The livelihood challenges of resettled communities of the Bui dam project in Ghana and the role of Chinese dam-builders

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Abstract
Emerging issues from the Bui hydropower project suggest that the experiences of two earlier hydropower projects in Ghana failed to prevent challenges related to resource access and livelihoods. This article examines the nature of the challenges, their causes, why they were not avoided and the role of the Chinese builders. We conducted 43 interviews and 11 focus group discussions and analyzed qualitative data by themes using narrative analysis. Our findings show that the livelihoods of the resettled communities are, on balance, negatively impacted by the construction of the dam. While Chinese dam-builders played a major role in financing and enabling the dam’s construction, the Ghanaian governance arrangements were found to be more important in addressing the livelihood challenges.

KEYWORDS
Bui, China, Ghana, large dams, resettlement

INTRODUCTION

Large dam projects have been built in many countries and a renewed interest in dam-building has been observed in many developing countries in the last few years. The twentieth century saw rapid increase...
in the construction of large dams, most of them in industrialized countries. By the turn of the millen-
nium, there were over 45,000 large dams in over 140 countries (World Commission on Dams, 2000).
At the peak of large dam construction, nearly 5,000 large dams were built worldwide in the period
from 1970 to 1975 (Tchotsoua, Moussa, & Fotsing, 2008). Dams have been promoted as an important
means of meeting perceived needs for water and energy and as long-term strategic investments, which
have many additional benefits such as regional development, job creation, industrialization and agri-
cultural development through irrigation.

The Chinese are at the forefront of the renaissance of large hydropower dams, as the world’s largest
dam-builders and financiers. Sinohydro, a Chinese state-owned enterprise (SOE), is leading the global hy-
dropower sector in terms of number and size of dams built, investment sums and global coverage (Urban
& Siciliano, 2014). While China has a long history of domestic dam-building, recent developments have
led to Chinese overseas dam-building, particularly in low- and middle-income countries (LMICs) in Asia
and Africa (Bosshard, 2009; McDonald, Bosshard, & Brewer, 2009; Beck, Claassen, & Hundt, 2012;
International Rivers, 2012). China’s “Going Out Strategy” encourages overseas investment to access nat-
ural resources and to create employment for Chinese workers overseas (Mohan & Power, 2008; McNally,
Magee, & Wolf, 2009; Urban, Nordensvärd, Wang, Khatri, & Mohan, 2011). There are currently more than
330 Chinese-built and Chinese-funded overseas dams, most of them in Southeast Asia (38%) and Africa
(26%). The majority of these are large dams that have been built since 2000 (International Rivers, 2014),
in a time when other dam-building nations and organizations, particularly those from the Organisation for
Economic Co-operation and Development (OECD) withdrew from the dam-building industry.

Africa has had its fair share of large dam-building projects even though it is still confronted with
a serious deficit in energy supply. Currently, African countries are tapping only about 8% of their
technical hydropower potential (International Renewable Energy Agency (IRENA), 2015). The World
Bank has indicated that Africa needs to develop an additional 7,000 megawatts (MW) per year of new
electricity generation capacity to overcome the deficit, which is perceived as a serious impediment to
the continent’s economic and social development (Hensengerth, 2011). This is the gap that China has
been playing an active role in filling. Hensengerth further argues that it is in this respect that many
African countries have sought or are seeking assistance from China in developing their hydroelectric
power resources such that by 2008 China had become the largest financier of infrastructure projects
on the continent including the Bui dam in Ghana.

Ghana currently has two large hydroelectric dams: Akosombo, which was commissioned in 1965
and Kpong, in 1982 with a combined installed capacity of 1180 MW (Energy Commission, 2012). Bui
is the third large hydroelectric dam with a capacity of 400 MW. The Bui dam is the first dam built by
Chinese companies and partly financed by Chinese banks and financiers (Obour, Owusu, Agyeman,
Ahenkan, & Madrid, 2016). However, very little research has been conducted on the livelihood chal-
genues of resettled communities affected by dams in Ghana and the role of Chinese dam-builders. This
article therefore aims to address these issues by investigating the Bui dam. The overall objective of this
article is to discuss the emerging livelihood challenges associated with the implementation of the re-
settlement of the communities affected by the Bui hydropower project and to make recommendations
towards ameliorating them. The article also discusses the role of the Chinese dam-builders and how
this may have affected the Bui dam and its impacts on the resettled community.

2  |  CONCEPTUAL FRAMEWORK

This research uses the conceptual framework of the “political ecology of the Asian drivers.” This
framework is a hybrid approach that draws on the political ecology of China’s engagement in overseas
hydropower projects and the Asian drivers for explaining the rise of China and its global, national and local impacts. This is outlined as follows: until very recently, the majority of work on China’s engagement with LMICs has been speculative (Mohan, 2008), economistic (Jacques, 2009) and Africa-focused (Alden, Large, & Soares de Oliveira, 2008; Brautigam, 2009). This has changed in recent years as more scholars are exploring the rise of China and its internationalization from an environmental perspective as well as drawing on empirical data (Power, Mohan, & Tan-Mullins, 2012; Hensengerth, 2013; Tan-Mullins & Mohan, 2013; Kirchherr, Charles, & Walton, 2016; Shen & Power, 2016; Power, Newell, Baker, Bulkeley, Kirshner, & Smith, 2016). Understanding a complex set of international actors, interdependencies and ecological impacts necessitates a broad theoretical framework (Urban, Nordensvärd, Khatri, & Wang, 2013).

We used the political ecology framework (Wolf, 1972; Greenberg & Park, 1994) as a basis for analyzing the conflicts caused by the varied forms of control over the access to natural resources such as water and energy (Blaikie, 1985; Bryant & Bailey, 1997; Peet & Watts, 2004). The political ecology is basically concerned with nature–society relations (Perreault, Bridge, & McCarthy, 2015). Power relations between different actors are at the heart of this framework (Tan-Mullins, 2007) and assessing the unequal power relations between actors allows us to explain the uneven distribution of access and control of environmental resources. Power relates to the differential ability to control and/or access the economic benefits from resource exploitation (Peluso, 1992; Dauvergne, 1994; Bryant, 1998). Bryant and Bailey (1997) developed three fundamental assumptions in practising political ecology in developing countries. First, costs and benefits associated with environmental change are distributed unequally. Second, this unequal distribution inevitably reinforces or reduces existing social and economic inequalities. Third, the unequal distribution of costs and benefits and the reinforcing or reducing of pre-existing inequalities holds political implications in terms of the altered power relationships that result (Bryant & Bailey, 1997).

We combined this theoretical framework of political ecology with the distinctive approach of the “Asian drivers” and their impacts. This framework has already been used in an amended form to assess the motives and implications of Chinese investments in the hydropower sector in the Greater Mekong sub-Region (Urban et al., 2013). The Asian drivers framework developed by Humphrey and Messner (2006), Kaplinsky and Messner (2008) and Schmitz (2006), assesses China’s direct and indirect impacts as a rising power and its channels of interaction with LMICs. In each of these channels—aid, trade, investment, global governance, individuals/migrants and environment—there will be a mixture of complementary and competitive economic impacts, and positive and negative impacts in relation to society and the environment (Kaplinsky & Messner, 2008). Urban et al. (Nordensvärd, Wang, Khatri, & Mohan, 2011; Urban et al., 2013) advanced the Asian drivers framework further by addressing the motives, actors and beneficiaries in addition to impacts to analyze in detail how, why and with which impacts Chinese actors engage in LMICs. Taken together, this framework of the “political ecology of the Asian drivers” helps us to understand the role of Chinese dam-builders and financiers in Ghana, and the impacts of the dam on resettled communities.

3 | METHODOLOGY

The study on which this article is based involved a number of steps. The first steps involved the realization of a stakeholder mapping to identify key stakeholders at the national, regional and district levels. At the national level, key ministries, departments and agencies (MDAs) and international organizations were identified and contacted for interviews. Second, a reconnaissance survey was undertaken at the Bui dam project resettlement communities during which the research team met
the chiefs or headpersons of the resettled communities, their opinion leaders and elders. Also, the local government units: Tain and Banda district assemblies, where some of the resettled communities are located, were visited, during which the study team interacted with their key staff including their district chief executive, planning, co-ordinating and finance/budgeting officers. The third phase of the fieldwork comprised of interviews and focus group discussions with the different categories of respondents identified during the stakeholder mapping exercise.

In total, we conducted 43 interviews and 11 focus group discussions: 15 key informant interviews with institutional actors who had an involvement in the Bui dam construction; three interviews with Chinese dam-builders and financiers (carried out in China for the wider project); 25 interviews with affected community members and their community chiefs (Table 1). For the institutional interviews, we undertook semi-structured interviews with MDAs; international organizations; and non-governmental organizations (NGOs) at the national and district levels. These actors were interviewed on their perceptions of the socioeconomic and environmental impacts of the dam, governance issues, political and economic implications. The community fieldwork was carried out in the four affected villages (Jama, Dokokyena, Bui, Akanyakrom), selected in collaboration with the village chiefs and assemblyman.

In terms of occupation, the respondents were predominantly farmers and fishermen. All the interviews and focus group discussions (FGDs) were recorded, transcribed and analyzed theme by theme using Nvivo 10 software. The consultation data have been analyzed according to nine main themes identified during fieldwork which refer to the following issues: resettlement, life changes, involvement and consultation, interaction and communication, social (access to natural resources, livelihood changes and access to energy) and environmental impacts, expectations, cultural impacts, compensation and challenges.

### TABLE 1  Interview setup

| Targets                                      | Methods          | No of interviews | Further details                      |
|----------------------------------------------|------------------|------------------|--------------------------------------|
| Affected local communities at Dam sites      | Focus groups     | 11               | 50% women; 50% men                   |
| Affected individuals from local communities | Semi-structured interviews | 25 | Men and women                        |
| Institutional actors                         | Semi-structured interviews | 15 | National/local government, NGOs      |
| Chinese actors                               | Semi-structured interviews | 3  | Sinohydro, regulators and financiers |

Interviews and focus group discussions with affected communities were carried out in September 2013 in Ghana; Interviews with institutional actors and Chinese actors were carried out during the 2013, 2014 and early 2015.

4 | RESULTS

4.1 | The political ecology of the Asian drivers and the Bui dam

The framework of the political ecology of the Asian drivers indicates that for the Bui dam, the costs and benefits associated with environmental change due to the dam-building are distributed unequally. Poor local people are negatively impacted due to resettlement, declines in their livelihoods, loss of
access to fertile land etc. At the same time, the Chinese developers Sinohydro and the Ghanaian state represented by the Bui Power Authority (BPA) are reaping the financial benefits of the dam. Second, this unequal distribution inevitably reinforces or reduces existing social and economic inequalities. The poor and marginalized are disproportionately affected whereas wealthy elites are gaining further power and wealth. Third, the unequal distribution of costs and benefits and the reinforcing or reducing of pre-existing inequalities holds political implications in terms of the altered power relationships that result. The close relationship between Chinese dam-builders and Ghanaian government authorities changes power relationships, meaning much closer political, trade and investment ties between China and Ghana after the dam construction than before. These issues, as well as the channels of interaction that China uses to engage with Ghana, will be presented in this section.

The need for the development of hydroelectricity to facilitate economic development in most developing countries has ignited heated debate about where to strike the balance between development and other important national interests. However, their economic importance notwithstanding, the development of big dams has been opposed due to severe environmental impacts and socioeconomic consequences (Nüsser, 2003). The state, in developing hydropower dams, is expected to balance the need for energy for development and protection of the environment “due to its unique remit to act in the national interest” (Bryant & Bailey, 1997, p. 48). As the state remains a major actor, its role often becomes contradictory in promoting development and capital accumulation with its own power and political strategic interest (Bryant & Bailey, 1997, p. 48).

In the construction of the Bui dam, the political ecology framework is used to assess the unequal relationship between the principal actors (the state, BPA, Sinohydro, district assemblies and resettled communities) for control of environmental resources (Tan-Mullins, 2007). The proposal for the construction of the Bui dam was always opposed by many stakeholders citing environmental concerns and Ghana’s poor record of dealing with dam-related socioeconomic problems (based on experiences at the Akosombo and Kpong dams). The two earlier dams came with huge environmental and social costs (Sarpong, Quaatey, & Harvey, 2005; Tsikata, 2006). For example, Gyau-Boakye (2001) estimates that more than 88,000 people were displaced and had to be resettled, with many irregularities associated with the compensation schemes. The main problems included lack of property rights, poor health and loss of artefacts with cultural and religious significance (International Water Management Institute, 2009). Despite these challenges, successive governments in Ghana had attempted to build a third hydropower dam at Bui Gorge on the Black Volta River. The World Bank and other partners declined financial support, citing social and environmental impacts, including flooding of the Bui National Park—home to some rare black hippopotamus populations (Benjamin, 2007). With the government’s determination to generate power, a solution was found when the state signed an Engineering, Procurement and Construction (EPC) Agreement with a Chinese company (Sinohydro) and a French consultancy (Coyne et Bellier) to construct a dam at Bui (Barry, Obuobie, Andreini, Andah, & Pluquet, 2005).

An environmental and social impact assessment (ESIA) was conducted prior to the commencement of the dam construction to satisfy both local and international requirements. The ESIA also highlighted potential adverse environmental, social and economic impacts of the project. The overriding benefit of the project was that it has the potential to enhance economic development at both the local and country level (Bui Power Authority, 2011). However, critics challenged the economic viability of the project and argued that the potential benefits were embellished by the government. Among the developmental benefits projected by the state included the construction of Bui City, a public university and an irrigation project. The ESIA also projected that only 859 people would be displaced by the dam. The dam has since been commissioned with numerous challenges emerging. Power generation runs at about a quarter of its nameplate capacity; 1,216 people have been resettled, which is 40% of
the original estimate (Ampratwum-Mensah, 2011). All things considered, the actual winner of the Bui dam project may not be the state or the local people who have been displaced.

With regards to the Asian drivers perspective, the Bui dam is built by Chinese SOE Sinohydro and jointly funded by the Government of Ghana, the Chinese Exim Bank via a commercial loan and buyer’s credit, as well as the Government of China via a concessional loan. For the payment of the loans there is a trade agreement between China and Ghana, such that Ghana is paying back the loans to China’s Exim Bank with revenues derived from cocoa production (Odoom, 2015). This means that the Bui dam deal has bundled together trade, aid and investment.

### 4.2 The governance process for the Bui dam

Governance has been defined to refer to structures and processes that are designed to ensure accountability, transparency, responsiveness, rule of law, stability, equity and inclusiveness, empowerment, and broad-based participation. Governance also represents the norms, values and rules of the game through which public affairs are managed in a manner that is transparent, participatory, inclusive and responsive. Governance is about the culture and institutional environment in which citizens and stakeholders interact among themselves and participate in public affairs. It is more than the organs of the government (UNESCO, n.d.). In this article, governance is used to refer to the management structures set up by the central government to implement and operate the Bui hydropower project. These are BPA, as the core body responsible for the Bui project and all other state institutions, agencies and departments, including local government units that BPA was to collaborate with in executing its mandate. By extension, it also includes the communities and civil society generally.

Despite the positive benefits that countries derive from large dam projects, these projects have been criticized because of their negative environmental and social governance (Lerer & Scudder, 1999). In Ghana, the construction of the Akosombo and Kpong dams resulted in numerous socioeconomic as well as environmental challenges in the adjoining communities, and the scope and severity of these challenges attracted a lot of local and international research and civil society attention (Amoah, Adiku, & Owusu, 2008). The lessons drawn from the Akosombo and Kpong dam projects were supposed to have informed the planning and implementation of the Bui resettlement projects in order to reduce the ill-effects of dam displacements on resettled communities. Like its counterpart, the Volta River Authority, which had the responsibility to plan and implement the Volta River Project including the planning and implementation of resettlement, the BPA (established by Act of Parliament (ACT 740) in 2007), was given full responsibility for planning, executing and managing the Bui project (Zigah, 2009, p. 25).

The area affected by the Bui dam project comprises approximately 2,000 people living in small villages scattered all over the dam area in the former Tain district in the Brong Ahafo Region and Bole District in the Northern Region. Those that were to be inundated or isolated by the dam and had to be resettled were: Bator Akanyakrom, Bui Village, Dam Site, Brewohodi, Dokokyina in the former Tain district and Lucene/Loga and Agbegikro in the Bole district. The first communities (those communities that were immediately affected by the construction namely, Brewohodi, Agbegikuro, Dam Site and Lucene) were settled in May 2008. Between 2009 and 2010, the BPA and Bui communities held a series of meetings to finalize resettlement arrangements and by June 2011, the Bui communities including Bui Village and Akanyakrom (Bui Power Authority, 2011; Doh & Andoh, 2014) had been resettled.

In accordance with best practice, various studies were conducted on the Bui project, most notably: an ESIA, an Environmental and Social Management Plan and a Resettlement Plan Framework (RPF). The RPF was developed using the World Bank’s Policy on resettlement as
a guide and the provisions of the 1992 Republican Constitution of Ghana. On the basis of the RPF, the BPA developed a Resettlement Action Plan (RAP) in 2009 for the Bui project. The principal focus was on the choice of host communities, housing and social infrastructural development, environmental protection, participation and integration with the host community. The selected resettlement principles outlined in the RPF and RAP are based on weaknesses in past resettlements in Kpong and Akosombo and also in line with international best practice (Doh & Andoh, 2014). However, a few years into the implementation of the resettlement plan, a report produced by Ghana Dams Dialogue documented some of the challenges that the resettled communities were encountering (Doh & Andoh, 2014). Our fieldwork analyzed these challenges in further depths.

4.3 | Livelihoods impacts of the Bui dam

4.3.1 | Access to natural resources: land, energy, water, forest products, and food

Using Nvivo 10, we performed a word frequency analysis to list the most frequently occurring words in the coded interviews, in relation to the impacts of the dam construction on access to resources, including land, energy, water, forest products, and food. The results of the analysis are presented in Appendix 1 and Appendix 2, where we report the selected references coded and the interview code used in the text to refer back to specific references used.

This analysis relates back to the conceptual framework of the political ecology, indicating the role of access to natural resources, the control of this access and altered power relationships with regards to resource control as key the local population, who had to be resettled and lost access to its land.

Access to land and food

According to our analysis, land is main source of concern of the affected communities. Moreover, farm, farming and fertile are also listed among the most frequent words, highlighting not only land scarcity, but also land fertility and therefore productivity as the main issues for the affected population in the resettlement areas (see Appendix 1 for selected quotes and interview codes on land access, scarcity and fertility). According to respondents, access to land has dramatically decreased since resettlement, which is causing problems either in terms of the possibility of engaging in commercial farming activities (INI-M-BUI-L) or in terms of food self-sufficiency. Community members after resettlement rely more on the market for food provision.

Previously [before resettlement] I was able to harvest 1000 tubers of yam, presently we can’t harvest more than 30’ (quote from FGD with men in Dokokyina resettled village);

Previously when we were at Nsuoano [near the river bank], we weren’t buying food’ (quote from FGD with a woman in Jama resettled village).

Moreover, according to resettled people, the influx of construction workers has resulted in the rise of food prices at the dam site. 1,836 workers were employed for the construction of the Bui dam, most of whom were Ghanaian (91%) (Kirchher et al., 2016) and coming from outside the construction area (Baah & Jauch, 2009).
Food situation, it is expensive because of the influx of the construction workers. In the old village, we used to get yam for two Cedis$^1$ but today, yam goes for 10 Cedis for about three pieces’ (quote from man in Bui Village).

In terms of food provision, access to fish and the rising price of fish in the market due to immigrant workers are also a source of concern of the affected communities. Even if the expanded lake resulting from the construction of the dam has led to a general boom in the fishing business, native communities have been unable to take advantage of the booming fishing industry. There are three main challenges that the resettled communities complained about regarding access to fish and fishing activities: (1) the distance to the river from the community; (2) the lack of skills to fish on the newly expanded lake (INI-M-AK-FH); (3) the fact that it is more expensive for them to buy fish now than it was before resettlement. Respondents reported that previously, when community members were not able to catch fish, they paid two Cedis to buy enough to make a meal for the whole household. Now, though, they must pay five Cedis for the same quantity of fish (INI-F-BUI-FH). Access to bush meat for both home consumption and commercial purposes has also declined due to difficulty accessing the forest from the resettled communities; villagers now have to buy meat from the market (INI-M-DK-A).

Access to water, forest products and energy

Water scarcity is also a problem in some of the resettlement sites, such as in the case of Jama. According to the quotes reported in Appendix 1, in Jama and Dokokyina, water boreholes are not enough to satisfy the water requirements of the population, which has increased due to the presence of immigrants moving into the village (FGD-F-JAMA-W; INI-F-DK-W).

Access to forest products (such as charcoal, firewood, commercial trees) has decreased since the construction of the dam, as the resettlement sites are far away from the forest (INI-M-JAMA-T; INI-M-AK-T). Most of the resettled communities have to buy firewood and charcoal, which was freely available from the forest before the construction of the dam. The same goes for shea nut (Vitellaria paradoxa), dawadawa (Parkia biglobosa) and medicinal plants and trees which brought extra income to the villagers from the old sites (see quotes for trees, shea, charcoal, firewood in Appendix 1).

In terms of energy access, energy and electricity are not a concern for the resettled communities. This is because following the construction of the dam all communities have been provided with electricity, as reported in the quote below.

The thing we appreciate most about our coming here is that previously we didn’t have electricity at the village close to the lake but now we have light (quote from FGD with men in Jama).

Across the board, the affected population indicated that they have diminished access to fertile land, forests and forest products and other natural resources. The political ecology framework links this to unequal power relations between actors resulting in the uneven distribution of access and control of environmental resources. This can be seen for the Bui dam case, where the Chinese developers Sinohydro (during construction) and most importantly the BPA (in the long run) are in control of natural resources and decide the fate of the resettled local people. This is further manifested in livelihood changes, as discussed below.

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$^1$The value of the Ghana Cedi at the time of field work was two Cedis to one US dollar.
4.3.2 Livelihood changes and impacts

According to the results obtained by the interviews reported in Appendix 2, there is a high correlation between access to natural resources and livelihood changes/impacts. Most of the livelihood changes perceived by the resettled communities interviewed refer to decreasing livelihoods (INI-F-AK-Fb), shifting livelihood strategies (INI-F-DK-Fb) and issues of reduced resource access and productivity (FGD-F-DK-Lb), mainly in reference to land and fish. Land scarcity and the reduction of land productivity/fertility in the resettlement sites have severely undermined the livelihoods of farming communities (FGD-F-DK-Lb). Moreover, due to inundation in the dam site area, some of the villagers have lost valuable cash crops, such as cashew plantations. Since cashew is hard to grow on the farmland in the resettlement area, villagers who used to cultivate cashew do not have an alternative occupation. Due to the declining cashew production, collectors have to go to Côte d’Ivoire to work as hired collectors (FGD-F-DK-WRb). Even if they received compensation for the flooding of cashew plantations, the money they received only lasted for two years (INI-F-AK-Mb; FGD-M-BUI-Mb). Unemployment is therefore increasing. As a result, some villagers had to shift from cash crops such as cashew to other less valuable food crops such as cassava and maize. Moreover, some villagers have shifted from farming to fishing because farming is no longer profitable for them (FGD-M-AK-Lb). However, the lack of skills and materials to fish on the lake rather than on the river (FGD-M-BUI-FIb), as well as the distance to access the river and lake from the new resettlement areas are also undermining the possibility of accessing new job opportunities (INI-F-AK-Fb).

Again, before the construction of the dam, smoked fish traders were able to access the river to buy fish without using a car. Now they have to go further afield and require a car. According to one respondent, they pay around two Cedis to get to the river. In the new settlements, they also have to buy firewood to smoke the fish which they previously got freely from the forest. All these additional expenses have negatively impacted on their livelihoods. Switching from farming or fishing to trading is difficult due to the lack of money to invest in the transition (FGD-F-DK-Mb). This is because in the resettlement sites communities are more dependent on the market for food provision due to the reduced access to fertile land and fishing activities.

According to our analysis, the Bui dam construction has resulted in competition for natural resources (land, fish and forest products) between (1) different proposed uses, i.e. land and water for dam construction and energy generation versus land and water for the provision of local livelihoods; (2) different users i.e. local communities versus immigrants, dam-builders and the government. The governance structure also seems to have broken down and allowed for illegal activities in the harnessing of economic resources within the dam site. For instance, the flooding of the Bui National Park during construction made it difficult for the officials of the Wildlife Division of the Forestry Commission to monitor and control the activities of illegal resource exploiters, including galamsey operators (small-scale miners who mostly are unregistered), fisher-folks and illegal chain saw operators within the dam’s immediate environs. The latter group includes migrants from other West African countries including Burkina Faso, Niger and Nigeria, and Chinese immigrants. An official of the local district assembly commented on these illegal activities as follows:

This whole environment is being somehow utilised and we don’t know to whose benefit.
The wood that is being cut we don’t control it and the revenue that comes as well.

Another District Assembly (DA) official also described these activities in these words;
the DA is not fully aware of what is going on, who owns the timber concessions etc. None of the firms have registered with us.

The apparent breakdown in the governance structure, and the fact that the local communities including resettled people do not have the requisite skills and financial power to exploit resources like the outsiders, means they benefit very little from the construction of the dam. This has been compounded by the lack of implementation of an alternative livelihood scheme promised by the BPA. The alternative livelihood support schemes were twofold: new skills training, including handling of new farm equipment and new fishing techniques; and the provision of new infrastructure, (such as irrigation technologies), to support existing livelihoods, particularly farming and fishing, social mitigation strategies by the BPA and local government. Across all communities, there were the two most important promises made between the communities and the BPA, which have so far not been kept. As a male participant commented on this as follows:

BPA and other government institutions need to perform their responsibilities towards the people –especially in making life more bearable since all the promises to better our farming through irrigation have not been fulfilled, currently we feel ignored. (Personal communication from FGD, Bui Village).

4.4 China’s role as a dam-builder and financier

The conceptual framework of the political ecology of the Asian drivers enables us to analyze the various channels of interaction that China uses to engage with Ghana in dam-building. These channels include aid, trade, investment, global governance, individuals/migrants and environment. Chinese actors are involved in overseas dam investments with different roles. They can act as financiers, developers, builders, or sub-contractors, or any combination of these roles. Usually they are involved in at least two of the above tasks (Urban et al., 2013). The Bui dam is the largest Chinese-funded project and the largest foreign investment after the Akosombo hydroelectric power project in Ghana in 2008. As mentioned before, various channels of interaction are being used with regards to the Bui dam, namely a bundled aid, trade and investment deal is in place that links revenues from cocoa exports to paying off the dam’s debt to the Export–Import Bank of China (Exim Bank).

Although the Chinese have a very important role to play in terms of providing the technical expertise and funding for the dam, they did not participate in the management and implementation of the ESIA of the dam. We also found out that the Chinese did not participate in implementation of the resettlement and the mitigation plan that details measures for reducing the environmental and social implications of the dam. The ESIA had in fact been commissioned before the construction of the dam, by Ghana’s Ministry of Energy and carried out by the UK firm Environmental Resources Management (ERM, 2007a; Hensengerth, 2013). The BPA was created by the Ghanaian government for the management of the dam and its impacts, including the implementation of the resettlement plan. Our fieldwork also found that the main functions of the BPA include the generation of electrical power, the operation of the dam, the construction of a transmission system, the supply of the electrical power generated at the dam, the provision of facilities and assistance for the use of the lake created by the construction of the dam, as well as the development of activities at the dam area. The BPA is also responsible for the control of the flow of water and flooding due to the creation of the reservoir and the acquisition of land and resettlement measures, including compensation payments to the local population.
As the contractor, Sinohydro’s obligations were: the implementation of a Construction Management Plan, including: “workforce and local residents’ health and safety;” “good housekeeping” site management practices; flow regimes during construction (particularly during diversion); emergency response to significant accidents/pollution incidents; site access; siting of temporary structures/work and locations/materials sourcing. Employment and workforce obligations included: health screening, and health provision for workers; workforce health awareness; employment policies, favouring employment of local people where possible; codes of conduct for interactions between workers and local communities; and environmental and wildlife awareness programmes for workers (ERM, 2007b).

Our work found that the Bui dam project in Ghana is an EPC/turnkey project contract in which the construction company is responsible for the construction of the dam, including the health and safety of the workers and their recruitment, but once the infrastructure is finished and operational, the host government becomes the immediate owner and takes full responsibility for the project. In this case, even though the construction company had to abide by the regulations of the host country, including environmental regulations, the company was not responsible for the execution of the ESIA and the mitigation strategies. As the BPA is the only authority responsible for the implementation of the environmental and social mitigation measures and monitoring Sinohydro’s conduct, various concerns have been raised about the lack of proper control and supervision over BPA and Sinohydro’s activities, to ensure a more transparent and effective application of social and environmental regulations and standards (Hensengerth, 2011). However, in the long term, it is the BPA that manages, operates and maintains the dam and deals with its impacts, such as resettlement and compensation of the affected population. The role of Chinese actors Sinohydro and Exim Bank is therefore limited.

5 | CONCLUSION

We used the conceptual framework of the political ecology of the Asian drivers to assess China’s engagement in the dam sector in Ghana and its impacts. We analyzed how costs and benefits associated with dam-building are distributed unequally, with poor people losing more and wealthy elites gaining more. The research indicated how this unequal distribution inevitably affects existing social and economic inequalities and how this altered the power relationships between China and Ghana and led to a tighter political and economic relationship between the two countries. This research found that China uses various channels of interaction to engage with Ghana in dam-building, most importantly a bundled aid, trade and investment deal that links revenues from Ghanaian cocoa exports to China for paying off the dam’s debt to Exim Bank.

The analysis shows that, on balance, the Bui dam project has been more costly than beneficial to the resettled communities. The reduced access to various forms of natural resources has resulted in limited livelihood opportunities for virtually everyone in the resettled communities. The lack of access to adequate land of appreciable fertility has greatly reduced the possibilities for enhanced food as well as commercial crop production, with serious implications for achieving food security and poverty reduction. The irrigation project promised to the resettled communities has not materialized and information obtained from the field indicates that the project is to be moved to another district, very distant from the resettled communities. The resettled fishing communities have not fared any better as their communities are located too far from their main source of livelihood (the lake), making fishing expeditions too expensive and consequently, fishing has become an unprofitable livelihood activity. Worst of all, the creation of the enlarged lake has provided them with the opportunity for an enhanced livelihood but they do not have the requisite fishing gear and the skills to fish on this open expanse of water and therefore are unable to benefit fully from a resource that was supposed to benefit
and improve their livelihoods. They therefore urgently need to be given the requisite training in the techniques of fishing on the lake that they were promised during the planning of the resettlement but which has not been fulfilled.

Opportunities for livelihood diversification are also limited. The farmers among the resettlers who might have wanted to diversify into fishing are constrained by lack of fishing skills, lack of resources to acquire the appropriate fishing gear and also the long and expensive distance from their community to the lake side. Equally, the fishermen cannot engage in farming. Trading seems to be an attractive form of livelihood diversification but lack of capital was found to be the limiting factor. Based on the above it could be concluded that there is a cost to all the previous livelihood activities in the resettled communities. On the other hand, the BPA reneged on two promises to the communities during the planning phase of the Bui project: new skills training and provision of new infrastructure to support existing livelihoods particularly farming. The inability of BPA to implement the skills training programme resulted in reduced livelihood opportunities and led to a huge migration of the youth from the resettled communities.

In terms of livelihoods then, the dam project seems to have deepened the pre-existing poverty situation of the communities. It seems the dam has been more beneficial to the fishermen and fishmongers from outside the resettled communities (from Burkina Faso, Niger and Nigeria) on account of their skills in fishing on the lake and cash resources to be able to engage in fishing more profitably. This has economic and sociocultural consequences for the resettled communities. It is recommended that the BPA fully implements the terms of the resettlement plan framework (RPF) including alternative jobs training and other livelihood assistance packages to better the livelihoods of the resettled communities.

The Ghanaian government has negotiated a favourable turnkey contract with Chinese dam-builders Sinohydro and Chinese financiers. In addition, the Ghanaian government established the BPA, a separate entity that manages the dam and its impacts, including resettlement and compensations. Sinohydro does not make any decisions on the dam’s management, but relies on very clear-cut roles of responsibility and decision-making held by a Ghanaian authority. We therefore draw two conclusions from the analysis of the role of Chinese dam-builders and financiers for the Bui dam. Firstly, the commercial loan from Chinese financiers Exim Bank and the concessional loan from the Government of China enabled the building of the dam in the first place. No other investors dared to invest in the Bui dam because of its social and environmental impacts. In addition, Sinohydro brought a wealth of expertise and engineering capabilities to the Ghanaian hydropower sector. Clearly, the Bui dam would not have been built without the Chinese dam-builders. Secondly, the impacts on livelihoods are not strongly influenced by Chinese actors. The main decisive authority is the BPA—Sinohydro and the Chinese financiers have very little involvement in post-construction issues. We therefore conclude that although the Chinese dam-builders played their part, the livelihood challenges of the resettled communities were more heavily affected by the Ghanaian governance arrangements.

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**APPENDIX 1**

Access to resources, word frequency analysis and selected references coded

| Word                      | Selected references coded                                                                 | Interview code |
|---------------------------|------------------------------------------------------------------------------------------|----------------|
| **Land (count 65; weighted % 4.56)** | “the land allocated to me over here is not enough, my land is about one and half acre” | FGD-M-AK-L     |
|                           | “They allocated an acre of land […] this is not enough”                                   | FGD-M-JAMA-L   |
|                           | “The land which was allocated to us for farming is too small”                             | FGD-F-AK-L     |
|                           | “Currently land for farming would be inadequate if people want to engage in commercial farming” | INI-M-BUI-L    |
|                           | “Land is very scarce here. Land shortage will continue […] especially when every young man wants a plot to farm” | INI-C-JAMA-L   |

(Continues)
### APPENDIX 1  (Continued)

| Word                  | Selected references coded                                                                 | Interview code |
|-----------------------|-------------------------------------------------------------------------------------------|----------------|
| **Trees** (count 22; weighted % 1.54) | “[…] trees like the Nim plant, Moringa, we also had special trees which we used to cure malaria in children but we left all these trees back at our old place, there is nothing like that over here” | INI-M-AK-T     |
|                       | “Windstorms are high and there are few trees to serve as wind breaks”                     | INI-F-AK-T     |
|                       | “[…]access to commercial trees is difficult”                                               | INI-M-JAMA-T   |
| **Firewood** (count 21; weighted % 1.47) | “we buy firewood and charcoal for cooking which was not the case in our previous community” | INI-M-AK-F     |
| **Fish** (count 21; weighted % 1.47)   | “We pay as much as 4 Cedis for a round trip to the lake with the motor cycle and sometimes we don’t even get any fish” | INI-M-JAMA-FH  |
|                       | “We were close to the river there so we used to get easy access to fish but fish is now scarce here. During that time you could use 2 Cedis to buy fish and it can make soup for the whole household but today, fish worth of 5 Cedis would not be enough for this family” | INI-F-BUI-FH   |
|                       | “Our water source is a lake which is different from the river we were used to, so most people have stopped fishing. We were supposed to be educated on lake fishing. They were supposed to educate us on the use of life jackets; we informed our leaders about it. We lost 4 people to that disaster, after this incident the fishermen were struck with fear, some of us even decided not to fish anymore” | INI-M-AK-FH    |
| **Water** (count 21; weighted % 1.47) | “[…] ever since we came here, they brought four communities and they have given us only two pipes and as a result getting water is not easy. We go to the tap early morning and we come back with just a basin of water, at the previous place water was not an issue but here we sometimes end up fighting by the tap” | FGD-F-JAMA-W   |
|                       | “Inadequate access to water—we have only few boreholes; we have to queue for long hours to get water for households use” | INI-F-DK-W     |
| **Farm** (count 19; weighted % 1.33) | “If you don’t farm, what will you feed your family with and when you try getting a place to farm people start to claim ownership of the land so this is a very big problem” | FGD-M-JAMA-FA  |
| **Farming** (count 19; weighted % 1.33) | “For yam farming, after harvesting you need to move to a new farmland but over here the land is not vast like our former place” | INI-F-BUI-FR   |
| **Fertile** (count 12; weighted % 0.84) | “The land for farming was fertile and so we could harvest plenty yields but the land they gave us here is not fertile. Also, they agreed to help us with chemicals to make the land fertile again but we didn’t hear from them again” | FGD-M-JAMA-FE  |
| Word                          | Selected references coded                                                                 | Interview code          |
|-------------------------------|------------------------------------------------------------------------------------------|-------------------------|
| Charcoal (count 9; weighted % 0.63) | (See selected quote for firewood)                                                        | INI-M-AK-13-F           |
| Lake (count 9; weighted % 0.63)    | “If you take a close look at the new path they have created, it is almost 3 miles away, meanwhile at our previous place we were very close to the lake. The distance was just about 10 feet long” | FGD-M-JAMA-LK           |
| River (count 9; weighted % 0.63)    | (see quote on fish)                                                                      | INI-F-BUI-FH            |
| Shea (count 9; weighted % 0.63)     | “We had a lot in our old community. I could gather a lot of shea nuts for sale. None of those are here” | INI-F-AK-S              |
|                                | “Had a lot of forest products which gave people extra income, such as shea nuts, dawadawa, medicinal plants” | INI-M-BUI-S             |
| Animals (count 7; weighted % 0.49) | “Difficult to get bush meat—animals are fleeing away”                                  | INI-M-DK-A              |

Note. in the interview code the first part indicates the type of interviews, distinguishing between FGDs or individual interviews (INI); the second part indicates the gender of the interviewees, male (M) or female (F); the third part the village where the interview has been carried out, Jama, Bui, Akayakron (AK), Dokokyena (DK); the fourth part indicates the word to which the code refers, such as land (L), trees (T), fish (FH) and so on.

Source: The Authors.
### APPENDIX 2
Livelihoods’ changes and impacts—word frequency analysis and selected references coded

| Word        | Selected references coded                                                                 | Interview code |
|-------------|------------------------------------------------------------------------------------------|----------------|
| **Land**    | “The fishermen are more after the construction of the dam; […] because the land is too small some have been forced to divert their work to fishing” | FGD-M-AK-Lb    |
|             | “Since moving, if you plant any vegetable for soup, it does not grow well because the land is not fertile so we have to buy everything” | FGD-F-DK-Lb    |
| **Fish**    | “I used to be involved in trading of fish but here I sell tomatoes, garden eggs and okro and pepper”; “We lived close to the river and it was easy to fish and our husbands had better harvest. Life span of fishing net has shortened because the lake/dam has inundated trees and other vegetation and this breaks nets” | INI-F-DK-FHb   |
|             | “[…] we walked to the river to buy fish but over here the distance to the river is such that you have to board a car, if you get fish you have to get a paa o paa to carry the load, when you get home you have to buy firewood to smoke the fish; after selling your fish when you deduct all these expenses you make just a little profit” “Before I used to be a trader and sell food but over here I am not able to go to the river to buy fish. In our old community I could get about 30 or 50 Cedis in a day but over here I am not even able to make 10 Ghana Cedis” | INI-F-AK-FHb   |
|             | “We now buy fish instead of fishing on our own since we are not used to fishing on the lake with our small canoe as compared to fishing on the rivers. […] We lack the skill to fish on lakes” | INI-M-AK-FHb   |
| **Farm**    | “[…] not able to raise any farm produce to sell” | INI-F-DK-FAb   |
| **Farming** | “We used to have two jobs, farming and fishing but when we arrived here due to the unavailability of lands, most young people especially those who were cultivating pepper, garden eggs etc. have changed their occupation” | INI-M-AK-FRb   |
|             | “We were farming cassava, yam, groundnut, tomatoes, okra, garden eggs etc. We are not farming the same things here so our lives have not improved” | FGD-F-JAMA-FRb |
|             | “At our previous place we were into both farming and fishing. But since we came here, the distance to the lake is very far and before you get back from the lake, you won’t be able to go to the farm” | INI-M-JAMA-FRb |
|             | “The inability to farm is a problem here. I used to have all products needed like bush meat and only bought salt and maggi cubes from the market. The main problem I have is food and work” | INI-M-DK-FRb   |
|             | “even if you have an idea of what to do, there is no money to help you to shift from one occupation to the other. For instance, one can say farming activity here is no longer profitable and so wants to shift into trading but the money to even go into trading is not available” | INI-F-BUI-FRb  |
| Word            | Selected references coded                                                                                                                                                                                                 | Interview code |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Fishing (count 22; Weighted % 1.62) | “There is no work for us to do. Nor all of us have the skills for fishing in the lake” FGD-M-BUI-FIb                                                                                                                                 |                |
| Work (count 20; Weighted % 1.48) | “now here I can’t get any cashew work to do. If I want to pick up cashew for a living I have to go all the way to Côte d’Ivoire “ “The major one [i.e. challenge] is our location from the river because it has led to loss of our fishing work” FGD-F-DK-WRb INI-M-AK-WRb |                |
| Money (count 19; Weighted % 1.40) | “You know we are farmers here so we invested the money into farming and the crops too are not growing well so all the money is gone” “if you don’t have money how can you trade? If your farm gives poor yield how can you get money to go into trade?” “We have been here for 2 years now and the compensation money has exhausted and we are all the time at home with nothing to do” “Difficult to get/obtain certain resources like firewood. It has affected my main economic activity (i.e. negatively)—used to sell *fanti kenkey* (cooked meal from corn dough) but people are not buying because they don’t have money” “had several acres of cashews and I was just given 1200 Cedis. When valued I realized that the money for each tree did not amount to 10 Cedis which is very less compared to the yields from before” FGD-F-BUI-Mb FGD-F-DK-Mb FGD-M-BUI-Mb INI-F-DK-Mb INI-F-AK-Mb |                |
| River (count 15; Weighted % 1.11) | “our community is a fishing community and we were not far from the river. However we pay about 2 Cedis to get to the river and even with this there is no assurance of getting fish for cooking” (see also quotes on “fishing” and “fish”) INI-F-AK-Rb |                |
| Food (count 14; Weighted % 1.03) | “we had good yields but here we have to buy every food” “In the old place, all our children had farms but here is not like that. Right now if I don’t buy food, I will go hungry” FGD-F-DK-FDb |                |
| Cashew (count 13; Weighted % 0.96) | “Currently they are telling us not to cultivate cashew any longer because they are going to do some work over there [they refer to the land inside the Bui National Park they were using for cashew cultivation]; So we only cultivate food crops, we do not cultivate cashew which is like our cash crops. We really need land to cultivate our cashew” FGD-F-AK-Cb |                |

Note. in the interview code the first part indicates the type of interviews, distinguishing between FGDs or individual interviews (INI); the second part indicates the gender of the interviewees, male (M) or female (F); the third part the village where the interview has been carried out, Jama, Bui, Akayakron (AK), Dokokyena (DK); The fourth part indicates the word to which the code refers, such as land (L), trees (T), fish (FH) and so on. The term b at the end indicates that we refer here to livelihood changes and impacts to distinguish from the interview codes used for access to resources.

Source: The Authors.