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Briefing note

# Making water infrastructure investment decisions in a changing climate

## A political economy study of river basin development in Ghana

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**Key messages**

- This report presents the results of a political economy analysis of decision-making over river basin management and development in Ghana, aimed at identifying entry points for natural infrastructure as a solution for climate change adaptation and sustainable development.
- In Ghana, decisions over water resources management prioritise water for hydropower generation and irrigation development. Built infrastructure remains the privileged form of investment also for risk mitigation/prevention. There is little awareness of natural infrastructure and its benefits.
- Climate change is increasingly a concern, and the Government of Ghana is showing commitment to adaptation and mitigation solutions, partly under the pressure and with the technical and financial assistance of development partners. Adaptation measures, however, continue to be primarily taken at the local level.
- Our analysis identified three entry points for natural infrastructure solutions: i) development of long-term development strategies at national and subnational levels; ii) taking advantage of opportunities for cooperation at the basin level and international climate finance; and iii) investing in awareness-raising and capacity-building for environmental management and protection at the local level.

## 1. The WISE-UP project: investigating natural and built water infrastructure

In the 21st century, climate change and natural resource degradation pose one of the most urgent and unprecedented risks to the global economy (NCE, 2015). Water is the primary channel through which societies will feel the impacts of climate change and environmental degradation. Water scarcity can drive conflict, political instability and migration. Thus, the question of how to manage rivers and other water sources for multiple benefits and to mitigate risks is critical to water security and other policy priorities, such as poverty reduction and climate adaptation (Tickner et al., 2017).

To date, responses have focused primarily on built infrastructure to store and regulate water (Parker and Oates, 2016). Some authors have advocated for a more integrative and nuanced approach - one that recognises diverse societal and biophysical contexts, embraces uncertainty, and is based on principles of adaptive management and equity (Zeitoun et al., 2016). This requires a better understanding of how, and for whom, water security can be realised in complex settings and across scales, given the inevitable trade-offs between different water uses and users (Mason and Calow, 2012; Zeitoun et al., 2016). It also requires greater recognition of the role of the environment in securing resilient outcomes – a recognition that, to date, has been largely overlooked by both research and interventions/policies for water resources management.

The 'WISE-UP to Climate' (WISE-UP) project was conceived to address this gap by demonstrating natural infrastructure as a 'nature-based solution' for climate change adaptation and sustainable development. The project is generating knowledge on the use of mixed portfolios of built water infrastructure (e.g. dams, levees, irrigation channels) and natural infrastructure (e.g. wetlands, floodplains, watersheds) in the Volta River Basin in Ghana and Burkina Faso, and the Tana River Basin in Kenya. Its approach combines decision-support models, economic valuation, and political economy analysis to illustrate and quantify the trade-offs of different investment portfolios and their impacts on actors at different scales, from community to national level interests. WISE-UP thus offers decision-makers a range of tools and approaches to assess investment options, with a view to optimising the range of benefits to society that river basins and their ecosystems can provide.

## 2. Our methodology

The WISE-UP project recognises that, alongside technical considerations, due attention must be given to the political and economic context and existing governance arrangements, if water resources are to be managed equitably and sustainably. In this paper, we present the results of one of the components of the WISE-UP project, which investigates the political-economy dimensions of decision-making over water infrastructure investments in Ghana. We examine underlying drivers, incentives and constraints to understand how stakeholders interact in pursuit of their interests. Our goal is to identify opportunities for the project to support positive change in water governance, with a view to leveraging greater recognition and inclusion of natural infrastructure in investment planning and policy-making. The same political economy dynamics can influence policies and decisions on adaptation to the water-related impacts of climate change.

We started from the assumption that, at present, there is insufficient inclusion of the concept of natural infrastructure in planning and decision-making processes for climate change adaptation and water resources management, as well as no economic valuation of ecosystem services. We then investigated formal institutions and informal arrangements and interactions that shape decisions, determinate outcomes, and facilitate (or block) decisions in line with the policy agenda that the WISE-UP project aims to promote.

Our approach was 'issue-based', meaning that we focused on an issue presenting difficult water management problems for apparently political reasons (e.g. resulting from conflicting interests or institutional/governance weaknesses). For Ghana, we identified the Pwalugu Multipurpose Dam (PMD) project, an example of built infrastructure conceived to contribute to Ghana's economic and development needs.

Our methodology for data collection consisted of a review of the literature on water resources management and river basin development in Ghana, and a rapid survey of the current national policies and strategies in relation to the relevant sectors (water, energy, agriculture/food, environment and climate change). We then conducted four separate sets of key informant interviews with actors at the national level in Accra and in the Talensi and West Mamprusi districts in the Upper East and Northern

**Box 1: Our research questions**

- How are decisions regarding the development and management of the river basin made, and by whom?
- How are these decisions justified, negotiated or contested by different actors? What are the underlying incentives and drivers?
- Are trade-offs identified and managed when making infrastructure investment decisions?
- To what extent, and in what ways, is natural infrastructure considered?
- To what extent, and in what ways, is climate variability and change considered?
- What opportunities exist to promote alternative approaches to river basin management and development?

region, where the PMD project will be located once built. We organised our findings around the 6 categories of incentives proposed by Harris and Wild (2013)[1], which explain why certain problems persist, and what can be done to overcome them, looking at the systemic constraints and logics that characterise the decision-making process on a given issue.

## 3. Water as an essential ingredient for Ghana's ambitious development plans

In the last two decades, Ghana has achieved impressive gains in terms of economic growth, as well as living standards, public health and educational attainment (Molini et al., 2015). It has become a middle-income country well before their set target of 2020. These developments have been largely driven by key economic reforms, aimed at the structural transformation of the economy away from agriculture into services and industry, as well as by the intensification of gold and crude oil production (Molini et al., 2015). Urban population has increased, mostly because of internal rural-urban migration. Today, however, Ghana is suffering the consequences of serious external and internal macroeconomic shocks. Poverty and inequalities remain high, especially in the North of the country (Molini et al., 2015).

Water features prominently in the key strategies driving the country's economic growth and development, such as the Ghana's Shared Growth and Development Agenda 2014-2017. Ghana has a comprehensive policy and regulatory framework for water resource management and investments, under the umbrella of the 2007 National Water Policy. In the last decade, the Government of Ghana has also invested in creating the institutions for addressing climate change both in mitigation and adaptation terms.

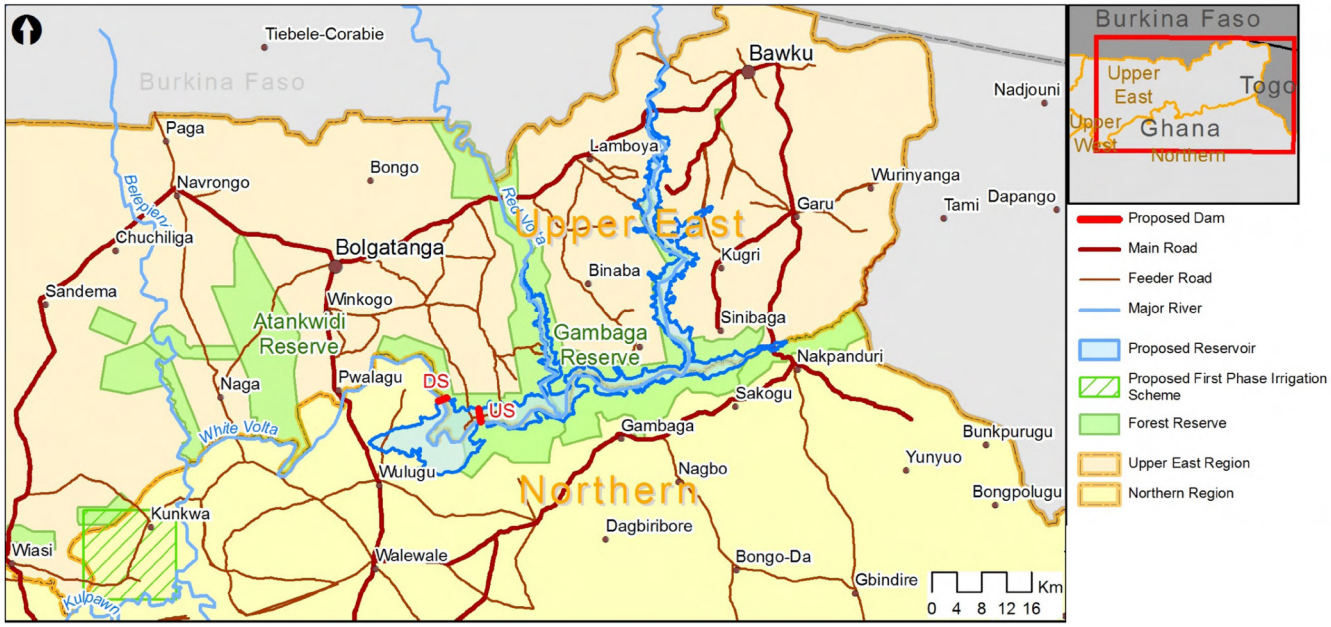
However, Ghana continues struggling to meet the basic food, water, sanitation and energy needs of its population. Rolling power blackouts are common, and there is discontent with living standards, rising taxes, fuel prices, and utilities. Situations of water scarcity and environmental pollution are becoming increasingly visible, and risk aggravating if not recognised and addressed. We wanted to understand how to introduce change in Ghana's governance framework for water management and development, towards promoting and implementing more sustainable and climate-resilient infrastructure investments.

## 4. The Pwalugu Multipurpose Dam Project: history and present

As part of the Government of Ghana (GoG)'s proposals for infrastructure development as a motor of economic growth and transformation, the construction of a multipurpose dam is planned on the White Volta at Pwalugu, at the border between the Talensi District in the Upper East Region and the West Mamprusi District in the Northern Region (see Figure 1).

A harsh environment, combined with the lack of significant investments and attention to the development needs of Northern Ghana, have resulted in high poverty rates. About 80% and 60% of the population in the Talensi and West Mamprusi districts, respectively, are rural. Farming is a widespread activity; about 97% of households in the Talensi district and between 85% and 70% in the West Mamprusi district engage in some form of agricultural practice (irrigated, floodplain, or rainfed). Other economic activities are hunting and forestry.

**Figure 1: Pwalugu project zone**




*Source: EEMC et al., 2014.*

The White Volta River and floodplain, forests, shrubs and woodlands, and natural ponds also enable various livelihood activities, including farming, fishing, livestock watering, collection of wild fruits, and provision of water for domestic use. Most of these ecosystem services are dependent on the seasonal flows of the White Volta River.[2]

Since the 2000s, the GoG has devised a package of interventions aimed at reducing poverty in these regions, including partnerships in agro-based industries, development of irrigation facilities to support year-round production, provision of extension services, new varieties of crops, and the establishment of manufacturing industries to improve agriculture and food production.[3] The Pwalugu Multipurpose Dam (PMD) project is part of a package that the government is proposing to boost the economic development of the Northern regions of Ghana. Originally conceived in the 1960s by President Kwame Nkrumah, the PMD project has been revived and abandoned multiple times until 2012, the Agence Française de Development (AFD) gave a loan to the Volta River Authority (VRA) to launch technical and environmental and social feasibility studies for the Pwalugu multipurpose project, conceived as 'a key driver for the development of Northern Ghana'.[4]

## 5. Built infrastructure in Ghana: a political economy analysis

We use the PMD project as a case study to understand the decision-making process around water management and development in Ghana, and identify entry points to introduce mixed portfolios of infrastructure investments – both natural and built.

### 5.1. Key actors and their interest in the PMD project

The VRA detains the main mandate over the PMD. It is the VRA that has overseen the project's feasibility study, and put together and presided the Project Steering Committee (PSC), tasked to provide oversight and support to VRA.[5] Both the AFD and the World Bank (WB) have played a key role in advancing discussions and plans for the dam. Recent discussions on the design and operationalisation of the PMD, which focus on the maximisation of the irrigation component at the expense of the hydropower one, could shift this institutional set-up. Some argue that if the PMD were primarily for irrigation purposes, the Ghana Irrigation Development Authority (GIDA), rather than VRA, should have ownership over the dam. Others support the claim that ownership would still reside with the VRA, considering its overall mandate over the management of the Volta River. To date, GIDA has been involved in discussions over the PMD only marginally, but the AFD and the WB had bilateral meetings with GIDA and the Savannah Accelerated Development Authority (SADA) to try and bring them more prominently in the process.

Local level actors have been only marginally involved in discussions and plans for the PMD project. In drafting the environmental and social impact assessment (ESIA) and feasibility studies, consultants met with governmental authorities in the Talensi and West Mamprusi Districts and Upper East and Northern Regions, as well as traditional chiefs representing local communities. These meetings have allegedly been informative rather than consultative – aimed at presenting the project, with little space for voicing and discussing local concerns and needs. Local level authorities are worried that 'land for irrigation in Pwalugu may end up going to large commercial farmers while poor farmers loose out'.[6] The resettlement of upstream communities was another reason for concern – there are about 1,500 to 2,000 people living in the area where the dam's reservoir will be located. These lands also have a cultural and traditional value for local communities, potentially making the issue of compensation a sensitive one.

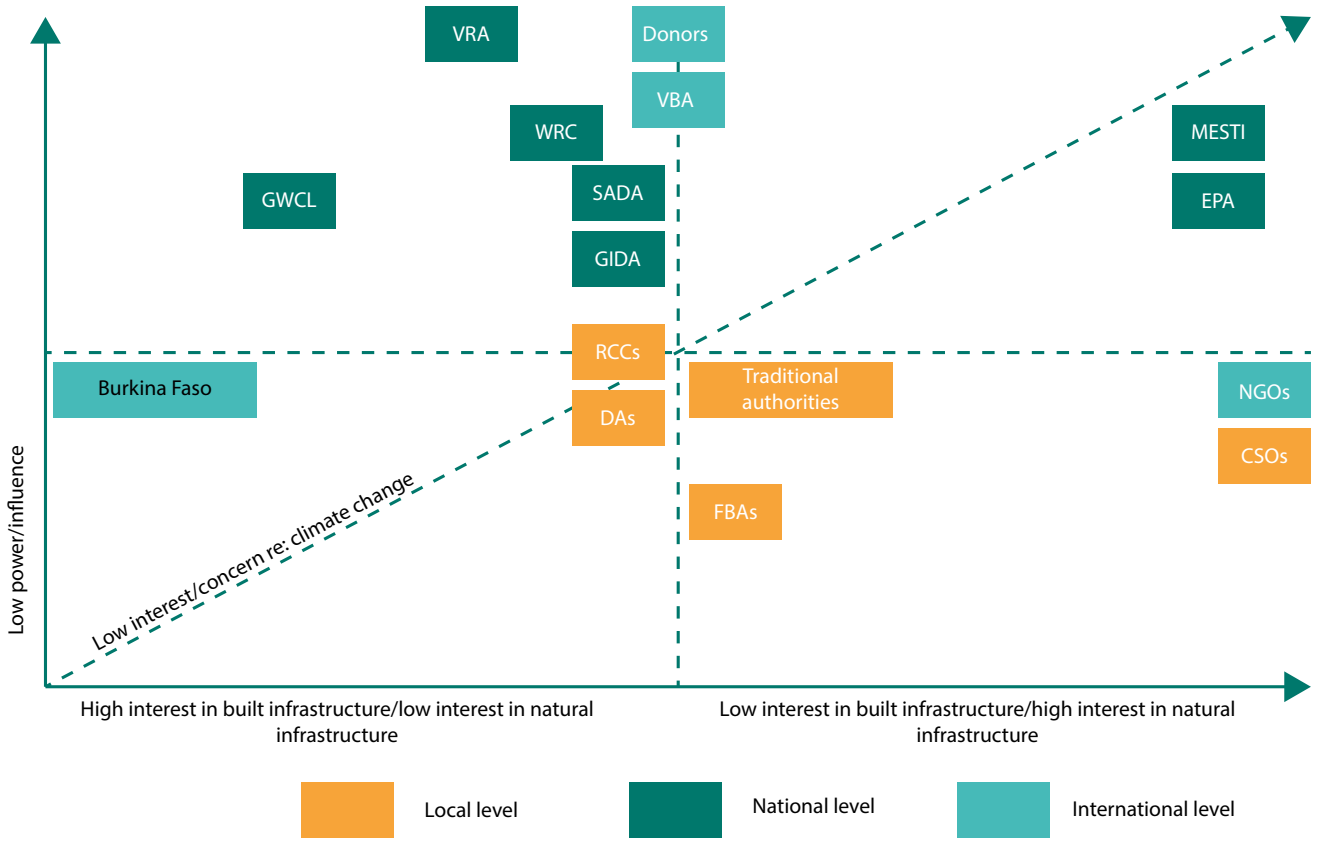
Despite these concerns, our interviews revealed that there seems to be a high degree of acceptance and even enthusiasm for the project in the communities and districts affected. In the words of one District Assembly's representative, 'our priority is food security in an area that is characterised by long periods of drought, bushfires, unreliable rainfall and poor soil fertility; the irrigation component of the PMD project will bring us some relief'.[7] Most importantly, and as highlighted in all our interviews in the Talensi and West Mamprusi districts, the PMD project is expected to mitigate the impacts of unregulated flood releases from the upstream Bagré dam, thus reducing the yearly devastation of crops and lives. Finally, 'the dam will bring jobs for our youth, thus also discouraging migration'.[8]

### 5.2. Relations of power and influence between actors

We analysed the relations of power, influence and the interests of the various stakeholders in the water sector in Ghana based on their role in the initiation and development of the PMD project. The results of this analysis, based on data and observations collected during key informant interviews, are illustrated in Figure 2.

From Figure 2, we can see that the actors that yield higher power and influence in the decision-making over the PMD are those that have an explicit political mandate over water-using sectors such as agriculture and energy. Actors such as the VRA, GIDA and SADA highlight the benefits of the PMD in terms of hydropower generation to address Ghana's electricity deficit and fuel its industrialisation plans, as well as to develop irrigation for improving agricultural yield and therefore food security in the Northern Region. Relative to other actors, however, they are also the ones that have taken less concrete measures to address climate change adaptation. They have committed to implementing the National Adaptation Strategy, and have engaged in the process of drafting adaptation plans and mainstreaming climate change in their activities. Though this is an important first step, the extent to which this they will push for and implement concrete interventions aimed at climate change adaptation remains to be seen.

**Figure 2: Analysis of power, influence and interest of main actors in the water and water-related sectors in Ghana.[20]**




*Source: Authors*

The actors with less power and influence in the decision-making process over built infrastructure investments are those at the local level. All interviewees agreed that, despite a rhetoric of decentralisation, decisions on key infrastructure investments remain in the hands of national Ministries, or even the Parliament and President's Cabinet. The engagement of local level actors in the climate change discourse varies. District assemblies (DAs) and traditional authorities are more concerned about the livelihoods of their communities and undertake climate change activities on an ad hoc basis, generally on NGO-initiated and funded projects.

On the top right corner of Figure 2 appear those actors that, because of their mandate and agenda, are more interested in environmental considerations and could thus be open to consider investments in natural infrastructure. Among these, we find organisations with an explicit environmental focus, such as the Ministry of Environment, Technology and Innovation (MESTI) and the Environmental Protection Agency (EPA), as well as donors and international non-governmental organisations (NGOs). These actors are influential given their mandate in steering national climate change initiatives in Ghana, as well as their association with international agencies to mobilised climate change resources.

## 5.3. Drivers of the decision-making process over built infrastructure in Ghana

In Ghana, the principal driver of water infrastructure development is energy demand, with the objective of satisfying unserved and under-served households and powering industrialisation. Most stakeholders interviewed in Ghana agreed that 'the government has its priorities, and now it's energy, energy, energy'.[9] There is a political drive to invest in new generation capacity, and to operate existing infrastructure for maximum output. While many current dam projects are described as multi-purpose, the widespread view is that 'hydropower is always the priority'.[10] Although nationally the demand for energy is the primary driver, irrigation development is also an important concern, especially in Northern Ghana.

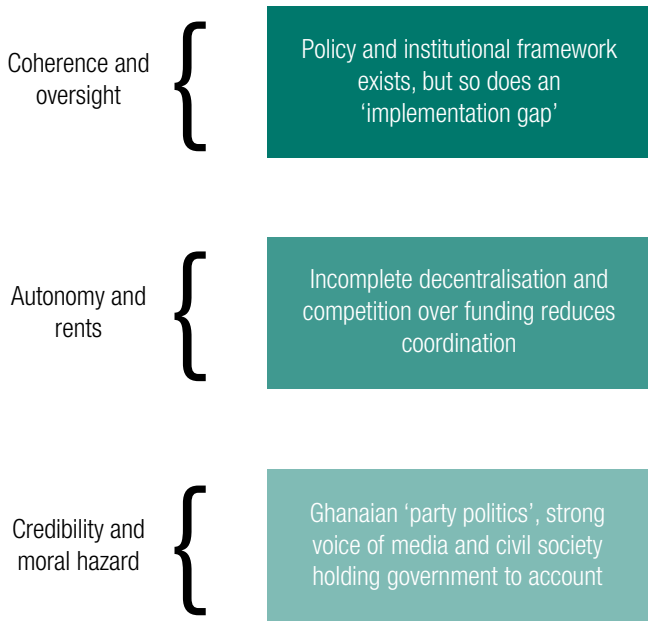
Respondents had different opinions on the extent to which the environment, or ecosystems, are a real concern for policy-makers in Accra. Some argued that energy, water supply, infrastructure development and food security should take precedence over environmental considerations in Ghana. A key informant stated that politicians 'are not insensitive to nature, but they have to show progress on energy and water supply first'.[11] Implicit in these observations is the assumption that there is a trade-off between benefits to society (to be gained from developing water resources) and benefits to nature (to be gained by

leaving them alone), and that investments that benefit national economic growth should be prioritised over investments that have benefits at the local level. Climate change is also a preoccupation of the GoG, partly due to the high levels of donor interest as well as the promise of international climate finance.

## 6. The decision-making process around water infrastructure in Ghana

We identified the main 'bottlenecks' that, based on our analysis, limit the capacity of the political system to change and innovate, particularly in terms of integrating environmental and climate change concerns into the planning and implementation of built water infrastructure projects (see Figure 3).

**Figure 3: Main characteristics of the decision-making process over built infrastructure in Ghana.**




*Source: Authors*

### 6.1. The 'implementation gap' for environment and climate change

The decision-making process around the PMD occurs within a well-defined policy and institutional framework for water resources management and investments, under the umbrella of the 2007 National Water Policy. Since 2010, the Government of Ghana has also invested in developing a strong policy and institutional framework to address climate change adaptation and mitigation. The 'goodwill and commitment of the government'[12] to climate change is visible at both the national level through the launch of the National Climate Change Policy (NCCP) and the National Climate Change Adaptation Strategy, and at the international level with the submission of Intended Nationally Determined Contributions and the preparation of the 4th Communication to the United Nations Framework Convention on Climate Change (currently undergoing).[13]

In practice, however, the implementation of these policies and processes is fraught with challenges. A recent analysis of the political economy of climate compatible development in the fishery sector concluded that 'the major constraint to climate compatible development is institutional failing, rather than the lack of policies per se' (Tanner et al., 2014, 3). Several reasons have been brought forward to explain the persistence of such 'implementation gap', from the failure to monitor the compliance of different actors with existing rules and regulations, to poor coordination and data sharing between agencies and ministries, and the lack of financial and human resources especially at district level.[14]

Funding is the major constraint, especially at the district level. DAs can generate revenues on their own, but they barely manage to collect sufficient funds to cope with the many development priorities they face. Indeed, government agencies at all levels suffer from significant gaps in terms of human resources, and staff turnover is high. This results in the loss of institutional memory over the planning and implementation of infrastructure projects.[15] Low salaries also make public posts less attractive for well-qualified and high-level technicians and experts, especially when alternatives in international organisations or the private sector are available.

### 6.2. The lack of coordinated action for water management and development

In the design and implementation of water management and development solutions, there is a problem of coordination between Ministries. This is especially true for infrastructure projects that attract loans and generate economic returns, where collaboration and information sharing with other stakeholders can turn at one's disadvantage. This results in stakeholders continuing to work in siloes. Dialogue is even more difficult at the transboundary level. The VBA lacks visibility and authority in decisions over water infrastructure investments. The process to develop a Water Charter for the Volta River Basin is ongoing, but until its approval, the VBA remains a coordinating body, with little say over country-level investment policies and decisions, and relying on international donors' support.[16]

In addition to the difficulties of horizontal coordination, information flows from top to the bottom, and vice versa, were also found to be weak. 'Decentralisation was conceived to foster participation, but participation remains low'.[17] While the DAs should be the ones interacting with communities and presenting their needs and demands to the Council Assembly (which decides the allocation of resources to local communities), they lack sufficient resources to conduct proper consultations. More generally,

local governments do not have the financial and human resources they need to design and implement development plans in line with national objectives. This is especially true for climate change adaptation and environmental issues, which are considered less of a priority than, say, basic service provision. Increasingly, this gap has been filled by NGOs, with mixed record of success.

Our interviews highlighted that one important cause for the lack of coordination is competition for funding between different Ministries. Especially on climate change adaptation and mitigation, the Government's agenda appeared to be largely shaped by donors' priorities and funding. This risks creating dependency on donors and hampering the sustainability of projects in the long-term. Although the GoG has identified the Green Climate Fund (GCF) as a priority climate finance mechanism to achieve the goals set in the NCCP, accessing such fund remains a challenge. Our interviews pointed to the lack of capacity within key agencies for submitting a proposal to the GCF.

### 6.3. The importance of elections and accountability

In Ghana, political support is another important motivation for action at both local and national levels. Typically, politics plays an important role in determining one's position and appointment, and setting the agenda – what some commentators have defined as 'Ghanaian party politics'. Often, politicians in key positions use built infrastructure projects as 'vote winners' to obtain the favour of the electorate. Although the country has decentralised its political and development strategy since the 1990s, little progress has been made to devolving real power to the DAs. The President appoints all district Chief Executives, as well as one-third of the DA's membership (Ayee et al., 2011). In addition, national Ministries retain substantial control over budget allocation and investments.[18]

Fundamentally, this means that party politics conditions the decision-making process. Issues will be included or excluded from the political agenda depending on priorities and interests of the party in power. Given the current priority given to tackling environmental pollution as well as addressing climate change adaptation and mitigation by the current government, this can be good news. However, it also makes the implementation of policies and regulations contingent upon who is in power, at the detriment of long-term development planning.

Because elections are such an important test for a politician's own survival, and that of their party, they need to be seen as 'doing something good for the people'.[19] This becomes even more important considering the presence of a strong media and civil society, both of which have been quite vocal in the past in denouncing government wrongdoing, and holding decision-makers accountable for their actions. During the last round of interviews that we conducted in April 2017, for example, all our respondents discussed the critical role of the media in highlighting the 'issue of galamseys' denouncing the pollution of water bodies they cause, and calling for the government to act.

## 7. Conclusions and recommendations

Our analysis of water infrastructure for development and growth in Ghana revealed that, at present, priority is given to water built infrastructure for hydropower generation and irrigation. There are several bottlenecks to introducing natural infrastructure solutions, and more generally to introducing environmental and climate change considerations into infrastructure investments. We propose some ways to overcome these bottlenecks – what we call 'entry points' to introduce change in the way water resources are managed and allocated in Ghana.

### 7.1. Long-term development plans at national and local levels

Because the decision-making process over water infrastructure and, more generally, investments aimed at fostering Ghana's economic growth and climate resilience takes place at the national level, this is where entry points for natural infrastructure predominantly lie. In a way, this is good news. The Government of Ghana has increasingly demonstrated commitment and goodwill to tackle environmental pollution and climate change. The GoG is taking steps to implement the NCCP and mainstream climate change considerations into its mid-term development process. There are new opportunities to access funding from the Green Climate Fund and the Adaptation Fund.

It is also necessary to bring this information to the Cabinet and Parliament where decision-making powers ultimately lie. Key sectoral ministries should play this role – ideally, under the coordination of the MESTI. The National Development Planning Commission has also an important role to play in ensuring that environmental and climate change considerations are integrated in development planning at the district level. With the support of international donors, the Ministry of Finance should ensure that district and regional authorities have the required resources for implementation. In all the relevant institutions, it is also important to have champions for natural infrastructure and climate change. Champions should have the expertise and motivation to push these issues through the political process at the national level, for example by calling for their inclusion in development plans, and advocating for a monitoring system with sanctions and rewards for implementation at national and local levels.

### 7.2. International and basin-level opportunities

We identified opportunities to introduce natural infrastructure solutions to the decision-making process over water infrastructure development also at the basin and international levels. Through the VBA, Ghana could open and engage in dialogue with neighbouring countries to agree on mutually beneficial infrastructure investments. To realise these opportunities, the VBA should complete the process of drafting and approval of its Water Charter, which would give it a legal mandate and therefore increase

its authority over riparian countries. It is also important that the VBA receives adequate financial support from international sources and, importantly, its member countries; this would allow it to get the required resources and expertise to perform its functions.

One focus of transboundary cooperation should be the development of Ghana's northern regions. With a significant mass of land, water resources and labour to trigger economic transformation, Northern Ghana can become a motor of development for the Sahel region. This requires resources and investments to fund a comprehensive set of development actions in Ghana's three Northern regions. SADA could lead this process, in an independent and transparent way, and leveraging on partnerships with international donors, the private sector, and the civil society. Projects like the PMD could be pivotal in sustaining this effort. However, it is critical that their impact on vital ecosystems on which people's livelihoods depend is minimised, and that the future impacts of climate change, albeit with a certain degree of uncertainty, are considered in investment decisions.

Engaging development partners in discussions over natural infrastructure solutions for climate change adaptation is also key. Development Partners have access to international knowledge, technology, and funding, and can support the piloting and scale-up of local-level adaptation responses, as well as the incorporation of adaptation into official government planning institutions and processes. Perhaps more importantly, international partners can support Ghana in its efforts to access climate finance funds through capacity-building and technical assistance.

### 7.3. Investing in awareness-raising and capacity-building

While decisions are predominantly made at the national level, our study revealed that politicians in Ghana are susceptible to the pressure and lobby of citizens through the media and civil society organisations. Therefore, it is key to buildpublic awareness of the potential of natural infrastructure to mitigate against the impacts of climate change, and to lead to a more sustainable management of water and other natural resources. Television, radio, newspapers and other media channels can be instrumental in this sense. Journalists should be trained on environmental issues and climate change to ensure they can translate research findings into a language that the public understands and empathises with. Civil society organisations should be empowered to raise people's awareness of these topics and lobby the government to pay adequate attention to the environment.

Finally, our study highlighted the importance of working with local level government and communities' representatives. These are generally in closer contact with communities and are therefore better suited to understand their needs and demands. The existence of a legal framework that legitimately devolves roles and responsibilities to local authorities is a good entry point to ensure these actors have the political and economic power to make or at least influence decisions that will have an impact on people and communities at the local level. The party structure of politics in Ghana means that it is also important to build awareness and improve the capacity of political parties, both in office and in opposition, to address climate change and incorporate environmental considerations into their decision-making.

# Notes

1 These are: i) coherence, or the degree of coherence in policies and processes for implementation; ii) oversight, or the extent to which oversight systems effectively link actors across the service delivery chain, expose them to incentives and sanctions set by others, and permit them to deploy incentives and sanctions for others; iii) autonomy, or the capacities and scope to come together to solve shared problems locally, or act individually; iv) rents, or the availability and distribution of rents; v) credibility, or the extent to which competitive advantage can be obtained by making and fulfilling commitments to an electorate or another power base; and vi) moral hazard, or the degree to which risk-takers are insulated from the consequences of their decisions. Source: Harris and Wild (2013).

2 Based on focus group discussions with three communities at the villages of Pwalugu, Arigu and Bisigu, where the PMD will be located, Mul et al. (2016) identify 3 categories of ecosystem services (ES)-based livelihood activities: 1) activities directly reliant on ecosystems – floodplain, ponds and river- that exist due to the seasonality of the White Volta River such as flood recession and irrigated agriculture, fishing in ponds and the river, livestock grazing in the flood plains, and near the ponds in the dry season, and water collection from the river; 2) forest-based activities, which indirectly rely on water-based ES, such as the collection of Non-Timber Forest Products (NTFPs) and construction material, and charcoal making; and 3) Not river-flow dependent ES-based activities such as rainfed agriculture and off-farm employment.

3 Information from key interviews conducted in Accra between April 2014 and April 2017.

4 Information from key interview with representative of government conducted in Accra in April 2014.

5 The PSC comprises of representatives from the VRA, Water Resources Commission (WRC), Savannah Accelerated Development Authority (SADA), Environmental Protection Agency (EPA), Ghana Irrigation Development Authority (GIDA), Volta Basin Authority (VBA), and Ghana Dams Dialogue.

6 Interview with District Assembly representative conducted in Bolgatanga in February 2015.

7 Interview with District Assembly representative conducted in Bolgatanga in February 2015.

8 Interview with District Assembly representative conducted in Bolgatanga in February 2015.

9 As the analysis suggests, the actors can be put into three main categories, I, II and III. In category I, we have actors whose power and influence is high. They also have high interest in built infrastructure. Actors in category I however appeared to have low interest in natural infrastructure with low interest/engagement in climate change discourse. In category II, they are actors who also have high power and influence with high interest in natural infrastructure. This group of actors also has high interest/engagement in climate change discourse. Actors in category III were found to have low power/influence but had high interest in built infrastructure.

10 Interview with representative of government conducted in Accra in June 2015.

11 Interviews with representatives of government conducted in Accra in June 2015 and April 2017.

12 Interview with representative of government conducted in Accra in June 2015.

13 Interview with representative of civil society conducted in Accra in April 2017.

14 Interviews with representatives of government and civil society conducted in Accra in April 2017.

15 Interviews with representatives of government and donors conducted in Accra and Bolgatanga in April 2017.

16 Interviews with representatives of government conducted in Accra in March 2015 and April 2017.

17 Interviews with representatives of government and VBA conducted in Accra in March 2015 and April 2017.

18 Interview with representative of government conducted in Bolgatanga in April 2017.

19 Interviews with representatives of government conducted in Bolgatanga in April 2017.

20 Interview with representative of civil society conducted in Accra in April 2017.

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The full version of this report is available at **odi.org/wise-up-water-infrastructure-decisions-climate-ghana**

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