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Crafting Adaptive Capacity: Institutional Bricolage in Adaptation to Urban Flooding in Greater Accra

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ABSTRACT: Institutional bricolage, which explains how institutions are actively crafted across different degrees of formality, and urban adaptation have been studied separately in the past. Linking critical institutionalism and adaptive capacity research, this article describes how institutional bricolage shapes the distribution of adaptive capacity in adaptation to urban flooding. The Densu delta in Greater Accra, Ghana, is taken as a case of a rapidly urbanising area in coastal West-Africa. Interviews and stakeholder mappings show that institutional bricolage shapes who is likely to adapt to urban flooding and who isn't, as well as where people are likely to adapt and where they are not. Interviews moreover provided evidence of the distribution of adaptive capacity in dynamic water governance contexts that are characteristic of urban areas particularly in Africa. The role of the traditional 'chief' is shown to be a dynamic institution that can contribute to or hinder adaptation to urban flooding, depending on his own world views and institutional context. Four new findings emerge. Firstly, key elements of bricolage foster the decisive role of chieftaincy structures in adaptation to urban flooding in the local context of a West-African city. Secondly, institutional bricolage exposes the role of culture in adaptive capacity. Thirdly, applying institutional bricolage in the setting of a rapidly urbanizing flood-prone area offers new perspectives on both institutions and adaptation in urban water and risk governance. Fourthly, a bricolage analysis enables incorporating different forms of knowledge towards transformative adaptation.

KEYWORDS: Flood, transformative adaptation, critical institutionalism, urban water, African cities

INTRODUCTION

The mutual reproduction of urban flooding and poverty in African cities results from both disaster impacts exacerbating poverty, and poorly planned urban development creating floods (Bhattacharya and Lamond, 2011; Bicknell, Dodman, and Satterthwaite, 2009; Bull-Kamanga et al., 2003). Current strategies of cities and urban dwellers are limited to immediate adjustments with little or negative effects on future sensitivity and exposure to flooding (Bhattacharya and Lamond, 2011; Hetz, 2016). Reasons for this are low awareness of flood risk, other priorities, or more pressing risks, especially among the urban poor. As governments, non-governmental organisations and urban dwellers are faced with multiple acute risks that require urgent action, flooding tends to be overlooked, particularly in informal settlements where settlers are exposed to multiple risks (Benouar et al., 2012). In Accra, the dynamically growing coastal capital of Ghana, floods result from the interaction of urban development, rainfall intensity and poor management of surface water, and impacts from climate change and variability (Amoako and Boamah, 2014). The ability of urban dwellers to adapt to flooding is distributed unevenly among different social groups (Aboagye, 2012; Codjoe and Issah, 2015; Oteng-Ababio, Owusu, and Appeaning Addo, 2011). Understanding how differences in access to adaptation options are produced is key to overcoming inequalities and providing a safer urban environment particularly to the urban poor.

Adaptation is needed where risk reduction is impossible under conditions of rapid change and uncertainty. Whether adaptation occurs (or not: then vulnerability increases) depends on people's capacity to adapt. The ability to adjust practices and modify processes in response to experienced or perceived risk is referred to as adaptive capacity (Brooks, Neil Adger, and Mick Kelly, 2005). The term describes the option space of adaptation and depends on underlying social relations, networks, knowledge and institutional support as much as on more tangible resources such as financial means (Adger and Vincent, 2005; Juhola and Westerhoff, 2011; O'Brien, 2013). It also depends on culture as the underlying dynamic of risk perception and behaviour (Warner and Engel, 2014). Adaptive capacity is scale-dependent and nested as individuals' and communities' adaptive capacity is embedded in institutional context. Access to adaptive capacity therefore differs between social groups, locations and scales. It moreover shifts in time, also because adaptive action "drives scope for action, which in turn can foster or hinder future capacity to act" (Pelling, 2011), and can have unintended consequences for the distribution of adaptive capacity at different scales (Birkmann, 2011; Pelling, 2011). Anticipating implications of adaptive action for future adaptive capacity in coastal cities in Africa is particularly limited as knowledge and information on human-environmental interactions in the dynamic and diverse governance context of urban development in African coastal regions is currently scarce (Adelekan et al., 2015; Bruns and Frick, 2013; Parnell and Walawege, 2011).

Social networks and norms that create relations of trust, reciprocity and exchange are important components of people's adaptive capacity (Adger, 2003; Pelling and High, 2005). They have been analysed as underlying institutional factors in institutional learning and as social capital (Aßheuer, Thiele-Eich, and Braun, 2012; Pelling et al., 2008; Pelling and High, 2005). Social learning has also been identified as a factor of adaptive capacity in research on adaptation to floods in formal institutions such as governmental organisations, regulations and instruments (McFadden, Penning-Rowsell, and Tapsell, 2009; Næss et al., 2005; Pahl-Wostl et al., 2013). What institutional learning, social capital and flood risk literature have left open is the question of how navigation between different institutions takes place when boundaries of formality/informality are fuzzy, and institutions are dynamic. Addressing a dynamic and diverse institutional context is particularly relevant for adaptation in expanding urban areas, not only in Africa. In such areas a particularly large number of organisations, norms and legislations interact as cities grow across administrative and cultural boundaries, and become entangled in global networks (Adelekan et al., 2015; Grant, 2009).

'Institutional bricolage', the crafting of institutions beyond formal arrangements, is an analytical lens that was found to expose institutional adaptation in natural resource governance from a critical perspective (Cleaver, 2012; Nunan, Hara, and Onyango, 2015). From this perspective, institutions "include designed arrangements of varying degrees of publicness and formality (…), institutionalized interactions as embodied in kinship and social networks, relations of reciprocity and patronage and in norms and practices deeply embedded in habits and routines of everyday life" (Cleaver, 2012). Similar to actor-centred institutionalism (Mayntz and Scharpf, 1995) critical institutionalism stresses the key role of individual actors as agents who combine different governance modes, but it goes beyond this by stressing the fuzziness of the boundary between formal and informal institutions (Cleaver and De Koning, 2015). This is of particular relevance for institutional analysis in the African context where boundaries between the state, traditional authorities, private and informal sectors are particularly messy (Adelekan et al., 2015; Benjaminsen and Lund, 2002). Understanding how these institutions are navigated is key to understanding differences in adaptive capacity.

The contribution of this paper results from its original lens introducing critical institutionalism in adaptation research, and by applying the bricolage framework developed for institutional analysis in natural resource management to a context of urban flood risk. The potential of an institutional bricolage analysis for adaptation knowledge, i.e. describing how institutions are shaped across different degrees of formality, has been pointed out for instance by Nunan et al. (2015) because it stresses the adaptive nature of institutions resulting from more and less formal arrangements in natural resource

management. Mainstream institutionalism,[1] in comparison, explains institutional adaptation mainly through relatively formalized decision making processes.

In sum, studying adaptation to flooding in African urban areas is of particular relevance as it concerns a large number of people, many of whom live in low income settlements where the priority of other risks prevents them from actively creating adaptive capacity. Looking at adaptive capacity from a critical institutional perspective is very promising because of the institutional and legal plurality found in the African context. The Densu delta, located in the most dynamically urbanising part of Greater Accra, Ghana, and of the West-African coastal strip (Stow et al., 2016), is a case example of traditional, governmental and private institutions interacting in the alteration of a flood plain where people are increasingly forced to adapt to floods. Social relations shape discharge water flows, which in turn shape the distribution of flooding, exposure and adaptive capacity. Looking at the case through an institutional bricolage lens rather than adopting other potentially relevant approaches promises to be particularly insightful for understanding the distribution of adaptive capacity because (1) other critical approaches such as political ecology that explain uneven patterns focus on structures but do not explain dynamic practices and agency, (2) it builds on assumptions that apply to post-colonial cities, namely plurality in governance, and twilight institutions, and (3) the lens promises to complement the literature on which institutions shape adaptive capacity by how they change, and also on the role of actors in these dynamics.

The question guiding this research is: How does institutional bricolage shape the distribution of adaptive capacity in adaptation to flooding? By linking adaptive capacity and institutional bricolage, a contribution is made to both adaptation and critical institutionalism research. More specifically, novel insights are gained on the role of chieftaincy in adaptation in urban Ghana, on culture as a factor of adaptive capacity, on applying the institutional bricolage lens in an urban flood risk context, and on integrating different forms of knowledge in research on urban water and adaptive capacity.

INSTITUTIONAL BRICOLAGE: AN ANALYTICAL LENS

The differential exposure of social groups to risk and vulnerability has been the object of political ecology research on risk pointing to the role of power and discourse in reproducing patterns of uneven risk (Cutter, Mitchell, and Scott, 2000; Wisner et al., 2004). Here uneven patterns are explained mainly by structural determinants such as capitalist relations between the powerful and the vulnerable (Ranganathan, 2015). However, the distribution of risk and vulnerability is also importantly shaped by actors as people actively shape their adaptive capacity (Pelling and High, 2005). Moreover, urban political ecology approaches tend to be based on narrow assumptions about capitalist relations, namely that the urban poor settle in the most hazardous areas. This does however not apply to post-colonial cities, where multiple institutions and agents shape who settles on hazardous sites, and who is most at risk (Collins, 2008, 2010; Ranganathan, 2015). A plurality of institutions that have been formalised in very different ways, such as traditional law, or religious norms define the option space people have in dealing with risk and vulnerability, and the relation between these institutions is reproduced in people's practices (von Benda-Beckmann, 2001). Culture plays an important role in shaping practices that constantly reconfigure conditions of risk and vulnerability (Krüger et al., 2015). Thus far, little attention has been paid to institutions that are not formalised, long-term arrangements in research on disaster risk. As non-formal, dynamic types of institutions play an important role in rapidly changing contexts, as

[1] Cleaver (2012) distinguishes between Mainstream Institutionalism that follows the ideas of institutional economics influenced by Elinor Ostrom, and Critical Institutionalism which adopts a wider definition of institutions, as for instance Benjaminsen and Lund (2002) do.

is the case here, a 'critical', actor-centred approach to institutions appears most insightful to the present analysis.

Drawing on a broad range of case studies of natural resource management in Africa and Europe, Cleaver develops 'institutional bricolage' as an analytical frame for studying the messiness of institutions in natural resource governance. She builds on the work of Claude Lévi-Strauss, who first introduced the terminology of bricolage and bricoleurs in social sciences, and Mary Douglas, who advanced it to criticise rational choice views on institutions (Cleaver, 2012; Douglas, 1986; Johnson, 2012). Further drawing on Bourdieusian conceptualisations of structure-agency relations (Bourdieu, 1989; Bourdieu and Wacquant, 1992; McNay, 2000) and Foucaultian governmentality (Agrawal, 2005; Foucault, 1991), 'institutional bricolage' (Cleaver, 2012) or 'doing institutions' (Etzold et al., 2012) describes the mechanisms by which institutions are rearranged. For instance, traditions are invented, as has been described in detail by Hobsbawm (1983). Governmental symbols of legitimacy are copied into customary practices, for instance in land allocation by traditional rule makers (Earle, 2014).

Relations between different sets of rules are reproduced through the practices of actors confronted with a plurality of legal systems, defined for instance by government or religion (von Benda-Beckmann, 2002). Institutional bricolage draws on this understanding of institutional dynamics in legal pluralism by looking in particular at underlying mechanisms of power, authority and inequity that are invisible to the researcher of polycentricism in formal governance arrangements (Cleaver, 2012). Accordingly, Cleaver defines institutions as "arrangements between people which are reproduced and regularized across time and space and which are subject to constant processes of evolution and change" (Cleaver, 2012). In this view institutions of different degrees of formality and visibility shape and are shaped by actors who "consciously and non-consciously (…) assemble or reshape institutional arrangements, drawing on whatever materials and resources are available" (Cleaver and De Koning, 2015). The role of actor interactions between formal and informal arrangements has been stressed in actor-centred institutionalism (Mayntz and Scharpf, 1995). Critical institutionalism diverges from this view in stressing the fuzziness of the boundary between 'formal' and 'informal' and by aiming at overcoming the dichotomy in explaining how institutions form.

Cleaver describes the mechanisms by which institutions are patched together as five groups of 'key elements of bricolage'. The elements of bricolage that appear particularly relevant to adaptation to flooding in the Densu delta are identified from a literature review on case studies adopting critical and actor-centred institutional lenses. Land and water are key resources in the co-production of urban water (Ranganathan, 2014), and shape flood risk in the Densu delta (see section 2.2, also Frick, 2016). Adaptation to urban flooding includes the governance of 'resources' that are not 'natural', for instance safety, roads, open space and housing development. Hence case studies from urban, land and water governance are used to identify and illustrate key elements that will guide the analysis.

The piecing together of infrastructure, constant redefinition and renegotiation of the content and meaning of institutions and authoritative processes have been described in urban water governance by Schwartz et al. (2015). Naturalisation by analogy and authoritative process were identified as key elements of bricolage in managing land for reindeer herding in Norway (Marin and Bjørklund, 2015). Koch (2011) and Gailing (2012) have applied actor-centred institutionalism to the governance of urban and cultural landscapes, respectively, and have identified personal relations of trust and power, ontologies, values, and traditions as invisible institutions that shape (in)formalisation of existing governance arrangements. Etzold et al. (2012) highlight the dynamics of institutions and the role of actors within their relational context of power in open space governance in two Asian cities.

Based on these case studies, three 'elements of bricolage' as described by Cleaver appear particularly relevant for the present case. The first element, 'authoritative processes and their unequal outcomes', explains how institutions are formed by power relations and individuals whose actions benefit some more than others. Small scale providers of water supply in Maputo, for instance, rely on

diverse authoritative resources such as social status, relations of kinship, and financial resources to navigate between the formal and informal institutions regulating the market. The outcome is highly uneven access to water provisioning in the city (Schwartz et al., 2015). The second element, 'naturalisation, leakage of meaning and invention of traditions', summarizes different modes by which symbols or acts are borrowed from existing institutions to legitimize new arrangements. This is illustrated by Sami herders in Finland who adopted the framing of 'commons' as articulated by government in order to legitimise land use practices that diverge from traditional land use management (Marin and Bjørklund, 2015). A third element, 'moral rationality' explains that institutional arrangements are partly the result of belief systems and world views that guide actors' ways of doing things. An illustration is provided in the description of hospital guards in Dhaka who tolerate street vendors at night acknowledging their poverty and need for livelihood strategies, while removing them during daytime under surveillance by formal authorities (Etzold et al., 2012). While Cleaver stresses the role of value systems that define what is 'good' and what is 'bad', here the element is defined more broadly to include world views shaping what is considered acceptable (risk) and what is not. The element is therefore termed 'belief systems and world views' for the purpose of this paper. While culture, defined as "constantly changing and shifting configuration of social practices (…) inscribed into society" (Bankoff et al., 2015), is a cross-cutting aspect of institutional bricolage, particularly the analysis of beliefs, perceptions and priorities contributes to an understanding of culture shaping risk (Bankoff et al., 2015).

Understanding adaptive capacity implies looking at how and where adaptation has occurred because adaptive capacity is scale- and place-specific, and indicators are difficult to transfer (Adger and Vincent, 2005). As indicators of adaptive capacity are unknown for the case study area, the role of bricolage in shaping adaptive capacity cannot be assessed directly. Understanding the role of institutional bricolage in adaptive capacity requires the assessment of where and how bricolage has shaped adaptation in the past. Analytical steps required prior to assessing the role of institutional bricolage in shaping adaptive capacity are therefore the identification of institutions involved in adaptation, and of the enabling or hindering role of institutional bricolage in adaptation in the case study area. Looking at adaptation as part of assessing adaptive capacity is all the more important as adaptive action shapes future capacity to act (Pelling, 2011). Here institutions are defined as socially legitimized arrangements between people. They are being patched together through 'elements of bricolage', by which social arrangements become legitimized and thus institutionalized, which distinguishes them from purely instrumental and provisional conventions (Cleaver, 2012; Diaz-Bone, 2012; Douglas, 1986). The three elements of bricolage identified above as relevant for adaptation to flooding are traced in coping and adaptation strategies developed by organisations, households and community groups. Finally, key factors of adaptive capacity that shape adaptation options in the Densu delta are identified through a bricolage lens. In summary, the analytical questions are:

1. Which institutions are involved in the creation and mitigation of, and adaptation to, floods in the Densu delta?
2. How do 'leakage of meaning and invention of tradition', 'authoritative process and unequal outcomes', and 'belief systems and world views' act as key elements of bricolage in adaptation to flooding in the Densu delta?
3. What are the key factors of adaptive capacity shaped by institutional bricolage?

METHODOLOGY

Methods and data

The three analytical questions are addressed with data from expert interviews, stakeholder interviews, field observations, and document analysis. Institutional mapping based on interviews, documents and observations served to identify institutions involved in the creation and mitigation of, and adaptation to, floods (1). The role of the three elements of bricolage was identified from institutional practices through interviews and observations (2). Factors of adaptive capacity were identified from interviews and contrasted with the processes of bricolage identified (3).

66 semi-structured interviews were conducted in Accra in January 2014, May to July 2014, and January 2015. During the time of data collection, the Densu delta flooded in June 2014, following the spillage of the Weija Dam. Expert interviews (N=32) were conducted, in English, at the workplaces of the interviewees. The experts interviewed represent decision makers in the fields of urban planning and disaster risk reduction at sub-metropolitan district, district, city, country, and cross-national levels in government, non-governmental and donor organisations. Key stakeholder (N=24) and street (N=10) interviews in the Densu delta were conducted in English, Ga, Twi and Ewe, and took place on streets and in front of the homes of the interviewees. Key stakeholders represent opinion leaders and heads of formal and informal community groups. Experts and key stakeholders were identified based on literature as well as on information given in interviews (snowball sampling). Interviewees for street interviews were selected by convenience at different sites across the delta to represent different levels of bio-physical exposure.

All interviews followed a thematic structure of causes and consequences of urban flooding in Accra and the case study area, strategies for coping, adaptation and risk reduction and collaboration. Photographs and maps of the case study area were used to illicit responses. Further methods of data collection and validation include site visits accompanied by stakeholders, transect walks, participatory observation at decision makers' meetings, and informal conversations with local researchers. Where possible the interviews were recorded and the interview material transcribed. All interviews were coded using MAXQDA software (VERBI Software GmbH, 2012) in a cyclical approach (c.f. Saldaña, 2013) to identify institutions, capacities, practices and risks, and relations between these elements from the qualitative interview material (see also Frick-Trzebitzky, Baghel, and Bruns, forthcoming). Off-the record informal conversations, meetings and observations were collected as field notes. Relations between institutions were mapped based on a document analysis, expert and key stakeholder interviews. Limitations may arise from the small sample of street interviews as it is not representative of the total population potentially affected by flooding, cultural and language barriers. Due to the multitude of languages spoken in the case study area the researcher had to rely on translations of an interpreter, particularly in street interviews.

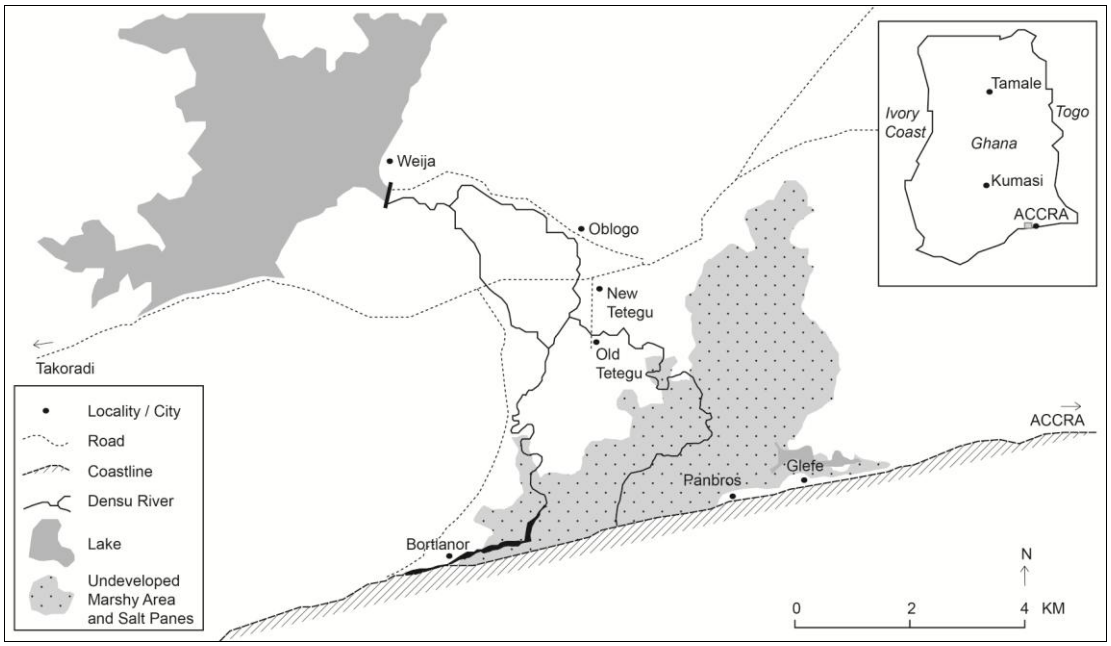
Introduction to the case study area

Accra, a growing coastal city of approx. 4.3 million inhabitants as of 2014 (a projection based on the latest census from 2010, Atlas of Urban Expansion, 2016) has been affected by flooding almost every year between 2000 and 2012, with no flood events recorded in 2002 and 2006. During this period, the loss of 83 lives, 178,750 displacements and an estimated economic cost of US$43.71 million have been recorded as impacts from flooding (Amoako and Boamah, 2014). Localised flooding in Accra occurs predominantly in May to July and September to November as a consequence of extreme rainfall and run-off discharge, and in August to October as a consequence of tidal waves (NADMO, 2010). Dam openings causing flooding in the Densu delta have occurred one to seven times per year for periods of two to 65 days between 1998 and 2007 (Kuma and Ashley, 2008). Further causes and consequences of flooding in Accra result from the interaction of unplanned urban development, lack of adequate

drainage and waste infrastructure and services, as well as coastal erosion and sea level rise (Amoako and Boamah, 2014; Karley, 2009). Large parts of the built-up area are low-lying and therefore particularly prone to flooding. These areas coincide with low-income settlements (Amoako and Boamah, 2014), and within these marginalized groups are most vulnerable to impacts from flooding (Aboagye, 2012). It has been estimated that 366,823 people are living in informal settlements on flood prone sites in Accra (Amoako and Boamah, 2014). As the capital of an emerging economy, Accra is an example of a medium-size growing coastal city that is entangled in global market and migration flows (Grant, 2009) and thus serves as a case not only for African cities but of growing cities in flood-prone areas around the world (Güneralp, Güneralp, and Liu, 2015).

The Densu delta west of Accra (Figure 1) is among the most flood-exposed areas in the city (Amoako and Boamah, 2014). It is located in what has been the most dynamically urbanising area of Greater Accra in the 21st century (Stow et al., 2016). The protected wetland is being encroached on from all sides, leading to the loss of natural flood retention space. Sedimentation in the Densu River and subsequent overspill of the Weija reservoir north of the wetlands is causing more and more flooding in the Delta (Kuma and Ashley, 2008). High pollution levels of river and lagoon waters from upstream agriculture, industrial and domestic waste disposal imply that floods are associated with health risks and environmental degradation (Denutsui et al., 2012; Osei et al., 2010; Osei et al., 2011). Knowledge on adaptive capacity in the Densu delta is limited to vulnerability and coping capacity assessments in selected localities (Amoako and Boamah, 2014; Amoani, Appeaning Addo, and Laryea, 2012; Appeaning Addo, 2013; Oteng-Ababio, Owusu, and Appeaning Addo, 2011), with no explicit mentioning of the role of institutions. As the Densu delta expands beyond the boundaries of the Accra Metropolitan Area (AMA), land use is managed by the respective authorities in AMA and Ga South District. In addition, land is owned and governed by various traditional authorities who have increasingly fought over land ownership claims in the context of increased urbanisation pressures (Barry and Danso, 2014). Litigation, land and successor disputes have been part of the Ghanaian chieftaincy system in recent years, and the governmental supervision of customary land transactions is barely put in practice (Ubink and Quan, 2008).

Figure 1. The Densu delta. Own design based on (Osei et al., 2010) and (Google Maps/Google Earth, 2016). A prior version has been published in Frick (2016).



INSTITUTIONS IN ADAPTATION TO FLOODING

Designed governmental and non-governmental arrangements

Designed regulations, rules and norms on disaster, water and land management are arrangements legitimized as institutions by governmental agencies, traditional authorities, and non-state organisations. Among governmental organisations, the National Disaster Management Organisation (NADMO) is particularly relevant as it was established in 1996 under Act 517 with the mandate to "manage disasters and similar emergencies in the country" (Government of Ghana, 1996). The organisation operates through separate headquarters at national and regional levels, and officers based at district level and constituency government offices. Disaster Volunteer Groups (DVGs) assist in implementing NADMO's activities at local level. Following a focus on emergency relief, the organisation shifted its focus to prevention in 2013 due to increasing costs of emergency relief operations and reluctance of international donor agencies to continuously fund these.[2] NADMO collaborates with numerous national and international, governmental and non-governmental authorities and organisations in its operations. Flood prevention measures involve close collaboration with agencies responsible for drainage construction (namely: Hydrological Services Department for storm drains, Urban Roads Department and Feeder Roads Department for drains along roads), for urban planning (Town and Country Planning Division), conservation of wetlands (EPA) and implementation of land use planning and environmental protection (Municipal, Metropolitan and District Assemblies, MMDAs). NADMO moreover collaborates with UN Agencies, the NGO World Vision, Ghana Hydro-Meteorological Services Department, the Ministry of Water Resources Works and Housing (MWRWH), Ghana Health, Ghana Armed Forces, Fire Service, Ghana Police, Ghana Communications, and Universities for consultancy and in technical committees. Key governmental agencies engaged in urban development and risk management as indicated in Figure 2 operate at national, district, and constituency levels.

Although not directly engaged in risk and hazard reduction, the traditional chieftaincy system is a crucial component of flood risk management in the Densu delta, and Ghana more generally, because chiefs act as custodians of land and as such take key decisions on land use. Traditional chiefs and the respective stool hierarchies are designed institutions that are formally recognized by the Regional House of Chiefs. Land is family-owned in the Densu delta. Hierarchies of state and traditional authorities governing land use in the Densu delta and the respective legal systems are shown in Figure 3 taking two localities as examples. The figure shows the levels of hierarchy in both the statutory and the customary legal systems relevant to land and water governance in the case study area (namely, Glefe and Tetegu). Shades of grey indicate hierarchical levels from Municipal and metropolitan district (region in customary law; dark grey) to locality and family (light grey).

Policies, regulations and by-laws anticipate the integration of environmental management, urban development planning and disaster risk reduction in planning.[3] In the aftermath of major flooding in November 2011, the National Disaster Management Organisation (NADMO), together with the Environmental Protection Agency (EPA), UNDP and the University of Ghana, pushed for an integration of adaptation to climate change and disaster risk reduction in national and urban development planning. This shaped the formulation of key national action plans and policies, including the Ghana National Action Plan of Disaster Risk Reduction and Climate Change Adaptation (NADMO, 2011), the National Urban Policy Action Plan (MLGRD, 2012), and the National Climate Change Policy (MESTI,

[2] Where not stated otherwise, sources for the findings presented in this and the following section are the interviews conducted for this research as indicated in 'Methods and data'.

[3] Both state and customary legislation are considered part of Ghanaian law according to the constitution. As indicated earlier however, customary law is not publically available in written form (except for case law), and is subject to change and local interpretation; see Ubink (2008).

2013). Several by-laws have been drafted to enforce urban development that is in line with flood risk reduction and adaptation to climate change in Accra.

Figure 2. Government Agencies involved in flood risk management in Ghana. Own design based on governmental documents and interviews. Responsibility for policy design increases from right to left, and for implementation from left to right.

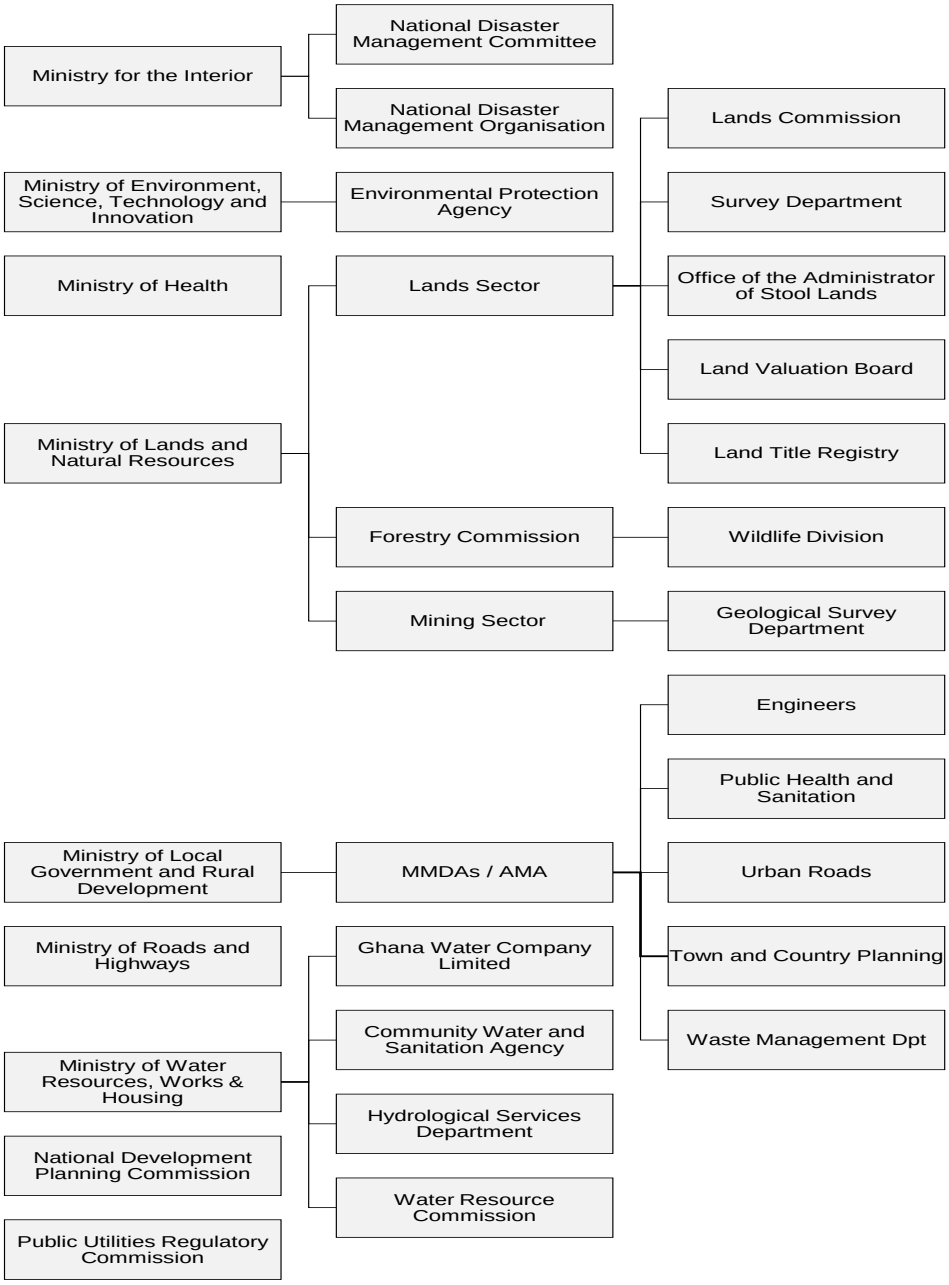
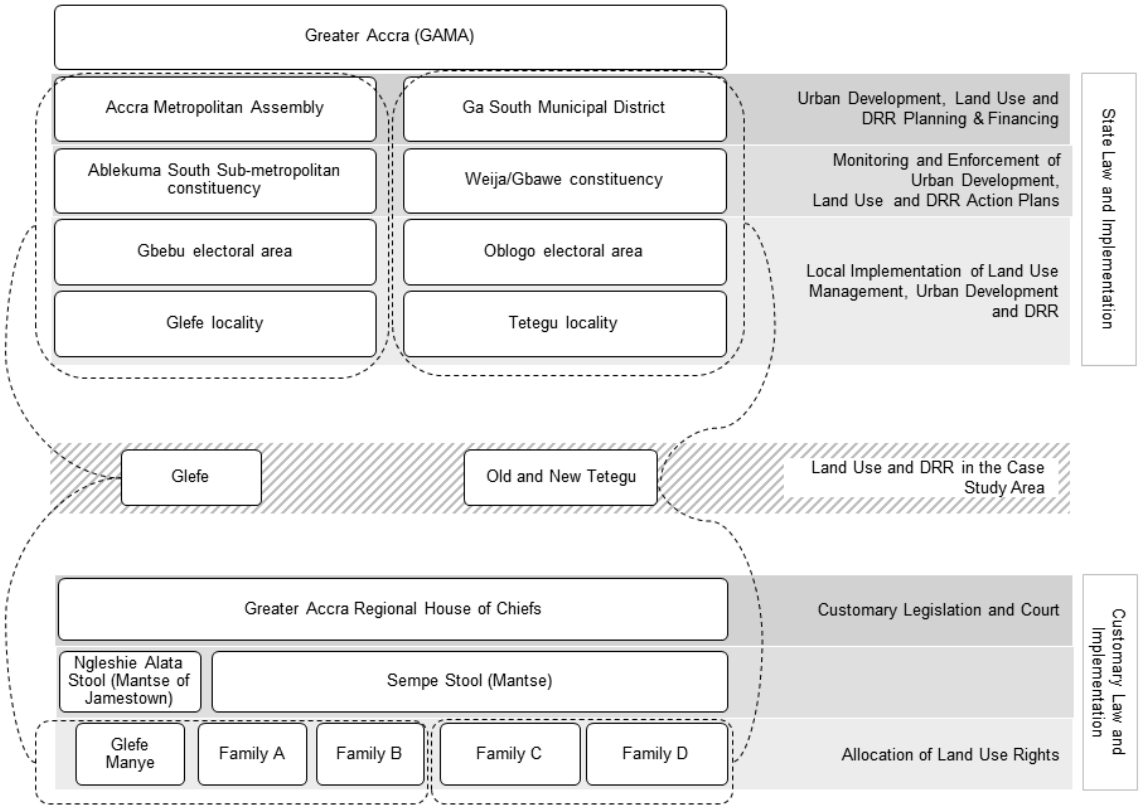


Figure 3. Hierarchical organisation of state and chiefly authority over land use and disaster risk reduction (DRR) management in the case study area. Own design.



The ultimate authority to monitor compliance with planning regulations and codes is the municipal, metropolitan or district assembly (MMDA). New buildings are, however, constantly erected in areas that are to be kept free from development under formal regulations, namely the Accra Structure Plan (TCP, 1991) and the Ramsar site management plan. Among experts, the lack of enforcement of environmental and planning regulations is considered the result of ignorance, lack of capacity and conflicting interests in MMDAs and among assembly members, poor coordination of donor activities, as well as of the lack of legal and political backing of environmental protection at national level. The Ministry of Environment, Science, Technology and Innovation (MESTI) is currently pushing for a national law to support environmental protection; however, presidential support is limited in the face of the National Growth Strategy. In the meantime, residents and the EPA attempt to push for environmental planning enforcement by suing AMA for tolerating or supporting violations.

The apparent incoherence of governmental institutions to manage flooding in Accra results in a limited impact of these institutions on the ground. According to NADMO officers at AMA and Ga South district and Ablekuma South constituency, flood risk in the Densu delta is caused by choked gutters from waste disposal, poorly developed and maintained drainage systems, building on waterways and reclamation of lagoon land in the area that floods when the Weija dam has to be spilt. The dam was constructed to supply Accra as well as agricultural lands with water. As agricultural lands have been converted to urban use however, no water is currently extracted for irrigation. Lacking both capacity

and permission to extract larger quantities for supply to Accra, GWCL releases water from the reservoir more frequently during the rainy season to prevent the dam from bursting.

The Town and Country Planning Department at AMA level is responsible for designing and implementing a planning scheme for urban development which includes the provision of drains along roads, as well as buffer zones along water streams. The current scheme demarcates the Densu delta as a green belt in which urban development is to be prevented in order to protect natural drain for runoff in the delta (TCP, 1991). Enforcing implementation of land use and building regulations by demolishing structures that block waterways is the mandate of district governments to which NADMO reports any violations. However, the government has been unable to control the sale of stool-owned[4] land by local chiefs and started tolerating established settlements in the area by issuing permits, constructing drains and collecting revenues. A revision of the planning scheme was underway at time of the research (ibid). The wetlands of the Densu delta are also protected under the international Ramsar convention and National Law LI 1659 as a habitat for migratory bird species following the national non-governmental initiative 'Save the Seashore Birds' supported by the UK based Royal Society for the Protection of Birds 1990s. Today the site is managed by the Wildlife Division of the Forestry Commission in collaboration with Panbros Salt Industries, a private company that owns large parts of the land in the protected area's core zone. However, in the face of ongoing deterioration of the wetland and little political support of environmental protection, it is likely that the Densu delta will soon be removed from the list of Ramsar sites. NADMO activities are limited to the construction of drains, education and awareness activities, and emergency relief.

As governmental arrangements for flood prevention by land use planning in the Densu delta have limited effect on the ground, alternative arrangements have been designed. The private sector is present in formal arrangements for flood risk management through contractors for waste management, GWCL and Panbros Salt Industries, as well as through companies distributing relief items after floods hit[5]. Chiefs, assembly members, Panbros Salt Industries, NADMO and Wildlife Division are informed by GWCL ahead of a planned spillage of the Weija dam, which is operated by the company. This public-private partnership is effective in reducing the immediate impacts from flooding. However, it also undermines adaptation as the arrangement contributes to low risk perceptions and consequently to further encroachment. Moreover, it benefits some areas and actors more than others, and therefore adds to uneven access to adaptive capacity, as I will discuss below. Further alternative arrangements include humanitarian aid organisations such as the Red Cross, and the non-governmental organisation World Vision, with whom NADMO cooperates. However, their engagement in the Densu delta is limited as NGO activities tend to target the allegedly more vulnerable rural communities. Ghana Red Cross activities are constrained by a lack of resources and bureaucratic procedures that create time lags in the provision of emergency response. The Red Cross member residing in Glefe did not inform the organisation when the June 2014 flood hit. This may hint to the lack of adaptive capacity and poor suitability of bureaucratic practices in big international NGOs stated for Accra in the context of water provision (Morinville and Harris, 2014). Local, community-driven NGOs that work towards reducing the vulnerability of the urban poor, such as the Ghana Federation of the Urban Poor, are not active in the Densu delta.

[4] A 'stool' signifies the chiefly office in Akan-speaking Ghana, referring to the furniture on which chiefs sit while in office (Berry, 2008).

[5] For instance after the flood-fire disaster in 2015; Andoh (2015)

Neighbourhood associations and other arrangements

Embedded institutions that contribute to adaptation to flooding in the Densu delta can be identified from the adaptation strategies found. Similar to the strategies of designed institutions (see previous section), adaptive strategies in socially embedded institutions, visible at individual level and in community groups, involve both intentional adaptation to flooding and less targeted improvement of background conditions. Fishermen in particular benefit from increased catch due to flood water and have developed successful strategies to cope with reoccurring floods. Residents tend to accept flooding as part of normal life and claim to feel safe from future flooding, even when interviewed shortly after the locality was flooded for several days in June 2014, as illustrated by the following quote of a Tetegu elder, recorded one week after the waters had receded from Tetegu:

> Many houses were flooded. The mud houses collapsed. Many people were affected, they asked other people to stay with them until they could go back to their houses. (…) The normal spilling doesn't affect anyone. This was an accidental spillage. (…) A flood like this last occurred more than ten years ago. So we are not going to experience anything like this again (Tetegu Elder, 2014).

The traditional houses in the Densu delta are mud huts that reportedly easily collapse during floods. They have largely been replaced by concrete houses which now dominate the built up area in and around the Densu delta. To prevent these houses from regular flooding up to approximately knee-height, they are built on strong basements of sand and concrete. Where building grounds are particularly prone to inundation, plots are filled with gravel, sand or solid waste prior to housing construction. Next to the preventive filling of land and raising of houses, the grounds of compounds are also filled temporarily with gravel and sand during the rainy season to prevent flood waters from entering houses. Individual waterways to discharge water are also constructed by individuals and neighbourhood associations both permanently as a preventive measure, and temporarily to divert flood water. Further strategies during times of flooding include the placement of stepping stones, navigating the streets by canoe, raising furniture and storing valuables under the roof, as well as temporal relocation of valuables and people to relatives.

The strategies taken at household level are primarily targeted at reducing the immediate exposure of people and valuables to flood water. Several of them involve the diversion of exposure and vulnerability to neighbours, e.g. when flood water is diverted, to other parts of the community, e.g. by mining sand for filling from the built-up coastal shore, or to the future as savings are spent on short-term strategies. Embedded institutions that can be identified from these strategies are professional traditions, conventions in housing construction practice, and personal relations of trust and reciprocity among relatives. In addition to these, neighbourhood associations are embedded institutions that become apparent from collective adaptation strategies, as described below.

Institutional arrangements to outbalance counterproductive on and off site consequences of households' (mal-) adaptation have had mixed results in the Densu delta. After settlers in Tetegu had discharged their water onto adjacent plots at the beginning of the informal development of middle and high income houses, a house owners' association was formed to collectively organise the installation of drainage, as well as further basic infrastructure, such as roads and water supply. A prerequisite for public infrastructure provision would be the authorisation of the settlement. The value of the members' properties was a decisive factor in the association's lobbying of local government as the municipality would benefit from authorising the settlement in the form of property taxes. Consequently, the association succeeded in obtaining building permits for the houses already erected in 2010 (see also Frick, 2016). Members of the association and the community's chief successfully pushed for the adjustment of dam gate openings and early warning by GWCL, which led to chiefs and assembly members being considered in dam gate management (see subsection above). The events reveal the formation of a community group and the formalisation of urban land use through building permits – though not primarily targeted at the reduction of flood risk – as important steps towards a process of

adaptation to environmental and crime risks. At the same time the formalisation and subsequent adaptation process is spurring continuous development into the Densu delta. As a consequence of reduced natural retention space, regular flooding increases in frequency. More and more people are exposed as the population in the delta increases.

Community associations have similarly been formed in the deprived locality of Glefe to foster development in collaboration with the local assembly member. Their activities are constrained by lack of political support and collaboration of an enterprise. In the absence of a drainage system, a few households have constructed individual drains which end abruptly in the only street, creating ponds of waste water. In light of the poor sanitary conditions in the community, government officials describe the community as 'the new Sodom and Gomorrha' – referring to the colloquial name of the allegedly most deprived informal settlement of Accra. Dredging the lagoon has been proposed as an interim solution to facilitate drainage of run-off water into the lagoon. However, the project was dropped following a political change in Parliament. In the meantime, the assembly member continued negotiations with Panbros Salt Industries, whose operations interfere with the discharge system of the Sakumo lagoon due to the layout of the salt panes. Panbros has altered the lagoon outfall to prevent pollution of water pumped into salt panes from waste dumped at Glefe. As a consequence, water from the lagoon does not flow off and easily creates floods. The community association finally succeeded in pressuring the government to install gutters and carry out demolitions of exposed houses by drawing media attention to the extreme exposure and vulnerability of Glefe during heavy flooding in June 2014. Whether this measure is effective remains to be seen as according to engineers' assessment, the construction of open gutters in the extremely low lying area is unlikely to reduce flood risk if the lagoon is not dredged. This may indicate that the process of bricolage has led to the government implementing a measure for flood risk reduction that experts consider to have little effect.

In sum, several embedded institutions, understood as socially legitimate arrangements between people that are not regulated through formal documents and authorities, can be identified from the adaptive strategies applied in the Densu delta. These are neighbourhood associations and community groups, professional traditions, conventions in housing construction practice, the insurance system of extended families, and value and belief systems that make residents accept perennial flooding as part of daily life. Personal relations of trust, reciprocity, status and political affiliation are key resources that enable actors to engage with these institutions. Embedded institutions are used not only to replace and complement ineffective institutions, but are also merged with these to form new arrangements in adaptation to flooding.

POWERFUL AND INVENTIVE BRICOLEURS AND THE CHALLENGE OF COLLABORATION

Struggles in the formalisation of infrastructure

Authoritative processes reproduce relations of power (Cleaver, 2012). In the Densu delta case, these processes and relations become most visible in attempts to formalize infrastructure. In Glefe, for example, contestations over lagoon outfalls between community representatives, Panbros Salt Industries and NADMO, respectively, are the expression of competition over the power to control the water flow among actors linked by uneven relations of dependence. This power game took a new turn when Glefe's assembly member succeeded in pressuring the state for constructing drains through media reports. In spite of openly questioning the legitimacy of 'chiefs' selling land in both localities, the chiefs' practical power to control land allocation is unchallenged, including by National Government authorities. The analysis of designed institutions in adaptation to flooding in the Densu delta in the previous section reveals that authoritative processes shape decision making in state organisations where environmental governance receives little support from central government. Its implementation has even been hindered by the presidential office in the past.

The observed authoritative processes have unequal outcomes. In Tetegu, the association's achievements benefit large parts of the locality, except the less affluent fishermen of Old Tetegu. The latter are by contrast exposed to increased contamination of the Densu, as a result of drains discharging into the river which they use for cleaning and cooking. Newly constructed houses further downstream of Tetegu are being squatted or rented out to construction workers or land guards. These tenants are likely to have little capacity to cope with the impacts from flooding. Authoritative processes and unequal outcomes moreover shape individual adaptive strategies and maladaptation. Sand for filling foundations and compounds in Glefe is mined at the sea coast and carried across the settlement to protect houses by the lagoon against flooding, while huts located at the coast are increasingly exposed to erosion. Self-constructed drains divert water flows from individual houses in Glefe but discharge onto streets and compounds, triggering conflict among neighbours.

Leakage of meaning from one institution to another is particularly evident in the allocation of land. The title 'chief' is used by individuals under a 'stool' as a resource of legitimacy for selling land plots, particularly to new migrants. As chiefs are traditionally responsible for land use management and plot allocation, new migrants are often unaware of conflicting regulations or ownership claims. Moreover, plots are sold with allegedly official documents, combining symbols of legitimacy from state and customary rules. Coupled to the leakage of meaning in land allocation is the reinvention of tradition, particularly with regard to 'drinks', which have been redefined. There used to be a custom of giving a chief a bottle of schnapps in return for a land allocation. Nowadays a significant sum of cash referred to as 'drinks' is handed to the chiefs for the same purpose. The result of institutional bricolage in land allocation is, for the time being, an ever increasing number of buildings situated and people living in flood prone areas, as well as the reduction of natural wetland, both of which increase exposure to flood risk and vulnerability in the Densu delta. Finally, belief systems and world views shape the perceived need to adapt, as illustrated by the quote from the Tetegu resident given above, describing a recent flood as a singular event caused by management failure, unlikely to reoccur. Here and among fishermen in Oblogo and Tetegu, occasional flooding occurring once a decade is considered as an acceptable and manageable part of daily life.

In particular, the uneven outcomes of authoritative processes in adaptive strategies show that bricolage can both trigger and hinder adaptation. The above analysis only sets out how bricolage influences the extent to which those capable of adapting do in fact take adaptive action. How do elements of bricolage shape the distribution of adaptive capacities, understood here as the ability to adjust practices and processes to reduce impacts from flooding in the Densu delta?

Policy design, enforcement and collaboration

Key factors of adaptive capacity referred to in interviews are legislation and policy design, enforcement of regulations and political will, collaboration and coordination. The distribution of these factors in the Densu delta and within organisations is uneven. Collaboration among different actors facilitated the negotiation for infrastructure in Tetegu whereas it failed in Glefe. The different mandates of key authorities give overarching power to control exposure of people to flood risk in the Densu delta to the Town and Country Planning Department, whereas the NADMOs role is reduced to advising and providing relief – although this contradicts the organisations' 'prevention pays' strategy. An uneven distribution can also be observed for factors mentioned in interviews that refer to social capital and institutional learning, namely human and financial resources, learning, knowledge and awareness, data management and monitoring, and background conditions. These factors of adaptive capacity are not discussed here because they have been analysed in depth elsewhere (Aßheuer et al., 2012; Pelling et al., 2008; Pelling and High, 2005).

Authoritative processes, belief systems, and world views shape the uneven distribution of factors of adaptive capacity. The combination of these elements signals that power relations and culture are

influential. Legislation and policies are currently designed based on politicians' interests and by international conventions that influence the world view of UN representatives and researchers engaged in policy design. As has been pointed out by Holloway (2012), involvement of these actors does not mean that local customs and values were regarded. Instead, they reflect a reliance on internationally renowned sources of knowledge. Legislation and policy tend to ignore the authoritative role of traditional chiefs, customs and values on the ground. As a consequence, policies are poorly enforced, as shown by the example of the Densu Ramsar site. Strengthening traditional structures and cultural values in environmental and climate change legislation is therefore seen as a major step towards adaptive governance at National level by the director of the MESTI. Belief systems and world views shaping implementation on the ground, however, are not only influenced by traditional values, as a Wildlife Division officer describes:

> [Assemblies] want us to go and build some physical structures that require huge sums of money, they don't want wetlands to perform its natural functions. If you go in to support them they think of huge funding to establish drainage systems, expensive drainage systems which the country cannot perform or the district cannot afford. So in the end they back out from supporting you (Wildlife Division, 2014).

The physical structures referred to by the interviewee, e.g. constructed drainage systems, are also known as 'hard infrastructure' solutions. They are considered to have immediate effects but bear the danger of creating a technical lock-in and are costly, whereas 'soft solutions', such as protection of wetlands as ecosystems that naturally collect and filter excess water, are considered to be less costly and they provide a more flexible, sustainable, long-term solution to flood risk (Wesselink, 2016). The underused potential of green space as a sustainable solution to flood risk in Accra has also been pointed out by Karley (2009), and by Fohlmeister et al. (2015) for African cities more generally. The preference for hard infrastructure in the Densu delta reported by the interviewee is not only an authoritative tool to claim legitimacy as a politician, it is also the manifestation of a world view to prefer engineering over protection of the environment, as well as an indicator of the influential role of the municipal hydraulic paradigm that has shaped water management in (post-) colonial cities of the Global South in the 20th century (Bakker, 2013).

Collaboration in extended families builds on culturally embedded belief systems and world views of trust and reciprocity:

> it is part of the system that you must admit other family members especially when they are in difficulties (…) Everybody in Accra has a relation that they can perch with for two or three days for the water to recede. So normally what they do is they put the children and the vulnerable there and then they themselves come and hang around to guard their property. (…) You enable me, I enable you later – those are (…) the coping mechanisms that we have [also in covering emergency costs, for instance for funerals] (NADMO, 2014).

Within this system, money received is paid back depending on the distance of the relation, meaning the closest family is paid back last and thus bears the greatest risk of not being paid back fully. At the same time, the system is slowly eroding in the urban context where relatives are spread across the country. Leakage of meaning and invention of tradition in land sale practices are reconfiguring the links between stool members and their representatives (chiefs), converting them more and more into unclear relations, accompanied by an erosion of trust. Implications for adaptive capacity are not only a loss of social capital but also of financial resources, especially when residents need to pay twice for a plot, or are forced to move to a different plot because of conflicts over land ownership.

These examples merely illustrate how elements of institutional bricolage contribute to an uneven distribution of adaptive capacity such as in the Densu delta. Further examples are the undermining of legal and regulatory frameworks by the leakage of meaning and invention of tradition in chiefly structures and the naturalisation of humanitarian aid structures as NADMO has created voluntary

groups. Again, authoritative processes and their unequal outcomes are a particularly evident element of bricolage in all examples of factors of adaptive capacity. Both people in leading roles and structural power relations such as funding mechanisms perform authority.

Next to the authoritative role of people and structures the cases of bricolage in adaptation in the Densu delta reveal the crucial role of bricoleurs in adaptation and in negotiating for an equitable distribution of adaptive capacity. A bricoleur actively puts together more and less formalized institutions that are within his reach in everyday practice (Funder and Marani, 2015; Johnson, 2012). Local measures rely heavily on committed and influential individuals and their relations with people in other functions. Assembly men, for instance, strategically liaise with chiefs, neighbourhood associations, media, government and consultants to the government to act in the locality's interest (here: adapting to flooding). They do so minding the different visible and invisible institutions they are aware of, and consciously utilize elements of bricolage, for instance by improvising the way of communicating community needs to local government, e.g. by shifting from direct communication to indirect communication via the media. Similarly local NADMO officers adjust the implementation of the 'prevention pays!' strategy to local realities through improvisation in everyday practice, by demanding assurance from the assembly for providing fuel for excavation activities, and combining education activities with the provision of material goods, for example. Both are responses to moral world views according to which the government has the duty to help with material interventions.

CONCLUSION

We have seen that 'leakage of meaning and invention of tradition', 'authoritative process and unequal outcomes', and 'belief systems and world views' are all elements of bricolage that are key in adaptation, and key local stakeholders act as bricoleurs. Together, elements and bricoleurs influence where adaptation is successful, and where it is not. In Tetegu, authoritative processes have enabled house owners to adapt to flood risk by negotiating with local government, chiefs and the private company GWCL. Both access to adaptive capacity and boundaries of formality/informality have become reconfigured during this process. A similar formation of residents in Glefe did not result in adaptation as the actors did not have the social, symbolic and economic resources to perform authority. The ways in which elements of bricolage shape where adaptation is likely and where it isn't, as well as who is likely to adapt and who isn't have been outlined. Here the role of cultural factors such as world views has been stressed. The culturally embedded practice of relying on an extended web of personal relations to cope with risk shapes perceived needs for preparing for floods as well as access to financial resources and options for relocating in the aftermath of a flood event. The institutional bricolage lens appears particularly insightful in the analysis of adaptation and adaptive capacity in urban water governance. It shows that water flows are co-produced in both social and bio-physical processes and relations. It also shows the manifestation of power relations and inequalities in adaptation as bricolage may enhance the adaptive capacity of individuals or groups, but has negative effects on the adaptive capacity of people elsewhere or in the future. Four lines of thought emerge from the results presented in this article.

Firstly, the bricolage lens has highlighted key elements that foster the decisive role of chieftaincy structures in adaptation to urban flooding in the local context of Accra, which can be generalized for urban areas in Ghana. In the present case, individuals use the authoritative role the chieftaincy structures gives to chiefs to claim legitimacy in creating revenue from land. Outcomes of the respective practices in land management are ineffectiveness of governmental land use regulations and planning, continuous housing development on flood prone sites and a particular exposure of recent migrants who ignore both flood risk and the chieftaincy structures in place. The shift of formal authority over land and water use control from traditional leaders to the state, and of land ownership from stools to families and individuals in Ghana is representative of the elements of institutional bricolage, as described by

Cleaver. Governmental rules in land use planning are undermined by chiefdom structures in a bricolage process where customary arrangements for instance for the selling of land plots are reinvented and change in meaning. The powerful role of chiefs in peri-urban land disputes and speculation in Accra has been studied in depth (Barry and Danso, 2014; Gough and Yankson, 2000; Ubink, 2008). In a similar fashion, 'chefes' in Maputo significantly shape urban land titling as a 'twilight institution' at the intersection of local ('informal') and state institutions (Earle, 2014). 'Mafias' exercise public authority by governing land and water in informal settlements in Bangalore (India) (Ranganathan, 2014). What this study adds to the literature is that it highlights the role of the chief as a dynamic institution that can contribute to or hinder adaptation to urban flooding, depending on his own rationalities and institutional context.

Secondly, the bricolage lens offers new insights in adaptive capacity. As indicated above, culture is a factor that has only recently begun to be explored in adaptation literature. Traditional ways of implementing policies, as well as motivational factors, coordination and governance practices are all context-specific factors shaping adaptive capacity in cities of the Global South; however, concepts that capture these are currently lacking (Heinrichs et al., 2013). The factors of adaptive capacity that have been identified in this research are legislation and policy design, enforcement of regulations and political will, collaboration and coordination. Belief systems and world views, leakage of meaning, and invention of tradition have been exposed as key elements shaping these factors of adaptive capacity. These findings highlight the role of culture in adaptation and provide insight on how culturally embedded practices shape adaptive capacity. While Codjoe and Issah (2015) find that culture in a traditional Accra community creates a resistance to innovation and adaptation and a moral rationale of risk avoidance, the results from the Densu delta show that embedded institutions are innovative in adapting to changing conditions, and indicate that adaptive strategies contribute to an acceptance of risk. The findings resonate in stating a willingness of community members to invest voluntary work in collective adaptation strategies. Institutional bricolage therefore appears as a promising concept in further understanding urban adaptive capacity from a Global South perspective. Further research might look into cultural differences in risk perception as a component of adaptive capacity between historical settlements such as those studied by Codjoe and Issah (2015), and settlements where migrants of diverse cultural backgrounds mix, as in the Densu delta. Further research ought to be devoted to finding solutions to overcome cultural barriers to building adaptive capacity and using it to act, both in policy and in local practice.

Thirdly, looking at adaptation to urban flooding and adaptive capacity through institutional bricolage offers new perspectives on the concept itself and its application in the setting of a growing city in a flood-prone area. Developed for the analysis of natural resource management and deployed mostly in a rural context, institutional bricolage also shapes institutions that manage risk and infrastructure, and that operate in conditions of constant change, typical for growing cities. Informal formalisation describes how "those who master current and characteristic modes of expression, who know when to observe tradition and institutionalize rights in informal settings and when to substantiate them through the formal institutions of the state, thrive" (Benjaminsen and Lund, 2002). The bricolage analysis exposed cultural norms, informal formalisation, dynamic chieftaincy structures and innovative bricoleurs as key factors that shape the distribution of adaptive capacity and thus uneven urban development. Actors that are not involved in formal arrangements for flood risk management were identified as key agents in adaptation particularly from the analysis of authoritative process and unequal outcomes. Compared to rural settings, the complexity of actors and institutions in cities offers more opportunities for bricolage, with a multitude of elements of bricolage to draw on. The results moreover reveal parallels to an assemblage analysis of urban flooding which "makes visible unusual suspects involved in the production of flood risk, (…) including state agents, developers, and corporate actors [who] are complicit in the risky encroachment of storm channels" (Ranganathan, 2015). The results of the bricolage analysis of the Densu delta case suggest that here land adds as another layer of

'distributed agency' in the assemblage of flood risk (Ranganathan, 2015). Bringing bricolage and assemblage perspectives into engagement therefore appears promising for further research on patterns of urban flooding and adaptation.

Fourthly, an analysis employing a bricolage lens enables incorporating different forms of knowledge towards transformative adaptation. Adaptation to flooding on the ground is shaped by the interaction of designed and embedded institutions, actively pieced together by key stakeholders, both consciously and unconsciously. From a policy perspective, this main finding of this research implies that bricoleurs hold crucial knowledge on the effectiveness of institutions. Engaging with this knowledge and the flexibility of embedded institutions in policy design and planning might improve the effectiveness of designed institutions on the ground. Current frames for studying and managing global cities are dominated by a Western understanding of what is urban development, and tend to be at odds with lived reality shaped by persistence, creativity and resilience in African cities (Macamo, 2013). Water research tends to study materiality rather than the social relations that are likewise part of the co-production of (urban) water (Ahlers et al., 2014; Budds and Hinojosa, 2012). In exposing alternative forms of knowledge and knowledge holders, the bricolage analysis creates a link between theoretical and practical understanding of urban water flows. At the same time the research has shown that institutional bricolage in adaptation entails unequal outcomes, reducing marginalized urban dwellers' capacity to adapt. Unconscious practices in bricolage moreover render the strategic integration of practical knowledge difficult. Major challenges therefore remain in enhancing the capacities to adapt among those poorly represented by active bricoleurs, and in eliciting knowledge from unconscious practices in institutional bricolage to enhance adaptive capacities. Participatory mapping approaches merging qualitative and quantitative assessments of adaptive capacity in geographical information systems may provide important insights for overcoming inequalities in access to adaptive capacity.

The bricolage lens proved particularly useful to understand how bricoleurs patch together institutions that are at the same time designed, bureaucratic, formal, informal, traditional, corporate, embedded, etc. as is typical of arrangements for risk reduction and adaptation to climate change in African cities (Adelekan et al., 2015). In addition to the crucial role of local government officials as bricoleurs, the authoritative role of traditional chiefs was identified to shape adaptive capacities. The findings of the bricolage analysis support the key role of chiefs due to their culturally embedded authority, but also point to the dynamic of the institution, further influenced by the wider context of global land markets and migration. The authoritative processes and unequal outcomes identified in the triangle of government, traditional and market authority illustrate what Benjaminsen and Lund (2002) have described as informal formalisation in Africa. As the case study illustrates, not only individual bricoleurs but also groups use the ability to know when to draw on what kind of institutions to adapt. The results of bricolage in adaptation are inherently uneven as bricolage may enhance the adaptive capacity of individuals or groups, but at the same time negatively affects adaptive capacity elsewhere, at other scales, or in the future. Institutional bricolage therefore doesn't enhance adaptive capacity of a community as such. Officials' reports on practices undermining the implementation of designed institutions hint to the significance of institutional bricolage and bricoleurs acting across various scales. This paper has focused on bricolage in adaptation at local level. Further research is needed on how people decide which institution to turn to in adaptation, on the role of institutional bricolage in adaptation at higher levels of policy design and implementation across scales, how the uneven outcomes of institutional bricolage in adaptation are shown in the spatial distribution of flood risk, and ultimately how inequalities can be overcome and flood risk reduced for all.

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