Are Chinese companies devastating the African environment?
Exploring the role of a Chinese hydropower company in the Zambian environmental impact assessment process

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Abstract

This article examines the role of Chinese companies in the environmental impact assessment (EIA) process, as exemplified by Sinohydro’s involvement in the Kariba North Bank Extension project (KNBE) in Zambia. Since the launch of several large-scale Chinese hydropower projects in Africa, the international press and politicians have singled out the Chinese companies as the only stakeholders in those projects that violate environmental standards. Very little research has explored the detailed involvement of the Chinese and non-Chinese stakeholders in observing environmental norms. This article aims to fill in this gap. The present study examines the responsibility of the major stakeholders in the environmental impact assessment process. It concludes that both the Chinese and non-Chinese stakeholders are obligated to participate in this process. It is the interaction of the stakeholders instead of a single stakeholder that determines the environmental outcome. Therefore, a comprehensive understanding of the stakeholder network in so-called “Chinese” hydropower projects is important to identify possible intervention points that can guide the stakeholders to work together towards sustainability.
Introduction

China’s investment in Africa has increased substantially in the past decade. The total volume of trade rose from $10 billion in 2000 to an estimated $200 billion in 2013 (Flynn 2013, Fig. 1). According to a World Bank Report, more than 30% of the investment goes to the power sector, of which hydropower projects have the biggest share (Foster et al. 2009). There are two categories of drivers that can explain China’s inroad into Africa’s hydropower market.

The first category is the market driver. The supply from China matches Africa’s demand for electricity. The hydropower market in China is extremely saturated. The total hydroelectric generation capacity has grown from almost zero to 14,823 MW in 2007 (Fig. 1). Having built about 88,000 dams in China, Chinese hydropower companies have accumulated a great deal of construction experience and numerous hydro-electrical engineers (China Statistics Bureau 2012). Most machines used in previous hydro-electrical projects have yet to reach the end of their life cycle. Especially after the completion of the Three Gorge Dam, there are almost no large-scale hydropower projects left to work on in China.

Chinese hydropower companies are desperate to explore new hydropower markets in order to survive. On the other hand, Africa has huge hydropower potential that is yet to be developed. Africa has rich water resources. The total hydropower potential in Africa is estimated to be 35,000 TWh but only about 5% of Africa’s hydropower potential, estimated to 1750 TWh, has been exploited (United Nations Industrial Development Organization 2009). While the world’s average electrification rate is 82%, the rate in Sub-Saharan Africa is only 32% (International Energy Agency 2012). The rapidly growing population in Africa indicates the potential growth of demand for electricity. The world population will increase to between 9.6 and 12.3 billion in 2100 and much of the increase will be in Africa (Gerland et al. 2014).

The second category is the policy driver. The Chinese government launched the “Going Global” strategy in 2006. This strategy encourages Chinese state-owned as well as private companies to explore overseas markets and promote trade between China and the rest of the world (McDonald et al. 2009). To support this strategy, China’s two policy banks, the China Export-Import Bank and China Development Bank, provide loans to host countries in Africa so that the African governments can afford to launch mega projects (Bräutigam 2011). Chinese companies are supposed to bid for the projects funded by the Chinese loans in host countries. In those Chinese-funded projects, the contracted companies (many of the contractors are construction companies from China) will get payment directly from the China’s policy bank, which significantly decreases the financial risks of overseas projects for contractors. As a result, Chinese government-backed financial flow catalyzes the surplus flow of human capital and technology into the hydropower market in Africa.

While there seems to be great synergy between China and Africa, environmental criticisms have increased dramatically as Chinese hydropower projects flourish in Africa. The well-known political figures and advocates from international environmental NGOs singled out the Chinese companies in environmentally destructive dam projects and claimed that the Chinese dam builders ignored the international environmental standards. For example, on her visit to Tanzania in 2011, Hillary Clinton urged the African countries to hold Chinese investors to the same standards as they did Western countries and indicated that China was going to be a new colonizer on the continent (Quinn & Heinrich Jones 2011). International Rivers, a US-based environmental NGO, has been actively advocating against China’s dam projects in the world. They estimated that Chinese companies are involved in at least 92 major dam projects all over the world (International Rivers 2012). In their published journal articles and policy briefs, they concluded that China’s dam builders have yet to adopt interna-
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![Graphs showing annual investment and accumulated capacity](image)

**Fig. 1.** *Left:* 2007–2013 China’s annual investment in hydropower Sub-Saharan Africa (USD million) *Data:* The Heritage Foundation (2013). *Right:* Accumulative hydropower capacity in China/10MW, 1910–present (Zhu 2010).

The environmental criticisms have created a misconception that Chinese companies are the only stakeholder in the project or at least the most powerful stakeholder that can steer the environmental outcome of a hydropower project. Very little literature has examined what a Chinese hydropower company should do to follow environmental norms in a project and how a Chinese company interacts with other non-Chinese stakeholders in complying with the environmental norms. This paper aims to fill in this gap and concentrates on the environmental impact assessment (EIA) process. The EIA process, first introduced in the USA, is an important effort to integrate environmental concerns into economic development. As an internationally adopted environmental legislation, EIA provides a structured framework to evaluate the negative impacts on the environment and systemic guidance for project owners to develop mitigation strategies. In Zambia, EIA approval is the prerequisite to launch a project.

This article first reviews the procedure of environmental impact assessment (EIA) in Zambia and highlights the role of a hydropower contractor in that process. Then it contextualizes the EIA process in a Chinese hydropower extension project in Zambia. By analyzing the working relationship of major stakeholders in that project, this paper explores how they interact with each other in the EIA process.

**Background of case study: Kariba North Bank Extension project**

Hydropower provides 99.7% of electricity in Zambia (Government of the Republic of Zambia 2011). Zambia has vast hydropower potential that is yet to be developed. According to the International Energy Agency, the total hydropower potential of Zambia is 6000MW but its current installed capacity is only around 1900 MW and only 26% of the population has access to electricity (IEA 2012). Copper mines consume up to 68% of electricity,
and the mining industry contributes to 10% of GDP in Zambia (Government of the Republic of Zambia 2006).

The Zambian government has decided to continue focusing on developing hydropower in the next five years and Chinese hydropower companies have been actively involved in planning and constructing some of the hydropower projects. For example, Zambia plans three mega hydropower projects in the Zambezi River Basin: Kariba North Bank Extension (360MW), Kafue Gorge Lower (750MW), and Itezhi-tezhi (120MW). Sinohydro, a Chinese state-owned hydropower company, is the EPC contractor of all the three projects (EPC: engineering, procurement, and construction). The Kariba North Bank Extension Project (KNBE) is located on the border of Zambia and Zimbabwe, sitting at the north end of the Kariba Lake, the biggest man-made lake in the world. Once complete, the Kariba North Bank power station will meet the demand of electricity during peak hours and export the electricity to the neighboring countries.

The construction of the Kariba dam occurred between 1955 and 1959. The construction was stalled because it forced the resettlement of 48,000 local people, causing a huge political problem. Final construction was completed in 1977 by Mitchell Construction, a British company (Reeve 1960). On November 7th 2007, Sinohydro signed a contract with the Zambian Electricity Supply Company (ZESCO) to add two 180MW generators to the KNBE station. The contract became effective on October 1st 2008. This extension project officially ended on July 31st 2014.

The KNBE project was co-funded by loans from China Export-Import Bank (CEB) and the Development Bank of Southern Africa (DBSA). CEB is a state bank solely owned by the Chinese government and under the direct leadership of the State Council (Export-Import Bank of China 2015). It signed a Buyers Credit Loan Agreement with ZESCO amounting to US$315.6 million for the project on November 13, 2009. ZESCO signed another loan agreement with DBSA on September 30, 2010. DBSA is a state-owned entity in South Africa. According to media reports, the amount from DBSA was US$105 million (Reuters 2010).

**Methods**

I worked as an interpreter at the KNBE project for 33 days. In the Sinohydro office camp, I conducted semi-structured interviews with managers from the environment, health & safety department (EH&S), the contract department, and the human resources department. Each interview lasted for one hour. On the construction sites, I spoke with 11 Sinohydro Chinese junior engineers about their awareness of EIS. In Lusaka, the capital city, I conducted a semi-structured interview with a management team member in Sinohydro, one of six inspectors in the Zambian Environmental Management Agency (ZEMA) and the CEOs of two local environmental consulting companies. ZEMA, the Zambian equivalent of the Environmental Protection Agency (EPA) in the US, enforces the EIA legislation. The two environmental consulting firms are hired to prepare EIA reports for infrastructure projects in Zambia.

In addition to semi-structured interviews, I also did participant observation on the project site for one month. I lived at the Sinohydro camp and interpreted for Sinohydro engineers when they spoke with engineers from other stakeholder companies and the Zambian labor force on the construction site. I followed the same working schedule as the Sinohydro engineers, from 7:30am–12:00pm and 1:30pm–6:00pm from Monday to Sunday. The engineers I worked with were responsible for checking and repairing electronic devices. Since electronic devices are installed all over the project site, I worked in the underground powerhouse, the switchyard, and the step-up substation. I also interpreted for the chief technical engineer during his weekly meetings with the engineers from other stakeholder companies. Every meeting lasted for an average of four hours. In addition to interpretation, I participated in the weekly meeting within Sino-
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Table 1. A list of semi-structured interviews at the Kariba North Bank Extension (KNBE) project.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Position</th>
<th>Interview length (hrs)</th>
</tr>
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<tbody>
<tr>
<td>Sinohydro</td>
<td>KNBE project environmental health &amp; safety manager</td>
<td>1</td>
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<td></td>
<td>KNBE project contract manager</td>
<td>1</td>
</tr>
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<td></td>
<td>KNBE project human resources manager</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Company manager in Lusaka</td>
<td>2.5</td>
</tr>
<tr>
<td>Environmental Consulting Co.1</td>
<td>CEO</td>
<td>1</td>
</tr>
<tr>
<td>Environmental Consulting Co.2</td>
<td>CEO</td>
<td>1</td>
</tr>
<tr>
<td>ZEMA</td>
<td>EIA inspectorate</td>
<td>1</td>
</tr>
<tr>
<td>ZEMA</td>
<td>Registry Clerk</td>
<td>2</td>
</tr>
</tbody>
</table>

hydro where the project team checked the working progress. Moreover, I was actively involved in post-work activities to speak with more Sinohydro workers. I also had lunch and dinner with them in a small public canteen every day. After dinner, I would join the three department managers to walk for one hour near the Sinohydro camp. From them, I would learn the schedule of meetings and work for the proceeding days.

At the KNBE project site, I collected documents relevant to EIA from the Sinohydro project team. From the EH&S department, I collected the Environmental Project Brief (EPB), Environmental Management Plan (EMP), Environmental Control Plan (ECP), weekly safety inspection results, the company’s internal environmental standards and the 2009 environmental audit report. From the contract department, I received the general contract of the project. From the human resources department, I acquired the environmental permit issued by ZEMA.

Contextualizing the EIA process in the KNBE project

EIA is a formal process used to predict the environmental consequences, both positive and negative, of a project prior to the decision to move forward with the construction. EIA now exists in over 100 countries worldwide. Before the project owner launches a project, he is required to prepare an EIA report. The EIA report assesses the negative environmental impacts of a project and lists the strategies to mitigate those negative impacts. In the process of preparing the report, the project owner is supposed to consult with all of the affected stakeholders including nearby communities to make sure that their concerns are properly addressed. If ZEMA approves the report, it will issue the project owner an environmental permit. Only after the project owner receives the permit can the project be launched. During the construction of the project, the project owner should regularly conduct environmental auditing to make sure that the contractor implements the mitigation strategies laid out in the EIA report. In addition, ZEMA can also conduct irregular environmental auditing of this project at any reasonable time (Fig. 2).

The EIA process shows that three stakeholders are involved in the process. The project owner refers to the company that borrows the money from development banks, pays for the construction of the project, and collects the revenue generated from the completed project. The project owner should prepare an EIA report before it launches the project.
The environmental government agency is responsible for reviewing the EIA report and deciding whether to issue the environmental permit. A contractor is hired by the project owner to materialize the project plan once the owner gets the environmental permit. In the KNBE project, the government agency is the ZEMA. The project owner is ZESCO, a Zambian state-owned company. The contractor is Sinohydro. An additional stakeholder in this project is Électricité de France (EDF), a French company. ZESCO hired EDF as the owner representative to assist ZESCO in supervising Sinohydro’s construction work because EDF is an electrical engineering firm with a long history of engineering expertise (Fig. 3).

My field research shows that the KNBE project has the EIA document and the environmental permit from ZEMA. But the environmental audits of the EIA were not strictly carried out. According to the 2013 Zambian environmental management act, hydropower extension is within the category of the projects with insignificant environmental impacts.

So the project owner only needs to prepare a simplified version of an EIA report, which is called Environmental Project Brief (EPB). The EPB lists the environmental impacts of the project. Along with EPB, the project owner also prepares an Environmental Management Plan (EMP). The plan lists the mitigation strategies for the negative environmental impacts. In response to the EMP, Sinohydro has to prepare an Environmental Control Plan (ECP) in its bidding document. The ECP then provides core guidance to Sinohydro regarding how to implement the mitigation strategies proposed in the EMP (Sinohydro Corporation Limited 2014). The EH&S manager of the Sinohydro project team kept a copy of all the three documents (EPB, EMP, ECP) and I reviewed them.

But there was no existing copy of the annual environmental audit report from 2010 to 2014. The only available environmental audit report was from 2009. That report is 11 pages long and lists all the items that should be checked for this project. In this report 15 out of 60 items are not fully implemented.

I haven’t found the follow-up documents that can show whether the suggestions for improvement in the 2009 report were implemented or not. ZESCO, EDF, and Sinohydro are supposed to conduct the audit together. The EH&S manager explained that Sinohydro, ZESCO, and EDF found that the auditing process was “not practical.” Rather than conduct one three-hour long inspection solely for environment per month, they changed the inspections to much shorter weekly ones, for both safety and environment. Each weekly inspection produced a list of recommendations for improvement. I was told that those documents were destroyed because the project team adopted and implemented the recommendations immediately and there was no need to file the documents.

According to the company manager team member of Sinohydro, he has not heard about any environmental complaints about this project. For Sinohydro...
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hydro, environment is a technical issue. As long as their technology is good enough to control the negative impact levels under the standard, environment is not a problem. His comments on the EIA were

we are just following the standards set in the EIA. For example, if the EIA said the dam could not be higher than 100 meters, then we would make it lower than 100 meters. If our technology cannot reach that standard and someone complained to the government, then we will pay the fine.

Discussion
The monitoring of post-EIA implementation was not observed at the project site. Since there is no auditing report, it is not known whether the mitigation strategies were implemented or not. The stakeholder analysis of the project shows that the weak compliance with EIA auditing is more of an outcome of a stakeholder network instead of a single stakeholder in that network.

Sinohydro is tied in the stakeholder network so it cannot decide for itself whether or not it wants to mitigate the negative environmental impacts. First, it is required to draft an environmental control plan in its bidding process. In order to win the contract, Sinohydro has to review the EPB and EMP of the project and propose a plan to implement the mitigation strategy. Second, if Sinohydro is the only stakeholder who does not want to implement the mitigation strategy, it cannot survive the annual environmental auditing jointly conducted by ZESCO and EDF or the random inspection conducted by ZEMA. According to the contract terms and Zambian environmental management act, Sinohydro will be fined if it fails to implement the ECP. So in that case, it is not in Sinohydro’s interest to destroy the environment.

One of the major criticisms of Chinese companies is that they either did not get EIA approvals or did not consult with the local residents about the relocation when preparing the EIA report. But this research shows that the contractor companies are not involved in preparing the environmental impact assessment report. Concurring with Hensengerth (2012), the contractual arrangements define how large a role of a Chinese company can play in the EIA process. If the Chinese company is a contractor rather than a project owner, its role in environmental impact is more limited than that of a project owner. It is the project owner who should negotiate the compensation with the affected communities. If there is an environmental complaint about the project, the project owner should speak on behalf of this project to address the complaints of the public and communicate with ZEMA. Inside the project team, the project owner should investigate the complaints and figure out what the responsibilities are of each stakeholder in the project team.

The findings from this research can be applied to other hydropower projects where Chinese companies are contractors. An updated record of Chinese overseas projects shows that from 2005 to 2014, Chinese companies were involved as contractors in 152 out of 187 Chinese investment projects in Sub-Saharan Africa. In the KNBE project, ZESCO, the Zambian company happened to be the project owner and Sinohydro, the Chinese company, was the contractor. Empirical data implies that the role of contractors in other projects in the EIA process may be similar.

Conclusion
This paper has two core concerns: 1) to analyze the relationship between the Chinese and non-Chinese stakeholders and 2) to understand the role of each stakeholder in the EIA process. I argue that the role of a Chinese contractor company in an EIA process is limited. The procedure of EIA designates the project owner as the primary stakeholder to comply with the EIA legislations in the project. The project owner employs a contractor after the owner gets the EIA approval and launches the project. Therefore, the contractor is not involved in preparing the EIA report.
This research implies that the evaluation of Chinese companies’ compliance with environmental norms needs to be more specific to the contractual terms of each project. As shown, the responsibility of a contractor is different from that of a project owner. When a project causes negative environmental impacts, the key stakeholder who can make change is more likely to be the project owner. In some projects, like KNBE, the owner is not a Chinese company. The understanding of each company’s role in enforcing environmental norms will help to foster effective strategies to mitigate negative environmental impacts.

References
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