Design and Assessment of water-energy-food-environment Mega-Systems

Dam building by the illiberal modernisers: ideology and changing rationales in Rwanda and Tanzania

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Abstract
Dams have a prominent historical status, imagined through high-modernist ideology as the premier infrastructure project, delivering electricity, irrigation and the spectacle of development. However, the decade from the mid-1990s to the mid-2000s saw few dams constructed and major funders such as the World Bank pull out. Dams have returned over the past decade, particularly in authoritarian countries in Africa. This sparks questions about the contemporary state of politics and development ideology. This article, using case studies from Rwanda and Tanzania, asks whether high-modernist ideology has returned and justifies the dam resurgence. The article finds, however, that high modernism now plays an indirect role. It underpins broader development-focused state building missions that are central to Rwanda and Tanzania and also rationalises pyramidal, expert-centric decision making and depoliticised ideas imbuing electricity itself with development. Dams are therefore built for their hydropower, rather than for their modernising spectacle; moreover, both countries demonstrate sustainable development discourse and critiques of dams' efficacy. The article concludes that this suggests a more nuanced modernising ideology and somewhat responsive authoritarian states. The article is based on my thesis involving elite-level interviews and ground-level fieldwork with members of each dam's local community.

Keywords
High modernism, development, dam resurgence, ideology, political economy, energy

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1 Introduction

Dam building is back. Featuring historically as arguably the premier development project, delivering electricity, water and the spectacle of modernity, large concrete dams became firmly established in Africa in the colonial period, but many newly independent nations continued their construction. Dams, through their symbolism and delivery of irrigation, electricity and control, were frequently central to state-building projects either intending to sustain colonialism,[1] or to found powerful independent countries.[2] High-modernist ideology, a phrase coined by James Scott (1998), was typically intertwined in such state-building programmes, imbuing these massive concrete infrastructures with the notion of development, the technology capable of delivering paths to modernity. However, the decade from the 1990s to the mid-2000s saw few dams constructed and major funders such as the World Bank pull out (Khagram, 2004). Surprisingly, over the past decade, dam building has returned to fashion (World Energy Council, 2015; Zarfl et al, 2015), particularly in Africa. An emerging literature records national dam building programmes from Sudan (Verhoeven, 2015) to Cameroon (Chen and Landry, 2018), Ethiopia (Kraak, 2012; Cuesta-Fernández, 2015), Uganda (Gore, 2017), Angola (Soares de Oliveira, 2015), Rwanda (Dye, 2016) and Tanzania (Dye and Hartmann, 2017). However, it is not clear if there is a pattern of justifications and discursive rationales in this new wave of dam building, or what it means for the state and politics of development in Africa.

Given the close historic intertwining of dam justifications and high modernism, this article specifically examines whether this particular ideology is present in justifications for the dam resurgence. It examines the potential existence of state-building projects in Rwanda and Tanzania, and the role of dam construction within them. Furthering a previous study of Rwanda (Dye, 2016), the paper uses a multi-case-study approach to examine the ideology of this apparent dam building phenomenon. Some of the existing literature points to modernisation narratives in the justifications and discourse rationalising dams, whether in Sudan (Verhoeven, 2015), Ghana (Miescher and Tsikata, 2009) or Ethiopia (Fantini et al, 2018; Fantini and Puddu, 2016). However, few authors have directly analysed whether an ideology is influential, or have examined its similarity to or difference from past high-modernist rationales for dam building. This paper therefore advances understanding of the potential ideational drivers behind the surge in this infrastructure. Moreover, the paper makes an additional significant advance to the literature by analysing high modernism as an ideology with core ideas and related idea-practices. This increases the rigour with which one can study dams' ideational aspects, while still appreciating states' potential strategic concerns. It also suggests how Scott's theory specifically applies to dams.

In particular, the paper analyses case studies from Rwanda and Tanzania and draws on three particular hydropower projects: the Nyabarongo Dam (Rwanda), Stiegler's Gorge Dam (Tanzania) and Rusumo Dam (on the Tanzania–Rwanda border). Rather than finding repetition of past high-modernist dam building, the paper's key argument is that the discourse around Rwandan and Tanzanian dams is different. High modernism plays an important role in both countries' state-building projects, which are in turn central to explaining why each regime develops dams. However, rather than the infrastructure's symbolism and benefits being central to national modernising projects, both national governments merely seek to build dams in fulfilment of electricity drives; the megawatt not the dam is imbued with power. Moreover, both states have borrowed a degree of the rhetoric and policies seeking to reform dams in order to sanitise and

[1] Eg Kariba (Tischler, 2013) and Cahora Basa (Isaacman and Isaacman, 2013) dams.
[2] Eg Akosombo (Miescher, 2014b) and Aswan High (Mitchell, 2002) dams.

justify the infrastructure. Such findings suggest high modernism plays a different, more subdued, role in today's development drives. It does inform understandings of how to do development but does not feature strongly in the dam building justifications: a singular focus on the megawatt rationalises the infrastructure, contrasting with grander claims about dams' developmental ability and powerful symbolism. Dam building in its resurgence consequently has a different veneer and different justifications. This conclusion is important because it allows for greater appreciation of the technical limitations of the dams and of their detrimental impacts. In turn, this makes discursive space for the adoption of reformist policies.

The article begins by analysing high modernism as an ideology, moving on to assess its historical intertwining with African dam building. The second half of the article then analyses contemporary dam building, particularly drawing on research in Rwanda and Tanzania, but also examining comparative cases of African resurgence-era dams. Research here is based on my doctorate and was conducted between 2015 and 2016, involving three months in each country. It is therefore focused on the resurgence of dam building in both states from 2003–05 to 2016, rather than on more contemporary events such as the rapid changes occurring under Tanzania's President Magufuli since the fieldwork concluded in October 2016. Research involved elite-level interviews with government ministers and civil servants in ministries, energy utilities and dam-implementing institutions in both countries. In addition, I interviewed actors connected with the energy sector, including the constructing dam-engineering companies, consultancies and donor agencies engaged in each country's energy sector. Overall, 144 interviews were conducted. Typically, these lasted between 30 minutes and one hour, and followed a semi-structured format where the researcher kept to a pre-decided set of thematic questions but allowed conversation to follow the interviewees' responses. International financiers and enablers from the World Bank, Indian and Brazilian governments were also interviewed in this same format, although they do not feature primarily here. All interviews were anonymised to institutional affiliation given the authoritarian context in Rwanda and Tanzania and the subsequent need to consider respondents' security. The following section introduces the argument's theoretical background, outlining the ideology of high modernism and its application

2 High modernism and its entanglement with dams

2.1 High modernism

High modernism emerged in the enlightenment era but became more established in the early 20th century.[3] As an ideology, it constitutes a specific set of ideas, a 'thought edifice' (Freeden, 1994, p 140) that legitimates explicit idea-practices of how to 'do Development',[4] whether consciously or unconsciously theorised (Goodwin, 2014, p 28). High modernism grew as the key inspiration for envisioning development thinking of late-stage, post-1930s colonialism. High-modernist aesthetics, authoritarian politics and even individual projects then became the blueprint for postcolonial development as "African intellectuals adopted [such] modernisation as a means of transforming material conditions in order to advance historic iniquities" (Bloom et al, 2014, p 2). High modernism therefore informed late-colonial and independence-era attempts at 'Development from above' (Havnevik, 1993), often through flagship 'modern' infrastructure like Mozambique's Cahora Basa (Isaacman and Isaacman, 2013) and Ghana's Akosombo (Miescher, 2014b) dams.

[3] Scott (2006) describes the ideology's growing attempts at social engineering and boosting industrial production, building on work by Ferguson (1994), Gilman (2003), Mitchell (2002) and Bähre and Lecocq (2007).
[4] In the sense of Hart (2001).

In brief, this paper understands high modernism as involving two core ideas. The first asserts a binary between the 'modern' and the 'pre-modern' or 'traditional' (Latour, 1993). Modernity meant industrialised societies, where rational and secular culture triumphed over superstition, tradition and public religion. In contrast, the traditional society was primordial, without the capacity for radical change and following traditional, communitarian, religious and irrational cultures and behaviours (Gilman, 2003). The second core idea expresses a triumphalist belief in science and *the expert* to derive solutions for development; the idea that state officials could understand and perfect society and nature from above. Thus, 'it was possible to conceive of an artificially engineered society designed, not by custom and historical accident, but according to conscious, rational and even scientific criteria' (Scott 2006, p 6). Central to this second idea is the rejection of 'the authority of history and customary practise' (Scott, 2006, p 8), the alternative specific knowledges of place, everyday livelihoods, culture and environments, termed *metis* by Scott (1998). At its core, then, high modernism uses dichotomies to essentialise and simplify a more complex world. Indeed, such simplification is key to high-modernist practice as it creates the legibility that is necessary to transform society from above; the accessible data about where and what society does.

Applied idea-practices, which actors espousing high modernism have varyingly adopted, stem from these core principles. Strongly related to high modernism's core idea is that of 'modernisation as spectacle' (Bloom et al, 2014), the importance of aesthetically expressing modernity, industrial technology and order. Thus, 'projects did not so much need to be efficient or modern, they had to look efficient and modern according to a legible structure' (Bähre and Lecocq, 2007, p 2). Another high-modernist idea-practice is the assertion of development as linear, externally induced and teleological: countries will advance primarily as a result of externally induced change derived by expert knowledge. Technology, meaning infrastructure and devices conceived in the industrial countries, become the main agent of change (Gilman, 2003, pp 39, 71; Mitchell, 2002, pp 14–15; Scott, 1998). This builds on high-modernist ideas pitting 'enlightened civilisation' against 'the traditional': the idea that the latter is the product of rational behaviour, technology and ordered environments, and that it can therefore be externally introduced through elite, state-led scientific interventions. Modernisation theory, proselytised by Rostow's (1960) stage growth model, is a prime exemplar applying this linear element of high modernism to capitalist consumer societies.

However, the potential breadth of high modernism and its consequent ability to homogenise all experiences of development has caused substantive critique. Scott's work is often seen to exist in the same bracket as that of post-development theorists (including Escobar, 2012; Crush, 1995) who see all attempts at immanent, imposed development from 'outside' as inherently flawed. This has been countered by others, such as Corbridge (1998), who points to the benefits such projects have brought to some, and argues that not all subjects of development reject projects of modernisation and articulate desired modernity. Industrial revolutions in Europe and America were politically and socially messy, unequal and destructive but would citizens from those places want to reject such modernisation? Additionally, the critiques of Scott's original text by Bähre (2007), Schneider (2007) and Geschiere (2007) argue that his portrayal of the state in Africa is overly static and uniform, paying insufficient attention to the variety of actors within a regime and their concentration and practices of power. Moreover, Scott's (1998) *Seeing like a State* theory is argued to be too generalising and uniform to capture the experiences of top-down projects; even if master plans are made on high, their implementation is so complex that such plans are not implemented as designed. These critiques deserve attention.

Such concerns can be partly addressed by introducing an ideological theorisation that is absent from Scott's seminal work. According to key scholars like Goodwin (2014) or Freeden (1994), ideologies are not descriptions of experiences, but are rather specific clusters of ideas and related policy practices. These will interact with other sets of ideologies and policy ideas, and will exist alongside strategic, materialist concerns, collectively influencing policy making. It is therefore important to think about what these specific idea-practices are, as the identification of ideologies comes from finding these idea-practices in rhetoric or in policy actions. According to scholars like Goodwin (2014) then, ideologies are rarely singularly important and, furthermore, are not intended to describe or predict outcomes and experiences, rather they inform the conscious and unconscious ideas behind particular actions. Taking the ontological position that ideas do influence policy making,[5] this article attempts to move beyond debates pitting idealist and materialist perspectives against each other, asserting that it is more fruitful to ask how they coexist, interact and change (Bevir, 2011). Moreover, such critiques demonstrate the importance of appreciating the complexity of the state in contrast to Scott's thesis, which tends to see the state as a relatively singular entity which is static and unresponsive.

2.2 High modernism and dam building in the 20th century

Historically, high modernism has underpinned many justifications for large dams. The infrastructure entails a scale of externally induced change to biophysical systems and control of rivers that has great affinity with high modernism and its desire to reshape society on a blank slate. Dams allow for the fundamental reordering of rivers, displacement of people, creation of livelihoods and provision of electricity; they are the ultimate modern technology. Consequently, regimes frequently place dams centrally in their development programmes, envisioning them as tools to establish new economies, societies and even citizens.[6] Prominent examples can be seen from the colonial era. Barnett (1977), for instance, describes the British Gezira scheme:[7] an attempt to found a heartland Sudanese irrigation area using Nile dams. The envisioning of dams as state-building tools continued after colonialism, as "African governments … viewed [dammed] rivers as a means of economic development as well as vehicles to showcase their independence and political power" (Hoag, 2013, p 4). A prominent example here is the Akosombo in Ghana, President Nkrumah's pet project.[8] Its energy was supposed to found an aluminium industry,[9] electrify the country and even support regional independence by providing power for neighbouring countries to develop (Miescher, 2014b). As Miescher (2014b, p 343) writes, "building the Akosombo Dam, Nkrumah sought to realize his dream of creating a modern … African nation that would join the industrialized world shaped by the parameters of science and technology". These examples therefore demonstrate the way that high-modernist rationales can justify dams as the enablers of linear, technologically induced progress towards an industrialised society.

Moreover, dams embody the aesthetic ideals of high modernism. A dam's ability to control the environment reflects a human–nature separation, and the power of scientific technology and of "man's superiority over nature" (Everard, 2013, p 60). As McCully (2001, p 237) explains, the

[5] This assumption demarcates this study from a psychological investigation to find 'what people really think'.
[6] Worster (1992). See also Isaacman and Isaacman (2013) and Tischler (2013).
[7] Enabled by the Sennar Dam.
[8] Nkrumah was Ghana's Independence leader, its first Prime Minister and later President. The dam was originally conceived by British Imperial masters, however.
[9] Imagined as resulting linearly from the dam, depicted in propaganda films like 'a river creates an industry' (Miescher, 2014b).

“scale of large dams and their seeming ability to bring power and capricious natural forces under human control gives them a unique hold in the human imagination. Perhaps more than any other technology, massive dams symbolise the progress of humanity from a life ruled by nature and superstition to one where nature is ruled by science.” Being such large, complex and bold technologies, dams also appeal to the veneration of science and technology. Egypt’s colonial-era Aswan dam, as described by Mitchell (2002), captures this in a neat metaphor. Its first purpose was electricity generation primarily for fertiliser production but, simultaneously, the dam curtailed the fertilising annual flood which also counters coastal erosion of the agriculturally rich Nile delta. Dam building thus has a long history of favouring technology over pre-existing economies, cultures and environments. The symbolic materiality of a dam is consequently important, leading to overwhelming praise of the infrastructure as representing modernity in itself, and as the enabler of economic transformation and social progress. As Everard (2013, p 12) summarises “[dam] construction, in the eyes of many became synonymous with development and economic progress. [Dams] … were viewed as symbols of modernisation and of humanity’s ability to harness and control nature.” This is well demonstrated by successive Indian governments’ praise for the infrastructure. As Roy writes: “Dams were portrayed as symbols of nationalism – huge wet cement flags … Every school child is taught that big dams will deliver the people of India from hunger and poverty” (Roy, 2001, p 32).

2.3 High-modernist rationales and practices in dam building

High modernism thus entails specific, applied justifying rationales, and planning and construction practices for dams.

Justifying dams: imbuing dams with development and emphasising their spectacle

The discussion above has emphasised dams’ material ability to extend state power, transform wild rivers to controlled environments and provide the water and electricity underpinning large-scale development projects. This leads to a dam being considered as embodying development itself and as capable of bringing about needed social engineering and economic growth. The discussion also demonstrates dams’ ability to materially and symbolically embody high-modernist ideas for teleological, technologically induced, linear economic process towards modern, end-point society. This often results in the beautifying of dams (as in the marble-clad Marathon dam (Kaika, 2006)), in their being rhetorically praised (as in Nehru’s ‘temples of modernity’), in grand ceremonial openings, or in deliberate increases in their height (Menga, 2015).

Shaping implementation: invisiblising impacts and empowering experts

While not the main focus of the article, it is worth briefly highlighting the role of high modernism in the processes of dam building. The first of these concerns the ideology’s implicit preference for ‘modern’, industrial technology and human-made environments which concurrently casts rural people as backward and thus their livelihoods as unimportant. With a narrow focus on a dam’s generation of modern electricity, water and irrigation services, a river’s pre-existing role for livelihoods and ecologies is overlooked. This is particularly true of downstream impacts (Adams, 1992). *Invisiblising* is also the result of the empowerment of experts to undertake development, underpinned by high modernism’s veneration of scientific development policy and assumption of expert knowledge as a rational means to understand the world. Such knowledge is presumed apolitical, universally applicable and therefore capable of finding the best development path or, as Klingensmith (2003, p 134) argues, the ‘technocratic, scientific and apolitical approaches to progress’. This reinforces narrow processes of knowledge production and the exclusion of those

being affected by dams from decision making. Typically, dam building states in the 20th century empowered *technicians' realms* (Dye, 2019), exclusively expert bureaucratic enclaves, to plan and build large-scale dam projects.

However, it is also important to appreciate potential drivers beyond ideology, conceptualised here as 'iron triangle' motives.[10] These include the mutually supportive materialist rationales for government, finance and corporate actors pursuing dams. As Verhoeven describes regarding Sudan "the alliance between a hydraulic bureaucracy, which derives its prestige, power and budget from the dams-as-development ideology, and powerful interests, ranging from capital-intensive farming interests and construction conglomerates to international financial institutions, has maintained momentum" in favour of dams (Verhoeven, 2015, pp 265–266). Other premier examples of, often corrupt, iron triangle dam building states include Nepal (Lord, 2016) and Argentina (Ribeiro, 1994), where alliances exist between financiers, consultants, engineering firms and politicians so that all pursue dam projects for personal or organisational enrichment. As well as appreciating the potential coexistence of these motivations, it is important to assert limits to characterising African 20th-century infrastructure development as singularly following Scott's (1998) high-modernist formula. Akosombo Dam well illustrates this, as it inaugurated a substantive research programme whereby social scientists, ecologists and engineers were invited to investigate the impacts of the dam, its reservoir and its displacement of people (Miescher, 2014a; Miescher and Tsikata, 2009). Furthermore, like many large national projects, praise for Akosombo extended beyond elites to popular masses.[11] Therefore, while justified through high-modernist rationales, this dam also contrasts with elements of applied high-modernist idea-practices noted above, and with the implicit oppositional subaltern vs elite dynamic in Scott's thesis. With this nuanced understanding of the 20th-century dam boom, the paper now turns its attention to the 21st-century resurgence of dams in Africa, focusing on the justifying role of ideology.

3 An ideology for the dam resurgence? Renewed dam dreams

Justifications for resurgence-era dams among some states do appear to follow high- modernist dam building rationales. Ethiopia is perhaps the premier, present-day dam builder in Africa, with the government seeing such infrastructure as central to its development plan (Verhoeven, 2013; Cuesta-Fernández, 2015): "Dams tangibly reaffirm the presence of the Ethiopian State … its performance in terms of economic development and reconfiguring rural society" (Fantini and Puddu, 2016, p 108). The infrastructure is believed capable of underpinning the country's total transformation to a high-income state and regional hegemon with strong industries and mechanised large-scale agriculture:[12] it will provide the water and cheap, bountiful domestic and internationally traded electricity necessary for this vision. Government propaganda illustrates the centrality of dams to its state-building project. The Grand Ethiopian Renaissance Dam (GERD), as its name suggests, is a key symbol of Ethiopia's future and often features beside former futurist Prime Minister Meles Zenawi in government posters (Cuesta-Fernández, 2015). Moreover, Ethiopia has completed the large Gibe III Dam and the Tekeze Dam, the latter being Africa's tallest.[13] For the Ethiopian regime therefore, beyond dams' economic leap-frogging role, they have significant symbolic importance. The possession of such transformative technology is suggested to be itself representative of Ethiopia's progress, showing its new status as a modern country taming

[10] Noting other conceptualisations as the' institutional triangle' (Ribeiro, 1994)
[11] Demonstrated by celebration and visits to the dam (Miescher, 2014b)
[12] Through regional trade in electricity.
[13] 'Ethiopia opens Africa's tallest and most controversial dam'. *The Economist*, 21 December 2016.

rivers for urban and agricultural industrialisation. Dams have taken on a similar role for particular figures within the ruling Al-Ingez Sudanese regime. According to Verhoeven (2011), certain ideologues within the government have imbued dams with state-building potential. The electricity and irrigation they produce are assumed to be capable of producing a new economic heartland and a stable regime-supporting middle class (Verhoeven, 2015) .

Focusing on dams themselves as the embodiment of development and as capable of transformation follows the high-modernist dam textbook. Not only are dams *imbued with developmental potential*, but their *spectacle* is seized upon as demonstrative of progress, flagships for the government's ambition. This is not without precedent. Dams have had a long-held position in Ethiopia, with emperor Haile Selassie emphasising their potential.[14] Similarly, Barnett's aforementioned research (Barnett, 1977), shows the colonial origins of dams as state-building tools in Sudan. In addition, Verhoeven (2016) analyses how dams fulfil Sudan's strategy of extraversion: elites use the infrastructure as a tool to solicit international investment, particularly from the Gulf States, and then use the construction contracts to enrich themselves and their political supporters Other illiberal modernisers are also prominent dam builders. Uganda has set about planning a number of large hydroelectric dams, seeing them as central to the country's economic development. The centrepiece of this programme is the Bujagali dam (Gore, 2017). It was commissioned in 2012 by private investors with World Bank support, despite controversy over its environmental and social costs (National Association of Professional Environmentalists, 2014). Angola has also embarked on a large dam rehabilitation and construction programme as part of its wider infrastructure spending boom.[15] The flagship here is the Lauca 2,096 MW dam, effectively one of Africa's largest-capacity electricity plants. This could suggest repetition of the 20thcentury's dam building rationales across the majority of Africa's countries, a continued emphasising of their modern spectacle and reaffirmed belief in their developmental status. However, dam building in Rwanda and Tanzania complicates a simple assertion of high modernism's return. These countries appear to have adopted a new idea of modernity, cloaked in the veneer of dam reforms and sustainable development, while locating the power to achieve modernity in electricity, rather than in infrastructure.

4 Rwanda and Tanzania's depoliticised drive for electricity, not dams[16]

4.1 Rwanda's dam building in the megawatt mission

In the 21st century, Rwanda has experienced rapid development, not least in its energy sector. Overall on-grid capacity moved from 39.95 MW in 2003,[17] to over 200 MW today.[18] Electrification (electricity-grid extension) has also seen marked change, rising from 6% of households connected in 2009 to 24% in 2017 (World Bank, 2017). Hydropower is the most significant contributor to this energy generation drive. From 41.95 MW installed capacity up to 2006, dams now contribute 100.37 MW to the grid, making hydropower technology the largest contributor to the country's energy generation. Many of the projects pursued by Rwanda have their origin in the past dam-building era. Feasibility and design studies for the 28 MW Nyabarongo Dam, the 9 MW Rukarara I and four micro-hydro sites (World Bank and UNDP, 1991) were completed in the 1980s. These were consequently among the first to be pursued by the government from 2006. The other large

[14] They were, for example, depicted on Ethiopian banknotes.
[15] Described by Soares de Oliveira (2015).
[16] The heading is a paraphrase from an interview with a dam engineer, Rwanda, 2015.
[17] Although majority non-functional.
[18] Author's calculation using Government of Rwanda statistics.

dam in Rwanda's programme was at Rusumo Falls.[19] It is the most longstanding, with a history stretching to UNDP studies of the region in the 1960s and the creation of the Kagera Basin Organisation. This dam stands on the border between Tanzania and Rwanda and, despite a presidential meeting at the dam site in 1977 to announce its construction, the project stalled until the signing of a joint agreement to pursue it in 2006. From 2009, Rwanda also pursued construction of micro-hydro projects. Initially building dams through the national budget, the Rwandan government, in collaboration with financing from the World Bank, the United Nations Industrial Development Organisation (UNIDO) and European donors from Belgium and Germany, then opened the sector to private companies.[20] As a result, 43 hydropower projects are under development or have been completed by 30 Rwandese and international companies (Government of Rwanda et al, 2016). Collectively this demonstrates a marked return to dam building by the Rwandan state.

However, unlike historic high-modernist dam building, the infrastructure was not looked to as the developmental solution for the country. Rather, Rwanda returned to large-scale hydropower construction as part of a wider energy sector ambition, seeking to create a wide range of electricity generation: by 2017, Rwanda had installed 15 MW of solar power, 30.2 MW of gas,[21] 12.08 MW of peat and 57.8 MW of imported fuels.[22] As one official explained "[Our] mandate is to look for power … whatever resources are available", "[We] try to develop all available resources."[23] This pursuit of a wide range of energy technology is one demonstration that Rwanda is aiming for ambitious increases in electricity generation and not dams in themselves. This quest for electricity forms part of the country's state-building project. The Rwandan Patriotic Front (RPF) government's domestic policy agenda emerged after the 2003 election, which introduced Vision 2020 and other 'master plans'. It set a vision of an urbanised, economic hub in Kigali, with clean infrastructure and skyscrapers reminiscent of Dubai. Meanwhile the wider country will be supplied with fibre optic cables for fast internet connection, and agriculture rendered increasingly technological (Behuria, 2015). This appears to be an updated, 21st-century idea of modernity; the country will grow into a regional business hub, hosting conferences, ITC industry and services with high-skilled workers. A redesigned, Dubai-aesthetic Kigali, complete with skyscrapers, global hotel chains and shopping malls, will service global corporates' East and Central Africa operations. Infrastructure plays a significant role, therefore, not just in energy, but also in transport (with shiny new roads and plans for airports and Eastern African railways) buildings and internet services.

Crucial to achieving this modernity is electricity. "Energy was one of the pillars" identified to achieve this Vision 2020, explained a key official.[24] This is partly practical, stemming from a deficiency of energy generation. However, Rwanda's ambitions in constructing electricity generators far exceed satisfying likely future demand. This is demonstrated by 2012 "supply-led demand forecasts"[25] asserting that Rwanda would need 1,000 MW by 2017. These aims are rooted in ideas that energy itself can create development, that it will produce this imagined future economic and social progress. Thus, officials undertaking the forecasts used models of rising demand taken from China and others at their peak, believing that, once projects were built,

[19] Defined internationally as a dam with a wall of over 15 metres.
[20] Supporting 20 of the 39 hydropower projects under the RPF (Government of Rwanda et al, 2016).
[21] From Lake Kivu.
[22] Author's calculation based on official government statistics.
[23] Interview, Utility official, Rwanda, 2015.
[24] Interview, senior politician, Rwanda, 2016.
[25] Interview, consultant, Rwanda, 2016. Implied economic demand didn't factor, only economic ambition.

Rwanda would follow this rising energy pathway.[26] One former senior government official,[27] echoing the sentiment of other interviewees, used a confusingly linear metaphor to explain this understanding: "it's all chicken and egg really ... Energy is the source for all sectors that started and for every [new piece of growth]".[28] This demonstrates the presence of modernisation theory ideas about technology (here electricity) and its ability to create growth and the Say's Law concept: build electricity and demand will follow. By 2013, alternative energy forecasts produced by donors and consultants and predicting a demand of 200 MW eventually gained ground. Their findings were accepted by a growing number of civil servants, and eventually by the energy minister. This led to the adoption of a revised figure, a mere five-fold increase of 563 MW by 2017.[29] The Rwandan state can therefore react to policy critiques, albeit within boundaries. Overall, however, the unprecedented scale of infrastructure construction and the persistently over-estimated electricity demand forecast reinforces the impression that, for the Rwandan regime, megawatts have been paramount and seen as capable of generating development.[30]

Such generation-capacity targets have significant implications in Rwanda's instrumentalised implementation regime. 'Imihigo' contracts, essentially job-performance targets, illustrate this culture. As Ingelaere (2011) and Chemouni (2014) show in the case of decentralisation, Imihigo create top-down practices of policy-making-as-implementation, with key decisions taken by the president and his top circle: Government agencies are then largely responsible for technocratic implementation, tasked with delivering outcomes rather than debating policy. In terms of energy generation, this pyramidal centralisation of policy making, along with the ambitious scale of narrowly defined megawatt targets,[31] resulted in a decision-making process that excluded measures like consistency of electricity, socio-environmental impact and economic costs. The decision was not whether to build generation infrastructure, but only how to do it.[32] Rwanda's resource-poor, landlocked status reinforced the government's planning of all potential resources, from highly polluting peat burning, to the world's first lake-methane plant. As one Rwanda Energy Group (the energy Utility) official stated, "when in crisis mode, don't focus on 'this is a clean energy', focus on resources that are available".[33] "In the past … [we were] not allowed to think [strategically of priorities]" because officials "experienced a lack of power". They "didn't have a priority of planning … [it was a question of doing] everything … whoever comes to negotiate".[34] In the implementation of Rwanda's megawatt mission, concerns about the merits or costs of energy technology were not forgotten, but they did not have fundamental importance. As another official described it, there was an idea of a "least cost plan … but at the moment since we are very short of power … not limiting ourselves";[35] ie they were pursuing all possible options regardless.

Hydropower dams were therefore primarily chosen because of their availability. They did serve an important function as being the most easily implementable projects with prior planning but were

[26] Interview, consultant, Rwanda, 2016. For China's demand rise, see Nan and Moseley (2011).
[27] Interviewed 2016. This was also demonstrated by the 2009 national policy asserting a causal relationship between energy and development (Republic of Rwanda, 2009, p 3).
[28] This is also suggested in documents such as Republic of Rwanda (2009, p 3).
[29] See Dye (2019). The figure is based on interviews with civil servants and consultants in 2016. Rwanda had 77.05 MW of power in 2009.
[30] Former senior Ministry of Infrastructure (Mininfra) official, Rwanda, 2016.
[31] Interviewees throughout the sector stated that institutional Imihigo included such electricity targets.
[32] Also demonstrated by the Nyabarongo Dam (Dye, 2016).
[33] Interview, Utility official, Rwanda, 2015.
[34] Interview, Utility official, Rwanda, 2016.
[35] Interview, former Mininfra official, Rwanda, 2016.

primarily chosen as a means to deliver ambitious electricity targets.[36] Rwanda therefore appears to express a depoliticised development consensus: greater generation capacity is essential for development and justifies the pursuit of extreme targets needing hydropower, solar, methane and highly polluting peat. The merits and impacts of generation technologies were thus deemed less consequential and largely overlooked. This speaks to the centralisation of power and the degree to which much of the visible Rwandan state of Ministries and the Utility typically implemented the pre-decided plan. High modernism is thus present in Rwanda's overall leap-frogging, expert-led and technological development vision, but plays an indirect role in justifying hydropower. The ideology rationalises an understanding of electricity as creating its own demand, underpinning the rejection of conventional demand forecasts of unrealistic 20-fold increases in under a decade. It justified building all the proposed hydro-projects in the country between 2004 and 2016. The ideology also supports centralised decision making, justifying the empowering of experts to deliver development and of a small cadre of elites at Rwanda's governmental centre. The public are thus conceived as recipients, not active participants in achieving or deciding on infrastructure projects.[37]

However, Rwanda contrasts with the past era's imbuing of dams themselves with development, the celebration of their symbolism and embodiment of progress. Rwanda does not proclaim the infrastructure as the development solution, rather reserving that status for the megawatt. This is illustrated by the speech given to commission the Nyabarongo Dam, which focused principally on Rwanda's electricity-generation mission. In the speech President Paul Kagame presented the dam as a contributor to energy-sector aims, imbuing electricity, rather than the dam, with the ability to progress Rwanda to a post-poverty, post-ethnic, developed-country status. This strongly contrasts with the cases of 20th-century dams in Africa cited above. This lower status is further demonstrated by officials' assertion of hydropower technologies' limitations and is particularly clear in reference to dams providing reliable, all-year power. Planners stated that hydropower "depends on the season",[38] or that in the dry seasons " some rivers close and some are useless".[39] Officials even pointed out that this is exaggerated in run of-river designs that constitute the vast majority of the country's new or planned dams.[40] For instance, the CEO of the Utility has consequently stated a preference for the weather-independent Kivu methane plant.[41] Although this did not stop the state's pursuit of dams, as generation was always the firm priority, it reinforces dams' lower symbolic status.

Another important difference in Rwanda's dam resurgence is the state's adoption of the rhetoric, and some of the policies, of sustainable, participatory development. First, this involved the creation of environmental regulation. The Rwandan Environmental Management Authority (REMA) technically began in 2005 but its establishment took time. Only by 2010 did all infrastructure projects in Rwanda need REMA clearance in practice. One former senior Utility official asserted that "it is tough … even on a government priority project … they want you to have ABC … to show you are addressing [all their environmental requirements]".[42] This suggests that Rwanda has adopted reformist ideas about dam building, of the need to consider dams' impacts and have

[36] Interviews, Mininfra and Utility, Rwanda, 2015–16. It was affirmed as being in line with hydro's dominance of the energy sector historically.
[37] This differs from other policy areas mobilising Rwanda's citizens to achieve development.
[38] Interview, former senior official, Mininfra, 2016.
[39] Interview, Utility official, 2015–16.
[40] Because run-of-river designs do not include storage capacity.
[41] Interview, CEO, Utility, 2016.
[42] Interview, former senior official, Mininfra, 2016.

standards in construction practices. In addition, the state asserts the importance of involving the community. This is demonstrated by Nyabarongo Dam. Its early stages of implementation included village meetings organised by local government (Dye, 2016). This gave the resurgence of dam building a new appearance, even if it didn't necessarily translate into substantively improved outcomes for affected local livelihoods or ecologies. Part of the reason for adopting such policies stemmed from Rwanda's experience. Environmental regulations partly grew up as a response to issues with seasonality and sedimentation in dam projects.[43] As a former senior ministry official explained "[we do have issues with] micro-hydro … too much rain, terrible silt problems ... and dry spells that [mean] less water". Therefore, the climate "is really an issue and should not be ignored like in the past",[44] here referencing the first phase of hydropower construction between 2004 and 2010 that occurred without prior Environmental Impact Assessments (EIAs).

This reveals an analytically important point of appreciating a state's capacity to learn and change. Indeed, Behuria (2017; 2018) and Booth and Golooba-Mutebi (2012) argue that this is a key feature of the Rwandan state. Alongside adopting greater environmental legislation, as the analysis above has described, there has been limited change in megawatt-installation targets. This doesn't mean that the new policy and discursive veneer significantly change implementation practices on the ground – in fact, research by the author elsewhere suggests the opposite (Dye, 2019; Dye, 2016). However, it does underlie the different discursive rationales from those associated with high modernism. The state does not especially celebrate dams as symbols or as representing development and modernity in themselves. Rather this symbolic value is placed on the megawatt, which is accorded a central position in achieving Rwanda's development alongside other infrastructure and economic policy. While high modernism features in the wider ideas about how to do development in Rwanda, it plays a subordinated role in the rationales for dam building. Officials understand dams as merely one of the solutions to energy targets. Relatedly, then, there are known public critiques of dams' limitations, and an awareness that they are problematically subservient to the climate and need environmental-protection legislation. With less of a high–modernism focus, dam reforms around impact assessments were adopted.

4.2 Tanzania's electricity drive and return to dam planning

Tanzania's return to dam construction is more historically grounded. Its ruling party (now Cha Cha Mapinduzi, originally Tanganyika African National Union), under the leadership of the country's first president, Julius Nyerere, was globally notable in asserting an African socialist ideology, *Ujamaa.* The original conception of *Ujamaa* celebrated agriculture, village-level cooperation and respect for local knowledge, but it later evolved into a modernising programme of sweeping socioeconomic change, exemplified by the villagisation policy, and large technological infrastructure building (Schneider, 2014; Scott 1998). This involved the construction of large dams, most notably the Great Ruaha Hydropower Project, which was hailed as a deliverer of development (Hoag and Öhman, 2008). Ostensibly, this ideology changed in the 1980s, with structural adjustment programmes and the end of Nyerere's rule. This ushered in market-led policy principles, democratic elections from 1995 and a reduction in control over officials' and politicians' ability to accrue private wealth (Lofchie, 2014, p 199). As Gray's (2018; 2015) analysis shows, this fuelled contests between rival factions within the ruling party for control over parts of the state and therefore the chance to use entailed patronage, corruption and embezzlement opportunities to

[43] Such issues shorten their lifespan (Interview, official, private company, 2016) and damage plants (Munyaneza et al, 2015).
[44] Interview, former senior official, Mininfra, 2016.

increase personal wealth and power. Consequently, fragmentation of the central, powerful elite accelerated. This became particularly apparent under presidents Benjamin Mkapa and Jakaya Kikwete in a series of corruption scandals in the energy sector that went largely unpunished.[45] Additionally, it was exposed by the state's limited ability to agree on shared policy positions.[46]

This accelerated the 'rusting' of state institutions, and decreased their effectiveness at coordination and timely decision making – a particular problem given that the private sector was largely tasked with building and operating electricity generation, causing limited completion of resurrected electricity-generation projects. Private sector investors require a high degree of confidence in signed agreements, and coordination of guarantees and permits across numerous government agencies. Whereas this process is deliberately streamlined and made relatively predictable in Rwanda – producing the aforementioned micro-hydro boom – in Tanzania, investors reported considerable difficulties.[47] The fragmentation of government was demonstrated by the energy minister, Muhongo (2012–15/2016–17), who essentially abandoned hydropower and renewable energy projects under development in 2012–13. The Tanzanian state therefore differs from Rwanda's pyramidal decision making and embrace of focused performance-management implementation. Moreover, the analysis of Tanzania could suggest the absence of ideological interests, with mere corruption ruling politicians' and officials' interests.

However, this article argues that Tanzania's government did embrace a modernising state-building mission. Underpinned by a favourable period of economic growth, President Jakaya Kikwete's government (2005–15) restarted a state-building development programme, which grew in his second term and is arguably accelerating with the current president, John Pombe Magufuli.[48] The programme involved economically interventionist efforts aimed at driving industrialisation (Gray, 2018, pp 181–185), and grand infrastructure planning, including the expansion of the road network, and the devising of new railways and of gas and oil pipelines. Grand visions for development, and an attempt to install and centralise implementation culture, were furthered by the 2012–15 Big Results Now initiative. Significantly, the energy sector is one of the most prominent elements of this modernisation programme. Substantial effort was put into electrification, which is orchestrated by a new Rural Energy Agency, an island of effectiveness somewhat insulated from government ministries and political disruptions. It has a ring-fenced budget from fuel taxes which is topped up by donors and government (Muhongo, 2016).[49] The agency has been active, initiating Tanzania's first mass electrification, increasing grid connections from 10% in 2005 to 41% in 2015 (Jacob, 2017; Eberhard et al, 2016).

Additionally, there has been a return to large-scale planning and constructing of energy generation. Power Sector Master Plans (PSMPs), starting in 2009, with updates coming in 2012 and 2016, demonstrate the state's returned leadership and large-scale ambition. These have seen the resurrection of a raft of formerly stalled dams, largely through a private finance build-own-operate model. A river basin organisation created in the height of the past era's dam building boom,

[45] Offenders involved in IPTL and the Richmond-Dowans plants were fired from government rather than prosecuted (Cooksey, 2017).
[46] For example on a climate change stance (Jacob, 2017).
[47] Interviews with senior officials, Western energy-sector investors, dam construction companies and energy-sector consultants, 2015–16.
[48] Although, as noted above, this paper is not focused on post-2016 Tanzania.
[49] Interviews with senior officials, Western energy-sector investors, dam construction companies and energy-sector consultants, 2015–16.

Rubada,[50] secured Memoranda of Understanding (MoUs) to build Iringa (K-Water, 2013), Mpanga (Sinohydro Corporation Ltd and United Republic of Tanzania, 2010) and Mnyera dams (Construtora Queiroz Galvão, 2012). These companies completed further studies on feasibility, design and impact assessment. Rubada also resurrected the flagship Stiegler's Gorge Dam, which had been planned to produce 2,100 MW, making it the joint biggest dam in Africa.[51] With the appointment of a new chairman of Rubada in 2006 and high-level diplomacy by the Tanzanian government with Brazil,[52] a deal was eventually secured with Odebrecht in 2012. While Odebrecht then furthered project preparation with a feasibility study and an initial EIA (Odebrecht, 2013), under President Magufuli (inaugurated in 2015), the dam has become central to energy generation policy, with a completed tendering process and national budget finance allocation (Dye, 2018; Citizen Reporter, 2018). The Ministry of Energy and Minerals (MEM) also pursued the 358 MW Ruhudji Dam, with negotiations nearing final approval in 2012.[53] MEM also advertised Rumakali Dam (525 MW) and paid for further studies by Studio Pietrangeli.[54] Rusumo Falls Dam was signed off by national governments in 2012,[55] achieved World Bank funding in 2013 and started construction in 2016. Funding from the US-led Millennium Challenge Corporation brought the Malagarasi Dam close to implementation. However, evidence that the dam would cause a snail species' extinction has delayed construction (Hovland et al, 2010). Finally, the Kakono Dam (87 MW), near to the Rusumo Falls Dam, looks set to proceed, having won African Development Bank finance in 2016. The majority of these dams were first identified in the 1980s, so their resurrection marks a substantive effort to implement long-imagined projects.

However, as in Rwanda, hydropower was not the only energy generation technology pursued. Gas-fired power plants are Tanzania's primary energy source. New gas plants, enabled by a major pipeline extension, include the privately owned Songas and government-owned plants.[56] Beyond gas, Tanzania has established agreements to develop its coal reserves. Plans currently envisage two government-owned power stations at Kiwira and two public–private partnerships (Jacob, 2017), although these plants have yet to materialise. A similar trajectory faces a wind project at Singida, long advocated by donors but yet to start construction.[57] Collectively then, this financing, planning and deal-making represents a significant change in state direction and initiative in the energy sector, reversing the deterioration experienced under structural-adjustment austerity and a period where the Utility (Tanesco) was under private-sector-contract management. However, the range of energy projects pursued also demonstrates that, in contrast to Tanzania's earlier history, dams are not the sole preferred electricity generation technology. Rather they constitute one part of a wider electricity generation drive.

[50] The Rufiji Basin Development Authority.
[51] Alongside the Aswan and Lauca dams.
[52] Involving the Tanzanian President, the Foreign Minister, the Prime Minister, the Minister of MEM and the Brazilian Ambassador, Brazilian Minister of Energy and Brazilian President, not to mention the agency of Odebrecht itself (Dye and Hartmann, 2017).
[53] Interview, senior official, dam construction company, 2015.
[54] According to the latter's website, they conducted an Environmental and Social Impact Assessment (ESIA) and a feasibility design (Studio Pietrangeli, 2018)
[55] With World Bank governmental finance but structured as a jointly owned Rwanda–Tanzania–Burundi Independent Power Producer (IPP).
[56] The first was begun in 2004 and expanded in 2006 and 2007; the latter are in and around Dar-es-Salaam (Kapika and Eberhard, 2013).
[57] It has Danish government support (Eberhard et al, 2016). Interviews with senior officials, MEM and officials from donor agencies, 2015–16.

The ambitions of this megawatt mission are captured in the Power System Master Plans (PSMPs): Tanzania's generation capacity in the mid-2000s was some 500 MW, but the 2009 PSMP called for an increase of 4,380 MW in two decades, which increased to ~7,500 MW in a 2012 update. Moreover, the Big Results Now programme outlined a 10,000 MW target by 2025, a figure which officials at Tanesco, and MEM frequently cited in interviews.[58] As in Rwanda, the ambitiousness of these targets indicates an imbuing of electricity with developmental power. They go far beyond the amounts needed to attract investors or prevent dry-season power failures: in 2016, Tanzania's predicted energy demand up to 2020 was only 2,200 MW, contrasting with all of the aforementioned PSMPs' figures. Many interviewees offered high-modernist rationales to justify the rejection of such conventional forecasts and the adoption of a rapid megawatt-installation programme, claiming that economic development would inexorably follow increases in electricity. For instance, equating development and electricity, one senior official stated, "you can't talk of development without power", even quoting Lenin's "communism equals Soviet power plus electricity" maxim.[59] External consultants and donors echoed this, describing the insistence on such ambitious plans despite contrary arguments and evidence: MEM "has a strong focus on megaprojects. We are trying to describe a more realistic approach".[60]

This is significant, given the risks involved with such an ambitious programme. The targets worried donor officials and external consultants as their analysis suggested electricity demand wouldn't materialise to meet this newly installed generation, something that can entail significant financial costs.[61] Such efforts at revision failed, as revealed in the 2016 PSMP. Its conventional model predicted a lower demand figure of 2,260 MW by 2020. However, Tanzanian officials, finding this unacceptable, included "additional demand factors", giving 4,889 –5,176 MW by 2020.[62] This episode underlines Tanzania's apparent preference for modern technology, its belief in the symbolism of large megawatt additions, as well as a faith in electricity to create demand. High-modernist rationales imbuing technology with development therefore feature in its electricity generation planning.

With this programme of rapid increases in electricity generation, officials recognised that "attention [is] very high [on the energy sector] … a serious focus on power generation in the country".[63] Therefore, the 2009 PSMP and its updates "include everything that is possible, all the resources we have".[64] With such ambition, dams are seen as an inevitable inclusion. As two senior Ministry officials stated, "if you have 4.7 gigawatts of hydropower and these targets, up to 10,000 MW, [you] have to include hydropower".[65] This suggests consensus among politicians and civil servants about what modernisation means in Tanzania, that electricity is a central generator of, and constituent in, the country's modern future. The role of citizens here is only as consumers of the state's electrification and development policy, not as active enabling or influencing participants. They may be directly or indirectly affected by the project but, even then, they are not given a political say.

[58] Interviews, officials from MEM and Tanesco, 2015–16.
[59] Interview, Tanesco official, 2015.
[60] Interview, donor agency official, 2015.
[61] Either because taxes haven't increased to meet debt payments, or because of insufficient tariff revenue to cover payments to privately owned electricity producers.
[62] Interview, Tanzania, 2016.
[63] Interview, former senior CCM official, Tanzania, 2016.
[64] Interview, senior official, MEM, 2016.
[65] Interview, senior officials, MEM, 2016, and reflected in interviews with Tanesco, 2015–16.

However, although high modernism does therefore appear to have a role in Tanzania's megawatt mission, typical high-modernist rhetoric praising the infrastructure as embodying development, or lauding dams themselves as generators of progress and symbols of modernity, has not featured. A stronger discourse than in Rwanda blames dams for power failures. Tanzania has been largely dependent on hydropower but, over the past five years, gas plants have pushed hydropower below 50% of installed capacity for the first time. Rains in Tanzania are highly seasonal and less reliable than in Rwanda. Consistent hydropower failure, particularly in the poorly planned Great Ruaha project,[66] creates severe dry-season power cuts, especially in drought years like 2004–05 and 2011–12. Despite Tanzania officially pursuing a number of hydro-projects, senior Tanesco managers and MEM civil servants confirmed the limitations of dams as hydro-power energy generators; policy documents explicitly state the need to diversify from hydropower.[67] Consequently, interviews with officials frequently reported a: "Focus on generation from natural gas",[68] as it "does not depend on the weather";[69] "that is the government priority, [it is the] … only source that can meet… immediate demands".[70] The 2012–15/2016–17 MEM Minister expressed this sentiment most publicly, demonstrating a break with previous ministers (Makoye, 2015).

This contrasts with Tanzania's history. Öhman (2007) and Van der Straeten (2017) record strong high-modernist rationales in President Nyerere's rhetoric around dam projects as nation builders. In addition, alongside more critical discourse, a new policy veneer is assessing dam's negative impacts. As of 2004, impact assessments are mandatory and examined by the National Environmental Management Council (NEMC) which, for large hydropower projects, requires consideration of upstream and downstream impacts and, unlike in Rwanda, a public hearing with relevant stakeholders.[71] This allows officials to assert that dam construction follows international norms, accounting for negative socioeconomic impacts. This is taken further than by Rwanda in Tanzania's Water Ministry, which has adopted a new institutional structure of water-basin committees made up of government officials and water users. Such action appears to recognise the politics of water and the need for participation in decisions over allocation called for by the Integrated Water Management policy discourse. It has been heralded at events like Africa Water Week, which was hosted in Tanzania in 2016. The author's research found such policies entail only limited change to dam planning and implementation, however, overlooking consideration of downstream changes, for instance (Dye, 2019). Nonetheless, and significantly, such discourse and policy again underline contrasts with high-modernist dam building, demonstrating a rejection of dams as simply developmental solutions and an awareness of their technical limitations in delivering benefits.

5 Conclusion: ideology of the illiberal modernisers' dam building

Rwanda and Tanzania therefore demonstrate a similar pattern of altered high modernism. Dams are not imbued with transformational potential to the extent they were in the past boom era. Their ability to order environments or to embody the aesthetic of modernity is not emphasised. Nor do the two countries' governments proclaim the ability of dams by themselves to generate social engineering or economic development. Rather, the megawatt is given this transformative role. Thus, high modernism has broader influence. Inspiring both countries' development-focused state-

[66] See Öhman (2007).
[67] See, for example, United Republic of Tanzania (2013) and United Republic of Tanzania (2015).
[68] Interview, senior official, Tanesco, 2015.
[69] Interview, officials, MEM, 2016.
[70] Interview, senior official, Tanesco, 2016.
[71] Interviews, junior and senior officials, NEMC, 2016.

building missions, high-modernist rationales have underpinned visions of progress involving technology and infrastructure rather than backward rural livelihoods. They have also helped inform ideas of how to go about achieving development, involving elite-discerned, state-led social and economic transformation, with technology and infrastructure enabling the leap-frogging of countries into modernity. Electricity as a technology is thereby imbued with the power to transform each country, linearly generating economic growth with an assumption of Say's law that states' economic growth and demand for electricity will follow construction. Moreover, the rejection of conventional forecasts for ambitious energy targets suggests a veneration of the megawatt as symbolically important, as almost inherently positive. It was only in the drive to build as much energy as possible that dams have been built. Dams' historic legacy as *the* electricity producer in both countries also supports their prominence: past studies have made dams' hydropower potential known and their construction easier. But most crucial has been their availability as a power source in a context of implementing indigenous energy resources.

To some extent, then, this does suggest a return to the style of development associated with late-colonial and early-independence governments in Africa: grand visions of large-scale transformation implemented in top-down, expert-centric practices were key features of Rwanda's and Tanzania's political economy. However, this article complicates the argument of simple historic replication. For one thing, high modernism is not present in dam justifications specifically. Indeed, particularly in Tanzania, the technology of dam infrastructure (but not of electricity, which does have apparent consensus) is the subject of significant debate, not total consensus. This is informed by the experience of dams' vulnerabilities to the environment and their consequent limitations in producing reliable electricity. The discursive veneer of dams has also been changed by the adoption of policies of environmental assessment and water management. Dam planners now speak of the need to scrutinise the infrastructure's environmental impacts and to make dams sustainable. This is significant, because it adopts some of the international dam-reform ideas that originated in critiques of the infrastructure, most notably stemming from the World Commission on Dams. Thus it appears that, with a less high-modernist understanding of dams, a more critical discourse about their limitations is possible. With technical restrictions on the capacity of dams to produce electricity acknowledged, governments have been able to adopt more reformist policies.

Overall, in theorising high modernism in greater detail, the article makes an important contribution to the literature. It argues that high modernism needs to be considered as an ideology, as a cluster of core and applied idea-practices that influence policy making alongside strategic interests. It should not be thought of as a description of the experiences of development, nor as the sole explanatory factor. Moreover, in studying high modernism in development, the article has argued that it is important to analyse the potential complexities of the state, that it is not a singular entity and can react and learn. The article therefore deepens understanding of the dam building resurgence. It demonstrates some of the key ideological rationales involved in the upsurge in dam building and asserts that this does not follow simple replication of past high-modernist hydraulic projects. In Rwanda and Tanzania, the focus has shifted to the megawatt from the dam itself. These findings contrast with literature on some of the other prominent dam-resurgence states. Most notably, Ethiopia emphasises the spectacle of dams as a national symbol and enabler of its central industrialisation mission, mobilising the population around the GERD in particular. Additionally, by refuting the idea of simple replication, the article highlights an increasing awareness of the limitations of dams and the growing adoption of reform. But by moving away from

particular 20th-century high-modernist rationales, will the 21st-century dam-building resurgence involve different outcomes and avoid controversial practices?

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