Policy Briefing
254
December 2021

China-driven hydropower: Lessons from Ghana and Cambodia

BRADLEY MURG, COBUS VAN STADEN & WANG DUANYONG

Executive summary

Chinese funders and contractors have attracted much criticism for the environmental and social impact of their infrastructure projects in the Global South. However, the process of setting environmental, socioeconomic and governance standards in the Global South is complex and thus requires further investigation. The South African Institute of International Affairs and the Foreign, Commonwealth and Development Office's 'Future-Proofing Africa's Development' series compares the implementation of environmental, socioeconomic and governance standards in respect of five categories of Chinese infrastructure provision in Africa and South-East Asia. This policy brief looks at two Chinese-funded and -built hydropower projects in Ghana and Cambodia respectively. It outlines the Chinese domestic regulatory environment for hydropower and compares how the contractors fared abroad. It highlights that while the projects were Chinese led, the standards implementation process was dominated by local actors. The comparison revealed shortcomings in both cases. However, while low levels of government transparency in Cambodia eroded public trust in the project, the opposite was true in Ghana.

African perspectives
Global insights

SAIIA
SOUTH AFRICAN INSTITUTE OF INTERNATIONAL AFFAIRS

Introduction

When it comes to large-scale infrastructure, dams are particularly controversial. While many governments see hydropower as an attractive alternative to fossil fuels, the environmental and community disruption associated with the building of dams has triggered much resistance to such projects. For this reason, the World Bank and other traditional funders stepped away from dam building in the 1990s. However, the emergence of China as an alternative infrastructure funder has led to a resurgence in dam construction. In this regard, China is drawing on its massive domestic hydropower sector to tap into the demand for electricity across the Global South.

This policy brief compares environmental, socioeconomic and governance (ESG) standard setting in two Chinese-funded and -built projects: the Bui Dam project in Ghana and the Stung Tatay hydropower and dam project in Cambodia. The policy brief starts by showing how ESG standards work in China's domestic hydropower sector. It then provides an overview of the two projects before comparing their respective ESG implementation processes.

Hydropower regulation in China

Chinese domestic regulations distinguish between large-scale hydropower projects and smaller (below 50,000 KW), 'rural' projects.[1]

Large-scale hydropower development in China involves several separate administrative departments and requires coordination between the central and local governments. At the central government level, almost all power industries, including hydropower, are administered by the National Energy Administration,[2] which was re-established in 2013 and is supervised by the National Development and Reform Commission.[3] However, the construction of a hydropower facility, which is a water conservancy project, is managed by the Ministry of Water Resources.[4] As hydropower development inevitably involves environmental protection issues, the mandatory environmental assessment permits are managed by the Ministry of Ecology and Environment.[5] In addition, large hydropower projects usually entail land acquisition and resettlement, which are the responsibility of local governments.

1 UNIDO, 'World Small Hydropower Development Report 2019,' https://www.unido.org/sites/default/files/files/2020-02/WSHPDR%202019%20Case%20Studies.pdf.

2 National People's Congress of the People's Republic of China, 'The Explanation on the Plan for Institutional Reform and Functional Transformation of the State Council,' March 10, 2013. http://www.npc.gov.cn/zgrdw/npc/dbdhhy/12_1/2013-03/11/content_1776445.htm [Chinese].

3 National Energy Administration, 'Brief Introduction to National Energy Administration,' n/d, http://www.nea.gov.cn/gjnyj/index.htm [Chinese].

4 Ministry of Water Resources, 'About Ministry of Water Resources,' n/d, http://www.mwr.gov.cn/jg/zzjg/gyslb/ [Chinese].

5 Ministry of Ecology and Environment, 'Responsibilities of Ministry of Ecology and Environment,' https://www.mee.gov.cn/zjhb/zyzz/201810/t20181011_660310.shtml [Chinese].

In contrast, the management system used for 'rural' or 'small hydropower' initiatives,[6] which mainly serve rural areas, agriculture, farmers and county economies, is relatively simple. The Ministry of Water Resources is responsible for providing guidance and supervision at the central government level,[7] while local governments are mainly tasked with organising construction and project management.[8] By the end of 2019, China had built 45,445 rural hydropower stations with an installed capacity of 81.442 GW, accounting for 22.9% of the installed hydropower capacity nationwide. This resource generates 253.32 billion KW hours of electricity annually, accounting for 19.5% of China's hydropower generation capacity.[9]

China has designed a relatively comprehensive environmental management and decision-making system comprising laws and regulations, environmental standards and design specifications for hydropower project development. The system covers different stages: river hydropower planning, preliminary investigation and design, engineering construction and commissioning. The environmental management of water conservancy and hydropower projects in China is not only in line with national laws and regulations; it is also ahead of the regulations in some respects. China has an environmental impact assessment (EIA) system for construction projects, and hydropower stations can only be approved if an environmental impact statement is issued. According to the requirements for classification management, hydropower stations are subject to the strictest, class A standards.[10]

It is important to point out that many of the state and non-state actors involved in China's domestic hydropower sector are also active across the Global South. For example, the key actors in Chinese hydropower initiatives in South-East Asia are: China National Water Resources and Hydropower Engineering Corporation (Sinohydro), China Gezhouba Group Corporation (Gezhouba) and China Southern Power Grid (CSG); financiers such as China Exim Bank, China Export and Credit Insurance Corporation (Sinosure), China Development Bank and Bank of China; regulators such as State-Owned Asset Supervision and Administration Commission (SASAC), Ministry of Environmental Protection (MEP), Ministry of Commerce (MOFCOM), Ministry of Finance (MoF), Ministry of Foreign Affairs (MoFA), and National Development and Reform Commission (NDRC), among others.[11] As will be discussed, several of these actors are also engaged in hydropower projects in Africa.

6 Guangdong Society of Hydropower Engineering, 'Why add the word "green" before "small hydropower"?,' November 6, 2018, http://www.gdshe.org/Item/11190.aspx [Chinese].

7 Ministry of Water Resources, 'About Ministry.'

8 Industry Information Network, 'The investment, electricity generation and consumption of China's rural hydropower in 2019,' Beijing Zhiyan Kexin Consultancy, November 10, 2020, https://www.chyxx.com/industry/202011/908266.html [Chinese].

9 Ministry of Water Resources, '2019 Annual Report on Rural Water and Hydropower,' Department of Rural Water and Hydropower, 2020, http://www.mwr.gov.cn/sj/tjgb/ncslsdnb/ [Chinese].

10 Gu Hongbin, 'Environmental management and decision-making in hydropower stations in China,' UN Department of Economic and Social Affairs, 2004, https://www.un.org/esa/sustdev/sdissues/energy/op/hydro_zhu_chinese.pdf [Chinese].

11 Frauke Urban, Johan Nordensvard, Deepika Khatri, and Yu Wang, 2013, 'An analysis of China's investment in the hydropower sector in the Greater Mekong Sub-Region,' in Environment Development and Sustainability 15, no. 2 (2013): 301–324.

Comparing ESG standard setting in Chinese hydropower projects in the Global South

Against the backdrop of China's domestic ESG standard setting, as outlined above, the rest of this policy brief examines how standard setting functioned in two Chinese-led hydropower projects in South-East Asia and Africa respectively.

TABLE 1 HYDROPOWER PROJECT DETAILS

	Bui Dam project	Stung Tatay hydropower & dam project
Country	Ghana	Cambodia
Location	Bui National Park, border of Savannah and Bono regions	Koh Kong province
Size	1 million cubic metres	439 million cubic metres
Output	400 MW	246 MW
Special purpose vehicle	Bui Power Authority	Cambodian Tatay Hydropower Ltd
Contractor	Sinohydro	China Gezhouba Group Corporation
Financing	• $270 million China Exim Bank concessional (2%) loan • $292 million China Exim Bank buyer's credit • $60 million Ghanaian government • Cocoa proceeds used as collateral for buyer's credit	$540 million (China Exim Bank)
Construction started	2008	2010
Commissioned	2013	2015
Project type	Engineering–procurement–construction turnkey project	Build–operate–transfer (42 years)

Source: Compiled by the authors from various works cited in this policy brief

Stung Tatay hydropower and dam project

The Stung Tatay River hydropower dam is a 246 MW hydropower dam located in Cambodia's western Koh Kong province.[12] It was constructed between 2010 and 2015 under a 42-year build–operate–transfer (BOT) agreement between the Cambodian government and Cambodian Tatay Hydropower Ltd (CTHL),[13] a local Cambodian subsidiary of a joint venture between three Chinese firms, which was established solely for the

12 China Gezhouba Group Co. Ltd., 'CGGC-constructed Tatay River Hydropower Station Begins Impoundment,' *China Daily*, November 19, 2013, http://www.chinadaily.com.cn/m/gezhouba/2013-11/19/content_17179646.htm.

13 Sok Chan, 'Cambodia's Energy Rising with New Hydro Plant: Officials,' *Khmer Times*, December 23, 2015, https://www.khmertimeskh.com/33923/cambodias-energy-rising-with-new-hydro-plant-officials/.

purposes of implementing this project.[14] Financed through a $540 million loan from the China EXIM Bank,[15] the dam was inaugurated in December 2015.

Environmental

The project EIA is not publicly available. Rather, the data used here draws from a draft published in 2010 by Open Development Cambodia.[16] CTHL hired a local consulting firm, Key Consultants Cambodia (KCC), to conduct the EIA, which was finalised in 2010. In June 2009, a public forum was held in Koh Kong to discuss the impact of the project prior to its approval and to release preliminary findings from the KCC-prepared EIA. While the Cambodian government defended large dams, claiming that their economic benefits outweighed their environmental impact, local residents raised concerns over the preliminary results. The available EIA stated that the reservoir created by the project would flood 2,949 hectares permanently and 182 hectares temporarily. Other documents offered different estimates. For example, an assessment by the Japan International Cooperation Agency (JICA) contended that the project would flood a projected 4,600 hectares.[17] The lack of transparency from the Cambodian authorities added to the uncertainty surrounding the project's impact.

The flooded area mostly consisted of the Cardamom Forest, which was home to a wide variety of wildlife, including endangered elephants, sun bears, wild boars, dragonfish and critically threatened Siamese crocodiles. Environmental NGOs raised objections in the light of the project's close proximity to the Central Cardamoms Protected Forest area and the disruption to the river's hydrologic flow patterns.

It is also important to consider the additional environmental externalities stemming from the project's supporting infrastructure. CHMC cut through various mountains to build a 230 kV transmission line stretching 63 km to the Ou Saom Substation in Pursat province. In February 2017, work began on a $139 million construction project to build another 230 kV transmission line to connect the Tatay Dam to the Bek Chan power station in Kandal province, thereby linking the hydropower project to the national grid and sending power to Pursat, Koh Kong and Phnom Penh.

14 SINOMACH, 'Construction Commenced for the Largest Chinese Investment Project in Cambodia,' SINOMACH News, July 13, 2009, http://www.sinomach.com.cn/en/MediaCenter/News/201412/t20141209_21765.html; Inclusive Development International, *Safeguarding People and the Environment in Chinese Investments: A Reference Guide for Advocates*, 2nd Edition (Ashville, NC: Inclusive Development International, 2019), https://www.inclusivedevelopment.net/wp-content/uploads/2020/01/2019_idi_china-safeguards-guide-final.pdf.

15 Axel Dreher, Andreas Fuchs, Bradley Parks, Austin M. Strange, and Michael J. Tierney, 'Aid, China, and Growth: Evidence from a New Global Development Finance Dataset,' (AidData Working Paper #46, Williamsburg, VA, 2017), https://docs.aiddata.org/ad4/pdfs/WPS46_Aid_China_and_Growth.pdf.

16 Open Development Cambodia, '[Draft] Environmental and Social Impact Assessment of Stung-Tatay Hydroelectric BOT project in Veal Veng district, Pursat Province,' n/d, https://data.opendevelopmentcambodia.net//dataset/bot.

17 Japan International Cooperation Agency, 'The Master Plan for Hydropower Development in Cambodia,' 2009, https://openjicareport.jica.go.jp/pdf/11925773_01.pdf.

Socioeconomic

The original KCC feasibility study predicted that the project would lead to a decline in water and fish stock quality, with serious consequences for the locals who rely heavily on these resources for food. However, the full impact was unclear due to the lack of transparency and the failure to publicly disclose official documents related to the environmental and social outcomes of the process. For example, for years it remained uncertain whether community relocation had actually occurred – until it was later confirmed through independent research.

The project's impact on local livelihoods was similarly unclear. The JICA study stated that 21 villages were located within a 40 km radius of the dam's planned power station, comprising 1,654 families and a total of 6,229 residents, according to a 2003 rural census survey. The EIA produced different estimates, claiming that the project would impact the livelihoods of 1,549 families who relied on the forest and its resources. While the EIA provided an anticipated budget for a forest conservation programme, an agricultural support programme, a small business loan scheme and healthcare services available to both construction workers and the local population, there is no evidence of any implementation, progress or success of any of these programmes. Moreover, whether these initiatives were completed or even launched remains unclear.

Governance

The project area was one of the last places of refuge for the Khmer Rouge army, and it contained a considerable number of landmines. CTHL outlined its intentions to collaborate with the Cambodian Mine Action Center to clear mines from the project area and ensure the safety of employees. Again, there was no public reporting on the implementation of these proposed initiatives, and it is unclear whether their proposed mitigation goals were achieved. In addition to the obvious environmental challenges associated with the project, transparency remained a key concern. Indeed, improved transparency standards (both on the part of China and recipient states) are vital for the success of future Chinese-supported hydropower projects.

While local residents were initially promised that the project would afford them benefits such as cheap electricity (the process of rural electrification continues in Cambodia, with many villages still without access to EDC [Électricité du Cambodge – the state power utility] powerlines), the initial EIA results showed that the electricity would instead go towards the national grid. This raised questions about the fairness of the project.

Bui Dam project

Plans to turn the Bui Gorge on the Black Volta River in Ghana into a hydroelectric dam date back to the days of colonial rule in the country. The project was initially shelved after traditional multilateral funders retreated from hydroelectricity, but was subsequently revived in the face of China's increased activity in the sector. Construction on the dam eventually started in 2009, and the dam was commissioned in 2013.

Environmental

The project has had a significant impact on the protected area where it is located, with roughly 21% of the forest area having been inundated. The Bui National Park is the habitat of several rare animal species, including the highly endangered black hippopotamus and colobus monkeys, among other.[18] The hippo population was estimated at about 305, divided between 13 hippo pools. All of these would be swamped.

Sinohydro, the main Chinese contractor on the project, was not responsible for conducting an environmental and social impact assessment (ESIA). In fact, the ESIA had been commissioned by the Ghanaian government, as directed by the UK firm, Environmental Resources Management, before Sinohydro's involvement and updated as part of the final approval process.[19] The full responsibility for the ESIA fell on the Ghanaian government via the Bui Power Authority (BPA), the company created to oversee the project.

The BPA committed to relocating and providing safe environments for the hippopotamuses. However, it became apparent that they lacked the resources and capacity to do so, even to track the animals. Many are presumed to have been displaced by the construction activities and drowned when the river was dammed.[20] While there were also lapses in the socioeconomic mitigation efforts (detailed below), some people have argued that the latter were more successful than the environmental mitigation efforts – partly because of a lack of engagement from the underfunded Wildlife Division of the Ghanaian government. A researcher who visited their offices found that, by as late as 2008, no concrete resettlement plans were in place, despite calls for such planning in the ESIA.[21]

Socioeconomic

Ghana's experience with the Bui Dam project was informed by an earlier and bigger hydroelectric project involving the Akosombo and Kpong Dams, which were built in the 1960s and 1970s. The earlier project led to the resettlement of about 88,000 people, a traumatic and much-criticised outcome that influenced the mitigation planning for the Bui Dam project. The latter's location in a nationally protected area meant that far fewer people had to be resettled. However, about 1,216 local residents from 219 households were displaced as a result of the development.[22] These communities made a living mostly from fishing, foraging and small-scale farming.

18 EJOLT, 'Bui Hydroelectric Power Dam Project in Ghana,' (EJOLT Fact Sheet 025, 2015), http://www.ejolt.org/wordpress/wp-content/uploads/2015/07/FS-25.pdf.

19 Oliver Hensengerth, 'Interaction of Chinese institutions with host governments in dam construction: The Bui Dam in Ghana' (Discussion Paper, Deutsches Institut fuer Entwicklungspolitik, Bonn, 2011), https://www.researchgate.net/publication/279466573_Interaction_of_Chinese_Institutions_with_Host_Governments_in_Dam_Construction_The_Bui_Dam_in_Ghana.

20 Oliver Hensengerth, 'Interaction of Chinese Institutions.'

21 James K. Habia, 'The Bui Dam impact on Ghana-China relations: Transparency, accountability and development outcomes from China's Sinohydro dam project in Ghana' (MA diss, Massachusetts Institute of Technology, 2009), https://core.ac.uk/download/pdf/4419663.pdf.

22 Daniel Doh and Paul Kofi Andoh, 'Monitoring of Natural Resource Governance: Assessments of changes in policy and practice as a result of the multi-stakeholder Ghana dams dialogue,' International Institute of Environment and Development, March 2014, https://pubs.iied.org/sites/default/files/pdfs/migrate/G03773.pdf.

The resettlement process was managed by the Ghanaian government and the BPA. The Ghanaian authorities based their resettlement plan on International Finance Corporation (IFC) and World Bank standards, particularly the latter's Involuntary Resettlement Sourcebook, and Ghanaian legislation.[23] One of the commitments was that local livelihood conditions would be replicated elsewhere. Because this is a fishing community, access to comparable fishing grounds formed part of this commitment. However, while increased water volumes led to an expansion in fish populations, the displaced communities lacked the requisite skills to take advantage of the improved fishing, and migrants from elsewhere benefited more.[24] The BPA did not follow through on its commitments relating to skills development and technology transfer, which were intended to bridge knowledge and competency gaps. Overall, the local communities reported that the resettlement process had significantly compromised their livelihoods,[25] while also prompting significant youth migration away from the area.[26]

In addition, communities were originally promised that they would live in Bui City, a development that would not only house displaced communities but would also provide additional amenities, including a university.[27] While the project was under way, people would be temporarily settled in Jama Resettlement Township. However, the Bui City development has so far not materialised and the Jama site now seems like their permanent home.[28] It is noteworthy that in the resettlement plan currently available on the BPA website, Bui City (the plans for which were widely cited in scholarly accounts of the project during the 2010s) is not mentioned. Rather, the current version of the plan focuses on how amenities in the area have been improved.[29]

Governance

ESG mitigation measures fell to the Ghanaian authorities, and specifically its proxy, the BPA. Whereas Sinohydro was responsible for on-site mitigation of pollution, run-off and so forth, the wider ESG implementation was dependent on Ghanaian actors implementing Ghanaian law.

On the one hand, the Ghanaian authorities commissioned ESIA reports and made them publicly available throughout the project's long gestation period. They also met the requirements for stakeholder engagement, including working with environmental consultancies to hold local community briefings. Notably, the Ghana Dams Dialogue,

23 Oliver Hensengerth, 'Interaction of Chinese institutions.'
24 Paul WK Yankson et al., 'The livelihood challenges of resettled communities of the Bui dam project in Ghana and the role of Chinese da-builders,' Development Policy Review 36, Issue S1 (2018), https://onlinelibrary.wiley.com/doi/full/10.1111/dpr.12259.
25 Richard Twum Barimah Koranteng and Guoqing Shi, 'Assessing the resettlement scheme of the Bui hydro-project using the social lens,' *Journal of Sustainable Development* 11, No. 4, 2018, https://www.researchgate.net/publication/326687283_Assessing_the_Resettlement_Scheme_of_the_Bui_Hydro_-_Project_Using_the_Social_Lens.
26 Paul WK Yankson et al., 'The livelihood challenges.'
27 Isaac Idun-Arkhurst, 'Ghana's relations with China,' SAIIA, 2008, https://saiia.org.za/wp-content/uploads/2008/04/chap_rep_03_idun_arkhurst_200804.pdf.
28 Oliver Hensengerth, 'Interaction of Chinese institutions.'
29 Bui Power Authority, 'Resettlement Plan,' n/d, http://buipower.com/wp-content/uploads/2021/06/Resettlement_Plan.pdf.

an initiative supported by German development authorities, provided a platform for community engagement.[30] These initiatives arguably helped to prevent earlier dam projects from failing.

On the other hand, there were governance lapses on the government and BPA sides. The most glaring of these were the ongoing complaints from the community that some of the promised compensation fees, which were supposed to provide an economic buffer during the community resettlement process, had not materialised.[31] This was compounded by the BPA's failure to deliver promised skills training and additional fishing equipment, which would have enabled the communities to take advantage of the evolving fishing environment.

Comparison

The comparison of the impact of these two projects revealed some of the shared problems that tend to beset hydropower projects. While these projects are frequently attractive to host governments because they bring the promise of non-polluting energy, they still carry massive environmental and socioeconomic risks. In both cases, the dams resulted in significant destruction of the habitats of endangered species. They also resulted in the large-scale loss of livelihoods for local communities.

While in both cases, environmental and socioeconomic impact assessments and community facilitation processes were prepared by outside bodies, their full implementation was hampered by a lack of government capacity.

In the case of Cambodia, a lack of transparency at the official level, pointing to weak governance, raised concerns about the project among affected communities. Impact assessments were not publicly available and so it remains unclear whether any relocations took place. In the case of Ghana, there was much more transparency, especially with respect to the resettlement process. Although the process was dogged by some failures, the Ghanaian government and the BPA consistently documented the process and (with support from development partners) facilitated public forums, thus allowing communities to voice their concerns. In contrast, the environmental mitigation process has not seen the same level of success, in part due to the relevant ministry's lack of capacity and funding.

Standard setting in both projects was heavily dependent on the recipient authorities, meaning that in some cases, institutional weaknesses in the recipient governments were replicated in the mitigation processes. This heightened the reputational risk for the Chinese contractors that were involved, even though they played a relatively small role in the mitigation processes.

30 Daniel Doh and Paul Kofi Andoh, 'Monitoring of Natural Resource.'
31 Oliver Hensengerth, 'Interaction of Chinese institutions'; Paul W.K. Yankson et al., 'The livelihood challenges.'

Authors

Dr Bradley Murg

is Vice-Rector and Associate Professor of Political Science at Paragon International University in Phnom Penh, Cambodia. He is also a Distinguished Senior Research Fellow at the Cambodian Institute for Cooperation and Peace and Senior Academic Advisor at Future Forum.

Wang Duanyong

is Associate Professor at Shanghai International Studies University in China and the Director of the Centre for China's Overseas Interests Studies. Over the past 10 years his research has focused on Chinese outward investment and infrastructure projects as well as the security risks facing Chinese citizens in key partner countries.

Cobus van Staden

is a Senior Researcher at SAIIA focusing on Africa–China relations.

Acknowledgement

This series of policy briefs was funded by the UK Foreign, Commonwealth and Development Office as part of SAIIA's Future-Proofing Africa's Development series. SAIIA gratefully acknowledges FCDO's support.

Foreign, Commonwealth & Development Office

About SAIIA

SAIIA is an independent, non-government think tank whose key strategic objectives are to make effective input into public policy, and to encourage wider and more informed debate on international affairs, with particular emphasis on African issues and concerns.

SAIIA's policy briefings are intended for use by policymakers, whether in government or business. They are concise, providing a brief analysis of the issue at hand, and make policy recommendations.

Cover image: Construction of Bui Dam (Wikimedia Commons/ZMS)

Please note that all currencies are in US$ unless otherwise indicated.

African perspectives.
Global insights.

Jan Smuts House, East Campus, University of the Witwatersrand
PO Box 31596, Braamfontein 2017, Johannesburg, South Africa
Tel +27 (0)11 339-2021 • Fax +27 (0)11 339-2154
www.saiia.org.za • info@saiia.org.za