

The Government of Malaysia through the Federal cabinet on 8th September 1993 gave approval to the proposed development of Bakun Hydro Electrical Project (BHEP) in Sarawak. The project is considered crucial in meeting the long term power and energy requirements of the nation.

The proposal for the Bakun project follows a series of studies begun most seriously in the 1970s, to assess the hydroelectric potential (both theoretical and practical) of Sarawak's rivers. This was in conjunction with the production of the general "Electricity Master Plan for Sarawak" undertaken by the Sarawak Electricity Supply Company (SESCO). In 1979, 155 potential dam sites with a total capacity of 80 000 MW were identified. 51 sites were short listed and 11 were further found to be the best in terms of exploitable hydroelectric capacity, including the Bakun, Murum, Pelagus and Baleh in the Upper Rajang basin. In 1980, the SAMA Consortium, a joint venture of German and Swiss consultants together with the Malaysian power generating and supplying authorities, was commissioned to conduct feasibility studies centring on the hydro-power potential of Rajang River in Sarawak.

Four possible dam sites were identified. There were at Bakun, Murum, Pelagus and Baleh, estimated to have the power generating capacity of 2 400 MW, 900 MW, 770 MW and 900 Mw respectively. Bakun was originally proposed to be built in the 1980s. The SAMA study confirmed the technical feasibility of the proposed Bakun dam, 37 km upstream from Belaga on the Batang Rajang. The dam would have a capacity to generate 2 400 MW. It was recommended then that the Bakun dam should be the first of the four dams in this general vicinity to be developed.

However, the Federal Government at that time decided to shelve the project due to the following reasons. The recession and slow economic growth that occurred during the 1985 to 1986 period resulted in the Government being less optimistic about the growth of electricity demand. Then, the availability of gas for electricity generation caused the Bakun HEP to lose its status as the least-cost option for Peninsular Malaysia until the year 2000.

A review of the project undertaken in 1992 concluded that the project was economically viable and should be implemented, for commissioning by the year 2005. Based on this review, the Government agreed in September 1993 that the project be implemented.

A public-listed company, Ekran Berhad, submitted a conceptual proposal to the Government to implement the project on a privatised and fast-track basis for commissioning by the year 2003. Subsequently, the Government issued an invitation to Ekran Berhad to submit a detailed project proposal for consideration. The Government reviewed the latter with the assistance of a reputable international consulting firm, Harza Engineering L.P. of the United States. Subsequently, a letter of intent was issued to Ekran Berhad to undertake preliminary works to implement the project, including the preparation of tender documents, pre-qualifications of contractors, invitations to bid and submission of Environmental Impact Assessment (EIA) reports.

In March 1994, Universiti Malaysia Sarawak (UNIMAS) was appointed by Ekran Berhad to be the main consultant for the Environmental Impact Assessment of the Project. UNIMAS, through its Centre For Technology Transfer and

Consultancy (CTTC), had to ensure that all environmental considerations of the project were comprehensively addressed and organised into a framework which guaranteed that the Bakun HEP would be implemented in an environmentally acceptable manner.

In view of the huge capital outlay involved, the Government decided that the project should be undertaken by a joint-venture company. The Government invited the State of Sarawak, Tenaga Nasional Berhad (TNB), Sarawak Electricity Supply Corporation (SESCO), Malaysia Mining Corporation Bhd (MMC) and others to participate in this joint-venture company to be led by Ekran Berhad. This joint venture company was called Bakun Hydro Corporation (BHC).

Due to the economic crisis between 1997-98, this Bakun HEP has been undertaken by the Government's own company. Currently, the project manager is Sarawak Hidro Sdn Bhd, which was formerly known as Bakun Hidro Sdn Bhd.

2.2 The Bakun HEP: The Environmental Impact Assessment (EIA) Report

The proposed Bakun HEP involves three activities prescribed under the Environmental Quality (Prescribed Activity) (Environmental Impact Assessment) Order 1987. These are:

- i. clearing of vegetation/land for access road, dam and power transmission line installations which is subjected to Schedule 6a (Conversion of hill forest land to other land use covering an area of 50 hectares or more)
- ii. clearing of bio mass within the reservoir area prior to flooding, subjected to Schedule 6c (Logging covering an area of 500 hectares or more), and
- iii. construction of the dam which is subjected to Schedule 13b (Dams and hydroelectric power schemes with dams over 15 meters high and auxiliary structures a total area in excess of 40 hectares and/or reservoirs with a surface area in excess of 400 hectares).

A technical proposal for the Environmental Impact Assessment study was prepared by UNIMAS in collaboration with ten other sub-consulting firms and institutions. There were nine parts of the Interim Report under separate covers:

- a. Part 1: Technical Summary & Project Description
- b. Part 2: Bintulu-Tubau- Bakun Access Road
- c. Part 3: Land Use (Rajang River Basin)
- d. Part 4: Physical Environment (Rajang River Basin), containing reports on
 - Climate
 - Geology and Hydrogeology
 - Existing Water Quality
 - Hydrology of Bakun Catchment
 - Potential Soil Erosion during Bio mass clearing
 - Downstream Hydrology
- e. Part 5: Biological Environment (Bakun Catchment), containing reports on
 - Vegetation and Forest Resources
 - Wildlife
 - Aquatic Life
- f. Part 6: Public Health & Quantitative Risk Analysis
- g. Part 7: Environmental Accounting Costs and Benefits & Environmental Management Plan
- h. Part 8: Power Transmission Line (On-Land Sarawak Sector)
- i. Part 9: Power Transmission Line (Submarine Sector)

2.3 The Environmental Effects in the Bakun HEP

The environmental effects in the Bakun HEP site may be classified into three types: the physical environment, the biological environment and the existing human environment. In this section the researcher will analyse the environmental effects based on the reports, especially the EIAs on Bakun HEP.

2.4 The Existing Physical Environment

The physical environment of the reservoir is critical to the various stages of preparation and operation and to the integrity of the reservoir. The physical environment of the catchment determines the ability and the long term viability of the reservoir to retain and deliver water.

a. Climate

The climate of Sarawak falls under the category of humid tropical, characterised by high temperatures, heavy rainfall and high relative humidity throughout the year. Climatic conditions in the reservoir and catchment area show variation in temperature and humidity depending on land use, aspect and elevation. The temperature range in this area is between 22 °C – 36 °C, and the humidity is between 35- 88%.

According to the Department of Irrigation and Drainage (DID), Sarawak, the mean annual rainfall for the area is 4,070 mm. The maximum rainfall centres on November-December and March-April. The minimum rainfall

occurs during the months of June, July and August. Rainfall in this area is predominantly caused by thunderstorms. In terms of wind, there are two patterns of winds in this area. Firstly, during the Southwest monsoon period (May-September) the winds are predominantly south-easterly with some strength from the north-east. Secondly, during the Northeast monsoon period (November-March) the winds are mainly northerly, but followed quite closely by the south easterly.

b. Geology

The reservoir area and the greater part of the Balui Basin are formed by intensely folded sediment of the Belaga formation, part of the Rajang Group. The Rajang Group was deposited from the late Cretaceous to the early Tertiary in the Northwest Borneo Geosyncline. Most of the rocks are highly compacted, but microscopically they do not show any indication of distortion. The lithological conditions on both riverbanks are almost the same, as the beds are striking nearly at right angles to the river valley, with a steep inclination.

The whole sequence has been subdivided into three predominant rock types; predominant sandstone and conglomerate, predominant shale and interbedded shale, siltstone and sandstone. Sandstone is the predominant rock type in the dam site, characterised by intensely folded massive beds, and can be classified as greywacke consisting of angular and poorly sorted quartz and feldspar grains. Rock fragments are mostly shale and quartzite.

c. Hydrology and Water Quality

The catchment to the reservoir is approximately 1.5 million hectares comprising 20 subcatchments. Twelve of the subcatchments will be affected by the reservoir. The main stream of the reservoir and catchment is the Batang Balui which is fed by three big tributaries, namely Murum river (397,000 ha), Linau river (262,500 ha) and Bahau river (165,500 ha). The other nine subcatchments include two less than 5,00 ha, six less than 100,000 ha and one over 100,000 ha.

There are large variations in water level within every month of the year but there is no distinct dry season. Annual average water yield from the catchment is about 2,800 mm. Long term discharge at the dam site in the reservoir is 1,314 cumecs. The net run-off is approaching 70% of the mean annual precipitation. Variation in annual stream flow of the Batang Balui is 830 cumecs in August and 1,720 cumecs in December.

The existing water quality of the major rivers in the dam and catchment area is turbid. The water quality in the smaller tributaries is generally better. Suspended solid levels between 170 to 300 mg/L were measured during a low flow period and 290 to 1,400 mg/L during a high flow period.

2.5 The Biological Environment

The biological environment includes floral, wildlife and aquatic resources. Tropical terrestrial and aquatic biodiversity is diverse, luxuriant and abundant. Sarawak is typical of this resource and exceptional because of the magnitude of endemism that has evolved in the isolated island environment of Borneo.

a. Vegetation (Flora and Fauna)

There is very little published information pertaining to the floristic resource of the catchment and reservoir. From observation, the types of vegetation in the reservoir are associated with land use, i.e. shifting cultivation, mainly hill paddy and cash/subsistence crops, secondary forest from prior shifting cultivation and logged over Mixed Dipterocarp (MDF), including riparian and remnant virgin MDF components.

Approximately 37% of the Bakun reservoir area is logged over MDF. Three remains remnant virgin dipterocarp and non-dipterocarp stands within the larger logged over type. The stands are largely confined to the steepest slopes and isolated locations. Typically, very large dipterocarp trees (20-80 cm DBH) up to 50 m in height dominate the emergent canopy. *S. macroptera (meranti melantai)*, *S. argentifolia (meranti binatoh)*, *S. parvifolia (meranti sarang punai)*, and *S. amplexicaulis (engkabang pinang)* are dominant and are all very highly valued commercial species. Protected species identified were *Ficus microcarpa*, *Gamua beccarina*, *F. aurata* and *F. lamponga*.

Beside that one thousand two hundred and thirty plant species that are used by the local people were inventoried in the reservoir. They include ornamental plants, medicinal plants, fibre plants, spices and condiments, rattans, latex producing plants, cereals, root and tuber plants, starch producing plants, plants producing poison, plants used for making handicrafts, furniture and forage.

b. Wildlife

The reservoir and catchment area have not been comprehensively inventoried for wildlife, but consist of mammals, birds, amphibians and insects. A total of 35 birds and 8 mammal species are protected or totally protected under the Sarawak Wildlife Ordinance 1990. Three birds and two mammal species have IUCN recognition as being rare or vulnerable. Several protected species are endemic to Borneo such as Hose's *langur*,

Borneon gibbon, Thomas flying squirrel and *Borneon* yellow *munjak*, large billed blue flycatcher, *Borneon* blue flycatcher, dusky *munia* and blue headed *pitta*.

c. Aquatic Resources

The Rajang River is the main drainage system for central Sarawak and is the longest river in the state. A total of 14 families represented by 39 genera and 104 species were caught from the main rivers of the upper Rajang river basin and its tributaries. Cyprinidae accounted for 54% of the number of species caught. Carp-like fish were found such as the *empurau*, *semah*, and *mengalan*, and catfish, namely the *tapah* and the *labang* with weights ranging from 5 gram till as high as 10 kilogram. These fish are important to indigenous people as one of the main sources of protein.

2.6 The Existing Human Environment

The residents of the reservoir and its surround are important to the Bakun HEP. In this regard the State Government of Sarawak officially tackled the issue of resettlement. Therefore during the researcher's visit to the Bakun HEP, one section called the Special Task Section for Resettlement had been set up under the Office of State Planning Unit, Sarawak. This section has led by Mr Liman a/k Numpang.

There are 9,428 permanent residents in 1,639 apartments housing 2,141 families, and include 5 different ethnic categories – Kayan, Kenyah, Kajang (Lahanan), Buket and Penan within reservoir and more outside of the reservoir within the upper catchment. They reside in 15 longhouse communities where each community is separate and distinct from the next and located close to a major watercourse. Each community practises communal long house living around the household consisting of residence, extended family group and recognised tenured territory. These groups had occupied the reservoir and catchment for between a few decades and more than 100 years. (See Table 7.1: Population Census of the Affected Communities, April 1995). In 1998, the government launched an "Operation Exodus" to transfer the affected people from their homes to the new resettlement area at Sg. Asap.

2.7 The Development in Bakun HEP

According to the environmental impact assessment of the Bakun HEP, there are four considerations to the hydropower potential of Bakun. They are technical feasibility, economic feasibility, environmental feasibility and 'no project' option.

In terms of technical feasibility, the proposed Bakun HEP is expected to be a low-cost hydroelectric project, and when implemented will supply the nation with electricity that is cheap, clean and reliable, and will not be subject to fluctuating international fuel prices. The feasibility study results on geological and rock mechanical investigations indicate that the Bakun dam and reservoir area is situated in a seismically and tectonically stable block. The foundation rockmass at the Bakun dam site consists predominantly of massive quartzitic greywacke with thinly interbedded shale, siltstone and greywacke alterations. High quality construction materials are therefore available at the site, and the greywacke has been proven to be durable and strong when used as concrete aggregates.

In the respect of economic feasibility, the unit cost of electricity produced by the Bakun HEP would be very much cheaper than the alternative of thermal generation. The Bakun project will also contribute significantly towards strengthening the foreign exchange position of Malaysia, as the project will help reduce the import of fossil fuel for power generation.

The environmental benefits that will emanate from the Bakun HEP include the reduction and containment of global warming and acid rain, improvement of river water quality, regulation of river flow, mitigation of floods, improvements to ecotourism potential and the sustainability of resources.

The Bakun HEP is expected to emerge as a potent force that can accelerate the socio-economic development of the state of Sarawak and the country within a period that would not be possible if Bakun does not come into existence. The spin-off effects Bakun will have on smaller industries and businesses are equally immense. Some of the more obvious benefits of the Bakun project can be summarised as follows:

- a. It will enable a major indigenous and renewable energy source to be tapped.
- b. It will contribute significantly to the saving of fossil fuels, diversification of energy sources, and reduction of dependence on fossil fuels for energy generation.
- c. It will provide much cheaper energy than could alternative thermal generation methods.
- d. The socio-economic well being of the 9,000 more affected local native inhabitants will be elevated when they move to new resettlement areas where they will be provided with modern infrastructure and social amenities and will have access to better employment and business opportunities.
- e. It does not produce as much green house gas as other fossil based thermal plants do.
- f. The development of the project will help to further develop local skills and expertise, particularly in the field of engineering and maintenance, and effect technology transfer on a wide range of research and development activities.
- g. The flood control capacity of the Bakun reservoir helps to regulate river flows and flood levels. River navigation can thus improved, and salinity intrusion and flood damage in the lower course of the Rajang river can be reduced significantly.

- h. The Bakun reservoir and the scenic landscape of the surrounding area (such as Batu Laga and Hose Mountain) can be developed and promoted as a tourist attraction, particularly for those who favour adventure and eco-tourism.

In summary, the Malaysia Government believes that the Bakun HEP is needed to satisfy the long-term power and energy demand of this country. The availability of renewable, efficient and less polluting energy resources should be exploited to achieve a balanced long-term energy-mix plan for Malaysia. According to the EIA for the Bakun HEP, there are three main project components: firstly, the Bakun access road, secondly, the water reservoir and dam site, and thirdly, the power transmission lines.

2.8 Current Status of the Bakun HEP

Following the researcher's visit to the Bakun HEP's site, there are some considerations that need to be taken into account. Firstly, in terms of the spending on this project, which began in 1992 until the end of 2002, the Government of Malaysia, through the company, has spent an estimated RM 1 billion (Ringgit Malaysia: one billion), around Pounds Sterling 170 millions. The spending includes:

- a. The access road from Bintulu to Bakun via Tubau which cost approximately RM 300 million (GBP 50 million).
- b. The Bakun dam site.
 1. Three tunnels: approximately RM 300 million (GBP 50 million)
 2. The coffer dam: approximately RM 400 million (GBP 66.67 million)

At the moment, as the Government of Malaysia has decided to proceed with this project, it will be completed in 2007.

Secondly, there is the question of the resettlement area for the people who are affected directly by this Bakun HEP at Sg Asap. A total of more than ten thousand people, which include various communities, has been resettled since 1998. Although some of the people do not wish to move from their home village, they must choose to either go far away or instead stay at their homes with danger because the area will be flooded to be a reservoir. Therefore, the Government itself has spent the money to provide the better facilities at Sg. Asap. This includes compensation, long houses, lands for cultivation and agriculture, schools, clinics and others. The Government's spending at Sg. Asap is ongoing and new area is becoming a developing town.

Thirdly, although the Bakun HEP is still on schedule, the impact of the development of the area has become increasingly rapidly, because the road Bintulu-Bakun has affected the traditional internal transportation in the State of Sarawak, which is the Rajang river.

Now, the question is whether this project should be stopped or continue? The next part is the researcher's point of view on either agreeing to stop or continuing this project. This analysis will be based on the Islamic perspective to resolve the conflict.

2.9 The Public Interest, *Maslaha*, on the Bakun HEP

Now, in the researcher's view, the Bakun HEP should continue until the project is completed and take up some suggestions. Before that, if this project has not yet started, the Government should hold a consultation or '*shura*' before making a decision to build this project. Indeed, Islamic legislation is expected to contain provisions to protect the environment and guarantee its sustainability. In addition, the Bakun HEP should not be built based on some justifications. According to the Qur'an, that outlines general principles such as justice, consultation and public interest, this project is a danger to the environment. For instance, the Qur'an says,

Evil (sins and disobedience of Allah etc.) has appeared on land and sea because of what the hands of men have earned (by oppression and evil deeds, etc.), that Allah may make them taste a part of that which they have done, in order that they may return (by repenting to Allah, and begging His Pardon). (Ar-Rum, 30: 41)

It is clear that human beings, for instance policy-makers, must accept the responsibility to be a good '*khalifah*' before make a decision to build this kind of project. It is important that human beings should not destroy and neglect the valuable natural world of God's creation. Moreover, the Islamic law outlines that the actors of the destruction must be punished with a hard sentence, such as the punishment for the people who fight against God and His Messengers. The Qur'an states,

The recompense of those who wage war against Allah and His Messenger and do mischief in the land is only that they shall be killed or crucified or their hands and their feet be cut off on the opposite sides, or be exiled from the land. That is their disgrace in this world, and a great torment is theirs in the Hereafter. (Al-Ma'idah, 5: 33)

In terms of the public interest, *maslaha*, in Islam, according to al-Ghazali,

As far as the term *maslaha* is concerned, in its root sense it means procuring something beneficial or removing something harmful, though this is not what we mean (by the legal definition); for seeking benefit and removing harm are the purposes at which the creation aims, and the goodness of creatures lies in the realisation of their purposes. But what we mean by the term *maslaha* is the safeguarding of the ultimate objectives of the revealed law; and the

ultimate objectives of the revealed law with regard to God's creatures are five, which are : safeguarding for them their religion and morality, their lives, their reason, their progeny and their property. Whatever assures the preservation of these five fundamentals is *maslaha*, and whatever causes the loss of these fundamentals is *mafsadah* and its removal is *maslaha*.

Based on the above statement, he elaborated that an unprecedented *maslaha* must meet three requirements. Firstly, it must be absolutely necessary and indispensable (*darurīyya*), preserving one or more of the five essential values. Secondly, the beneficial result must be definitely predictable (*qat'ī*) and not conjectural. Lastly, it must be universal (*kullī*), taking into consideration the welfare of God's creatures as a whole, and not benefiting part at the expense of the whole.

According to Izzi Dien, he classified the public interest, *maslaha*, into three categories, namely, the major interest, *maslaha darurīyya*; the needed interest, *maslaha hajīyya*; and the embellishing interest, *maslaha tahsīniyya*. In the researcher's view, the Bakun HEP was not fulfilling any of the three public interest categories. For instance, in terms of the major interest, *maslaha darurīyya*, on the consideration of possession, *al-mal*, this project has destroyed natural resources. Natural resources, such as trees, lands, animals, flora and fauna and so on are valuable things. As aforementioned in the previous section, the area, in which the dam is to be built, may destroy the environment. In fact the Qur'an observes that all property belongs to God.

Furthermore, this project is against the public interest in terms of the needed interest, *maslaha hajīyya*: for instance, the supply of electricity, which is surplus to the demand by the consumers. These arguments are supported by the group who oppose the Bakun HEP. Moreover, there are alternative ways that more electricity may be produced without building a big dam.

In addition, almost any action will result in a combination of benefit (*masalih*) and harm (*mafasid*). As quoted by Izzi Dien, Ibrahim b. Musa b. Muhammad al-Shaībī has defined the term *maslaha* as, There is no absolute benefit, *maslaha mutlaqa*, or absolute harm, *mafsada mutlaqa*, since they should both be understood according to that which is common knowledge. And he continues: 'however, when *maslaha* and *mafsada* conflict, judgement should only be passed when one value can clearly be seen to outweigh the other.

Therefore, from the researcher's point of view, the arguments between the two groups, which support and oppose the Bakun HEP, should be taken into consideration. The arguments must be justified in order that the project is seen to benefit the people and the government. Furthermore, it is believed that the project should be evaluated by third parties to obtain an unbiased result, whether to permit this project or to cancel it. After consideration of the arguments from the groups who support this project, it appears that this project has a *maslaha*. Then, from the views of the groups who oppose this project, it seems that it has *mafsada*. According to Ibn 'Abd al-Salam, 'when interest and corruption is clear, there should be no hesitation in dealing with them promptly. If an interest clashes with another more important interest then the first should be suspended, with no harm resulting'.

Perhaps, the viewpoints of the groups who support the Bakun HEP may be examined. Islamic law permits the authority, particularly the government, to intervene and to control as well as to uphold the law for the advantage of human beings. However, in this case the government has overstepped the mark in allowing this project. It is believed that the government may have acted in accordance with the legal maxim, such as 'the acts of leader is determined and is limited by the public interest'. Based on this legal maxim, the government can justify its decision by asserting that the Bakun HEP has more advantages for the public, either directly or indirectly.

However, in retrospect having studied the current status of this project, the Bakun HEP should be continued; the main reason is that the Qur'an forbids human beings from wasting the earth's resources: ...But spend not wastefully (your wealth) in the manner of a spendthrift. Verily, spendthrifts are brothers of the devils, and the Devil (Satan) is ever ungrateful to his Lord. (Al-Isra', 17: 26-27) As previously mentioned, the government has spent RM 1 billion (approximately GBP 170 millions) on this project, therefore if cancelled, there would be a great wastage of expenditure. Such waste would include both material and non-material resources such as time, space, money, labour, buildings and so on.

In addition, according to the Islamic legal maxim, such as 'the greatest harm should be avoided with the lowest harm' is important to justify the arguments that the Bakun HEP should continue. In fact, there are some suggestions that should be taken an account for the developer to proceed with this project. Firstly, the project should reduce expenditure to avoid greater loss. In my suggestion, this project needs modification, particularly regarding the technical elements. As a result, the budget may be reduced from RM 15 billion (approximately GBP 2.5 billion) to half that. For instance, the project to transmit a power supply from the Bakun HEP to the Peninsular should be cancelled, due to the potential danger of running electricity across the South China Sea through cables.

Secondly, after completing the project, the developer should take some consideration to implement the practice of *harīm*, *hima* and *hisbah*, which can be formed as appropriate. This practice should be implemented according to the Islamic perspective. The researcher suggests that the authority should consult with every organisation and expertise, such as the Department of Environment, Department of Forest, non-governmental organisations, communities and

others to modify some elements of this project. It is important to implement these concepts of *harīm*, *hima* and *hisbah* to prove the seriousness of the authority. It is perhaps true that this project may have benefits and advantages for the country as well as the people.

Furthermore, from the observation that the sacrifice of the affected community for this project has not been appreciated by the public and community. It seems that the affected community is in one-way communication. It believes that 'three-way' communication is important between the Government (include the developers), the affected community and the public to honour their sacrifice directly or indirectly.

3. CONCLUSION

The case study on the Bakun HEP is an example for the need for people to form the right attitudes towards the environment at the right time and at different levels of society, i.e. on the part of the policy-makers, the officers, the people, the workers and others. At the beginning of the project, the researcher's opinion would have definitely been not to start the project because of the threats that it represented to the surrounding environment, which is a more important consideration than the development gain. However, it became important to accept the continuity of the project and thus developments which are not in harmony with the environment because of the huge amount of natural resources that have already been used. It would be a great double loss if the project was suddenly stopped when the environmental damage has already been done. From the Islamic point of view, the fulfilment of public interest or *maslaha* dictates that such a project has to continue in order to achieve the expected benefits that the environment has already paid for. However, similar projects should be stopped before they start in the future.

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3. Mr Ir. Sim See Sheng, Senior Resident Manager, Sarawak Hidro Sdn Bhd., Bakun, Sarawak, Malaysia.
4. Mr Ir. Wan Mohamad Su'ut Bin Wan Moss, Resident Engineer, Sarawak Hidro Sdn Bhd., Bakun, Sarawak, Malaysia.
5. Mr Ismail Othman, Technician, Sarawak Hidro Sdn Bhd., Bakun, Sarawak, Malaysia.
6. Mr Ili Lawing, Long House, Sg. Asap, Sarawak, Malaysia.
7. Mr Dah Selung, Long House, Sg. Asap, Sarawak, Malaysia.
8. Mr Peter Sawal, Long House, Sg. Asap, Sarawak, Malaysia.
9. Mr Ir Shamsuddin Bin Abdul Latif, Deputy Director General, Department of Environment, Putrajaya, Malaysia.
10. Mr Wan Aminordin Bin Wan Kamaruddin, Environmental Control Officer, Department of Environment, Putrajaya, Malaysia.
11. Assoc. Prof. Dr Mohd Ismid Mohd Said, Head, Department of Environmental Engineering, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.
12. Prof. Dr Zaini Ujang, Director, Institute of Water and Waste Management, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.
13. Assoc. Prof. Zainuddin, Faculty of Civil Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.
14. Assoc. Prof. Dr Abdul Rahim bin Mohd Yusoff, Faculty of Science, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.
15. Mr Justine Jok Jau Emang, Assistant Controller, Natural Resources Environmental Board, Menara Pelita, Sarawak, Malaysia.
16. Professor A.H. Zakri, Director, Institute of Advanced Studies, United Nations University, Tokyo on 17 October 2002
17. Dr Geoffrey Davison, Director, WWF Borneo Malaysia.
18. Professor Murtedza Mohammad on 17 October 2002, Dean, Faculty of Environmental, Universiti Malaysia Sarawak, Kota Samarahan, Sarawak, Malaysia.
19. Professor Maryati Mohammed, Universiti Malaysia Sabah, Sabah, Malaysia.
20. Assoc. Prof. Dr Abdullah Mohammad Said on 18 October 2002, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia.
21. Mr Liman a/k Numpang, Special Officer, Special Project Unit, State Planning Unit, Sarawak, Malaysia.