

**Ecological Debt**  
**Dams on the Zambezi River a source of Ecological Debt for the people of Mozambique**



*“Let our Rivers run free for the next generations”*

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### ***Acknowledgement***

*The paper owes much to the numerous scholars and researchers who have done tremendous work in exposing the negative impacts of dams on the Zambezi River. My thanks go to all the people I interviewed while doing the research. Of particular mention are the people from Livaningo, Environmental Justice Monitoring Group and the Mozambique Council of Churches who are doing great work in the area.*

*The literature developed so far on dams on the Zambezi River has exposed the ecological impact on marine life along the river as well as to the many people whose livelihoods depend on this wonderful watershed.*

*It is hoped that this short case study will contribute to the fight for the recognition of the ecological debt owed to Mozambique and to stop further damming of the river that will only increase this debt.*

## **Preface**

The Economic Justice Network of FOCCISA, investigated the social and ecological impact of the dams along Zambezi River, which is the most dammed river in Africa with more than 30 large dams, on the Mozambique people. In particular the construction of the Cahora Bassa dam in 1975 led to the displacement of over 57,000 individuals from their sources of livelihood, mainly small-scale prawn-farming and fishing, and heightened the incidence of water-borne diseases among people depending on the river for their drinking water. It has also resulted in serious environmental problems including massive flooding (such as the one that occurred in 2000) and the related loss of lives and agricultural lands, increased likelihood of earthquakes, and disturbance to aquatic and terrestrial habitats of animals, among others. The Cahora Bassa dam demonstrates concrete links between ecological and external debt: the US\$2 billion dam was financed by the World Bank with little consideration of its costs to local communities and the environment. Until recently, the dam has been owned by the Portuguese government, which has refused to hand over control of the dam until the government of Mozambique repays in full the debt owes to Portugal. Moreover, despite generating the cheapest electricity in the world, over 90% of the electricity is exported to South Africa and only about 5% is utilised by Mozambique. The study concludes that the Cahora Bassa as well as other dams along the Zambezi River represents a tremendous ecological debt owed by the Portuguese and South African governments to the peoples of Mozambique.

The case study of Mozambique is just but one of many examples of ecological debt cases in the world. In the name of development and investment, rich governments of the North and their Trans-national companies continue to construct mega-projects in Developing countries which often overlook ecological damage to the environment as well as people's livelihoods.

The paper further shows how weak and powerless governments in the Developing countries can become when confronted by trans-national companies. Pushed or lured to sign neo-liberal policies of the WTO, IMF and the WB, third world governments open up their countries for wholesale investment and or hurriedly enter into agreements which in most cases have had little or no thorough feasibility studies on environmental impact assessment. The thrust in such projects is merely profit making in the name of development, but whose development is it?

This research document is therefore a contribution to the on going ecological debt campaign not just for the people of Mozambique, but also for the global campaign. It is a call to the rich west to stop appropriating resources of the poor south in the name of investment and development but at the expense of poor people's livelihood. It is also a call to governments in the south to consult their people when and where they are being lured by trans-national companies and the International Finance Institutions to consider their country's environment and people's livelihoods. And where damages have been done, like in the case of Mozambique, by any rich country, it is time to pay back reparations for the damages.



Malcolm Damon  
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## Summary of Findings

- Zambezi River is the most dammed river in Africa having more than 30 large dams. This has resulted in loss of the river's natural memory leading to serious ecological and environmental problems down the river valley.
- Construction of the Cahora Bassa dam displaced over 57,000 people from their livelihoods and further construction of Mphanda Nkuwa will displace another 2,000 people down the river.
- The damming of the river has changed the water from a riverine to lacustrine, thereby affecting the ecosystem in and along the river.
- The huge mass of water held by the dams has disturbed the seismicity of the area rendering it more vulnerable to earthquakes.
- Management of the dams on the river is poor due to bad dam inter-communication leading to erratic flood control mechanism making the area flood volatile.
- The erratic flood control has led to deepening of valleys along the river, disruption of siltation crucial in flood agriculture systems, thereby affecting peoples' source of livelihoods, dwindling of fish and prawn industry and disruption of other marine life in and along the river valley
- The long and protracted political disagreement over ownership of the Cahora Bassa dam between the governments of Portugal and Mozambique has influenced the government of Mozambique to plan construction of the Mphanda Nkuwa Dam which, if implemented will further exacerbate the ecological problems down the river.
- The presence of the dams on the river greatly contributed to the year 2000 floods that ravaged the Zambezi basin.
- The construction of the dams has created new social, economic and environmental problems such as an increase in water borne diseases, accumulation of toxic waste and security problems.

## Summary of conclusions

- Greed and disregard for sustainable use of the Zambezi River by the rich powerful countries is leading Mozambique into a serious ecological crisis. As a result, the governments of Portugal and South Africa owe Mozambique an ecological debt.
- The political and economic furore between the governments of Mozambique and Portugal over ownership of the Cahora Bassa Dam should be resolved in favour of Mozambique in order to stop the Mozambican government from looking at construction of Mphanda Nkuwa Hydro-electricity Dam as the only alternative source of electricity and foreign exchange earnings. Mphanda Nkuwa Dam will be a frivolous expense to its fragile economy and will worsen environmental degradation, especially along the Zambezi River.
- Improved communication between managements of dams on the Zambezi River is the only way to effectively control erratic floods along the banks of the river which have caused repeated ecological disasters as registered. In 1978, 45 people died and another 200,000 were displaced. Additional floods occurred in 1997 and again in 2000, when thousands of people died in the worst floods ever to occur in Mozambique. Much of the flooding problem is a result of the poor communication between the dams.
- Efforts to re-establish the natural flow and flooding of the Zambezi River or simulating the original geo-nature of the river will not wholly solve the ecological impact done to the river over the years without concerted efforts of many stakeholders including the civil society.
- The Mozambican government must come up with a water act to protect future misuse of its waters while finding lasting solutions to sort the ecological impact left by the large dams on Zambezi River one of which is demand for an ecological debt from its debtors, Portugal and South Africa.
- Facilitation of experience sharing on the hardships faced by the people displaced by the dams would be a powerful way to influence government of Mozambique to reconsider the construction of the new dam at Mphanda Nkuwa.

## **Introduction**

The fact that the world environment is under serious threat of continued degradation that will lead to a global ecological disaster cannot be disputed. It is also an undeniable fact that this environmental degradation is the result of the pursuit and application of the ideology of trans-national corporations (TNCs), which is also the ideology of the capitalist class in the advanced countries. Ideas about sustainable development cannot succeed in a world where profit making, mass consumption, acquisition and greed inform or provide the fundamental bases for economic, political and social relationships. It is also apparent that those who exercise this dominant power are not only responsible for producing environmental degradation; they are also responsible for producing poverty in these contexts. This point is amply supported specifically by African experiences from the times of slavery, through colonialism and neo-colonialism in the current era of economic globalisation in the 21<sup>st</sup> century.

Countries of the South have seen the worst ecological disasters ever, ranging from the destruction of ecosystems due to the dumping of toxic waste materials and the extraction of resources by Northern industrialised countries including funds in the form of profits from the construction of mega-projects on rivers and elsewhere. For all of these reasons, the South is owed an ecological debt by the North.

As a specific case of ecological debt, this report focuses on the construction of large dams on the Zambezi River and the social and environmental costs this has generated from the perspective of the people of Mozambique living in the wetlands along the river.

The report has three parts beginning with an introduction to the case study and a brief explanation of the doctrine of ecological debt. The second part is an investigation of some of the ecological impacts of the dams on the Zambezi River focusing mainly on two dams – Kariba and Cahora Bassa; and a comparative debate on the two dams and the proposed new dam, Mphanda Nkuwa Dam, that the government of Mozambique plans to construct some 70 kilometres (km) from the Cahora Bassa Dam. By summarising the main findings and conclusions of the case study, the third and last part reiterates the justification for the ecological debt owed to Mozambique.

Overall, this case study on the construction of dams on the Zambezi River reveals the negative effects of the neo-liberal policies of imperialist countries supported by their TNCs on economically-poor countries. More often than not, the TNCs are financially and politically promoted by the World Bank (WB) and the International Monetary Fund (IMF), revealing the linkages of these international finance institutions to the neo-liberal agenda imposed on Southern countries. The case study of Mozambique brings to light the sufferings that the local people go through as a result of the construction of mega-projects in the name of the economic development of a country but at great expense to the livelihood of poor peoples.

The plan to build Mphanda Nkuwa Dam further shows the dilemma that many countries in the South have to live with as they struggle to overcome the anachronism of post-colonial history. On one hand, as the poor countries seek to have full control of their resources to develop their fragile economies, they are, on the other hand, faced by a hangover of colonialism wherein TNCs want to further establish economic control through neo-liberalism; hence, the justification for the campaign for ecological debt to the countries of the South.

## **Aims and objectives of the study**

This study is aimed at raising awareness on the effects of the impacts of construction of mega-projects in poor countries especially when communities who will be affected are not fully consulted. In this case, the research focuses on dams on the Zambezi River, in particular, the Cahora Bassa Dam and the famous Mphanda Nkuwa Dam, which the Mozambique Government intends to construct in the near future. Despite the fact that the Cahora Bassa Dam is in Mozambique, it is still owned by the government of Portugal until the government of Mozambique has fully repaid the US\$2 billion it owes to Portugal, or if the current negotiations to repossess the dam by the Mozambican government work out favourably for them<sup>1</sup>.

Unfortunately, the people of Mozambique, including those displaced by the dams, do not enjoy the benefits of the dam since most of the electricity is sold to South Africa. The research was also aimed at critiquing the weak position that national governments often take when they are faced with or lured by mega-projects that usually do not even benefit the local people or the governments themselves.

## **Methodology of the study**

The research combined desk study and field research whereby some key informants in Mozambique were interviewed. The desk research examined work done by some institutions and people, principal of which was that of the World Commission on Dams<sup>2</sup>, Livaningo<sup>3</sup>, International Rivers Network<sup>4</sup>, and Prof. Joan Martinez-Alier<sup>5</sup>.

They have done tremendous work to unfold the dangers of further construction of dams on the rivers and to try to save the ecosystems and source of livelihoods of people and wildlife along rivers. Efforts to reach the government of Mozambique for comments on plans for repossession of Cahora Bassa Dam and plans for the construction of the Mphanda Nkuwa Dam proved futile – the researcher could not get clearance to meet government officials at the Ministry concerned.

## **What is ecological debt?**

There have been many definitions given to what ecological debt is. For the benefit of this paper, ecological debt is defined as the cumulative responsibility of industrialized countries, including their TNCs, for the destruction caused by their production and consumption patterns while extracting precious minerals and oil, or the impact made on the environment and the people affected after construction of mega-projects such as water dams. In other words, it is the debt that the North owes the South due to environmental plunder, occupation of the environmental space, and the continued imposition of neo-liberal policies on poor countries<sup>6</sup>.

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<sup>1</sup> At the time of doing this research, the governments of Portugal and Mozambique were already discussing on the way forward to give the government of Mozambique full ownership of the dam on the condition that Mozambique repays the US\$ 2 billion debt in a reasonable time scale.

<sup>2</sup> A commission set up in May 1998 by the World Bank and the World Conservation Union as a direct response to the growing opposition to large dams. Its mandate is to review the development effectiveness of large dams and assess alternatives for water resources and energy development

<sup>3</sup> The civil society organization in Mozambique spearheading the fight against environment degradation more especially further construction of dams on the Zambezi River.

<sup>4</sup> Leading organization working to halt the construction of destructive river development projects: [www.irm.org](http://www.irm.org)

<sup>5</sup> Professor in Economics and Economic History at Barcelona University and producer of several books on Environmental Justice

<sup>6</sup> Donoso A, No More Looting, 2000

However, countries of the South that have shared in the looting and plunder of resources from other fellow southern countries also owe an ecological debt to the countries they have plundered.

For instance, corporations in South Africa have been involved in electricity supply sourcing from Mozambique and also in the mining industry in other African countries.

The causes of ecological debt include

- The looting, destruction and devastation carried out by the rich countries during the colonial period.
- The extraction of natural resources (e.g. petroleum, minerals, marine, forest and genetic resources) that continues to destroy the basis of survival for Southern people.
- Ecologically inequitable terms of trade, whereby goods are exported without taking the social and environmental impacts of their extraction or production into account.
- The intellectual appropriation and use of traditional knowledge related to seeds and medicinal plants, upon which biotechnology and modern agro-industries are based, and for which countries in the Third World are expected to pay royalties.
- The use and degradation of the best lands, and of water, air, and human energy for the development of export crops, thus putting the food and cultural sovereignty of both local and national communities at risk.
- The contamination of the atmosphere by industrialized countries through their disproportionate emission of gases causing climate change and ozone depletion.
- The illegitimate appropriation of the atmosphere and of the carbon absorption capacity of oceans and vegetation.
- The production of chemical and nuclear weapons and substances, and the toxic wastes that are deposited in the Third World<sup>7</sup>.

## **Why the ecological debt campaign?**

Countries in the South must fight for the recognition of ecological debt at all levels, i.e. local up to international, in order to penalize those responsible for social and ecological damages, to demand for the restoration of the environment as well reparations and, finally, to stop further generation of ecological debt. Civil society organizations, including churches have to raise more awareness on ecological debt just as they have done with the campaign for the cancellation of foreign debts for Third World Countries from the late 1990s. Ecological debt, just as the demand for foreign debt cancellation, has both a moral and economic justification in that people, regardless of their economic status or geographical location, have the right to a clean environment that would support their livelihoods and well being. Nobody has the right to take away this right from anybody not even in pursuit for economic gains more especially if the gains do not benefit the victims. The fight for ecological debt will also help to deter other people, TNCs or countries from damaging ecosystems of weak and poor people or countries in the name of development or investment.

## **Historical genesis of ecological debt**

The problem of ecological debt stems from the colonial period when European conquistadors began to pursue the resources of the South for their own good but at the expense of the people of the lands where these resources were extracted.

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<sup>7</sup> Donoso, A, 2000:2

Through centuries of colonialism and North-South linkages, countries of the North became extremely rich from the cheap resources and labour of the South. It is right therefore to conclude that the high living standards enjoyed by the industrialised countries now is due to a great extent to the immense flows of natural and financial resources and labour (either slave or underpaid) from the Third World.

Today, the condition has not changed at all. There is still an immense resource outflow to the North which does not take into account the social and environmental damages caused by resource extraction in Southern countries. In other words, the impoverished countries of the South have been, and still are, subsidising the rich countries of the North.

This trend has worsened. The way the ecological problem is being exacerbated is very subtle. While during the colonial period the extraction of precious metals and other resources was an openly violent affair, today's looting is organised through international organisations such as the IMF, the World Bank and the World Trade Organisation which dictate world economic policy in order to maintain a system of dominance and control over the trade of financial and natural resources. As a result, countries of the South are forced to open up to the TNCs in such a way that the countries have very little control over what the TNCs do and usually cannot hold them accountable for any damage done to their ecology because TNCs are protected by trade rules that benefit the rich countries.

Unfortunately, damage to the ecology will worsen as increasing production and trade means greater energy requirements and the use of more natural resources. Simultaneously, it means greater external debt for the South since, under the dominant development paradigm, rapid progress can only be achieved through external financing, which is usually available through the agencies of rich countries of the North. Once this is availed of, the process of paying back the financial debt begins. The production and consumption patterns that drive and sustain Northern economies cause environmental deterioration on a global scale. For example, the current statistics which show that the richest 20 percent of the world's population consumes 80 percent of the planet's natural wealth is obviously unjust and unsustainable.

## **Case study from Mozambique**

Mozambique was chosen to be a case study for ecological debt because of the work that the Economic Justice Network is doing with civil society and churches in the country. Of late, especially after the year 2000 floods, Mozambique has been under focus by scholars and researchers to discover the real cause of the floods and to seek a lasting prevention to reoccurrence of similar disasters in the country.

A review of the documentation on the 2000 floods in Mozambique and the role of the dams on the river showed some linkages between the ecological impact and the fight for ecological debt. The paper will endeavour to add this element to the literature on the dams and their ecological impact on the country.

## **Dams on the Zambezi River as sources of ecological debt**

There is no river in the world that is as heavily dammed as the Zambezi River. It is estimated that more than 30 large dams<sup>8</sup> – the major ones being Kariba, Cahora Bassa and Itzhi-Tezhi – have already been constructed to generate electricity.

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<sup>8</sup> International Rivers Network: [www.irm.org](http://www.irm.org)

The dams were built at great cost to the local people and environment. The negative impacts of the dams have been particularly harsh in Mozambique where the giant Cahora Bassa Dam displaced tens of thousands of people and severely degraded downstream floodplains, disturbing agriculture and the fishing industry and even the life patterns of people living on river banks. Another famous dam on the river is the Kariba Dam constructed from 1955 to 1959.

The government of Mozambique is now planning to construct yet another dam called Mphanda Nkuwa Dam on the Zambezi River to meet its ever growing need for electricity as well as to fill demand for export of electricity to other Southern African Development Community (SADC) countries. For the purpose of this research, emphasis will be on the Kariba and Cahora Bassa Dams and the proposed Mphanda Nkuwa Dam.

## **The Kariba Dam**

The Kariba Dam, sometimes referred to as Lake Kariba, was constructed at a cost of £80 million financed by a consortium of financing institutions via the World Bank<sup>9</sup>. The dam has a storage capacity of 180 km<sup>3</sup>, extending over an area of 300 km, covering a flood area of 5,500 km<sup>2</sup>, and producing up to 1,266 megawatts of electric power. Situated between the borders of Zimbabwe and Zambia, it is jointly owned by the two countries. The *sole* aim for its construction was to generate electric power for the two countries to substitute the coal-powered electric generators which were thought to be unfriendly to the environment, and to meet the ever increasing demand for electric power in the copper mines of Zambia and industrial and urban growth centres in Zimbabwe. Thus, the designers planned the dam in such a way that it would achieve these specific functions.

However, research and studies conducted on Kariba Dam indicate that there have been many unexpected positive and negative outcomes from the dam since its construction, some of which are:

### ***On the positive side***

- Growth of tourism in the areas around the dam, especially on the Zimbabwe side;
- The introduction of *kapenta* fish from Lake Tanganyika to the fishing industry on the Zimbabwe side; and
- Irrigation programme using waters from the dam.

### ***On the negative side***

- Displacement of over 57,000 people who, up until recently, have not been compensated nor given alternatives for the loss of their livelihoods;
- Increase in water-borne diseases due to the creation of the unnatural body of water;
- Increased incidences of earthquakes in the surrounding area due to disturbance of the seismicity of the area as a result of the presence of a huge unnatural mass of water at the end of the Rift Valley that is prone to tectonic activities, and of the presence of the reservoir itself;
- Loss of agricultural land due to the flooding of the dam area;

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<sup>9</sup> The institutions include: international Bank (IBRD), British South African Company, Federal Government, Commonwealth Development Finance Company, Colonial Development Corporation, Copper Companies

- Disturbance to aquatic and terrestrial habitat due to loss of river memory and flooding of the area which killed or pushed out many wild animals from their natural habitat;
- Change of a section of the river from riverine to lacustrine with the consequent effect of changing its habitat from riverine to lacustrine as well;
- Mushrooming of townships around the dam that has created new social problems such as pollution and waste management and human insecurity;
- Loss of trees through annual bush clearing around the pylons transmitting power inland to Zimbabwe and Zambia; and
- Further death of birds and wild animals as a result of electrocution on the high voltage pylons.

## **Lessons from Kariba Dam**

It is very important and interesting to note that, first, the Kariba Dam was constructed prior to the setting up in 1977 of the World Commission on Dams, the world body that regulates and controls the construction of mega-dam projects around the world. Second, while the dam was constructed for the sole purpose of generating electricity for Zambia and Zimbabwe, today it is being used for many other activities.

Third, the funding institutions, the World Bank and the owners, Zambia and Zimbabwe, did not give much consideration for the 57,000 people and huge number of wild animals that were displaced. Only later, when they saw that the water was going to displace wild animals, did they come up with the famous “Operation Noah” to rescue the animals where possible. In other words, the Kariba Dam project was not accompanied by a prior thorough impact assessment to the environment, the people and the biodiversity in the area.

## **Cahora Bassa Dam**

Cahora Bassa Dam, the second largest dam on the Zambezi River, and the fourth largest dam in the world, covering a distance close to 270 km, is situated in the Tete Province in Mozambique.

Constructed by ZAMCO – a consortium of companies consisting of AEG Telefunken, BBC, and Siemens AG of Germany at a total cost of US\$2 billion financed by the Portuguese government and was commissioned in 1975. It has a water holding capacity of close to 52,000 million cubic metres, and generates up to 2,075 MV<sup>10</sup> of electricity, of which 533 KV<sup>11</sup> (DC) is exported to South Africa and another portion to Zimbabwe. Only about one fifth is used in Mozambique.

Unlike Kariba Dam, which is jointly owned by the governments of Zimbabwe and Zambia, Cahora Bassa Dam is 82 percent owned by the Portuguese government through its firm, Hidroelectrica de Cahora Bassa (HCB), while the government of Mozambique has only 18 percent of shares in the dam. In terms of transmission of the power, ESKOM South Africa offers much of the technical expertise.

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<sup>10</sup> Mega Volts

<sup>11</sup> Kilo Volts Direct Current

**Table 1: Facts about Cahora Bassa Dam<sup>12</sup>**

Length of the lake	270 km
Area	2 660 km <sup>2</sup>
Catchment Area	1 200 000 km <sup>2</sup>
Capacity	52,000 million cubic metres
Average inflow	2,800 cm <sup>3</sup> per second (cumecs)
Flood inflow	Above 30,000 cumecs
Wall height	160 metres
Dam Crest	Altitude 331 metres
Wall Type	Double curved concrete arch
Generating Potential	4,000 megawatts

### **Impact of the dam on the river and the environment**

Studies and research work done so far on the Cahora Bassa Dam indicate that the dam has caused considerable environmental impact on the river itself as well as to people living along the banks of the river and the ecosystem in the river basin, especially on the flood-based agriculture and fishing industries.

Before construction of the Cahora Bassa Dam, Kariba Dam already regulated the flow of the river to the extent that aquatic and marine life as well as the flooding patterns in the plains along the river changed. With the addition of Cahora Bassa Dam, the structure of the river was further transformed to the extent that the natural flooding season, which took place from January to April, was drastically altered thereby affecting the farming seasons of the people along the plains. Prior to river regulation, agriculture in the lower Zambezi centred on floodplain recession practices in response to annual flood cycles: planting in April and harvesting prior to the main flood.

The dam, therefore, disrupted both the social practices of the people in the plains and disturbed the ecological processes along the river. It is, therefore, right to conclude that the engineers and planners of the dam did not do a thorough environmental impact assessment on the long-term effects of constructing the dam on the river and had therefore no concern for flood-related agricultural systems nor the preservation of the wetland and delta which are very important to the marine life in the lower part of the river. To this effect, the 1963 United Nations Conference on the Application of Science and Technology for the Benefit of Less Developed Areas correctly noted that:

“Hydroelectric dams, financed by the World Bank and other large international lenders, are being built at an alarming rate with little regard for their impact on the indigenous peoples of the region. The projects are often viewed as panacea for developing countries. Unfortunately, the hidden costs of such projects frequently go unnoticed”.

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<sup>12</sup> Utip, (2003), Mphanda Nkuwa Hydropower project feasibility study, see also: [www.utip.org.mz](http://www.utip.org.mz)

## **Little profit to the people of Mozambique**

In as far as development for the people of Mozambique is concerned; Cahora Bassa Dam plays a very minimal role.

Despite producing the cheapest electricity in the world, over 80 percent of the electricity is exported to South Africa and Zimbabwe, and only about 20 percent is utilized in Mozambique. Yet, the ecological impacts are felt by the indigenous people in the country.

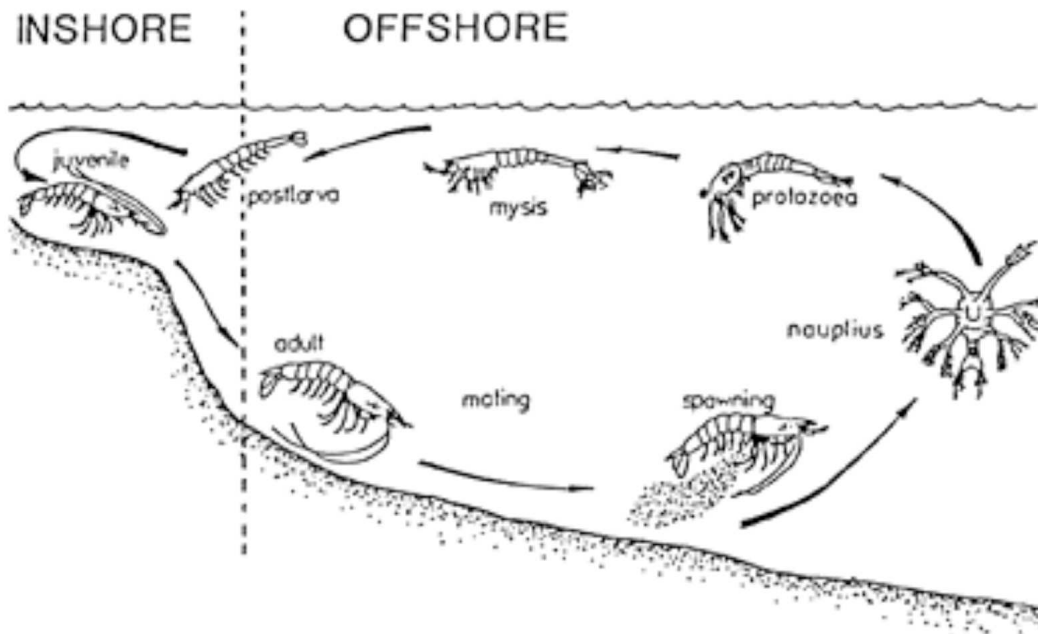
As indicated previously, the dam is still owned by the Portuguese government that controls and manages the production of the electricity via its state owned company, the Hidroelectrica de Cahora Bassa which in turns sells the electricity to South Africa. Despite many discussions to give control of the dam to the government of Mozambique, the Portuguese government still takes a very strong stand that it can only handover ownership of the dam if the government of Mozambique repays in full a debt of US\$2 billion incurred in the construction of the dam and for loss of revenue incurred during the 1975 to 1986 Civil War in the country.

## **Disruption of the shrimp, prawn and fishing industry**

Due to loss of natural wetlands and disruption of silt sedimentation which form the basis for food nutrients on which the shrimps and fish feed, the catching of shrimps, prawns and fish has gone down drastically resulting in disruption to the industry.

Prawns develop at the interface of marine and freshwater environments, such as mangrove areas, river estuaries and deltas. Floods are critical to aiding juvenile prawns to enter the sea. This is part of the prawn's life cycle. In the dry season, adult prawns lay eggs into the sea which then develop into larvae. The sea pushes the larvae to mangroves along the coast where the larvae grow into juveniles. These are pushed back into the sea during the wet season, aided by floods from rivers, where they develop into adults. Alteration of the natural water flow in the Zambezi River means a disturbance to the life cycle of the prawns and consequently to the population of the prawns in the river as well.

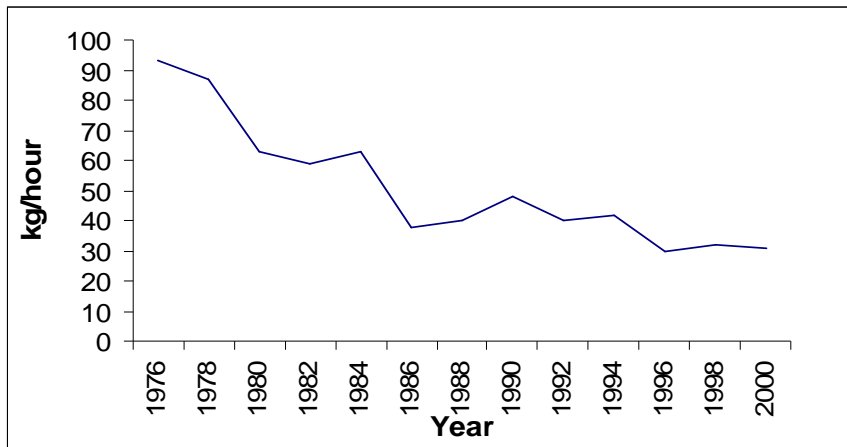
**Figure 1: Diagram of a typical penaeid prawn life cycle<sup>13</sup>**



Research conducted on prawn catch in the last few years revealed that the volume of catch is on the decline, having dropped from as high as 90 k/hr in 1978 to as low as 30 k/hr in 2000.

Even though there might be other factors leading to this, the major cause is the disruption of the flooding periods of the Zambezi River which has negatively impacted on the population of the prawns in the river.

**Figure 2: Prawn catches in Sofala Bank (Hoguane<sup>14</sup>)**



<sup>13</sup> Gustav, M et Lucia S. (2004). Why are prawns in the Sofala Bank declining? Paper presentation, Justica Ambiental, P2 citing: [www.thesis.library.adelaide.edu.au](http://www.thesis.library.adelaide.edu.au)

<sup>14</sup> Hoguane, A.M. (In Press), The Role of Zambezi runoff in the shrimp abundance in Sofala Bank

## Floods in 2000

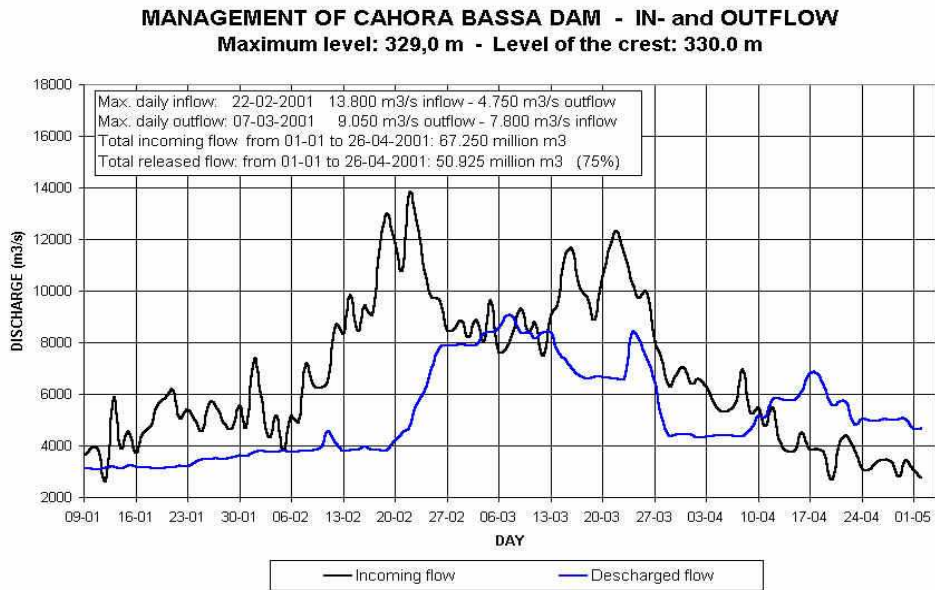
Even though some people have argued that the dams, especially the Cahora Bassa Dam, assisted in curbing the worst results of the 2000 disastrous floods in Mozambique, there is a lot of incriminating evidence that the dams, including the Kariba Dam, aggravated the 2000 floods.

According to a research done by a South African engineer and flood historian, Dirk Van Bladeren<sup>15</sup>, the 2000 floods were the worst floods ever recorded in the history of floods in Mozambique since 1848.

As reported by the Mail and Guardian<sup>16</sup> Newspaper of March 2001, those who argue that the dams on the Zambezi River assisted in curbing the worst occurrence of the floods state that:

“With regard to the so-called myth that *"the Cahora Bassa Dam cannot help reduce the impact of the flood"* or even worse, that *"the Cahora Bassa Dam is causing the current flood"*, it can be clearly seen from the graph that since the 9<sup>th</sup> of January, the dam outflow has been (sometimes even considerable) less than the inflow of the dam, the management of the dam and National Water Board (DNA) have done everything to minimise the impacts downstream of the dam. As such it is evident that the Cahora Bassa Dam in the very case of the floods of February and March 2001, in fact has helped significantly in the reduction of the impacts”.

**Figure 3: Management of Cahora Bassa Dam<sup>17</sup>**



This argument has been discredited by other researchers who have categorically said that the dams, to a large extent, were responsible for the flooding of the lower Zambezi River. Further research by Dirk Van Bladeren on the flooding level done at Xai-Xai in Mozambique since 1915 showed the following results:

<sup>15</sup> Engineer and Flood Historian

<sup>16</sup> David Le Page, “Floods ‘a predictable disaster,’” Mail and Guardian Newspaper, South African Edition, 27 March 2001.

<sup>17</sup> Mozambique Floods 2001, Cahora Bassa Role in Mozambique Floods, DNA, Maputo

**Figure 4: Flood levels since 1915<sup>18</sup>**

Year	Flood Level in Metres
1915	1.4
1955	0.5
1967	0.6
1972	0.9
1981	0.9
2000	4.7

It also argued that while the floods were a result of a combination of many factors, including climatic causes, the dams worsened the situation. For many years, the dams have acted as catalysts for the problem. And as long as the dams keep on regulating unnaturally the water flow on the river, they will continue to post risks to the people of Mozambique.

Professor Bryan Robert Davies<sup>19</sup> of the Fresh Water Project states that the major problem that exists between the two dams Kariba and Cahora Bassa, *is that they do not talk to each other properly and efficiently as regards when to open the flood gates or when to close them.* Civil society groups in Mozambique<sup>20</sup> concur with him and stress that it is the questionable management of the dams that poses great risk to the people living downstream. The people do not know when the river will overflow or recede. In other words, there is no coherent flood management policy for the two dams on the river.

## **The proposed Mphanda Nkuwa Dam**

Despite all the concerns raised on the Cahora Bassa and Kariba Dams, and civil society advocacy to improve management of the existing dams on the Zambezi River as a way to save the Zambezi River from further damming, the government of Mozambique plans to construct yet another dam, the Mphanda Nkuwa Dam.

According to an environmental impact assessment carried out by Unidade Tecnica de Implementacao dos Projectos Hidroelectricos (UTIP)<sup>21</sup> in April 2003, it is estimated that the construction of the dam would submerge more than 100 km<sup>2</sup> of arable land and would displace over 2,000 people down the stream. The Parliament of Mozambique endorsed the project and soliciting of funding is currently under way. The dam will hold 2,324 cm<sup>3</sup> of water to produce 1300 megawatts of electricity. The total cost to construct the dam is close to US\$2 billion, of which the government of Mozambique has yet to identify the funding source. Most likely, the government will borrow from international financial institutions, thereby exacerbating its level of indebtedness.

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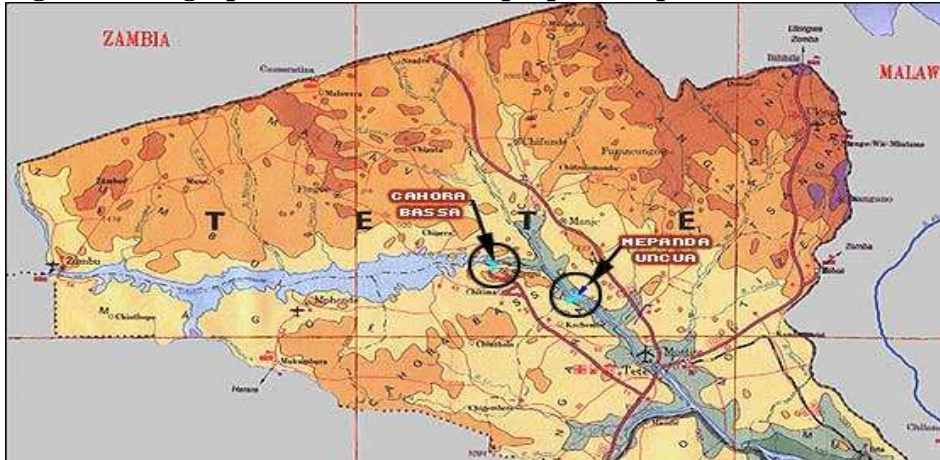
<sup>18</sup> Livaningo, Mozambique's Ecological Debt, January 2004, p4

<sup>19</sup> 09:03:01: Mozambique: Floods Should Prompt Dam Rethink, report by UN Integrated Regional Information Network( Nairobi) see: [www.rivernet.org](http://www.rivernet.org)

<sup>20</sup> Livaningo and the Environmental Justice Groups, local civil society organizations in Mozambique

<sup>21</sup> UTIP contracted Lahmeyer International, Electricite de France and Knight Piésold to do the feasibility study of the dam and its potential

**Figure 4: Geographical location of the proposed Mphanda Nkuwa Dam<sup>22</sup>**



### **Is the Mphanda Nkuwa Dam necessary?**

According to sources from the government of Mozambique, the construction of Mphanda Nkuwa Dam is crucial to supplying energy to its grand enterprises, MOZAL<sup>23</sup> and to the Southern African Development Community (SADC) region. It would be a source of electricity to Mozambique and other countries in the region. Besides being endorsed and approved by the parliament, the dam also has the blessings of New Partnership for Africa's Development (NEPAD) and sees it as one way of enhancing development and regional integration in the SADC region and beyond.

However, according to civil society groups such as Livaningo, the main reason the government of Mozambique intends to construct the dam is political in nature rather than developmental. The Cahora Bassa Dam, which provides cheap and affordable electricity to the region, is still owned and managed by the Portuguese government.

It is believed that when the new dam is constructed by 2010 as envisaged, the countries which are currently tapping electricity from the Cahora Bassa Dam would easily switch to use the electricity from the Mphanda Nkuwa Dam. This would consequently force the Portuguese to abandon their interest in the Cahora Bassa Dam.

Currently, the governments of Portugal and Mozambique are locked in discussions on the ownership of the Cahora Bassa Dam. The government of Mozambique wants to take over ownership but the Portuguese demands that, before this can happen, Mozambique must repay the US\$2 billion that Portugal claims Mozambique owes due to the loss of revenue incurred during 11 years (1975-1986) of civil war in the country.

The government of Portugal, which constructed the dam 25 years ago, claims to have lost millions of dollars during the war and through repairs as a result of sabotage activities, mainly by the RENAMO<sup>24</sup> army on the dam.

<sup>22</sup> UTIP (2003), Mphanda Nkuwa Hydropower Project Development Prospect, Republica de Mozambique, Ministry of Natural resources and Energy, Maputo p4

<sup>23</sup> MOZAL, is a consortium of investors led by South Africa's BHP Billiton smelting aluminum in Mozambique

<sup>24</sup> National Resistance Movement, a rebel movement that fought guerilla warfare against the ruling Freedom Liberation Movement RENAMO waged a number of sabotage attacks on Cahora Bassa Dam and caused considerable damage and loss of revenue

## Opposing views to the construction of the new dam

There are many dissenting views – locally and internationally – to the construction of a new dam in Mozambique. The civil society in Mozambique, led by Livaningo and the Environmental Justice Group, has protested strongly to the government’s plan to proceed with the construction of the dam. The reasons given for opposing are as follows:

- Mozambique already has enough capacity to generate electricity for local consumption as well as for export from the Cahora Bassa Dam. As such, there is no need for a new power-generating dam.
- The new dam will further displace over 1,000 people down the river and submerge over 100 km<sup>2</sup> of arable land for potential agricultural use.
- It is not certain that the electricity that will be generated will benefit the local people of Mozambique. It may be exported.
- The new dam will increase managerial problems of dams on the river.
- Financially, the government of Mozambique is not capable of constructing the dam and will be forced to contract new loans thereby creating new foreign debt for this highly indebted poor country (HIPC).
- The effects of flooding the dam may create may spill over to other countries like Malawi and could create trans-national problems.

Civil society in Mozambique believes that the only way to meet electricity needs in Mozambique in a sustainable manner is for the government to step up management and market of electricity from the existing power stations in the country. The government has to also enter into further negotiations with the current owners of the Cahora Bassa Dam, the Portuguese government, to discuss a time scale and viable modalities for taking ownership of the Cahora Bassa Dam.



Students’ protest against the construction of Mphanda Nkuwa Dam in 2003, Maputo Mozambique  
The banner says: “Let our rivers run free for the future generations”.

On the international scene, institutions such as the International Rivers Association and even the World Commission on Dams have protested the construction of the new dam in Mozambique citing the following reasons<sup>25</sup>

- Mphanda Nkuwa Dam would jeopardize ongoing efforts to restore natural flow of water in the lower Zambezi in that its construction would further regulate the flow of water in the river

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<sup>25</sup> IRN, Mphanda Nkuwa Dam, A risky proposition: [www.im.org](http://www.im.org)

- The proposed dam demonstrates government's interest to generate foreign exchange earnings rather than to have a viable water policy that would effectively manage the Zambezi River and other rivers in the country.
- The dam would cause daily water level fluctuations in the river, provoking mini-floods which would impact on about 150,000 people. There is, therefore, a need for further environmental impact assessments in accordance with the guidelines of the World Commission on Dams.
- With the construction of other dams in the Democratic Republic of the Congo and other countries within the SADC region, the idea that Mphanda Nkuwa Dam will sell electricity to other neighbouring countries may no longer be viable and may only be a resource drain in the long run.
- Consultations with local stakeholders and other partners were not exhaustive and did not take into account all possible risks to avoid future occurrence of mistakes like those that happened at Cahora Bassa Dam where other unforeseen social, and environmental problems arose.

### **Justification for the fight for ecological debt**

Looking at the impact of dams of the Zambezi River, one cannot but agree that Mozambique is owed an ecological debt by those who constructed and have made profits from the dams especially the Portuguese government and the South African company Eskom.

After the fateful floods of 2000, Mozambique should have received full debt cancellation of its foreign debt to allow the country to rebuild its infrastructure, redress the damaged ecosystem along the river and provide reparations to communities for the loss of their homes and livelihoods, rather than the debt rescheduling it got.

If Mozambique had not been servicing its foreign debt which by 1986 was close to US\$8 billion, the money could have been used to improve on its infrastructure so as to avert some natural calamities such as the flood of 2002. Mozambique has been spending more money to service its debt than it has been allocating to primary health care, education and infrastructure development after the civil war. And so, for the creditors of Mozambique to reschedule debt servicing in the midst of the floods that were prompted to a large extent by dams not even owned by the Mozambican government was too small an economic gesture to give to a country faced massive work of reconstruction the country was to undertake.

As stated earlier in the paper, the dams have created a huge ecological problem to marine, agriculture and livelihoods of the people in that they have distorted the natural ecosystem and have created new social problems such as water-borne diseases, erratic flooding and disruption of household economies especially those of fishermen. The people of Mozambique have every right to demand justice for the ecological debt from those responsible for the damage along the Zambezi River.

## **Quantifying the ecological debt owed to Mozambique**

Quantifying ecological debt has been one of the hardest exercises, much harder when compared to quantifying foreign debts of poor nations. In a dedication article to the late Manolo Barreno, former coordinator of the Ecuadorian Jubilee Campaign, entitled “Ecological debt, South Tells North: Time to Pay Up,” the author concurs with Joan Martinez-Alier (1998: 15), who states that:

“Although it is not possible to make an exact accounting, it is necessary to establish the principal categories of ecological debt and certain orders of magnitude in order to stimulate discussion”.

In this regard therefore, the ecological debt to Mozambique can be quantified approximately to determine how much is owed from the damage caused over the years since the construction of the dams on Zambezi River. It can also be categorized according to sectors such as loss in the prawn and fish industry, the cost of displacement due to flooding and movement from original livelihoods following construction of the dams, and, finally, vulnerability to earthquake created on the area as a result of disturbance to the seismicity of the area due to the creation of the artificial water bodies. There is a need to conduct more studies to determine and quantify how much Mozambique is owed in ecological debt.

## **Conclusion**

In conclusion, greed and disregard for sustainable use of the Zambezi River by the rich powerful countries is leading Mozambique into a serious ecological crisis. In this case, the governments of Portugal and South Africa and the financiers, builders and concessionaires of the Cahora Bassa Dam owe the people of Mozambique an ecological debt.

As it has already been shown, ecological debt is directly linked to foreign debt in most of the poor Third World Countries.

In some countries, the demand by the international creditor nations and institutions to repay unsustainable debts (combined with the imposition of structural adjustment programs), compels them to undertake ecologically destructive practices just to meet their debt payments. The debtor countries have no choice but to produce exports far beyond what is needed for their own populations. Such overproduction for export is what aggravates ecological trends in poor countries.<sup>26</sup>

In the case of Mozambique, the ecological debt owed to the country is directly linked to the Apartheid caused debt resulting from the destabilisation by the then South African Government’s involvement in funding and backing the RENAMO guerrilla fighters who destroyed infrastructure at the Cahora Bassa and led to losses in revenue to both the Cahora Bassa hydro-electricity company and the Mozambican government. On the other hand, the FRELIMO backed government was forced into odious debts to purchase weapons to fight the RENAMO rebels to ensure political stability in the country. And so the ecological damage that the Cahora Bassa dam has made to ecosystems along the Zambezi River especially in the legendary floods of 2000 cannot be mitigated by the revenue collected over the years from the dam.

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<sup>26</sup> Ecological Debt: South tells North, “Time to Pay up” (2000: 4)

And that to date, the multilateral creditors<sup>27</sup> have no plans in the near future to cancel Mozambique's foreign debts of US\$8.2 billion for such a poor country coming from a 15 years civil, afflicted by the worst floods ever in its flood history since 1848, and where 78% of its 16.9 million people live below 1US\$ per day and yet force the country to undergo structural adjustment programs, begs a big question as to whether these IFIs have the welfare of poor African countries at the heart of their reconstruction and development programmes. The people of Mozambique, especially the civil society and the churches, must advocate for the recognition of this ecological debt and fight for reparations. An important starting point would be to fight for the unconditional cancellation of the foreign debt of Mozambique so that funds may be freed up to restore the damaged ecosystem and indemnify communities who lost their land and livelihood because of the construction of the dams along the Zambezi River.

The fight for recognition of ecological debt is not without problems. Some view the ecological debt campaign the same way they do the fight for the cancellation of the illegitimate debt held by Southern nations – as a purely legal issue.

Some also think that the debate on ecological debt would create more tension and confusion, especially when it comes to claiming reparations from the North for ecological damages caused in the South. This arises from the complication that some actors in the South have also contributed to ecological debt. A good example is the question of slavery and slave trade where African tribes captured each other as slaves and then other races bought the slaves or even captured Africans as slaves.

Nonetheless, there are many who view the whole debate on ecological debt as *a moral fight*. This is because the struggle for the recognition and payment of ecological debt is essentially a struggle for the protection and affirmation of human rights, especially the rights of exploited people to a life of dignity, safe environment, clean water, nourishing food and also just livelihoods. This is the view civil society and churches hold. Civil society's fight for ecological debt is meant to bring to an end any further occurrence of degradation of the ecology by firstly making those responsible for damages accountable for the damages caused.

The ecological debt campaign is therefore a fight for environmental justice whereby companies which want to put up mega-projects should recognise and respect the dignity of nature, the web of life and the independent rhythms of biological and ecological processes (Friends of the Earth, (2004)). In other words, the ecological debt campaign is a way to protect environments and peoples against the aggression of neo-liberal economic globalisation which puts profit and money first without taking into account the welfare of human beings and their environment.

Those who abuse the biosphere, transgress ecological limits, and enforce unsustainable patterns of resource extraction owe a huge ecological debt to the peoples of the South and are under the obligation to make remedies for their behaviour.

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<sup>27</sup> At the time of doing this research, Mozambique was amongst the 18 HIPC countries that the G8 were to consider having their foreign debts cancelled 100% at the Gleneagles conference

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