

# Safeguards, financing, and employment in Chinese infrastructure projects in Africa: the case of Ghana's Bui Dam

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*Chinese players are now Africa's key partner for its infrastructure sector (including water supply projects), providing approximately two-thirds of investments since 2007. The social impacts of these engagements during the construction phase are mostly portrayed in an alarmist tone within the popular press. Meanwhile, scholarly literature investigating them remains scarce. We draw on the Bui Dam, a major dam in Ghana, financed by China Exim Bank (CEB), the largest financier of infrastructure in Africa, and constructed by Sinohydro, the largest dam developer worldwide, as a case study to explore social impacts of Chinese engagements in the African water sector. We particularly examine social safeguards policies from the perspective of Chinese players, the financing modalities, and the dam's impacts on the local labour market. We find that social safeguards policies were not within the responsibility of Sinohydro. Furthermore, financing modalities were largely favourable from a Ghanaian perspective, comparable to World Bank conditions, partly due to the successful negotiations (from the Ghanaian standpoint) during the planning and design phase of the project. Most likely, the project would not have been implemented if CEB had not stepped in to provide funding. Lastly, we find that most workers employed during construction were Ghanaian, paid significantly above the country's minimum wage. Nevertheless, working conditions overall were questionable. This case study highlights how Chinese engagement in construction of water infrastructure may help develop projects otherwise stuck in the planning and design phase. However, labour conditions during the construction phase of these projects need to be carefully managed.*

**Keywords:** Bui Dam, Chinese players, dams, infrastructure projects, Africa

Chinese players are now Africa's key partner for its infrastructure sector, providing approximately two-thirds of total infrastructure investments since 2007 (OECD, 2012: 48). Overall, 16 per cent of China's foreign direct investment (FDI) in Africa goes into infrastructure according to the Chinese State Council (2013: 6); 31 per cent of investments go into mining, 20 per cent into the finance industry. Within

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infrastructure, most investments concentrate on the power sector. Chinese investments in water infrastructure range from construction of mega-dams, mostly for power generation and irrigation, to water supply and sanitation infrastructure (IHA, 2013: 14ff) (overall, China only provided 4.2 per cent of Africa's total FDI from 2007 to 2013; EY, 2014: 29).

Key examples of recent water infrastructure projects carried out by Chinese players in Africa are the Caxito Irrigation Project in Angola, constructed from 2007 to 2010, irrigating around 32,000 ha of land; the Kuito Water Supply Project in Angola, carried out from 2007 to 2010, supposed to resolve the drinking water shortage of 400,000 citizens in Angola's capital Kuito; as well as the Lotsane Dam in Botswana, constructed from 2009 to 2012, providing potable water for 67,000 citizens (Sinohydro 2015).

Chinese engagements in Africa tend to be portrayed with an alarmist tone in the popular press. For instance, Grammaticas (2012) asks if 'China [is] becoming Africa's new colonial master?'. On a similar note, the former *New York Times* journalist, French (2014), argues that 'China is building a new empire [on the continent]'. Chinese firms would supposedly not shoulder responsibilities for the local population (Al Jazeera, 2014). Furthermore, allegedly shady deals and loans by Chinese banks would only lure African countries into massive debt build-up (Beattie, 2006). Lastly, Chinese projects would not create any jobs for Africans, but would 'rely primarily on workers flown in from China' (Hook, 2013). Working conditions in Chinese projects are supposedly poor (*Ghanaian Times*, 2008).

Scholars have started investigating Chinese investments in Africa particularly from an environmental perspective in recent years. For instance, Hensengerth (2012) analyses the role of international environmental norms in Chinese dam investments in Africa arguing that Chinese players would largely respond to and address them. Meanwhile, Tan-Mullins and Mohan (2012) evaluate corporate social responsibility (CSR) strategies adopted by Chinese state-owned enterprises (SOEs) in Africa and their effectiveness in mitigating environmental impacts. They find that outcomes vary significantly from project to project.

Comparable scholarly literature has not been published yet with a specific focus on the social impacts associated with the construction of water projects (analysed from the perspective of Chinese players), though. Hence, we intend to start addressing this gap via this paper. We concentrate on those social impacts most frequently discussed in the popular press, namely the social safeguard policies adopted, the project's financing modalities as well as its impacts on the labour market during construction. We examine these using a case study approach, focusing on Ghana's Bui Dam, a major irrigation and power generation dam, to understand how Chinese players implement infrastructure projects. We then consider how these social impacts are relevant across sectors.

We have selected a case study approach as 'each large dam is unique: it has its own set of benefits and costs' (Biswas, 2012). The case study approach allows us to account for this uniqueness. At the same time, our chosen case study, the largest Chinese investment in Ghana (TUC, 2013: 2), may yield maximum external validity.

It was constructed by Sinohydro, the world's largest dam developer with an alleged global market share of more than 50 per cent (Verhoeven, 2015: 178) and financed by China Exim Bank (CEB), the largest financier of infrastructure in Africa (Le Belzic, 2012), including drinking water supply programmes.

Hence, lessons learnt regarding this case study may yield insights for a variety of cases across Africa; an in-depth-understanding of the Bui Dam may help practitioners to judge future water infrastructure projects suggested and implemented by Chinese players. Furthermore, it may act as a reference point for future scholars on the topic. Findings outlined in this paper are based upon a set of semi-structured interviews carried out from April to September 2015, a systematic review of reports and the scholarly literature on the topic at hand (including grey literature on the Bui Dam, e.g. Fink (2005) ), as well as an holistic examination of relevant news articles. Herein, an advanced Google News Archive search was conducted for this paper (with the keywords 'Bui Dam' and 'Ghana') for the time period January 2006 until May 2015, yielding more than 60 results.

The remainder of this paper is organized as follows. In the next section we discuss the engagement of Chinese players in the African water sector and introduce the Bui Dam as the chosen case study. Then we analyse the social safeguards policies adopted during the project from the perspective of the Chinese players. In a later section, we discuss the financing modalities of the Bui Dam. Impacts on the local labour market are subsequently investigated, followed by a summary of our findings.

### Chinese engagement in Africa and Ghana's Bui Dam

Relations between China and Africa can be traced back to Pharaonic times, although modern Africa–China relations only began to blossom upon the continent's decolonization in the 1950s and 1960s (Zeleza, 2014). Ever since, infrastructure tended to be a key focus of SOEs in Africa. One of the first infrastructure projects developed by Chinese players was the Tazara railway, completed and handed over to the Zambian Government in 1976 (Corkin et al., 2008: 12).

It is one of the key beliefs within China's development policy that infrastructure is a starting point and key accelerator for development. 'To end poverty, build a road', a famous Chinese saying states (TUC, 2013: 17). This belief may – at least partly – explain China's focus on infrastructure in Africa. Chinese investments in Africa are also driven by commercial reasons and strategic political considerations. China's Going Out Policy, adopted in 2001, encouraged Chinese SOEs to start engaging abroad in order to secure additional profit pools and continue building the Chinese brand (Murphy, 2008: 1ff.). Meanwhile, particularly during the Cold War, many infrastructure investments were politically motivated; Chinese leaders hoped to gain Africa's support via these endeavours. Urban et al. (2013) note that Chinese dam projects in Africa pose 'a stark contrast to Chinese dams in Africa as electricity export to China is only possible from these Asian countries, whereas other motives such as business opportunities and economic growth are some of the key drivers for Chinese dams in Africa'.

The Bui Dam, a roller compacted concrete (RCC) gravity dam in Ghana, is one key water project developed in recent years in Africa. It also reflects China's broader development policy approach. Built on the Black Volta River in western Ghana, the Bui Dam is a multi-purpose dam with the key aims of electricity generation and water supply. The history of the Bui Dam begins in 1925 when its location was first deemed to be promising for a dam. By 1978, plans for the Bui Dam had reached an advanced planning stage, with Australian and World Bank involvement. However, four *coups d'état* made implementation impossible (Hensengerth, 2011: 9). The Bui Dam is now the second largest hydroelectric plant in Ghana with an envisaged capacity of 400 MW, only outpaced by the Akosombo Dam with a capacity of 1,020 MW (Volta River Authority, 2015). Together with the Kpong Dam with a capacity of 160 MW, the Bui Dam and Ghana's Akosombo Dam are Ghana's only hydroelectric power stations. These three power stations together account for more than 50 per cent of Ghana's total installed capacity of 2,936 MW (Khalil, 2015).

The Bui Dam also comprises an irrigation scheme that is expected to provide water for 30,000 hectares of land, 32 km north-east of the dam (Water Technology, 2015; Stocks, 2014). This area would be equivalent to 7.3 per cent of Ghana's Tain District where the project is located (Tawiah, 2015). Assuming an annual average rice yield of 5.75 tonnes/hectare (rice being the most common crop in Ghana) (FAO, 2015) and an average per capita rice consumption of 28 kg/year in Ghana (FAO, 2013: 7), the area irrigated by the Bui Dam may be able to feed approximately 6,200 people, 6 per cent of the Tain District's total population, already a significant contribution. However, more dams may be needed to develop Ghana's agricultural sector and enhance food security (Namara et al., 2011: 35f.). Currently, around 100,000 km<sup>2</sup> of the country (42 per cent) is cultivable. However, the currently cultivated area only stands at 11,400 km<sup>2</sup>, 11.4 per cent of the cultivable area (FAO, 2015).

Plans for implementing the Bui Dam project were officially announced at the 2006 summit of the Forum on China–Africa Cooperation in Beijing (Hensengerth, 2011: 11). Indeed, the project was one of the first major investments undertaken by Chinese SOEs in Ghana. Following the Bui Dam, Ghana signed a US\$3 bn deal with China Development Bank (CDB) in 2010 to develop the country's oil and gas infrastructure as well as a \$10 bn deal with CEB to develop Ghana's roads, railways, schools, and hospitals (Verma, 2011).

Upon the 2013 commissioning of the dam, approximately 450 km<sup>2</sup> of the Bui National Park was inundated (25 per cent of the park's total area). Overall, the government acquired 1,794 km<sup>2</sup> of land for the project. Most of the land purchased was only sparsely populated (Duodu, 2008). Eventually, 1,216 people in seven communities needed to be relocated (Interview T27052015).

### **Social safeguards policies from the perspective of Chinese players**

A key criticism of the Chinese players in Africa is the lack of social safeguards. Whereas the World Bank's safeguard policies 'are aspirational for [Sinohydro], at the project level, local laws and regulations form the basic safeguards' for the

company (International Rivers, 2014: 2). In many developing markets, these local laws and regulations are underdeveloped, frequently even non-existent, as also acknowledged by a Chinese dam developer (Interview T18072015a). For the Bui Dam, one of the criticisms – from a social safeguard perspective – promoted by Sutcliffe (2009: 2f.) is the lack of an appropriate consultation process during the construction of the Bui Dam: ‘None of the people [...] had any idea of when they were to be resettled, when they could expect compensation or how to make their grievances known’. She conveys the impression this lack of consultation may be due to Sinohydro. ‘[The] evidence suggests [...] that consultation and participation has been kept to a minimum level so that construction can run as smoothly as possible.’ However, for the Bui Dam there is evidence that a range of stakeholders and the communities were engaged in consultation, and further that it was not the role of Sinohydro to engage in the consultation and design social safeguards. This finding regarding roles and responsibilities of Sinohydro in dam projects is echoed by scholars investigating Chinese dam projects in the Mekong River Basin (Matthews and Motta, 2013: 5).

Fink (2005: 87ff.) identified about 60 relevant players involved in the Bui Dam project. Our mapping of stakeholder responsibilities (Figure 1) suggests that six players were key to its construction: Ghana’s Ministry of Energy (note that loan agreements did not fall within the responsibility of the MoE; indeed, loan agreements were signed between the Ministry of Finance (MoF) and CEB; Hensengerth, 2011: 11); Bui Power Authority (BPA); two consultancies; CEB; and Sinohydro. China’s role as a financier, through CEB, enables Ghana to develop using national

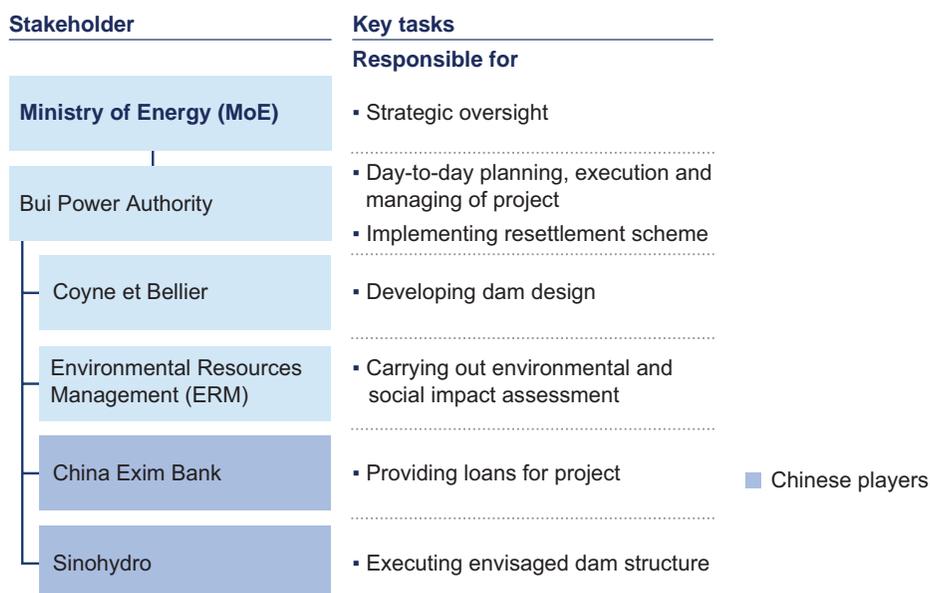


Figure 1 Bui Dam project set-up

policies rather than to subscribe to the World Bank or other funders' social safeguards (Herbertson, 2012: 35).

An environmental and social impact assessment (ESIA) was carried out by Environmental Resources Management (ERM), a British firm, including public consultations: 'During scoping, [...] focus group discussions in the villages during which villagers' perceptions and expectations were discussed. A national consultation meeting [...] was well attended by over 120 participants from a wide range of [civil society organizations]' (ERM, 2007: XI). Civil society and those to be resettled continued to be involved during the construction period via the Ghana Dams Dialogue; between 84 and 150 stakeholders participated in each dialogue session (Raschid-Sally, 2009: 2f.). Twum (2012) – holistically examining the consultation process upon completion three years after Sutcliffe (2009) – finds that 'affected people have been sufficiently consulted at all levels of their resettlement'.

An international donor interviewed for this research pointed out how Ghana carefully studied a prior project's failing to ensure that the Bui Dam project did not repeat past mistakes (Interview T21052015). This prior project was the Akosombo Dam, constructed by an Italian consortium (Impregilo) from 1961 to 1965, and funded by the World Bank, the United States, and the United Kingdom. It was originally conceptualized 'as the engine of Ghana's accelerated transformation [removing] the shackles of colonialism' (Miescher, 2014: 341ff.). However, many Ghanaians nowadays particularly remember the resettlement of 80,000 people due to the project, according to a new social media activist interviewed (Interview T20052015a): 'different tribes [were] thrown together into standardized housing, [there was] inadequate water supply, poor soil' (Mettle, 2011: 47).

Sinohydro, as the construction contractor, was neither involved in the ESIA on the Bui Dam nor in the implementation of the resettlement scheme. 'Sinohydro's only task in this project was to execute the dam design', a scholar also carrying out a case study on the project confirmed (Interview T12052015). Because the public tends to believe the dam developer, in this case Sinohydro, would be responsible for a project's resettlement scheme, 'Sinohydro unjustifiably takes much of the [public] heat' and criticism if a resettlement scheme fails, a consultant noted during our interviews (Interview T19052015).

Sinohydro's involvement in the project via a construction contract instead of a contractual agreement with additional roles and responsibilities (e.g. a build-operate-transfer (BOT) agreement) was most likely intended by the company. 'Maybe the greatest challenge for dam developers going abroad is the lack of networks in the new countries they are operating in', a consultant serving several leading global dam developers argued (Interview T14072015). This lack of networks may lead to various issues during the project, e.g. difficulties in obtaining approvals. 'Particularly in emerging markets, the signing-off of an ESIA is probably 80 per cent relations and 20 per cent content', a SIA consultant told us (Interview F19072015). Thus, involving additional players, particularly those with local experience, is a pathway chosen by dam developers in order to address their lack of networks in the host country; through the involvement via a construction contract Sinohydro could focus on what it is best at – constructing dams. If Sinohydro had entered a

BOT agreement, there would have been the risk that it needed to shoulder more responsibilities than it could handle in the new market.

Hensengerth (2015) points out that countries in South-east Asia sometimes actively encourage BOT agreements. A well-studied example of a BOT agreement by Sinohydro is Cambodia's Kamchay Dam; Sinohydro built and operates the dam under a 44-year concession agreement (Hensengerth, 2015). A key reason for encouraging BOT agreements is that these countries lack the technical capacity to operate large dams. However, owing to Sinohydro's inexperience in the Ghanaian market and Ghana's vast experience in operating the Akosombo Dam, overseen by the Volta River Authority (VRA) since 1961 (see VRA website), the possibility of a BOT agreement was not discussed in the case of the Bui Dam. Ghanaian policy-makers assumed that the country possessed the capacities needed to operate the dam. Indeed, none of those interviewed indicated a lack of capacity within BPA with regard to the operation of the dam; the turning-over of the dam from Sinohydro to BPA upon completion was seemingly unproblematic.

Whereas Sinohydro seems to be largely disengaged from social safeguards policies in African dam projects, CEB undertakes a more active role. According to its internal guidelines, an ESIA must have been carried out prior to any dam project in order for it to be funded. In addition, CEB is supposed to monitor regularly whether ESIA recommendations are implemented in practice (OECD, 2008: 190). Bosshard (2010) reports that China Exim Bank suspended funding of Gabon's Belinga Dam following environmental concerns raised by various NGOs. A lawyer serving CEB on the financing of various dam projects in South-east Asia confirmed that CEB nowadays pays attention to environmental and social safeguard standards. 'It is on their radar, but they still care less about it than the traditional international donors' (Interview F01072015). Meanwhile, a World Bank official told us that, 'the approaches the Chinese banks follow change and they change really fast. They are now much more in sync with the approach the World Bank and other development partners have because they learned from the difficulties they encountered' (Interview T09072015b). In the case of the Bui Dam, we did not find any evidence that CEB provided specific oversight. Limited oversight may have been needed in any case. After all, the ESIA was carried out by an established international player and 'resettlement overall actually was rather smooth', a representative from the Ghana Dams Dialogue noted (Interview T16052015).

The combination of CEB and Sinohydro in a water supply dam project is typical for Chinese-funded water projects in Africa. In order to promote trade, loans by CEB are frequently tied to the participation of Chinese contractors in the project, in this case Sinohydro (Foster et al., 2008: 1). This combination reflects again the triple aim of China's foreign policy: creating new profit pools for its SOEs; providing development assistance; and strengthening ties to African leaders.

### **Financing modalities of the Bui Dam**

International donors, particularly the World Bank and the International Monetary Fund (IMF), usually tie their loans to a set of policies to be implemented by the

recipient country, e.g. anti-corruption measures or, more contentious, the privatization of selected public services. This conditionality is rejected by Chinese players. Indeed, non-interference in a recipient country's domestic affairs is a key principle of Chinese engagement abroad – a principle criticized by many Western players (Nega and Schneider, 2011: 421ff.). Indeed, an international donor that we interviewed called this approach 'ruthless profit maximization' (Interview T21052015). Mattlin and Nojonen (2015: 701ff.) agree that Chinese players expect a strengthening of economic, but also political ties with the recipient country as a consequence of the loan provided. They call this approach 'emergent conditionality'. The exact conditions of the various dam deals frequently remain opaque, making assessments difficult, an activist noted (Interview F08072015a). This was acknowledged by a Chinese dam developer we interviewed. However, the developer also promised that this would change in the near future (Interview T18072015a).

The Bui Dam was largely financed by China Exim Bank (CEB), founded in 1994 and solely owned by the Chinese Government (China Exim Bank, 2015). According to Fitch Ratings, China Exim Bank lent \$67.2 bn to countries in sub-Saharan Africa from 2001 to 2010, \$12.5 bn more than the World Bank during the same period of time. Supposedly, 20 per cent of China Exim Bank's total business volume is now related to Africa; a total of 17 dam projects in Africa are currently financed by CEB (Interview T20052015b).

Possibly, only 'China's low-interest loans [...] got the [Bui Dam] project off the ground' (International Rivers, 2015). Indeed, the Ghanaian Government 'had difficulty finding potential investors' for the project initially (Hensengerth, 2011: 43). Anane (2015) reports that the World Bank refused to fund the project in the early 2000s particularly due to 'the intensity of the campaign against the dam' which was focused on the environmental impacts of the project. The World Bank also generally abstained from hydropower projects at that time (Schneider, 2013). When an international call for tenders was launched in 2002, only one company submitted a bid – which was not accepted by the Ghanaian Government. As a consequence, the country turned to China for help. Sinohydro eventually submitted an unsolicited bid for the dam in 2005. Accordingly, if CEB had not funded the project, it may have never been constructed. Already the OECD (2012: 50) points out that '[Chinese infrastructure investment] has helped develop infrastructure [...], which may otherwise not have had access to market finance or even to donor funding which tends to focus on social sectors'.

Initially, Bui Dam's total project costs were estimated to stand at \$622 m (International Rivers, 2015). \$562 m of funding was provided by CEB, while \$60 m was provided via an investment of the Ghanaian Government (Hensengerth, 2011: 37). Eventually, additional funding of \$168 m was needed for the final completion of the project, a budget overrun of 27 per cent. This additional funding was again provided by CEB (Kunateh, 2011).

Alves (2013: 207ff.) argues that '[African governments'] weak institutional capacity to negotiate the deals with Beijing on an equal footing' would lead to various infrastructure deals favouring the Chinese players involved. An international donor we

interviewed agreed to this depiction. Accordingly, he also believed CEB loans would not be favourable for Ghana.

Initially, the Chinese would just come to Ghana, provide a loan, ask only few questions. However, this honeymoon period is now over. Ghanaian policy-makers begin to understand that the Chinese want their money back soon. The Chinese are no do-gooders; they are in Ghana to make a profit (Interview T21052015).

However, these depictions may not hold true upon closer examination. Indeed, anecdotal evidence suggests that the project's financial arrangements were reached via tough negotiations. For instance, China Exim Bank initially only offered a repayment schedule of 17 years which the Ghanaian negotiators managed to push to 20 years (Hensengerth, 2011: 37). The typical payback period for a large dam project is 20 years (T02072015a).

The eventual overall loan provided by CEB was semi-commercial – a \$292 m buyer's credit with a 2 per cent interest rate over commercial interest reference rates (CIRR) as well as a \$270 m concessional loan at a 2 per cent interest rate. These conditions are significantly more favourable than the average conditions offered by CEB. On average, CEB agrees to an interest rate of 3.1 per cent, a grace period of 4 years, and an amortization period of 13 years (Foster et al., 2008: 2).

The eventual financial modalities provided by CEB for the Bui Dam largely resemble loans provided by the World Bank for similar projects. For instance, the World Bank recently provided (via its International Bank for Reconstruction and Development, abbreviated IBRD) a \$474 m loan for a water supply development scheme in Lebanon. The loan's amortization period was 20 years, its grace period 5 years, provided at the standard variable interest rate for LIBOR-based loans (BBG, 2015: 6; World Bank, 2015c); the 12-months-LIBOR rate (US\$) was 0.8 per cent in July 2015 (*Wall Street Journal*, 2015).

Admittedly, Ghana – as a lower middle income country (World Bank, 2015d) – would have been, at least on paper, eligible for a loan with more favourable conditions than Lebanon, an upper middle income country (World Bank, 2015e). A loan to Ghana for the Bui Dam would have been provided by the World Bank's International Development Association (IDA). However, IDA funding is extremely limited. The costs of the Bui Dam could not have been covered by it, a former World Bank employee explained to us (Interview F18092015). Hence, Ghana would have obtained an IBRD enclave loan for the Bui Dam if the World Bank had decided to fund the project. These IBRD enclave loan conditions would have been comparable to the IBRD loan conditions of the water supply development scheme in Lebanon (Interview F18092015).

The financial modalities for the Bui Dam are summarized in Table 1, largely collated by Hensengerth (2011: 37).

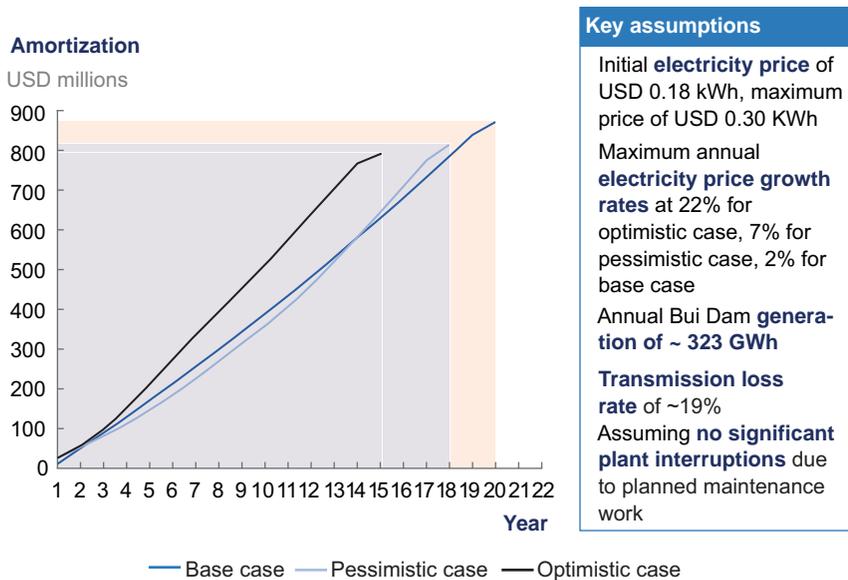
The eventual Bui Dam deal structure is viewed favourably within Ghana's Ministry of Finance (MoF). A former MoF employee noted during one of our interviews that 'CEB [really] follows international best practices' (Interview O27052015). Indeed,

**Table 1** Financial modalities for the Bui Dam

Type of credit	Amount (US\$ m)	Interest rate	Amortization period	Grace period
Buyer's credit	292	2% over CIRR	20 years	5 years
1st concessional loan	270	2%	20 years	5 years
2nd concessional loan	168	2%	20 years	5 years
Ghanaian Government upfront investment	60	–	–	–

three simple calculations also suggest that the MoF was able to secure advantageous conditions concerning the project's amortization. Even in the most pessimistic scenario from today's perspective, as depicted in Figure 2, a positive cash flow is reached in year 18; a positive cash flow is reached in year 15 in our optimistic scenario as the initial project costs pay back via the generated revenues in only 15 years.

Both our pessimistic and optimistic scenarios are rather conservative, e.g. assuming a transmission loss rate of 19 per cent (World Bank, 2015a) as well as an annual Bui Dam power generation of only 323 GWh (Interview T20052015c); if the dam ran as planned, annual electricity generation would amount to 980 GWh (Kunateh, 2013). We did not take into account possible protections under a power purchase agreement (PPA) for dispatch in the event of low demand because Ghana is facing an annual capacity shortfall of 200–250 MW (Energy Commission Ghana, 2014: 2f.). Furthermore, no dividend of the government was assumed for the project payback

**Figure 2** Bui Dam: repayment scenarios

period. Additional key assumptions are depicted in Figure 2. The outlined electricity price growth rates were determined via expert interviews with management consultants as well as international donors.

A key reason for the rapid pay-off in both scenarios is the significant increase in Ghana's electricity prices in recent years. When the construction of the Bui Dam started, the Ministry of Energy (MoE) assumed an electricity price per KWh of \$0.045 (Hensengerth, 2011: 40). Already then, one of those interviewed by Hensengerth (2011: 40) noted 'the project can pay for itself'. Indeed, an annual rise of electricity prices of only 2 per cent (modelled within our base case) would have led to an amortization period of 20 years. However, electricity prices rose much faster than 2 per cent annually in recent years. For instance, the current residential price stands at \$0.18, four times the assumed price (see PURC website). Accordingly, few scenarios can be thought of that would be unfavourable from the Ghanaian perspective.

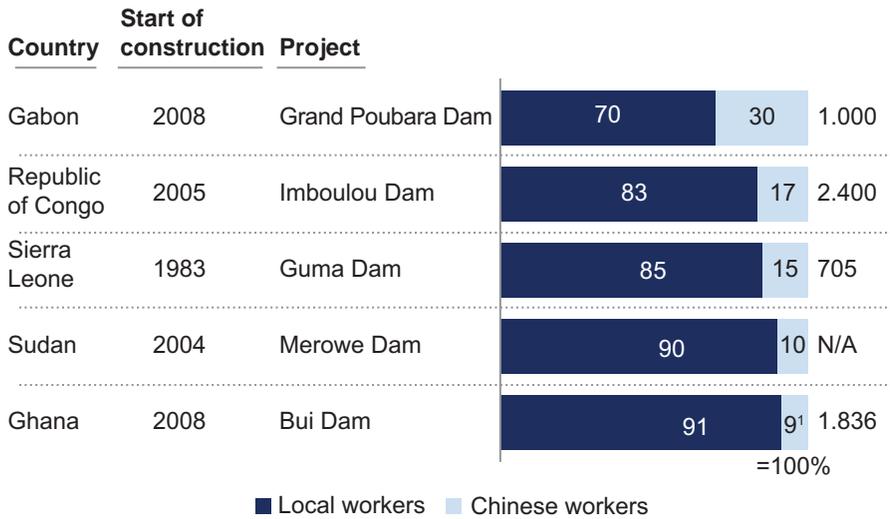
The original CEB loans were secured via commodities, namely cocoa (Verma, 2011). This backing via commodities serves as an insurance (from the Chinese perspective) against possible loan default. According to Hensengerth (2011: 38), the Chinese Government 'guaranteed to purchase 30,000 tons of cocoa per year from the Ghanaian government at going world market prices until the dam was operational'. Cocoa revenues are to be deposited in an escrow account. Upon completion of the project, 85 per cent of the electricity sales are also deposited in this escrow account in order to service the loan, whereas the remaining 15 per cent of electricity sales revenues are marked for BPA to cover administrative costs (Hensengerth, 2011: 38). This deal structure involving natural resources is called the 'Angola model'; it was first adopted during different energy, water, and road projects in Angola (Foster et al., 2008: 4).

### **Bui Dam's impacts on the local labour market**

China's investments in Ghana have already significantly impacted the country's labour market, with Chinese players creating many jobs. However, trade unions have repeatedly expressed grave concern regarding working conditions in Chinese firms (TUC, 2013: 19ff.). Working conditions were initially poor and improvements were driven by workers and Bui Power Authority.

Supposedly, Sinohydro was the ideal candidate for constructing the Bui Dam in Ghana because of its 'reputation for building dams under problematic [...] conditions' (Hensengerth, 2011: 43). Ghana was (and is) in urgent need of an increase of its energy capacity, while Sinohydro maintains a reputation as an engineering firm that can deliver large dam projects with relatively few overruns in either the schedule or budget.

At the peak of the project, Sinohydro intended to hire 2,600 Ghanaian workers as well as 400 Chinese workers to construct the dam. Assuming an employment-to-population ratio of 66 per cent for those above 15 years old (World Bank, 2015b) and taking into account that 39 per cent of Ghana's population is below 15 years (Henry J. Kaiser Family Foundation, 2015), this would imply that the project could



**Figure 3** Chinese dam projects in Africa

<sup>1</sup> On Bui Dam, 6% of total workers were Chinese, 3% Pakistani

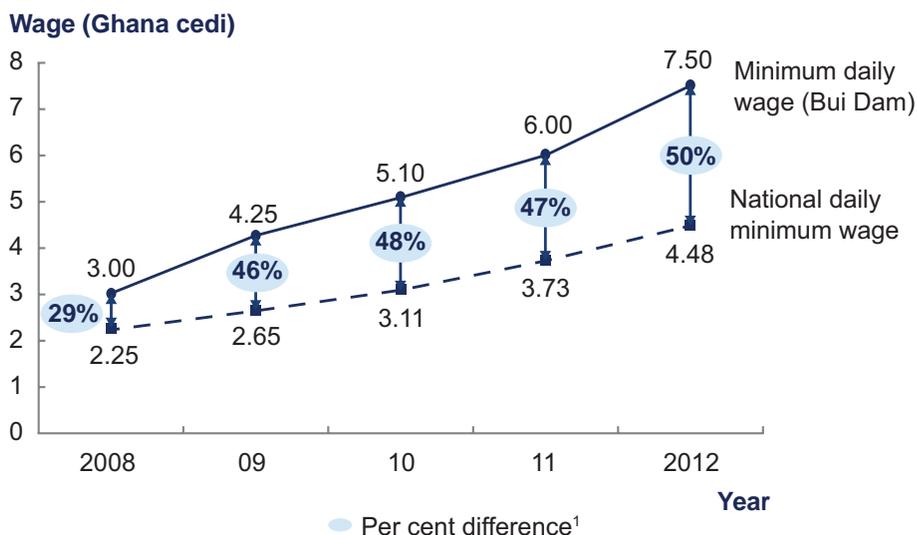
Source: Various sources, collated by Brautigam (2015) and Ghana Trades Union Congress (TUC, 2013)

yield temporary employment for roughly one out of 20 workers in the Tain District. However, the lack of a skilled workforce was expected to result in workers from neighbouring districts being used and the local population may have been able to sell food to the construction workforce (Sutcliffe, 2009: 5).

In reality, a maximum of 1,836 workers were employed at the site; 1,676 (91 per cent) were Ghanaian (TUC, 2013: 20). Most workers were reported to come from outside of the construction area (Baah and Jauch, 2009: 103), although accurate data on the origins of workers employed at the site are not available. This influx of workers is likely to have social impacts. However, no press reports detailing these impacts were identified. Large influx of workers from districts outside of the construction area are frequently associated with a rise in prostitution, and the introduction of diseases (Lerer and Scudder, 1999: 113ff.).

The mixture of Chinese as well as Ghanaian workers during the Bui Dam project may have been typical for such projects. Indeed, evidence mostly collated by Brautigam (2015) and depicted in Figure 3 suggests that only two out of 10 workers employed during dam construction in Africa will be Chinese.

International Rivers (2008) claims that Bui Dam workers were underpaid. At the beginning of the project in 2008, the minimum wage at the Bui Dam site was 29 per cent higher than the national daily minimum wage (TUC, 2013: 27). As depicted in Figure 4, this gap widened to 50 per cent until 2012, allegedly due to workers' protests during the project. Assuming construction workers worked 20 days per month, a daily minimum wage of 7.5 Ghana cedi (GHS) (approx. \$2) would imply a monthly wage of GHS150 (\$39) – GHS86 (\$22) above the World Bank's poverty line for Ghana, but GHS160 (\$42) below the alleged living wage for Ghana, necessary for a satisfactory standard of living (WageIndicator Foundation, 2015).



**Figure 4** Ghanaian national minimum wage compared with minimum daily wage at the Bui Dam

<sup>1</sup> Formula employed:  $(V_1 - V_2) / ((V_1 + V_2) / 2) \times 100$

Source: Ghana Trades Union Congress (TUC, 2013)

Allegedly, labourers worked for nine hours (a regular Ghanaian working day is eight hours). Any overtime work should be compensated by Ghanaian law; it was reported that this did not necessarily happen. Furthermore, there were reports that initially none of the Ghanaian workers was given a contract of employment. This changed, though, following unrest within the workforce (Baah and Jauch, 2009: 100).

A scholar investigating Chinese investments in Africa noted during our interviews that 'Chinese companies do not expect labour to be organized when they come to Africa' (Interview T20052015b). Another scholar remarked that Chinese firms would initially implement an 'industrial revolution capitalism when going abroad' (Interview T12052015). These notions may be reflected in the Bui Dam project. Upon the start of the project, workers attempted to launch a labour union. However, this attempt 'was met by the Chinese management with open intimidation and victimization' (Hensengerth, 2011: 35). Only after the intervention of BPA, which, in turn, was caused by mass resignation of workers, was the union set up and started negotiating and driving up wages.

Despite the launch of the labour union, working conditions remained questionable, according to articles in the popular press. Supposedly, workers who were absent on health grounds for more than three days were dismissed (*Ghanaian Times*, 2008). Allegedly, Sinohydro also did not provide workers with safety gear or proper accommodation; workers were 'billeted twelve to a room, with little ventilation and poor sanitation' (Smith and Talbot, 2009). Some Chinese supervisors, allegedly, even kicked and hit their Ghanaian subordinates without any provocation (*Ghanaian Times*, 2008).

When confronted with criticism, Sinohydro did not acknowledge any issues. The company allegedly claimed that ‘after all, some of them are living in better accommodation here than most of the villagers around’ (Motey, 2008). Indeed, working conditions may not have been atypical for a large infrastructure project in Ghana. Laryea and Mensah (2010) investigated 14 construction sites in the country in 2009 and 2010 finding poor health and safety policies and procedures almost everywhere; ‘injuries and accidents are common’, the authors argue. During one of our interviews, an international donor also remarked that ‘construction sites in Ghana never meet international standards – no matter who is implementing the project’ (Interview T20052015c). An official from Ghana Grid Company noted that ‘working conditions [at the Bui Dam site] were generally ok. The major concerns about Chinese engagements are in the resources sector like mining, not in the water sector’ (Interview T27052015).

Despite various protests by the workforce, the project was completed in May 2013 – six months after the originally envisaged launch date. This delay is minor for a large dam project; the contentious paper by Ansar et al. (2014: 7) reports an average delay of large dam projects of 2.3 years. WCD (2000: 42ff.) finds that 50 per cent of dam projects are completed on time, 30 per cent of projects were delayed for one or two years, and 20 per cent for more than three years.

Ongoing, non-verified secondary impacts of the project on the local labour markets have been reported to include illegal mining causing water pollution (Vibe Ghana 2015) and increases in narcotic drugs, prostitution, and armed robbery in the area associated with illegal mining activities (Graphic Online 2015) as well as a reduction in fish numbers near to the dam posing a threat to local livelihoods (GMG, 2015). Villagers also report that the reservoir area has become a mosquito breeding area, resulting in an upsurge of malaria cases and other river-borne diseases (*Today*, 2015).

The first feasibility study on the Bui Dam was carried out in 1992 (Water Technology, 2015). Indeed, as already outlined, various attempts were undertaken to materialize the project. ‘Only the Chinese eventually did it. They proved that something that had been in the cabinets for decades could actually be implemented rapidly if you bring in the Chinese. The implementation of the Bui Dam impressed many policy-makers in Ghana’, an international donor noted in one of our interviews (Interview T20052015c).

Many within the general public, though, argue that the Bui Dam has not lived up to its promise. ‘The government told people the dam would solve Ghana’s energy shortage. Now the project is completed and there is still an energy shortage. So people just feel it is a waste of money’, a new social media activist told us, for instance (T20052015a). Similarly, much of the envisaged irrigation infrastructure is apparently not yet fully developed.

## Conclusion

More and more countries in Africa now enter agreements with Chinese investors in order to develop water infrastructure. However, many claim China’s engagements

in Africa are a 'new form of colonialism' (Tiffen, 2014). Supposedly, Chinese firms would not shoulder responsibilities for the local population (Al Jazeera, 2014). Furthermore, allegedly shady deals and loans by Chinese banks would only lure African countries into massive debt build-up (Beattie, 2006). Lastly, Chinese projects would not create any jobs for Africans, but would 'rely primarily on workers flown in from China' (Hook, 2013).

We investigated these claims, drawing on Ghana's Bui Dam, a major water supply and power generation dam, as a case study. The project was financed by China Exim Bank, the largest financier of infrastructure in Africa these days, and implemented by Sinohydro, the world's largest hydropower company. Herein, we found that the reality may be far from colonialism.

Sinohydro acted as construction contractor within the Bui Dam project, solely responsible for executing a pre-defined dam design and largely disentangled from the project's social safeguards policies. The project's ESIA was carried out by Environmental Resources Management (ERM), a British consultancy, and the resettlement scheme was carried out by Ghana's Bui Power Authority (BPA). CEB monitored the implementation of ESIA recommendations, but did not intervene at any stage.

From a financial modalities perspective, the Ghanaian negotiators managed to secure favourable arrangements, comparable to those provided by the World Bank, as evidenced by our comparison to the water supply development scheme in Lebanon, funded by the World Bank. Not all African governments may be able to negotiate such conditions, though. The Bui Dam's financial modalities became even more favourable recently due to the dramatic increases in Ghana's electricity prices. Even in our most pessimistic scenario, the Bui Dam will pay off in 18 years – two years faster than the typical payback period for a large dam.

While the criticism about the reliance on overseas workers is not supported, with over 90 per cent of the employment going to Ghanaian workers, the working conditions and pay conditions were poor, with working conditions comparable to similar construction sites in Ghana, and pay causing worker unrest and project delays.

The CEB funding provided an opportunity for Ghana to develop this project that was otherwise not available. The Bui Dam may now operate for up to 100 years, providing irrigation for 30,000 ha of land as well as up to 980 GWh of electricity annually. However, that does come at an environmental and social cost. For water supply projects, where international funding is used without strong safeguards imposed, it remains the responsibility of the country to ensure environmental and social impacts are mitigated. One key area that was highlighted by this case study is the need for better management of labour conditions.

## Appendix

This paper is part of a larger research project investigating various socio-economic impacts of dams. More than 100 semi-structured interviews have been carried out for this project to date. Interview partners are international donors, policy-makers, scholars, NGOs, and consultants as well as dam developers (including

Chinese dam developers). Only those interviews cited in this paper are listed in Table A.

Interviews were carried out via telephone and email/online survey from April to August 2015 as well as during field research in Singapore, Myanmar, and Thailand from June to August 2015. Given the sensitive nature of the topic, all interviewees were assured anonymity. Thus, all interviews are coded with the first letter indicating the type of interviews (T for telephone, F for face-to-face, O for online survey/email) and the sequence of numbers indicating the date.

**Table A** Interview overview

<i>No.</i>	<i>Interviewee</i>	<i>Organization</i>	<i>Interview code</i>
1	Scholar	British university	T12052015
2	Representative	Ghana Dams Dialogue	T16052015
3	Consultant	Involved in various Chinese-led dam projects, mostly South-east Asia	T19052015
4	Leading new social media activist in Ghana	N/A	T20052015a
5	Scholar	US university	T20052015b
6	Team leader, renewable energy programme Ghana	International donor	T20052015c
7	Deputy head of a European embassy in Ghana	International donor	T21052015
8	Senior official	Ghana Grid Company Ltd (GRIDCO)	T27052015
9	Senior official (retired from ministry in question)	Ministry of Finance (Ghana)	O27052015
10	Lawyer, serving CEB in financing various South-east Asian dam projects	Major global law firm	F01072015
11	Managing partner	Consultancy specialized in hydropower and water resources projects	T02072015a
12	Activist	Involved in various anti-dam movements in Myanmar, especially the Myitsone Dam	F08072015a
13	Senior official	World Bank	T09072015b
14	Managing partner	Major global strategy consulting firm	T14072015
15	Spokesperson	Major Chinese dam developer	T18072015a
16	Senior engineer	European dam developer, involved in various dam projects in South-east Asia	T18072015b
17	Social impact assessment (SIA) consultant leading firm's operations in South-east Asian country	Major SIA consultancy	F19072015
18	Former civil servant	World Bank	F18092015

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