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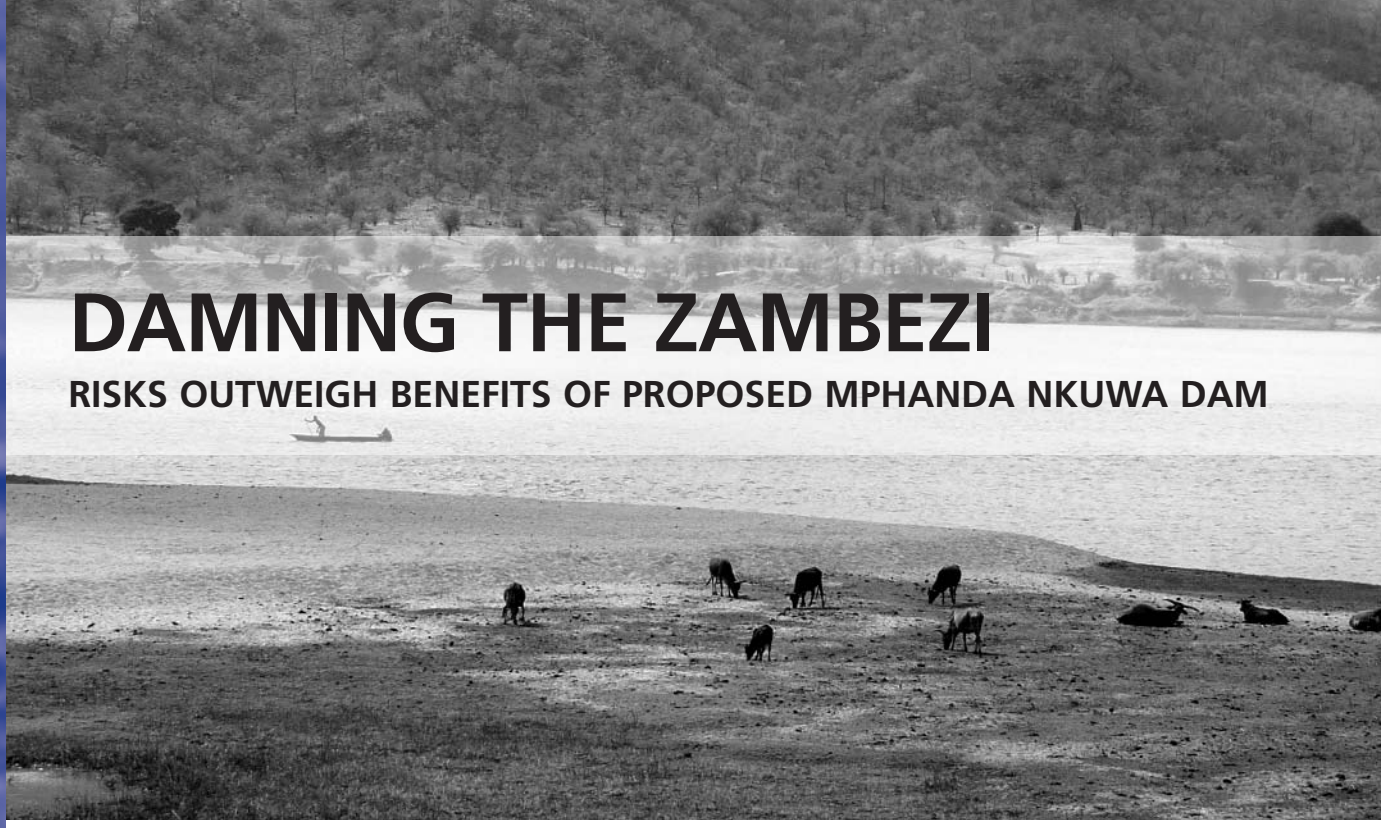
DAMNING THE ZAMBEZI

RISKS OUTWEIGH BENEFITS OF PROPOSED MPHANDA NKUWA DAM



The Zambezi River, downstream of the site for the proposed Mphanda Nkuwa Dam. Photo: Justica Ambiental

The Zambezi is one of Africa's most important rivers, supporting rich ecosystems and large populations of people and wildlife. The Zambezi delta is, biologically, the richest wetland in East Africa, and in 2003 was declared a "Wetland of International Importance" under the Ramsar convention. However, the Zambezi is also one of Africa's most heavily dammed river systems, and its health is in decline. More than 30 large dams in the basin constrict its flow. These impacts have been particularly harsh in Mozambique, where the giant Cahora Bassa Dam displaced tens of thousands of people, and severely degraded floodplains and fisheries.

Today, significant work is underway to restore the lower Zambezi by improving Cahora Bassa's water release patterns to more closely mimic natural flows. But that effort could be undermined if the Mozambique government moves forward with plans to build the proposed Mphanda Nkuwa Dam just 70 kilometres downstream of Cahora Bassa. Mphanda Nkuwa will require Cahora Bassa to operate according to its current destructive release patterns, and make downstream restoration very difficult. The dam could also exacerbate downstream environmental damage by causing daily fluctuations in river levels, and reducing the natural flow of river sediments, which are critical to the delta's health.

After years of futile attempts to secure funding for the controversial project, the government landed a partner in May 2006, when the China Export-Import Bank announced it would fund Mphanda Nkuwa. The announcement comes at a time when Chinese involvement in troubling projects across Africa is a growing concern.

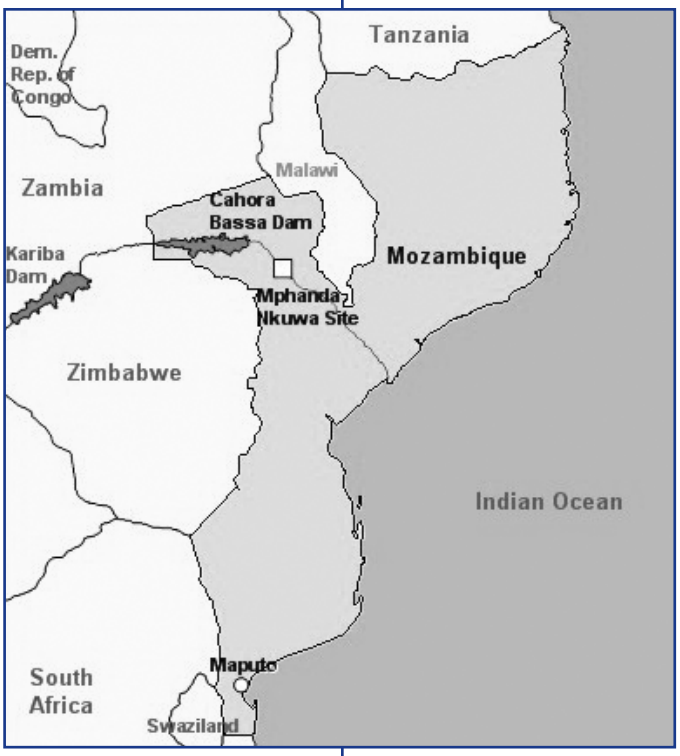
The dam's estimated capacity of 1,300 megawatts of electricity generation would be used for export and to attract energy-intensive industries to Mozambique, but this power would come at a high price. Some 1,400 people would be displaced by the dam, and an untold number by the transmission lines. The project would also compromise the livelihoods of the 200,000 or so subsistence farmers and fishers living downstream of the dam. Currently, there is no plan to compensate communities living downstream of the proposed dam. Adding insult to injury, those who are most impacted by the project's negative impacts will not benefit from the power it produces, as it is too expensive to extend the transmission lines to rural villages.

Civil society has not been able to examine many of the project's studies, and local NGOs have consistent-

ly called for greater transparency and a more democratic planning process. But what information is in the public realm does not bode well for improving the health of the Zambezi or the people and animals who depend upon it. Below is a summary of some of the environmental, social and economic risks this huge project poses.

ECONOMIC RISKS

The dam's energy output will be dependent on consistent rainfall in a river basin (and wider region) known for its climatic variability. In recent years, drought in the basin forced the upstream Kariba Dam to operate at only 14 percent of its capacity. Climate change is expected to increase the variability of rainfall in the region (increasing the risk of both worse droughts and floods), thus making hydropower even riskier. To date, no large hydropower dam has been designed to take into account climate change scenarios.



Mphanda Nkuwa could suffer the same fate as Cahora Bassa, which for years saw its hydroelectricity sold to South Africa's utility, Eskom, at below cost because there is not enough local demand. The local media has also reported that the Mozambique government is intent on offering subsidies to Chinese companies interested in industrial expansion in the Zambezi valley. With China already involved in building and financing the dam, it is likely that the energy-intensive companies expected to set up shop in the Zambezi valley will receive subsidized energy as an incentive for locating their businesses in Mozambique.

By increasing Mozambique's external debt, the project could also reduce social services for the poor.

SEISMIC RISK

Mozambique straddles a highly active fault zone called the Shire Trough, which runs southward from the southernmost point of Malawi almost all the way to Maputo. Poor seismic record-keeping has constrained scientists' ability to determine the potential for large earthquakes in Mozambique. The Mphanda Nkuwa Dam would be located just 200 km from the heart of the Shire Trough fault zone. In addition, the shape of the Shire Trough means that the dam's reservoir could increase the surrounding plates' seismic potential as a result of the increased weight of the water – a phenomenon known as "reservoir-induced seismicity" (RIS).

Experts are concerned about the potential for RIS, especially on the nearby Estima Fault. Currently the seismic potential of this fault has been conservatively estimated – again, a problem of poor record-keeping. This fault has not been active recently, but recent seismic activity south of the Shire Trough has raised concerns that this fault may now be active and in fact may pose the greatest threat to the Mphanda Nkuwa Dam.

There are also continuing concerns regarding the appropriate management of the upstream Cahora Bassa Dam. Seismic records for Cahora Bassa were not available to the team charged with undertaking the seismic assessment for Mphanda Nkuwa (the team was told these records did not exist). International best-practice calls for ongoing monitoring of seismic activity in the area surrounding large dams.

Since poor record-keeping precludes an accurate estimate of the size of the dam's maximum credible earthquake, a responsible approach would be to ensure that the dam's maximum-design earthquake is prudently determined. In this case, such action would likely require the "over-design" of the dam for seismic safety, and increase the project's costs.

ENVIRONMENTAL IMPACTS

In addition to making downstream restoration of the delta very difficult, Mphanda Nkuwa could worsen downstream social and environmental damage by causing daily fluctuations in river levels. These mini-floods are predicted to flood ecologically important sandbars and riverbank food gardens which provide the only vegetable resource for many local farmers and are essential for ensuring food security during the dry season. The water fluctuations will also impair fishing and navigation by canoe, especially in the stretch between Mphanda Nkuwa and the city of Tete.

The dam will be just downstream of the confluence of the Zambezi and the Luia River, one of the last unregulated catchments in the Zambezi Basin. This river contributes nutrient-rich sediments to the Zambezi, which are critical for mitigating impacts induced by Cahorra Bassa and thus to the health of downstream ecosystems. Much of the suspended sediment load in the Luia River may be trapped in Mphanda Nkuwa's reser-

voir, resulting in greater erosion downstream and less deposition on local fields. This impact cannot be mitigated. The dam will also further reduce downstream wetland soil fertility, potentially having negative impacts on prawn fisheries.

The dam will also block the migration of various aquatic species, including the African mottled eel.

SOCIAL FACTORS

Mphanda Nkuwa will have two distinct types of social impacts: those related to construction and those caused by dam operation.

Photo: Ryan Hoover

Boys in Zambezi valley show off their catch.

Dam Construction: As has been experienced in dam-affected communities elsewhere, the arrival of a large number of male migrant workers would disrupt the currently stable society living in the proposed dam site. This would fundamentally undermine the systems that currently ensure the maintenance of social order in the area. The communities would likely experience increasing rates of crime, prostitution, rape and HIV/AIDS.

Resettlement undermines the fabric of the society and virtually always leaves dam-affected people worse off than before a large dam is built. Resettlement schemes are very difficult to manage well, and the Mozambique government has neither the institutional capacity to handle such a complex undertaking, nor legal and policy safeguards in place to ensure a fair process. Typical problems expected to afflict Mphanda Nkuwa include the following:

- Corruption can lead to land and other resources being allocated on the basis of political cronyism. It also can result in the diversion of compensation funds.
- Villages to which resettlers are moved can react with hostility to the increase in competition for scarce resources, and undermine resettlers' recovery.
- Re-establishing livelihoods for poor farmers can be extremely difficult even when budgets for such programs are high (Southern Africa's Lesotho Highlands Water Project provides just one cautionary tale).
- Rapid modernisation in the area would also undermine traditional social "safety nets," and worsen the impacts on women, children and the elderly.

Dam Operation: Currently, only those people who are forcibly resettled for the project will receive compensation, leaving potentially tens of thousands living downstream of the dam uncompensated for environmental losses to fisheries, farming lands, and other natural resources upon which their livelihoods depend.

Food security for local people will suffer from a variety of changes, including mini-floods from dam operations, which would preclude the dry-season livelihood strategy of farming vegetables on the river bed; and loss of sediments, which will reduce the fertility of lands downstream of the dam and fisheries downstream and in the delta.

MEETING NEEDS WITH BETTER ALTERNATIVES

Alternatives to building another large hydropower dam on the Zambezi do exist, and could be better suited to meeting needs with less environmental damage and social harm. Here we look at options for Mozambique's rural communities and grid-connected customers, and South Africa (which is expected to buy some of the dam's power).

Those most underserved by Mozambique's energy sector – the rural poor – will not benefit from large hydro dams, due to the high cost of extending the transmission grid. Therefore, Mphanda Nkuwa cannot be said to significantly increase rural electrification. Smaller, decentralized options (micro-hydro, solar PV, windmills, improved cooking stoves and the like) would better suit the needs of Mozambique's rural majority.

Co-generation of crop wastes is a technology that can be used for both medium-scale rural enterprise creation and grid-based applications. Sugarcane waste (bagasse) or other crop wastes can be

FAST FACTS: MPHANDA NKUWA

Total Cost: Estimated $1.1 billion for dam and power plant, $1.2 billion for transmission lines.

Promoters: Ministry of Mineral Resources and Energy, Mozambique and New Partnership for African Development (NEPAD).

Likely Partners: South Africa's energy giant, Eskom, will be the likely buyer of the power to be produced by the dam. Chinese companies moving into the Zambezi Valley could also be beneficiaries.

Location: Lower Zambezi River in Tete Province, Mozambique.

Project Development: The Government of Mozambique has awarded the contract to build the dam to China's Sinohydro Company.

Financing: In May 2006, the China Export-Import Bank announced plans to lend Mozambique US$2.3 billion for the dam and transmission lines.

Construction time-frame: Undetermined.

used in modern co-generation plants to create heat and electricity. Mozambique has good potential for co-gen from bagasse. Issues to be aware of include the use of genetically modified sugar plants, and the high water consumption of sugar plantations. In future, other crops might prove to be more environmentally sustainable.

Another option is to enlarge the spillway at Cahora Bassa, which would reduce the need for Mphanda Nkuwa and help with the restoration of downstream flows. Previously the government had refused to consider this alternative, on the grounds that the government did not own Cahorra Bassa, but this situation has recently changed with the handing over of the dam by the Portuguese.

In South Africa, regional energy utility Eskom has huge potential for energy efficiency. In 2002, Eskom announced that it could reduce energy demand by up to 11,000 megawatts with energy efficiency measures and "demand-side management" (DSM) programs. These "negawatts" would come at a fraction of the cost of building new supply-side projects: DSM programs typically cost less than US$0.02 per kilowatt hour. They are also likely to create more longterm jobs than, say, building a dam. Progress to date has been slow. In May 2006, Eskom announced it was accelerating its DSM and efficiency programme. The 20-year plan includes a reduction in demand of 4,000 MW as a direct result of DSM programmes.

South Africa also has great potential for established renewables like wind (an estimated 3,000 MW potential) and solar PV, and for newer technologies like solar thermal and tidal power. Experts estimate that the coast between Port Elizabeth and Durban has some of the world's best ocean-power potential. One estimate shows South Africa's coastline has 56,000 megawatts of ocean-power potential.

"Cutting energy waste is the cheapest, easiest, fastest way to solve many energy problems, improve the environment and enhance both energy security and economic development."

Robert Taylor,
World Bank lead energy specialist

A BETTER WAY: NGOS CALL FOR WCD REVIEW

The independent World Commission on Dams (WCD) analyzed the development impact of large dams worldwide, and suggested a new method of planning them which would ensure that only the best projects were built. Local and international groups are requesting that the government not proceed with Mphanda Nkuwa until a thorough assessment of Mozambique's energy needs and options has been completed and publicly debated, as specified by the WCD. This is the first step to ensuring that Mozambique's energy needs are met with the least human, environmental, and economic costs.

Some of the following are key WCD concepts that are particularly relevant to this project:

- "In countries where a large proportion of the population does not have access to basic services, a key parameter should be the extent to which basic human needs will be met."
- "Comprehensive options assessment must precede selection of any specific development plan, whether it includes a dam or an alternative."
- The WCD report calls for an understanding of cumulative impacts of dams in a basin, stating that "a basin–wide understanding of the ecosystem's functions, values and requirements, and how community livelihoods depend on and influence them, is required before development options are made."
- The WCD report is also clear that risk must be fairly analyzed and publicly discussed: "[Risks] must be identified, articulated and addressed explicitly. Most important, invountary risk bearers must be provided with the legal right to engage with risk takers in a transparent process to ensure that risks andbenefits are negotiated on a more equitable basis… Determining what is an acceptable level of risk should be undertaken through a collective political process."

Although South Africa has begun to incorporate the recommendations of the WCD into national policy, its utility Eskom has thus far been silent on how that commitment would come into play if Mphanda Nkuwa were developed to benefit South Africa's industrial interests. NGOs are pressing the giant utility to play a positive role in encouraging the Mozambique government to adopt these best-practice standards, and abide by the WCD's call for democratic planning processes that lead to development projects with positive outcomes for the poor.

This fact sheet was prepared in August 2006
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and International Rivers Network.
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