



From Chinese dam building in Africa to the Belt and Road Initiative: Assembling infrastructure projects and their linkages

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ABSTRACT

This paper aims to build a political economic geography of the Belt and Road Initiative (BRI). We draw on assemblage thinking and the notion of the Chinese Water Machine to examine Chinese practices and business-related outcomes of building a dam in Africa, stressing the complicated interactions between different actors. Based on fieldwork in China and Ghana, as well as documentary data, this paper argues that Chinese engagement with Africa is a global enterprise, in which players come from China, the recipient, and other countries; and that project-level organisation and implementation under BRI umbrella will also likely be a joint production by all such players, elaborated in a path dependent way but subject to the spatial embeddedness of specific projects. Yet whether BRI-related projects can advance the specific geopolitical and economic interests of China is uncertain: not only have Chinese players been co-constructing such infrastructure projects with non-Chinese players, but also Beijing's role in forging the expansion of Chinese corporations' business abroad is not clear.

1. Introduction

The Chinese government's Belt and Road Initiative (BRI) in 2013 instigated an infrastructure construction program in Asia, Europe and Africa (Nordin & Weissmann, 2018). China has created new financial institutions and promised to invest USD 1 trillion in foreign infrastructure projects (Aoyama, 2016), and BRI is now taking shape at the project level: in 2015, China's Silk Road Fund made its first investment in large dam construction as a shareholder of a subsidiary of the Three Gorges Corporation. The first project sponsored by the Fund, the Karot Dam on the Jhelum River in Pakistan, is currently being built (Karot Power, n. d.). From 2013 to 2018, the value of contracts completed by Chinese companies in countries along the BRI is reportedly USD 400 billion (Steering Group for The Belt and Road Initiative, 2019).

China's official and scholarly rhetoric describes BRI as an inclusive scheme embedded in China's economic rise (Liu, 2017). Five priorities are proposed to help connect places: policy coordination, infrastructure connectivity, trade, finance and people-to-people relations (State Council, 2015). The key idea of the 'Silk Road Spirit', BRI's 'inclusiveness', has three dimensions: 'community of common interests'; respect for the development paths of different countries; and openness to all countries and international/regional organisations (Zeng, 2016; Zhang, 2018). Framing 'inclusive globalisation' as central to BRI, Liu and Dunford (2016) posit specific infrastructure projects and new multilateral investment mechanisms to promote poverty reduction and inclusive

growth. Other analysts, however, interpret BRI as a global project that manifests Beijing's grand economic and geopolitical ambitions to challenge existing regional and world orders (Mendes, 2018) – a kind of Sinocentric project that builds on and beyond China's 'going out' strategy (Yu, 2018), itself a "spatial fix" to address China's overcapacity problem (Sum, 2018).

Infrastructures, like big dams, are "one of the ways in which the state actualises power over its territory" (Menga & Swyngedouw, 2018) or attempts to extend power over other states (Sneddon, 2015). Yet most BRI-themed studies focus on discursive macroeconomic and political issues, rather than on-the-ground practices (Liu et al., 2018), so the project-level implications of China's BRI practices remain unclear. This paper, therefore, asks: what can we learn from past Chinese infrastructure projects (financing and building a foreign dam) about how BRI projects will likely take shape?

Assemblage thinking offers a mode of inquiry that is sensitive to on-the-ground practices, especially the "unusual suspects involved", and to processes of becoming (Ranganathan, 2015, p. 1315). Assemblage thinking originated from Deleuze and Guattari (1988), who proposed an ontological framework in which "relations are external to their terms" (Deleuze & Parnet, 2002, p. 55). Adopting the notion of the Chinese Water Machine (CWM) – a loosely-defined network of actors managing water in China (Webber & Han, 2017) – the paper frames some CWM members as actors cooperating with multiple actors outside China to co-construct a foreign dam. Particularly, we trace the "becoming-being"

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of CWM-related assemblages operating outside China that are linked through the participation of CWM members. We disentangle the configuration of different actors in a dam project and show how one project spawns a diverse array of business opportunities. Thus the paper explains how CWM members join and hold together other assemblages, using the concept of “assemblages of assemblages” (Delanda, 2016, p. 3) to derive broader implications for BRI. In other words, the paper explores how one assemblage spawns other assemblages.

We argue that Chinese engagement with Africa is a global enterprise, in which players come from China, the recipient, and other countries; and that projects implemented under the BRI umbrella will likely also be jointly produced by all such players, organised in a path dependent way but subject to their embeddedness in different places. Yet whether BRI-related Chinese investment in foreign infrastructure construction can advance the Chinese government’s geopolitical and economic interests is not clear: not only do Chinese builders co-construct projects with non-Chinese players, but Beijing’s role in forging Chinese firms’ business expansion overseas is limited. Tracing project-based networks, the paper shows the intersections of network assemblages that inform how projects play out on the ground, and their geography.

The paper selects a Chinese-involved dam project in Ghana, for two main reasons. First, dam projects are central to understanding China’s overseas investment: the Silk Road Fund launched its operations with a dam project; in 2010–20, Chinese companies added 8,134 MW hydro-capacity in Sub-Saharan Africa, over half the continent’s total added hydro capacity (Benazeraf & Yan, 2019). Chinese involvement in dams in Africa and Asia has attracted attention over development finance (Brautigam, Hwang, & Wang, 2015), geopolitics (Mohan & Tan-Mullins, 2018; Power, 2019), impacts and sustainability (Siciliano & Urban, 2018). Generally interpreted as being about China’s domestic over-capacity problems and the need for resource security (Gleick, 2012; Lee, 2017), or the export of China’s ‘development experience’ (Bossard, 2009), little is known about how Chinese actors actually participate in projects and how they discover a market through project-based networks, despite their significance for China’s geo-economic strategy in Africa (Carmody & Owusu, 2007).

Second, West African countries are rarely the focus of BRI studies, which typically highlight Europe, Central Asia and Southeast Asia (see, for example, Bhavna & Yuka, 2018; Foggin, 2018; Karim & Islam, 2018). While Africa is sometimes discussed in reports about BRI, the examples are typically East African, such as Kenya and Ethiopia (Zhu, 2018). Yet there are active BRI-related discussions between Chinese and West African officials, including in Ghana (Sun, 2017) and Nigeria (Saliu, 2018). During the 2018 Beijing Summit of the Forum on China–Africa Cooperation, the Chinese government announced that 37 African countries had signed Memoranda of Understanding (MOUs) to jointly advance the BRI (Ministry of Foreign Affairs, 2018). Ghana signed eight cooperation agreements with China including a “One Belt One Road MOU” (Ghana News Agency, 2018).

The case studied here is the Bui dam in Ghana. Other major Chinese-involved dam projects in Africa include Merowe (Sudan), Imboulou (Republic of the Congo), Gibe III (Ethiopia), and Memve’ele (Cameroon) (Chen & Landry, 2018). Officially commissioned at the end of 2013, the Bui dam was built by Sinohydro as an Engineering-Procurement-Construction (EPC) turnkey contract beginning in 2007 with finance from China Exim Bank (Hensengerth, 2014). The 2013 completion date permitted us to document the project’s organisation and implementation, as well as Chinese dam players’ subsequent business in Ghana. Information about the dam and its construction in Ghana was relatively open.

The analysis relies on fieldwork in China and Ghana, supplemented by open-source data. Personal communications and 28 semi-structured interviews with Chinese officials and employees in dam companies (including Sinohydro, Gezhouba, and Three Gorges Corporation), as well as delegates from recipient countries, universities, and non-government organisations (NGOs), were conducted during and after

the World Hydropower Congress in Beijing in May 2015 (Table 1). The Bui Power Authority and Bui construction and resettlement sites were visited from July to October 2015. Interviews and personal communications were also conducted with Ghanaian officials and researchers, Chinese embassy officials, Sinohydro employees at Bui, and international NGOs and researchers in Accra. Secondary information was collected from media reports, yearbooks, and official websites of

Table 1
Key interviews and informative personal communications in 2015.

Date	Place	Affiliation/role	Main topic
May	Beijing	PowerChina	Corporate overview and marketing strategies
		Sinohydro	Africa marketing strategies Personal experience of working in African office
		Gezhouba	Africa marketing strategies Personal experience of working in African office
June	Xi’an	Ghana Dams Dialogue (GDD)	Role of GDD Comments on Bui project implementation
		Northwest Engineering Institute, HydroChina	Working experience at Bui site
August	Accra	Sinohydro representative office	Bui implementation Business and marketing strategies Role and business in Ghana
		China Africa Development Fund University of Ghana	Chinese investment, especially about hydro/dam Project overview and plans Business strategies
	Tema	Sunon Asogli Power (Ghana) Ltd	Working experience at Bui site
	Bui	Chinese staffers at Bui Project Management Office Sinohydro’s Ghanaian staffer Sinohydro’s Pakistani staffer	
September	Accra	Chinese ambassador in Ghana MOFCOM staffer assigned to Ghana	Chinese investment in Ghana Overview of work, especially in relation to Chinese dam companies’ business Hydro/dams development plans Comments on (potential) Chinese role Business in Ghana
		Ghana Ministry of Energy	
		China Development Bank (Ghana office)	
October		Sinohydro representative office CWE staffer	Follow-ups after Bui site visit Business and marketing strategies
		China Enterprises Chamber of Commerce in Ghana Ghana Chinese Chamber of Commerce	Role and relations with the Chinese embassy and companies in Ghana Role and relations with Chinese embassy and companies in Ghana
		Ghana Environmental Protection Agency	Sinohydro’s role in Bui Comments on Chinese investment in Ghana
		Bui Power Authority Ghana Water Company	Sinohydro’s role in Bui Business with Chinese dam companies, mainly Gezhouba
		International Water Management Institute	Progress of hydro-sustainability assessment Comments on Chinese investment in Ghana
November	Changsha	Sinohydro Bureau 8 staffers	Working experiences at Bui site
	Nanjing	Chinese policy bank	Comments on the bank’s work in financing foreign dams

governments, corporations, and related organisations. The 2014 Ghana Chinese Business Directory,¹ provided by the Chinese Embassy in Ghana, identifies Chinese players operating in Ghana and guides research into their business there.

The remainder of the paper has four sections. We first outline the paper's conceptual approach, which understands networks as assemblages. We then examine the Bui case, describing the membership and formation of the Bui assemblage (second section), and tracing the businesses of Sinohydro and of other CWM members in Ghana, during and after Bui (third section). Here we reveal the linkages between the Bui assemblage and the CWM. The paper concludes by discussing theoretical issues and its implications for BRI.

2. The Chinese Water Machine as assemblage

Chinese dam players are interconnected through what [Webber and Han \(2017\)](#) call the Chinese Water Machine (CWM): the network of actors that manage water in China. The CWM includes Chinese government agencies, corporations, foreign companies operating in China, international industrial associations, and other relevant organisations. The framing of CWM follows [DeLanda's \(2019, p. 12\)](#) interpretation of the Deleuzian idea of assemblage, which emphasizes "relations of exteriority": members of an assemblage are held together by the relationship between them "transmitting influences that connect them but do not constitute them" ([DeLanda, 2016, p. 2](#)). CWM is a network assemblage built by people and institutions, the members of which interact to produce effects over the socioenvironmental region(s) of China – constructing water infrastructures like dams, creating common visions among its members and setting standards for the interactions between them ([Webber & Han, 2017](#)). Rather than simply theorising a particular assemblage operating in China, CWM enables an inquiry into "assemblages of assemblages" ([DeLanda, 2016, p. 3](#)). Since network assemblages are diffuse actor networks that emerge and are maintained by the capacities of their members, without an authority structure, CWM's members can belong to other assemblages that operate inside and outside China, such as infrastructure projects in socioenvironmental regions along the BRI ([Crow-Miller, Webber, & Rogers, 2017](#)). The flat ontology of assemblages implies that both the CWM and its individual members are actors, so the CWM can affect the capacities and behaviour of its members even if those members are operating within another network ([Webber & Han, 2017](#)). Importantly, the CWM does not operate in Ghana; rather it affects the capacity of (some of) its members to operate in Ghana.

Three clarifications of the assemblage-CWM framework are important. First, following actor-network theorists, we posit power as a "shared capacity" that is "thoroughly decentred in different networks", though unequally distributed ([Castree, 2002](#)). The members of CWM have their own specific properties, but their capacities are enhanced by interacting within the assemblage. Second, following challenges to the social-natural binary and local-global divide ([Castree, 2002](#)), we use the term "socioenvironmental region" to stress the inseparability of human and nonhuman actors within territories ([Webber & Han, 2017, p. 1448](#)). Third, following [Whatmore and Thorne \(2004\)](#), we observe that networks are "multiply sited", abandoning the unnecessary limits of local-global dialectics ([Castree, 2002; Swyngedouw, 1997](#)). Neither ignoring uneven power relations, nor avoiding the complexity of globalization-glocalisation ([Ong & Collier, 2005; Swyngedouw, 2004](#)), the assemblage-CWM framework provides "a theoretical account of the messiness and the effectiveness of networks and organisations" ([Webber & Han, 2017, p. 1455–6](#)).

We thus provide a grounded inquiry ([Klinger & Muldavin, 2019](#)) into the mechanisms configuring, holding together and linking networks related to the CWM. Eschewing the particularity of individual network

assemblages ([Castree, 2002](#)), we decipher the relations between Chinese actors investing in foreign infrastructure projects, and the ways in which their practices are influenced by other actors: "particular configurations actually make involved actors the way they are, producing the contingent character and capacities of the things and agents involved" ([Robbins & Marks, 2010, p. 182](#)). Particularly, the CWM assemblage is defined as a network of political and social organisations, but it and its members interact with, for example, rivers and waters in the socioenvironmental regions of China ([Webber & Han, 2017](#)) to produce particular effects; likewise, in forming new assemblages, members of the CWM interact with other local organisations and socioenvironmental circumstances. Thus we can sense how BRI projects will look – not only will each project end up looking different as it adapts to local socioenvironmental circumstances, but local effects accumulate and transmit up scale to the CWM and the overseas operations of its members ([Banister, 2014](#)).

The paper also contributes to literature debating Chinese investment in Africa. First, there is a literature about "China in Africa" (see [Alden, 2007; Brautigam, 2009; Kachiga, 2013](#)). But counting "Africa" as an object neglects the richness of African diversity ([Mohan, 2013; Power, 2019](#)). We respond with a country-specific focus. Second, dam/hydro-centred studies include big-picture discussions of Chinese involvement in Africa's hydropower ([Brautigam & Hwang, 2019](#)), comparative analyses of sustainable development ([Siciliano & Urban, 2018](#)) and explanations of the differences between Chinese and Western investors in African countries ([Chen & Landry, 2018](#)). None explore our central focus: the specific practices of Chinese dam-related involvement in Africa. Third, [Lee \(2017\)](#) offered an ethnographic account of Chinese investment in specific sectors (Zambia's mining and construction). We agree that Chinese on-the-ground practices are important, but demonstrate that the activities of Chinese corporations range across many sectors; assemblage thinking is particularly sensitive to such intersectoral linkages.

The Chinese players in this story are first dam construction corporations. They include Sinohydro, a state-owned enterprise (SOE), apparently the world's largest dam-building corporation ([Bosshard, 2014](#)). China Three Gorges Corporation, Gezhouba, and other Chinese dam corporations also work overseas. By 2008, Chinese dam players were participating in 93 dam projects in 38 countries across the developing world ([McDonald, Bosshard, & Brewer, 2009](#)), including Lancang-Mekong River projects ([Matthews & Geheb, 2014](#)) and such controversial projects as Merowe (Sudan) ([Foster, Butterfield, Chen, & Pushak, 2009; McDonald et al., 2009](#)), Gibe III (Ethiopia) ([Gleick, 2012; The Economist, 2016](#)) and Coca Codo Sinclair (Ecuador) ([Armony, 2012](#)). These corporations build dams overseas and interact with foreign actors on the ground, exporting not only dams but also their visions and practices of project management ([Han, 2018](#)). The second group of Chinese players are financiers, which fund overseas dam projects ([Tan-Mullins, Urban, & Mang, 2017](#)): development and commercial banks, export credit agencies, and investment bodies are all active, with China Exim Bank one of the most significant.

Many Chinese dam players operating overseas are members of the CWM. When they operate overseas, they form and participate in other assemblages, using capacities gained through membership of CWM, such as financial strength, derived from profit accumulated from dam business in China, a shared international paradigm of hydroelectricity generation, and specific skills (such as methods of labour management and environmental assessment). Other Chinese actors belong to related assemblages: China Exim Bank, for example, is a policy bank belonging to the network of Chinese fiscal institutions that enable water projects in China.

Chinese actors' capacity to produce effects depends on their interactions with members of other assemblages under particular socioenvironmental conditions. For example, Chinese companies constructing a dam in Africa need to abide by local laws, deal with local authorities and adhere to local norms – though they are sometimes

¹ This is a formal publication of the Ghana Chinese Chamber of Commerce.

criticised for neglecting these needs (Calow, 2016; Isaksson & Kotsadam, 2018). Therefore, each dam assemblage (such as the Bui-specific assemblage) is formed by a specific historical process. Later, other members of the CWM may also do business in the recipient country, forming and joining other network assemblages. Thus, other Chinese actors are not necessarily members of the Bui-specific assemblage but are related to it through membership of the CWM: their activities reveal the interactions of Chinese institutions as they look for and negotiate foreign business opportunities. To characterize these practices, we trace the business networks assembled by Sinohydro and other Chinese dam companies during and since the Bui project. As BRI will be anchored in specific projects in particular places, such experiences foretell how BRI's infrastructure projects will proceed. The details of these interactions in building infrastructure are poorly understood; our paper is aimed at this theoretical and empirical gap.

3. Assembling Bui: actors, configurations and beyond

This section investigates the formation and membership of the Bui project assemblage. The three core members of the assemblage were Sinohydro, which signed an EPC turnkey contract to build the Bui dam in 2007, China Exim Bank, which provided finance, and agencies of the Ghanaian government. Yet members of the Bui assemblage also included European consultants, HydroChina engineers, Pakistani operators, others like Ghanaian workers, as well as environmental conditions including the Volta River² and geological features near the Bui gorge that allowed the engineering of the dam. The building of Bui Dam was a joint product, the combined effort of all these players. Table 2 lists the Bui assemblage's members, including their relationship to the CWM, while Fig. 1 illustrates our interpretation of the relations between the Bui assemblage and the CWM. BPA and Sinohydro are the central planners in the Bui assemblage; their role and responsibilities were defined and stabilized under the EPC contract. Other players, such as HydroChina, which provided engineering services for Sinohydro, are regarded as other agents.

Before construction started, actors outside Ghana and China co-enabled the project. In 2005, the government of Ghana (GOG) authorised British consulting firm Environmental Resources Management to compile an Environmental and Social Impact Assessment, an Environmental and Social Management Plan, and a Resettlement Planning Framework (Fink, 2006). The studies, following Ghanaian laws and World Bank policies, were submitted to the Ghanaian government for an environmental permit, a prerequisite for loans from China Exim Bank (Hensengerth, 2014). In 2006, French firm Coyne et Bellier (Coyne) submitted a Bui Feasibility Study, updated from a 1995 document (Bui Power Authority, n.d.). In 2007 Bui Power Authority (BPA) was created by the GOG to implement the Bui project; however, lack of technical expertise meant that Coyne was then entrusted as an independent consultant to co-supervise dam engineering (Hensengerth, 2014). Table 3 outlines key time points in preparing for Bui.

Although Bui finance was for building a dam, repayment arrangements served other purposes. Security for loans was provided by a cocoa sales agreement (CSA) (Odoom, 2015). Income from the CSA was to be deposited in an escrow account with Sinosure, "the credit insurance department of Exim Bank" (pers. comm., senior staffer in a Chinese policy bank, Nanjing, 27 November 2015). Li Ruogu, former president of China Exim Bank, explained that the CSA was made as "Ghana could hardly provide other guarantees and was in poor economic condition", so "the two sides agreed to use cocoa beans to provide security that Ghana could afford" (China Central Television Français, 2016). But this arrangement also allowed China to import Ghana's cocoa, undermining

² The Volta River consists three main parts: Black Volta, White Volta and Red Volta. Bui is built on the Black Volta. Hereafter, we simply refer to the Volta River.

Table 2
Members of Bui assemblage.

Type		Membership	Role	
Host country actors	Government agencies	BPA	Central planner	
		Ministry of Finance	Other agents	
		VRA		
		Environmental Protection Agency		
		Customs		
	Contracting corporations	Firms subcontracted by Sinohydro		
		Construction materials suppliers in local markets		
		Ghanaian workers at Bui		
	Individuals	Ghana Trades Union		
		Ghana Dams Dialogue		
Chinese actors	Corporations	Sinohydro and its subsidiaries ^a	Central planner	
		HydroChina ^a	Other agents	
		China General Technology		
		China Exim Bank		
		Sinosure		
	Financiers	Government agencies	China embassy in Ghana	
		Universities	MOFCOM office in Ghana	
		Contracting corporations and consultants	Tsinghua University ^a	
		Other international actors	Coyne	
			ERM ^a	
Other actors	Equipment manufacturers and suppliers	Alstom, including its joint venture Alstom Hydro China ^a		
		ABB ^a		
		Westinghouse		
		IWMI ^a		
		GTZ ^a		
	International organisations	River	Black Volta River	
		Building materials	Such as cement and aggregates used to make concrete for the dam structure	

Note.

^a Indicates a linkage to CWM; this table excludes historical attempts to develop Bui, without Chinese involvement.

"Europe's monopoly as the major receiver of Ghana's cocoa" (pers. comm., MOFCOM secretary, Accra, 1 September 2015). The CSA is renegotiated every year using international pricing.

The CSA meshed with Sinohydro's interests. First, Sinohydro introduced the project to China General Technology Group, China's CSA contractor (State-Owned Assets Supervision and Administration Commission, 2007). Second, the condition that CSA expires in 'no more than five years' appears to have been attached to guarantee GOG's support during Sinohydro's performance of the EPC. Third, Sinohydro signed framework agreements for another project the day before the concessional loan agreement for Bui was signed: apparently, China Exim Bank financing was used to bargain for Sinohydro's market expansion.

Under the contract, Sinohydro was responsible for engineering, procurement and construction of the dam. An institute of HydroChina (another big Chinese SOE) was entrusted with technical design. Sinohydro Bureau 8 (SHBu8), a subsidiary within the Sinohydro Group, was authorised to implement the EPC. SHBu8 dispatched project managers to Ghana, to coordinate with Sinohydro managers in China over procurement and financial transactions, to liaise with BPA and Coyne at Bui and in Accra, and to hire and train workers. Construction materials were mainly purchased locally in Ghana. Specific equipment was procured overseas (pers. comm., Sinohydro staffer, Bui, 13 August 2015): turbines were purchased from Alstom's joint venture in China; other devices were purchased from Westinghouse and dispatched from the US. SHBu8 also collaborated with Tsinghua University researchers to develop international EPC project management strategies, publicised in a 2011

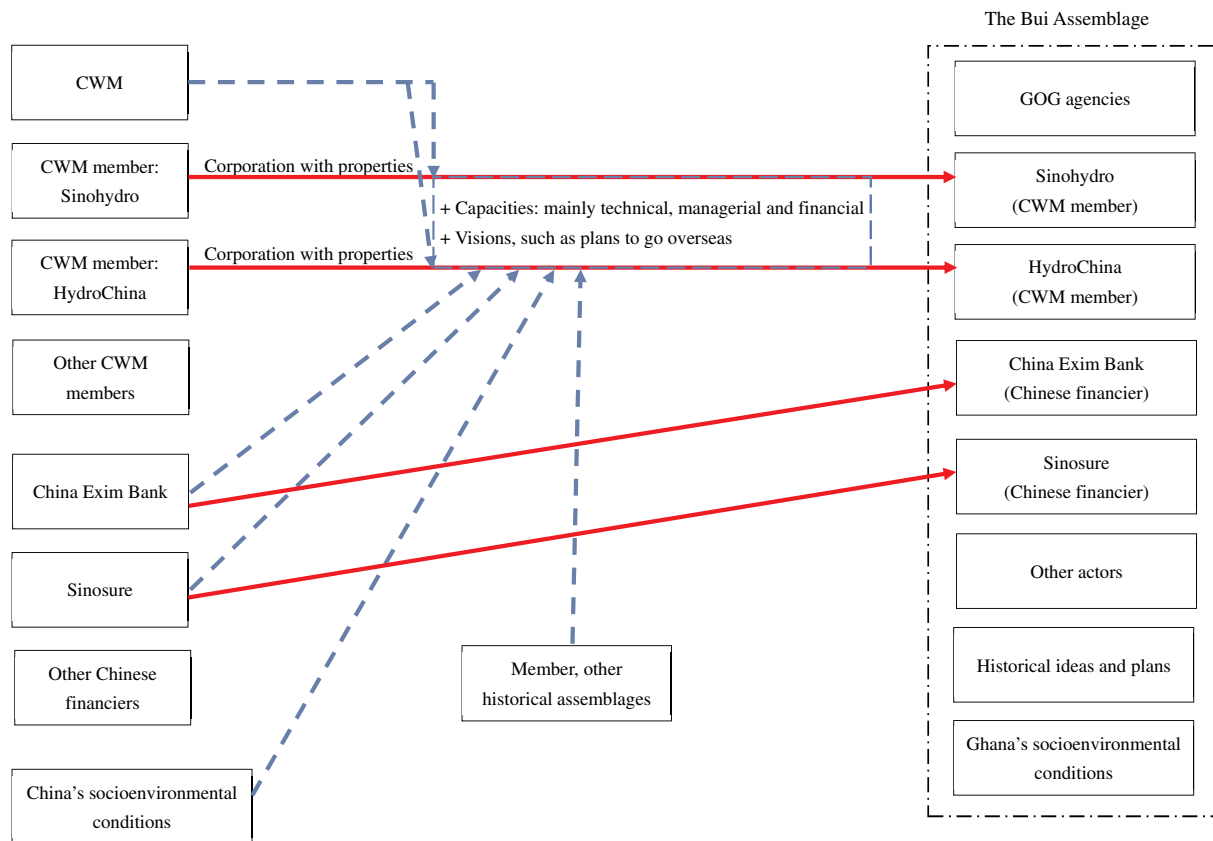


Fig. 1. Relation of the Bui assemblage to the CWM.

Note: [1] Red (solid) lines indicate specific corporations and financiers that shift resources from China to join the Bui assemblage. Blue (dashed) lines point to corporations, financiers and networks influencing each other by providing and enabling capacities and visions. For a complete list of actors, see Table 2. [2] Sinohydro's membership of other assemblages also contributed to its capacities. For example, Pakistani operators were mobilised through their membership of the assemblage that constructed the Ghazi-Barotha dam before Bui. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Table 3
Timeline: Bui contracting and preparation.

Timing	Documents, events	Actors
2007.04	Bui EPC turnkey contract, signed	Sinohydro Government of Ghana (GOG)
2007.07	USD 622 million budget for Bui, approval	Parliament of Ghana
2007.08	Bui Act (740), approval; BPA established;	Parliament of Ghana BPA on behalf of GOG
2007.09	Export credit contract signed	China Exim Bank GOG
2007.10/11	Start field investigations and building basic infrastructure (e.g. roads and camps) at Bui site	Sinohydro
2008.05	Start resettlement	BPA Resettlement communities GOG
2008.09.02	Preferred tenderer for other hydropower development, signed	Sinohydro
2008.09.03	Contract for concessional loan signed	China Exim Bank GOG
2009.12	Construction of main dam, start	Sinohydro

workshop (SHBU8, 2011). Thus, members of CWM – dam companies, engineering institutes, material suppliers, and universities – interacted to construct Bui; the capacity to build the dam was a network capacity.

For labour, Sinohydro adopted a “ladder strategy” (pers. comm.,

Sinohydro staffer, Accra, 13 October 2015): “Though most employees are Ghanaian workers, we have a small number of Chinese managerial staff, engineers to cooperate with HydroChina designers and Coyne consultants, and some skilled technicians to train Ghanaian workers”. In 2009, with support from the Ghana Trades Union, a local workers’ union was formed at Bui to help Ghanaian workers better negotiate with Sinohydro (Otoo, Ulbrich, & Asafu-Adjaye, 2013). Pakistani machinery operators were employed too, in order “to save the cost of training unskilled Ghanaians”. Almost all the Pakistanis had previously worked for Sinohydro on the Ghazi-Barotha dam project in Pakistan (which concluded in 2004).

Resettlement was arranged by BPA, in line with the EPC (Hensengerth, 2014). Sinohydro avoided this responsibility for two reasons. First, Sinohydro lacks expertise: in China, local governments organise resettlement, not dam companies. Second, Sinohydro wanted to minimise risks – Bui was the firm’s first project and China’s then-largest investment in Ghana. Some contractual housing was built at the resettlement site, but this was separate from the official resettlement. In addition, although China Exim Bank updated its social and environmental guidelines before the start of construction, claiming that they accorded with international standards (International Rivers, n.d), there is no information about monitoring and evaluation activities during and since the dam was constructed.

Sinohydro and the embassy also learned to deal with public relations. Sinohydro and MOFCOM officials in Ghana attended a workshop organised by Ghanaian and Western researchers on the impacts of Chinese-involved dams (attended by one of the authors). To show its corporate social credentials, Sinohydro organised activities, mainly

donations of cash and goods to local communities, while the dam was being built (pers. comm. Sinohydro staffer, Bui, 13 August 2015). But Chinese actors were “not invited and did not participate” in activities organised by the Ghana Dams Dialogue (GDD), an Accra-based NGO formed to advance multi-stakeholder negotiation of dam development in Ghana. “BPA as project owner was invited and participated” (pers. comm. secretary of Ghana Dams Dialogue, Beijing, 22 May 2015).

The establishment and role of GDD reflected Ghanaian preparations for Bui. Recognising concerns over social and environmental problems posed by past dam projects in Ghana, the Volta River Authority (VRA), together with the Volta Basin Development Foundation, initiated a conversation platform to facilitate the Bui project (Seeger, Nyman, & Twum, 2010). After its inception in 2006, GDD formed a National Coordinating Committee, which met regularly to review progress and make decisions, as well as to maintain connections with Ghanaian ministries and government agencies (including BPA), NGOs, research institutes, the media, and community representatives from Bui and past dam-affected areas in Ghana (International Water Management Institute, n.d.-a). GDD published the minutes of its 14 meetings online, organised a series of Ghana Dams Forums, and released action plans and policy briefs on specific topics. GDD was closed in mid-2011 when most work at the Bui resettlement site was finished (Ghana Dams Dialogue, 2011, International Water Management Institute, n.d.-b).

The formation and operation of GDD reflect collaboration between Ghanaian and international players. To meet GDD’s remit to consult, a secretariat was formed – experts assigned to Accra by the International Water Management Institute (IWMI) (pers. comm. IWMI researcher, Accra, 8 October 2015), including scientists who had worked for the World Commission on Dams and the United Nations Environment Programme’s Dams and Development Project (Water Power & Dam Construction, 2009). GDD received grants from the German Technical Cooperation Agency (GTZ, now GIZ) in 2007–2008 and 2009–2010 (International Institute for Environment and Development, 2014). GDD, like similar NGOs in Uganda and Togo, is also regarded by GTZ, and

other international organisations (International Rivers, 2010), as a means of addressing recommendations proposed by the World Commission on Dams (GTZ & IFOK, 2008). International dam experts and organisations influenced the Bui project through their effect on BPA and local community representatives who participated in GDD activities. The linkages between the Bui assemblage and the Dams Dialogue assemblage manifests the complexity of external influences on Chinese participation in foreign dam projects.

We note that, after Bui started operating in 2013, the dam “stopped generating power following its (BPA’s) announced cut in generation capacity” (GhanaWeb, 2014) because of low water levels in the Volta River (Bui Power Authority, 2014). Such post-construction problems remind that the dam is materially-grounded – the Volta River is an actor. Not only were the thinking, planning and building of a dam enabled by the existence of the river, but the dam’s outcome also depends on the behaviour of the river. Fig. 1 is a simplified representation of these links between the CWM, its members and the Bui assemblage.

4. Marketing of Chinese dam builders in Ghana

Bui was Sinohydro’s first business in Ghana. During and after building the dam, the company actively sought new projects in the country. As one of China’s policy banks, however, China Exim Bank has no role in marketing – it has no office or resident personnel in Ghana. Marketing, therefore, was the business of Sinohydro and other Chinese dam players (Table 4). Though seeking finance from Beijing, Sinohydro has followed market principles in winning contracts and collaborating with non-Chinese players. Other Chinese dam companies operating in Ghana have diversified their business beyond the building of dams and Sinohydro’s business model. New modes of operating overseas also appear.

Table 4
Overview of actors enabling Chinese dam companies’ operation in Ghana.

Type	Individual actors	Project-specific role	
Host country actors	Government agencies	Volta River Authority Ghana Ports and Harbours Authority Ministry of Roads and Highways Public Utilities Regulatory Commission	Central planners
	Contracting corporations	Energy Commission	Other agents
		Ghana Grid Company Ghana Water Company Meridian Port Services Electricity Company of Ghana	Central planners
	Corporations formed or held by Chinese actors	Sunon Asogli Power Savanna Solar	Other agents
Chinese actors	Other organisations	Ghana Chinese Chamber of Commerce China Enterprises Chamber of Commerce in Ghana	
	Government agencies	MOFCOM	
	Water-related SOEs	Sinohydro, other member companies of PowerChina, ^a Gezhouba, other member companies of EnergyChina ^a CWE, Three Gorges Corporation ^a HydroChina and subsidiary companies, such as Huadong Engineering Institute Corporation ^a	Central planners
		Shenzhen Energy Group ^a	
	Financiers	China Exim Bank Sinasure China Africa Development Fund, of China Development Bank	Other agents
Other international actors	Water-related private firms	Hanergy ^a	Central planners (no implementation)
	Foreign aid agencies	Exim Bank of Korea Agence Française de Développement	Central planners
Other actors	International organisations	World Bank West African Power Pool	
		Non-humans like water and building materials	Other agents

Note.
^a Indicates linkage to CWM.

4.1. Sinohydro's business during and after Bui

After entering Ghana through Bui, Sinohydro joined the two main Chinese corporate associations in Ghana – the Ghana Chinese Chamber of Commerce and the MOFCOM-initiated China Enterprises Chamber of Commerce in Ghana – to gather market information and opportunities to collaborate with other Chinese firms. Apart from Bui, by June 2018, Sinohydro had completed one contract and was undertaking three others; another had been cancelled and one suspended. Over the past decade, Sinohydro has submitted bids and participated in several projects in Ghana (Table 5); none of the successful contracts had a Chinese project owner or financier.

Sinohydro signed a framework agreement to develop hydropower in Western Ghana (Table 2) on 2 September 2008, one day before the Bui concessional loan contract was signed (State-owned Assets Supervision and Administration Commission, 2008). Under this agreement, Sinohydro would be contracted to develop four other hydroelectric projects in Ghana, at a total estimated cost of USD 900 million (SHBu8, 2008). 'Unfortunately, all our projects under negotiation went off after Ghana's newly-elected government came into power in 2009' (pers. comm. Sinohydro manager, Accra, 13 October 2015).

'During the Bui dam construction period, ... the P7 project at Akosombo was important' (pers. comm. Sinohydro staffer, Changsha, 20 November 2015). P7 was awarded in February 2010 by VRA after an international competitive tender (SHBu8, 2010, World Bank, n.d.). As a component of the World Bank-financed Coastal Transmission Backbone of the West African Power Pool, the 15-month P7 contract was to retrofit machinery, repair Akosombo power station, and to provide training (SHBu8, 2010); the contract was completed in March 2014 (PowerChina, 2014; SHBu8, 2014a). SHBu8 then negotiated for a solar photovoltaic project, making a preliminary agreement in July 2014 and subsequently contracting with Hanergy, a Chinese private company, to develop a 400 MW solar project near Tamale, Northern Ghana (SHBu8, 2014b); however, implementation was suspended in mid-2015 (see next section) (SHBu8, 2015) (pers. comm. Sinohydro staffer, Bui, 13 August 2015).

Not until 2016, nearly three years after Bui and P7, did SHBu8 commence new projects in Ghana. Two projects were contracted by the Ghana Grid Company: a Power Enhancement Project with the West African Power Pool, financed by the Exim Bank of Korea (GhanaWeb, 2015; SHBu8, 2018); and a substation construction-retrofit project, financed by Agence Française de Développement (AFD) (2016). Also in 2016, Sinohydro was awarded its first road project in West Africa (PowerChina, 2016), funded by Meridian Port Services (n.d.-a, n.d.-b), a joint venture of the Ghana Ports and Harbours Authority. Later in September 2018, Sinohydro started an 18-month subcontract with HydroChina's Huadong Engineering Corporation, to retrofit the Kpong dam, with funding from VRA, owner of the Kpong dam (PowerChina, 2018).

In July 2018, the Ghanaian Parliament approved a USD 2 billion Master Project Support Agreement with Sinohydro to construct a bundle of infrastructure projects – Sinohydro agreed to arrange investment to cover 85 per cent of the cost, to be repaid with refined bauxite (Arko, 2018); Ghana established the Ghana Integrated Aluminium Development Corporation to coordinate this agreement (Ghanaweb, 2019). The project's phase-I construction commenced in April 2019 (Yeboah, 2019); SHBu8 (2018) and four subsidiaries of HydroChina formed an intra-PowerChina³ consortium to build roads, bridges and other facilities across Ghana, under EPC contracts with the Ghanaian Ministry of Roads and Highways.

When Ghana signed the BRI MOU with China in 2018, a Framework Agreement on Financing Insurance Cooperation was signed between Ghana and Sinosure to facilitate Chinese investment projects in Ghana,

³ In continuing SOE reform, in 2011, China established PowerChina Group, now the parent company of Sinohydro and HydroChina.

including this Master Project (Ghana News Agency, 2018; Sinosure, 2018). Although it is unclear whether Sinohydro has borrowed from third-parties to finance its 85 per cent obligation, Sinosure certainly has gained a role – the GOG categorized USD 66.2 million (out of the USD 646 million investment) as premium to Sinosure to open and manage an escrow account into which will be deposited income from Ghana's refined bauxite sales to repay Sinohydro (Business Ghana, 2018; GhanaWeb, 2018). This arrangement is similar to Bui's CSA deal – except that Ghana will borrow from Sinohydro, instead of from a Chinese bank.

Thus, Sinohydro has sought to leverage Chinese state financing to expand its business in Ghana. However, its efforts have seen setbacks, including cancellation and suspension of previously-agreed projects. Sinohydro has been active and flexible in seeking projects: the company implemented contracts awarded by the GOG and enabled by Western donors not all of them dam-related. Infrastructure projects packaged with finance from Beijing, like Bui and BRI projects elsewhere, enable Chinese actors to enter foreign markets, as Sinohydro did; subsequent political and commercial events provide opportunities for other infrastructural interventions (and profit-making ventures) for Chinese actors. The Sinohydro infrastructure-for-bauxite barter is a path-dependent process in which project coordination at a policy level is paired to bargains between interest groups over project details and finance.

4.2. Other Chinese dam corporations in Ghana

Other corporations within the CWM have business in Ghana too. China International Water & Electric Corporation (CWE), a wholly-owned subsidiary of Three Gorges Corporation, is active. CWE first worked in Ghana in 1974 as a Chinese aid agency, and in 1992 CWE Ghana Company (2013) was established. By 2013, Three Gorges Corporation's contracts in Ghana totalled USD 571 million, mainly in rural electrification and road construction (Table 6). In 2014, CWE signed an EPC contract with the Ghanaian government to construct Hemang Dam in the Western Region (China International Water & Electric Corporation, 2014). This USD 307 million contract also includes a power plant (installed capacity 60 MW), a substation and a transmission line. Sinohydro is seeking work as a subcontractor on this project (pers. comm. Sinohydro staffer, Accra, 13 October 2015).

Contracted by the Ghana Water Company Limited (GWCL), Gezhouba completed the Kpong Water Supply Expansion Project, one of Ghana's largest water supply projects, in 2014 (China Daily, 2014). This contract was worth USD 273 million, 95 per cent financed by China Exim Bank and 5 per cent by the Ghanaian government (China Daily, 2014). The project included construction of a water intake and transmission facilities, as well as expansion of a treatment plant (Ghana Water Company, n.d.-a). In July 2014, Gezhouba signed an EPC contract with GWCL to improve the water transmission system (China Daily, 2014). GWCL (n.d.-b) plans to contract four other Chinese equipment manufacturers (all suppliers to the Chinese dam industry) to implement five urban water supply projects using China Exim Bank loans, continuing its cooperation with Chinese corporations (pers. comm. Ghanaian technician, Accra, 12 October 2015).

Another significant Chinese player in Ghana is Shenzhen Energy Group (SEG), a Shenzhen Municipal SOE (n.d.). SEG's subsidiary in Ghana – the Sunon Asogli Power (Ghana) Ltd (SAP) – developed and owns the Sunon Asogli Thermal Power Station in Tema. This gas power plant was completed in two phases (2010 and 2016) (Shenzhen Energy Group, n.d.-b). SAP managed the licencing, construction contracting, and operation of the power station. SAP contracted with the Electricity Company of Ghana, the Public Utilities Regulatory Commission, and Energy Commission for a 20-year Power Purchase Agreement, approval of power prices, and licencing of electricity sales (Shenzhen Energy Group, n.d.-b). Phase-II development was contracted to a sister company of Gezhouba in the EnergyChina Group (pers. comm. SEG staffer, Tema, 26 August 2015). SEG (n.d.-a), not itself a major dam player, is 25 per cent owned by a subsidiary of Huaneng (parent company of the Huaneng

Table 5
Sinohydro's business in Ghana, June 2018.

Project	Status	Main work	Project owner	Key financier	Cost (USD million)	Remarks
Projects implemented/undergoing P7	Completed	Akosombo power station retrofit	Volta River Authority (VRA)	World Bank	5.84	2010, contract awarded 2014, contract closed
Substation Construction and Retrofit	Under construction	Lot 3 award of Kumasi–Kintampo–Tamale–Bolgatanga Substation Project	Ghana Grid Company	Agence Française de Développement	23.83	2016, construction began
Power Enhancement	Under construction	Improve power delivery between Prestea and Kumasi	Ghana Grid Company	Exim Bank of Korea	67.2	2016, construction preparation
Tema Motorway expansion	Under construction	Road construction	Ghana Ports and Harbours Authority	Meridian Port Services	7	2016, construction began
Kpong (Akuse) Dam	Under construction	Kpong power station retrofit	VRA	VRA	Unknown	2018 construction began
Projects not implemented						
Western hydro-development	Cancelled	A package of four dam projects	VRA, Electricity Company of Ghana	Chinese donor	900	2009, dropped
Solar	Suspended	400 MW solar power station	Savanna Solar	Hanergy	0.2	Mid-2015, suspended

Note: other sources are referenced in the text.

Source: interviews; supplementary details from SHBu8 (<http://www.baju.com.cn/>, accessed 17 December 2018).

Table 6
CWE projects in Ghana, 2013

Project name	Contract price (USD million)	Description
Supply and Installation of Distribution Networks (Central Region, EPC)	5.03	Distribution network upgrade
Rehabilitation of Kassajjan Road	13	9 km road improvement and 1 km drainage canal reconstruction
Madina-Pantang Road	69.5	5 km road construction and expansion
Accra-Kumasi Highway Dualization	147	31.7 km road construction and an interchange construction
Fufulso-Sawla Road Reconstruction	50.03	80 km road reconstruction
Supply and Installation of Distribution Networks under Grid Extension (Western Region, EPC)	16.56	Upgrade of 923 km transmission lines; change of transformers; indoor installation
Electrification (Upper West Region, EPC)	90	Construction of 2550 km transmission lines; indoor installation
Extension of Electrification Facility (Upper West Region, EPC)	180	Extension of 2360 km transmission lines; substation construction; indoor installation

Note: This webpage not updated since 2013.

Source: [China International Water & Electric Corporation \(2013\)](#).

Lancang River Hydropower Company, a CWM member).

With 40 per cent of SAP's shares, China-Africa Development Fund (CADF) is SEG's partner in Ghana. Apart from USD 100 million invested by SEG, the SAP project Phase-I also received a USD 100 million commercial loan from [China Development Bank \(CDB\)](#), CADF's parent agency (pers. comm. SEG staffer, Tema, 26 August 2015). CDB loaned to Phase-II too. CADF was established to keep a promise made by China at the 2006 Beijing Summit of the Forum on China–Africa Cooperation. The use of commercial (CDB) loans rather than preferential (China Exim Bank) loans indicates the diversification of Chinese state-backed financing in overseas projects.

Hanergy, a privately-owned member of CWM, also seeks business

overseas, including the Sinohydro-contracted solar project in Ghana. In March 2014, its subsidiary, Hanergy Global Solar Power Group, acquired 70 per cent of the equity of Ghanaian-owned Savanna Solar, and 'entered into a power purchase agreement ... in relation to the sale of electricity to be generated under the 400 MW solar power plant project' ([Hanergy, 2015](#)). [African Review \(2014\)](#) reported that Hanergy planned to invest USD 0.2 million in this project. However, Sinohydro employees implied that the project was suspended (pers. comm. Sinohydro staffer, Bui, 13 August 2015) and in late 2015, Hanergy was reported by Chinese media to be in financial difficulties.

China's 2002 power sector reformers envisaged that industrial corporations would compete inside China, but that overseas they would collaborate to enhance their competitiveness ([Lin & Milhaupt, 2013](#)). Thus, MOFCOM initiated and sponsors the China Enterprises Chamber of Commerce in Ghana. The Chamber 'helps organise activities and events, for example sporting competitions and festival celebrations, to bring together Chinese managers in Ghana' (pers. comm. Chamber secretary, Accra, 8 October 2015). Every quarter, the Chamber reports on business opportunities with Chinese companies operating in Ghana. The Chamber ([2014](#)) listed 66 members, with Sinohydro, CWE, Gez-houba and SAP all on its presidential council. In reality, however, '(t)he entry of many (Chinese) SOEs into Africa's infrastructure sector creates severe competition among themselves, often leading to price wars and underhanded or shady practices' ([Huang & Chen, 2016](#)). Chinese corporations' bids to the French development agency AFD for Ghana's Kumasi–Kintampo–Tamale–Bolgatanga Substation Project reflect such problems. Apart from Lot 3 awarded to Sinohydro (the substation project), Sinohydro's bid for Lot 1 was rejected due to an 'abnormal' and 'unrealistic' low price ([AFD, 2016](#)). A Chinese consortium also bid for Lots 2 and 3, in direct competition with Sinohydro's bids (in fact, the consortium's bid were rejected as unqualified). Such competition overseas diverges from Chinese government expectations; the results of BRI projects may not align with the Chinese government's intentions either.

4.3. Characterising Chinese dam builders' business in Ghana

Many Chinese dam players now operate in Ghana. They are open to all kinds of projects: since Sinohydro received the Bui EPC contract, only CWE has signed another contract for dam construction in Ghana. The

Chinese government has not done much to promote dam projects: MOFCOM only facilitates information exchange through the Chamber of Commerce. Since Bui, none of Sinohydro's new projects in Ghana was proposed or successfully financed by the Chinese government – Chinese state-backed dam financing overseas is in practice weak. But Chinese state finance has enabled Chinese companies to undertake other kinds of infrastructure projects, such as water supply projects backed by China Exim Bank. Moreover, unlike China Exim Bank's loans to facilitate Bui, the CDB's investment through CADF's shareholding in Sunon Asogli Power plant exemplifies more market-oriented means of going out.

The influence of international actors is complex. In pursuing new projects, Chinese corporations often compete with Western companies for contracts awarded by the Ghanaian government or other foreign lenders. Non-Chinese financing has also contributed significantly to Chinese corporations' overseas business – three of Sinohydro's post-Bui projects are related to the West African Power Pool, funded by international financiers. Such projects allow Sinohydro and its employees to remain in Ghana and continue market expansion.

By contracting and managing projects with non-Chinese actors, Chinese companies become members of these projects' assemblages too. They accumulate experience and learn the ways of doing of the members of these assemblages. Thus, Chinese actors can strengthen and diversify their capacities to work with different foreign governments and businesses, creating ever-wider networks. For example, [Alstom \(2014\)](#) acknowledged that after providing Bui's turbine-generators, the company won another contract from Sinohydro for equipment supply and technical services for the Soubre Hydropower Project in Ivory Coast.

The business of Chinese corporations is diverse – ranging from power transmission through water supply to road construction, not being restricted to dams and other water-related projects – but always centred on infrastructure, the Chinese corporate expertise. The entry of SEG (a provincial SOE) and Hanergy (a private firm) into Ghana as project *owners* rather than construction *contractors*, is, however, quite different from the strategies of central SOEs, and perhaps more profitable. Sinohydro's infrastructure-for-bauxite deal reflects diversification too: Sinohydro's role as both financier and builder signals another evolution of the Chinese financialisation of foreign infrastructure projects. Still, this project has just started and little is known about the political risks of such a project and the management of its social and environmental issues, but the emergence of an infrastructure-for-bauxite deal already forges new articulations, between Ghanaian bauxite mining activities and Chinese actors such as Sinohydro and Sinosure (outside their central areas of expertise – water engineering and financing).

5. Conclusions

Following assemblage thinking and the characterisation of the Chinese Water Machine, this paper detailed the Bui-specific network assemblage that constructed Ghana's Bui dam. We responded to existing knowledge on hydropolitics and assemblage, especially [Sneddon's \(2015\)](#) book on US-centred Cold War geopolitics and recent scholarly debates in *Political Geography* (see [Hirsch, 2017](#)), making specific contributions to the theorisation of the assemblage-CWM framework. The paper showed the ways in which power as a shared capacity was created in a network and exercised by various actors. For example, Sinohydro, a member of CWM and a central planner in the Bui assemblage, strengthened its capacity to build the dam through collaborating with specific CWM members: with HydroChina for engineering design, and with Tsinghua for project management expertise. Following the Bui assemblage's links to other networks, the paper traced subsequent business outcomes of Chinese dam companies (also CWM members) in Ghana, and explained the intersections between these network assemblages. The paper demonstrates how one assemblage (the CWM) facilitates its members' construction of other assemblages to enable specific projects, such as a dam, and subsequent, more diverse, business opportunities.

The paper also illustrates the emergence of multiple new assemblages spreading out from the CWM assemblage, resulting from the interactions of heterogeneous actors. For example, despite being founded in the technological logic of capital accumulation, the Bui project is also materially-grounded: at least the Volta River and physical conditions near the Bui gorge co-constitute the Bui assemblage. The infrastructure-for-bauxite project, too, forms an assemblage linking up Sinohydro, Sinosure, local bauxite mines, Ghanaian authorities and other actors in the mining sector. The socioenvironmental embeddedness of infrastructure projects, then, co-shapes the power relationships between Chinese and non-Chinese actors, and between human and non-human actors, which in turn will affect the realisation of the claimed goal of the BRI – connectivity between places. There are five more practical implications.

First, contrary to claims that BRI is a top-down, Sinocentric geopolitical and economic strategy, this paper reveals that in reality, infrastructure projects like the Bui case are far more complex than just about the Chinese government and corporations. Building Bui was a global co-construction, subject to the socioenvironmental embeddedness of this dam: actors from Ghana, China, Britain, France and Pakistan played crucial roles in realising the dam, while there were also contributions from actors residing in other countries, such as GTZ and IWMI, as well as various project subcontractors and material suppliers, such as Alstom China, ABB and Westinghouse.

Second, the history of Chinese dam companies in Ghana suggests that BRI's political economy will evolve. Sinohydro's business beyond Bui, as well as the activities of other Chinese dam corporations and financiers, reveal diversification into different markets, use of different financial instruments, and participation in different roles (such as construction contractor, project owner, investor, and/or shareholder). Furthermore, contrary to the common criticism of a focus on oil and minerals ([Pannell, 2008](#), [Brautigam, 2011](#)), the cocoa deal, possibly Sinohydro's new bauxite-for-infrastructure barter too, reflect Chinese interest in other low value-added natural resources.

Third, the paper also points to relatively weak Chinese government sponsorship. Apart from loans for Bui, Sinohydro sought Chinese financing for other dam projects in Ghana, but failed. Chinese corporations have pursued market expansion in Ghana in a way that is similar to other international participants – playing in the market of international competitive bidding with little help from government actors. Contrary to the Chinese imaginary that stresses government financial support, at least in Ghana the host government and non-Chinese lenders are the key financiers that sustain Chinese business overseas. Outside China, the Chinese government's financial connections with these corporations may be more rhetoric than reality.

Fourth, nor should we discount the possibility of local protest. At Bui, Sinohydro avoided involvement in resettlement, arguing that it was inexperienced and seeking to minimise risks. Little is known about the China Exim Bank's monitoring arrangements during and after Bui was constructed, but researchers found that the resettlement affected local food security and economic conditions ([Obour, Owusu, Agyeman, Ahenkan, & Madrid, 2016](#); [Wilmsen, Adjartey, & Hulten, 2018](#)). Such a result is hardly in keeping with Chinese BRI discourse that envisages a thorough change to the behaviour of Chinese players overseas, particularly in poorly governed developing countries (the "Silk Road Spirit"). As Chinese companies become project owners or financiers, environmental and social issues will increasingly challenge their capacity to perform their corporate, social and environmental responsibilities; Sinohydro's new grand infrastructure deal is an important test.

Finally, this history tells us what we might expect of future BRI projects. By December 2018, three of the 34 projects approved by the Asian Infrastructure Investment Bank are about big dams: the extension of Tarbela Dam (Pakistan), improvement of dam safety through rehabilitation and training (Indonesia), and the rehabilitation of Nurek Dam (Tajikistan) (AIIB, 2018). Chinese dam players are also building a dam sponsored by the Silk Road Fund. Through such projects, dam

corporations will gain platforms from which to expand their business outside BRI projects. Moreover, the Bui case highlights how BRI projects will inevitably intersect with non-Chinese international and local networks, including the World Bank, local players in recipient countries, and other international actors. We should expect each project to involve a different assemblage, constituted of Chinese, international, and recipient country networks (including specific socioenvironmental conditions): the fluid nature of BRI will expand the range of projects that it spawns as well as the complexity of the networks that co-constitute them.

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Declaration of competing interest

None.

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