



**INTERNATIONAL FOOD
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**Information Flow and Acquisition of Knowledge in Water
Governance in the Upper East Region of Ghana**

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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ABSTRACT

This paper provides an assessment of information flows and the acquisition of knowledge in water governance of the Upper East Region, Ghana. These flows are patchy, often parallel, disconnected or slow. In many cases a great deal of information is gathered but for a number of reasons not transferred into knowledge that impacts on decision making and action. An analysis of knowledge flows can serve as guidance for research projects and capacity building endeavours to allow tackling the gap between data collection and knowledge for action.

Keywords: water governance, Ghana, information flow, irrigation, drinking water

ABBREVIATIONS AND ACRONYMS

CWSA	Community Water and Sanitation Agency (responsible for rural drinking water supply)
DISCAP	District Capacity Building Project, financed by the Canadian Development Assistance CIDA
EPA	Environmental Protection Agency
IFPRI	International Food Policy Research Institute
LACOSREP	Upper East Region Land Conservation and Smallholder Rehabilitation Project, funded by IFAD
MOFA	Ministry of Food and Agriculture
NGO	Non-governmental organization
UER	Upper East Region of Ghana
WUA	Water User Association (for the management of small reservoirs)
WATSAN	Community Water and Sanitation Committee (for boreholes)
WRC	Water Resources Commission

1. INTRODUCTION

External observers as well as policy makers and implementers in developing countries increasingly see knowledge as one of the crucial bottlenecks to the improvement of governance and service provision in developing countries. The 1998 World Development Report (World Bank 1999) identifies knowledge as one of the major factors for development. However for a concrete impact on the lives of people in these countries, the general commitment to the closing of knowledge gaps needs to be supported by concrete analysis of the specific knowledge needed and the networks of information flows, the brokers and gaps in this network.

This paper provides an example how such an assessment of information flows and the acquisition of knowledge can be undertaken and help to understand policy processes. The case is drawn from water governance of the Upper East Region, Ghana. These flows are patchy, often parallel, disconnected or slow. In many cases a great deal of information is gathered but for a number of reasons not transferred into knowledge that impacts on decision making and action. An analysis of knowledge flows can serve as guidance for research projects and capacity building endeavours to allow tackling the gap between data collection and knowledge for action (Boateng 2006 observes similar obstacles for agricultural extension in Ghana, see Le Borgne et al. 2007 for an exploration of disconnected knowledge networks in the Water and Sanitation sector in South America).

The paper starts with a brief overview of the basic concepts of data, information, knowledge, decision making and action; and develops a framework for examining the links between these components (Section 2). In Section 3, we present the case study region and the research methods applied, followed by a rich description of the water governance actors in the Upper East Region in Section 4. In Section 5, the hierarchical knowledge flows in agricultural and domestic water governance are analyzed and the role of brokerage for innovation is explored. We discuss the crucial challenges for different actors involved in the process and conclude by highlighting the further research needs and some implications for impact oriented researchers.

2. DEFINITIONS AND CONCEPTS

Data, Information, Knowledge, Decision Making and Action

In this paper, data, information, knowledge, decision making and action are seen as connected but distinct aspects shaping governance. Data encompass all observable phenomena such as sounds, figures, natural processes etc. Information is seen as data that is selectively collected and recorded. Information can exist outside individuals' minds, for example in written form. Knowledge however is bound to a human mind. It is information that is "digested" and which people have filled with meaning. Knowledge both structures and enables action (Berger, Luckman 1966). Decision making is the cognitive process that leads to the selection of a course of action among different options. This can refer to decisions about actions as well as about opinions. With respect to the questions of water governance explored here, the focus is on decision making that leads to actions and decisions reached amongst groups of actors rather than individuals. Decision making (be it achieved through a long and formal process or rather intuitive and ad-hoc) is a crucial pre-requisite for action, which is seen as involving a goal, an intention and a physical reflection/activity/movement.

Regarding knowledge more specifically, there are different types of knowledge that can potentially impact decision making and action. With respect to water governance in the Upper East Region of northern Ghana, different knowledge domains / types of knowledge have this potential, e.g.:

- Technical scientific knowledge such as hydrological information about groundwater and surface water flows, potential impacts of climate change, etc.
- Personal know-how, such as how to construct a dam that does not leak, how to plough to minimize erosion, and how to use technical equipment.
- Evaluation knowledge that captures the site-specific effects of past actions. This knowledge encompasses the impact of governance activities on livelihoods and local water use practice.
- Knowledge about procedures, structures and opportunities, e.g. how, where and when can communities apply for assistance, who are formal and informal decision makers, how do communities make decisions¹.

Figure 1, further explores these knowledge domains according to their characteristics concerning the following dimensions:

Dimension 1: Top down or the bottom up information flow? Most technical scientific information enters the governance setting from a higher level such as national or international research institutions, aiming at having an impact in the field (top-down). On the other hand, evaluation knowledge typically is gathered on the project or community level, to be fed into higher level decision making and planning processes (bottom-up). Knowledge about structures and opportunities and know-how would be seen between these two as these kinds of knowledge tend to be applied on the level they were acquired rather than flowing up or down the hierarchies.

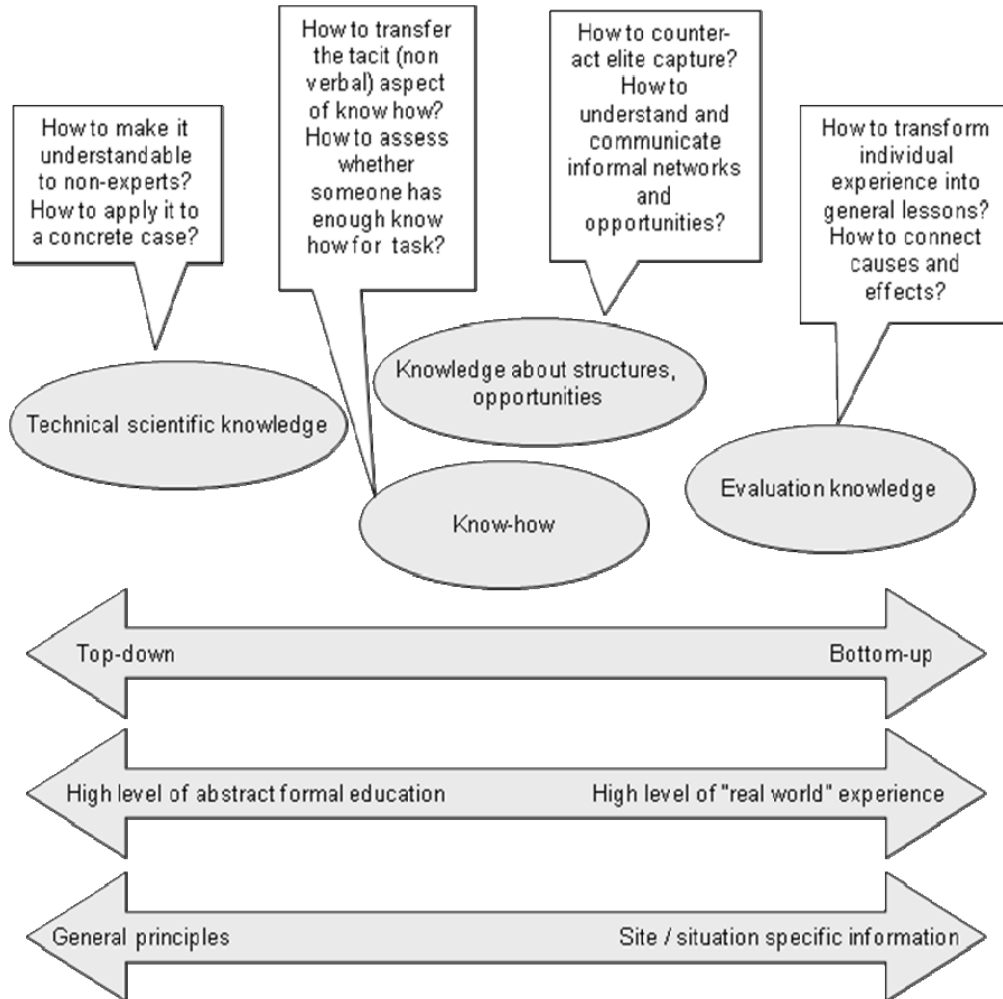
Dimension 2: Abstract formal education or hands-on experience required to gather and use this knowledge? Again, technical scientific knowledge and evaluation knowledge range at the outer ends of the scale while knowledge about structures and opportunities and know-how are seen as domains that require the combination of both.

Dimension 3: General principles or site and situation specific information? Technical and scientific knowledge attempts to give general rules: Under these conditions, we expect this to happen. Evaluation knowledge on the other hand is gathered by asking very specifically: What happened in this concrete case, what were the effects of this interaction? Knowledge about structures and opportunities is a combination where actors benefit from a more general understanding of how societies and

¹ One example of community decision-making processes is the decision about pricing for domestic water as analyzed in Engel, Iskandarani, and Pilar Useche, 2005.

administrations are structured and combine this with very concrete information about actual structures and opportunities in their fields. While know-how often builds on general principles (e.g. principles of engineering), the challenge is to correctly assess the specific situation and apply these principles accordingly.

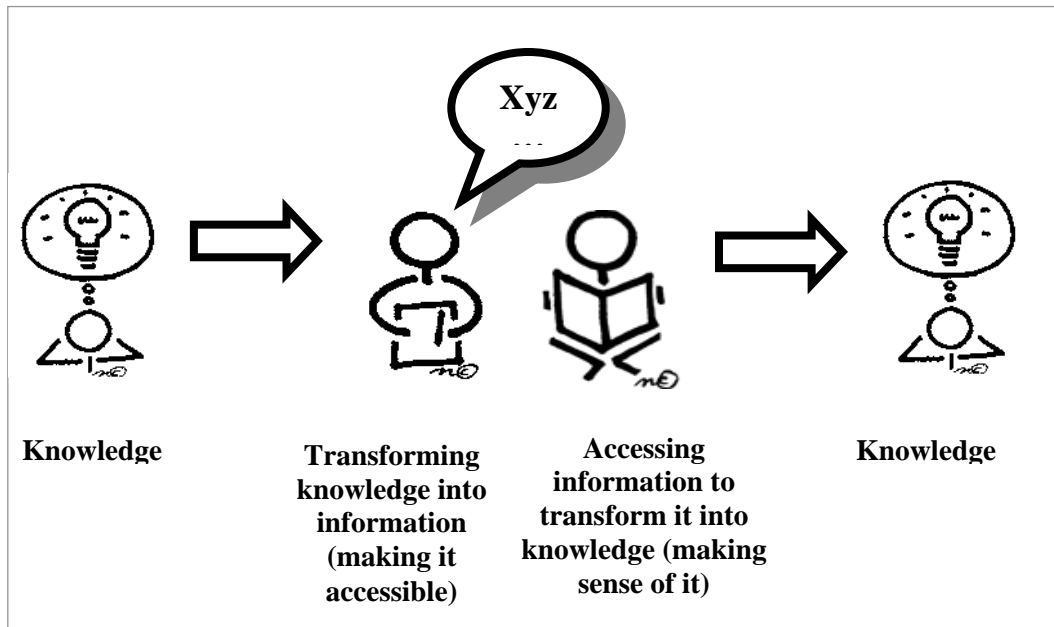
Figure 1. Knowledge domains in water governance (own source)



Information Flows and Knowledge Acquisition

Knowledge generation through the flow of information is captured in Figure 2. If one actor puts his or her knowledge into words (or figures, signs, etc.), it becomes information, which other actors can then access to increase their own knowledge. For an analysis of information flows and the acquisition of knowledge it is important to understand that different kinds of knowledge can be transmitted in different ways. Explicit knowledge can be expressed and transferred through language, while tacit knowledge (“know how”) is applied and transferred through action, experience and observation. A typical example for the acquisition of tacit knowledge is learning how to ride a bicycle. Reading and talking about cycling will not suffice to teach someone how to ride (Nonaka, 1994).

Figure 2. Information flow and acquisition of knowledge (own source)



In the context of governance, it is especially interesting to analyze information flows from different sources (e.g. researchers, practitioners, civil society) in order to assess the way such information influences the knowledge acquired by a decision-maker. This assessment can be combined with an analysis of the structure of information networks, which also affects the way in which information is transferred and transformed, as detailed in the following section.

Hierarchical Information Flows and the Role of Brokerage

The governance field analyzed here is structured by a number of more or less hierarchical organisations (e.g. Ministries) that focus on different thematic fields (such as agriculture, drinking water, fisheries). Ghana has embraced a decentralisation approach so that the governmental organisations involved share a structure of different levels from local (unit, community, village, electoral area) to district, regional and national representation.

The respective organisational bodies have institutionalised mechanisms to ensure vertical information flow, following the lines of command. However, apart from these vertical flows, knowledge also spreads following the way individual actors get in contact with each other within and beyond organisational boundaries. This refers to a concept called brokerage in social network analysis. A broker is an actor who can build a bridge between disconnected groups and facilitate the exchange of information between them. Following the classic argument of Granovetter (1973) we observe, that brokerage and weak ties are crucial in the development and transmission of innovations: The closely-knit communities of knowledge within one hierarchical organisation practice regular and institutionalized exchange, thus the members level their knowledge and develop a common knowledge pool. Exchange with actors from different backgrounds, who belong to different clusters, can allow new ideas to enter this system.

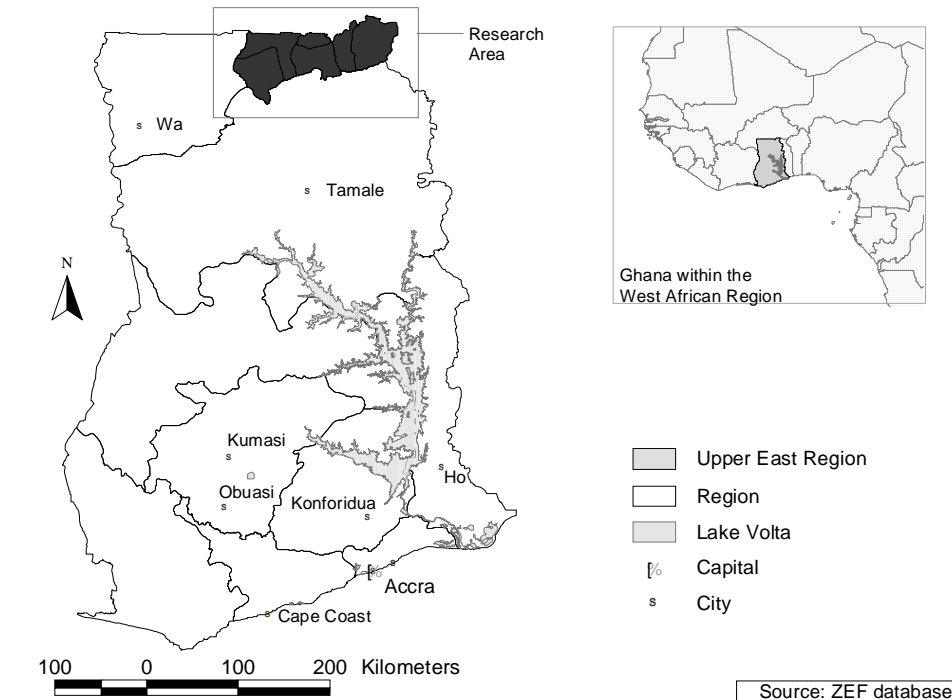
Below we follow the vertical flows of information in the water governance of the Upper East Region. These flows are analysed for the two main governance areas of domestic and agricultural water use.

3. PROFILE OF THE UPPER EAST REGION AND RESEARCH METHODS

Upper East Region

The Upper East Region (UER) is the poorest and one of the most densely populated of the 10 administrative regions of Ghana. The region is divided into eight administrative districts. Agriculture is the major economic activity with subsistence farming being the main feature. But the region has a single, short rainy season.

Figure 3. Ghana and the Upper East Region (curled from Engel et al 2005)



The dry season lasts from November to April, often with no rain at all during these months. This results in the drying up of most surface water sources in the area, as well as many domestic water wells and some boreholes.

Research Methods

The empirical basis for the paper are stakeholder interviews with governmental and NGO actors, discussions with fellow researchers in the region (including the IFAD-LACOSERP² evaluation team), community needs assessments in 20 villages in all Districts of the Upper East Region and interaction with the regional and district administration of all eight districts in the UER. The research team, in collaboration with the White Volta Basin Office, held three workshops, where key stakeholders in the water sector discussed knowledge needs and policy options.

² LACOSERP (Upper East Region Land Conservation and Smallholder Rehabilitation Project), funded by IFAD and the Government of Ghana is the core actor in the rehabilitation of small dams in the region. The second phase of the project ends Sept. 2005 (Project Coordinating Unit MOFA/IFAD LACOSERP II).

4. WATER GOVERNANCE ACTORS IN THE UPPER EAST REGION

The water governance of the Upper East Region is made up of a complex set of actors which are all potential agents for the exchange of information. For a more extensive description, see Birner et al. 2005.

Governmental Actors

The decentralized government system consists of regions, which are governed by the Regional Coordinating Councils, and the Districts, which are governed by District Assemblies. Government levels below the District are the area council and on the lowest level, the unit committee.

The major decision making capacities with respect to planning and public investment in water infrastructure are either vested with the national government or the District Assemblies, while the regional administration plays a mainly co-coordinating role (Local Government Act of 1993 (Act 462). The term “District Assembly” refers both to the legislative branch (elected and appointed members of the General Assembly) and the district administration. The responsibility of the District Assemblies in the water sector can be divided into:

- Investment decisions.
- Providing management support and capacity building for communities who are supposed to manage their own water infrastructure.
- Regulatory functions.

The elected members of the District Assembly are each responsible for their electoral area, which comprises a number of villages. While the Assembly is supposed to meet several times a year, some districts are subject to conflict that prevented Assembly meetings for years in a row. The major sector Ministries in charge of providing public services have also been decentralized, so that considerable authority has been devolved to regional or district-level offices.

The core ministries involved in water governance are: Ministry of Food and Agriculture (MoFA), Community Ministry of Works and Housing (on the regional and district levels as: Community Water and Sanitation Agency, CWSA), Ministry of Health (MoH), Environmental Protection Agency (EPA) and the Ministry of Fisheries.

With the aim of increasing the co-ordination within the water sector the Ghanaian government created the Water Resources Commission (WRC; Water Resources Act of 1996), with members representing all government agencies that are involved in water resources management, a member appointed by the national house of chiefs, and two additional members, one of which should be a woman. In the Upper East Region, a decentralized body of the WRC, the White Volta Basin Board started operation in 2007.

NGO Sector

The Upper East Region has an active NGO community involved in water issues. While some of them are involved in funding and / or physically building water infrastructure (dams, boreholes, hand dug wells), a majority is involved in facilitating information flow and the acquisition of knowledge focusing on government actors and community members alike.

Donor-Funded Projects

The major sources of funding for water-related infrastructure are donor agencies. They support projects that are either implemented through the existing administrative structures, or through special project implementation units.

Private Sector

The private sector actors involved in the water sector in the Upper East Region are manifold and their mandate has increased following a world wide trend of increased private sector involvement in the provision of public services. In the construction of boreholes, hydrological surveyors determine the suitability of sites for drilling, building contractors do the actual drilling, and technical assistance consultancies train communities and facilitate the formation of Water and Sanitation Committees (WATSAN). Private contractors construct small dams.

Water Users' Organizations

The users of small reservoirs in rural communities are organized as Water Users' Associations (WUAs) that are responsible for coordinating the access to land and water, the collection of water fees and the maintenance of the dam. Each borehole is supposed to have a WATSAN (Water and Sanitation) committee that is responsible for maintenance of the pump and collecting maintenance fees from the users. Some of the bigger villages or small towns have community owned small town water systems that are run by a community based Water Board. In the urban centres of the region, drinking water is provided by the Ghana Water Company Ltd.

Types of Knowledge Held/Provided by Different Actors

Members of all the above groups will have some share in the different categories of knowledge discussed above, namely technical scientific knowledge, know-how, evaluation knowledge and knowledge about procedures, structures and opportunities. In the agencies and organisations providing service to the users (government, NGOs and Donors), the technical scientific knowledge might include knowledge about water flows and availability, know-how will be crucial especially for field staff e.g. when introducing new technical solutions to communities or faced with local water related problems. The field staff are at the same time core actors in collecting and potentially transmitting evaluation knowledge, as the frontline staff experiences directly whether and how interventions work out on the ground. Knowledge about procedures, structures and opportunities concerns the internal structures as well as the interaction with other agencies and actors or the internal structures of partners and while actors in the centre of an organisation (e.g. national headquarter) might be best equipped to fully understand internal procedures, structures and opportunities, those actors at the margins that have high levels of interaction with external actors are crucial for informing the organisation about external structures.

The water users and their organisations will have a profound knowledge in those aspects that are located on the right side of Figure 1 (especially evaluation knowledge), as they are faced with the realities on the ground in their daily livelihoods activities. In terms of know-how, they will be especially experienced with those questions pertaining to these livelihood endeavours. One can assume, however, that the knowledge about procedures, structures and opportunities is not as equally spread among all water users but specific actors (either because of their position within the water user organisation or because of their position in the general social fabric) have a broader knowledge than others. As the scientific knowledge tends to be connected to schooling and access to formal information channels, this kind of knowledge will be least common in those locations where general education levels are low.

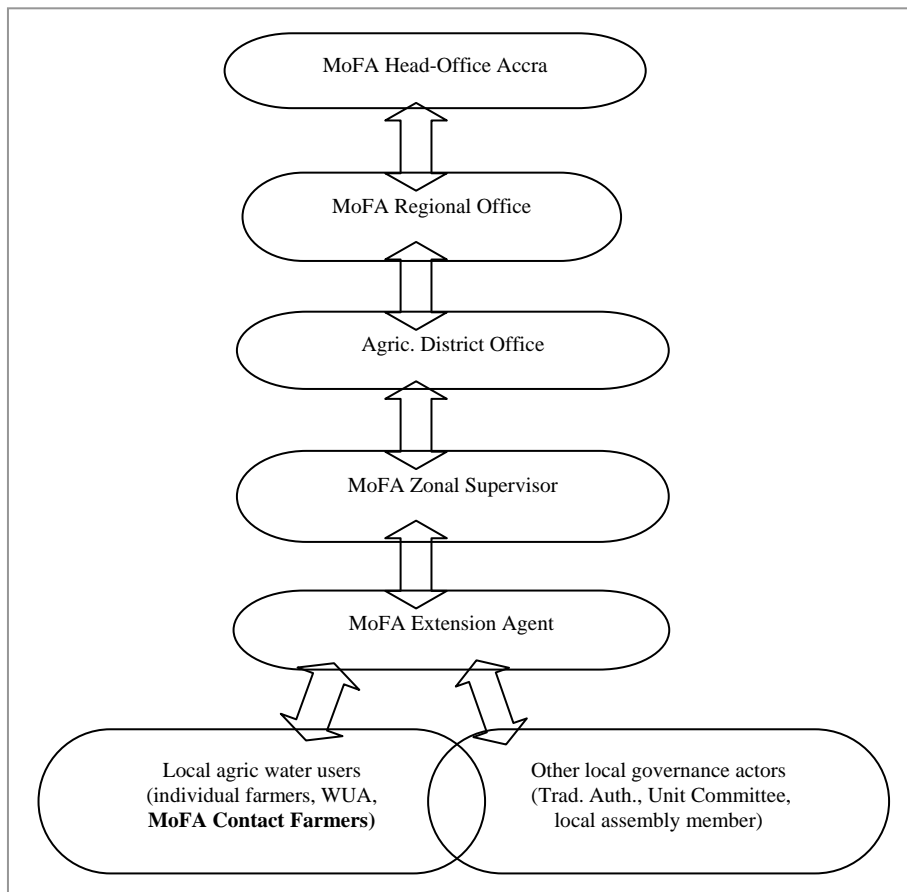
5. KNOWLEDGE FLOWS IN WATER GOVERNANCE IN THE UER

Hierarchical Information Flows in Agricultural Water Use Governance

The core governmental actor involved in agricultural water use is the Ministry of Food and Agriculture (MoFA). The decentralised Ministry has a strong presence on all levels in the Upper East, with Regional and District offices and a substantial number of agricultural extension workers to reach out to the local level. The extension workers are encouraged to ensure information flow within the villages they work with by choosing contact farmers who are responsible for facilitating the dissemination of information towards their fellow farmers. The Water Users' Associations (WUA) of communities with dams bundle the collective action around the dam and give the local people a common voice³.

The primary path of hierarchical information flows to and from the local water users goes from local actors such as the WUA or contact farmers through the Agricultural Extension Agents to their Zonal Supervisor, the District Director of Agriculture, the Regional Office and finally - if required - head office in Accra.

Figure 4. Hierarchical information flow in agricultural water use (own source)



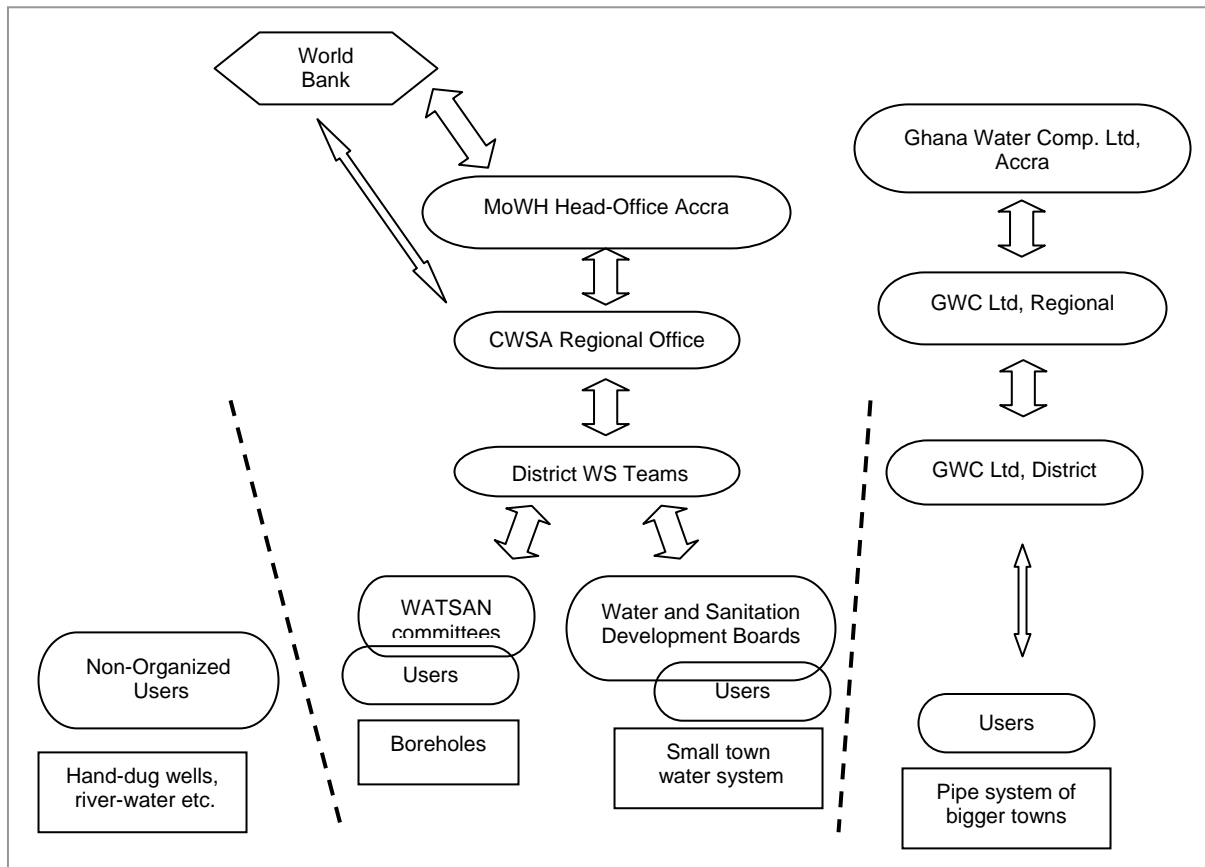
³ In some cases WUAs have been observed to tell their agricultural extension workers of specific knowledge needs (e.g. about crop diseases). Answering these needs MoFA organized on site training by outside expert for the interested farmers.

Hierarchical Information Flows in Domestic Water Use Governance

The actors involved in domestic water governance differ according to the kind of water infrastructure involved and the size of settlement. For rural communities with boreholes and for small towns with a locally run small town water system the path connects the local management body (Water and Sanitation committees for boreholes or Water and Sanitation Development Boards for small town water systems) with the DWSTs (District Water and Sanitation Teams), the Regional Community Water and Sanitation Office and their headquarter at the Ministry of Works and Housing in Accra. As the major donor involved, the World Bank requires and gives information from/to the Ministry of Works and Housing. But regional staff of CWSA also recounted occasional direct exchange of the regional level with the Bank.

As shown in Figure 5, two groups of water uses are not involved in the hierarchical exchange described above: Those inhabitants of bigger towns that get piped water through Ghana Water Company Ltd and the users of less elaborate water sources like hand dug wells, streams and dug-outs.

Figure 5. Hierarchical information flow in domestic water use (own source)



The Role and Potentials of Brokerage in Water Governance in the UER

Both in irrigation and domestic water use there were information flows that did not follow these hierarchical structures. As explained above, brokers between different clusters of a network can nurture innovation and drive change. We observed this in the community needs assessment, when looking at sources for innovation on the local level.

The region faces a high level of seasonal migration. Even though the absence of parts of the workforce in the dry season puts stress on the communities, we observed that a number of innovations were brought back to the communities by those local actors who were exposed to different environments and practices while migrating. The more mobile community members brought knowledge about opportunities and procedures (e.g. about funding for boreholes) as well as know-how (e.g. improved farming practices) back to their communities. Examples for the brokerage through mobile community members were found in the community around the Tonde dam (Bawku West District). This community was faced with the problem that roaming livestock destroyed their crops on irrigated fields. Through exchange visits farmers were exposed to different techniques of protecting their crops (placing guards on the fields to chase away the livestock or building mud-walls before the planting season). After trying out both options, the people of Tonde chose the construction of mud-walls as their preferred technique. These exchange visits also encouraged the farmers to learn from other communities' experience in onion farming. Cross-boundary mobility inspired innovation around the district capital Navrongo: Farmers learnt about improved tomato growing techniques through mobile farm labourers who cross the border to work in the tomato picking in Burkina.

Multi-stakeholder organizations are one approach to institutionalizing structures that facilitate brokerage. The Water Resources Commission with its decentralized bodies, the basin boards is one example. The first meetings of the new White Volta Basin Board were characterized by intense knowledge exchange between the different participants from various line ministries, district administrations, NGOs, the research sector and traditional authorities.

6. DISCUSSION

How are the research findings linked to the sequence sketched above: Data gathered becomes information, is transformed into knowledge by the understanding individual, and serves as the basis for decision making and action? Throughout the research it was questioned if this sequence is followed as stringently in practice as it is elegant in theory. Two major gaps were observed:

- Information available was often not transformed into knowledge
- Knowledge was often not the major determinant for decision making.

A number of agencies conduct large scale data collection activities (such as the GTZ poverty mapping and very similar studies by CIDA and UNICEF amongst others). These result in impressive data bases, maps etc. However the experience of the researchers showed that this information rarely formed the basis for the office holders' daily work. Even if in theory publicly available, the information was difficult to obtain as often none of the agencies supposed to use it, could find it in their offices. The isolated nature of these data-bases is also reflected by the fact that a number of Donor agencies conduct nearly the same exercise of counting boreholes and other public infrastructure, paying the same groups of district staff to gather information that they have collected for (and sold to) another donor just a few months ago.

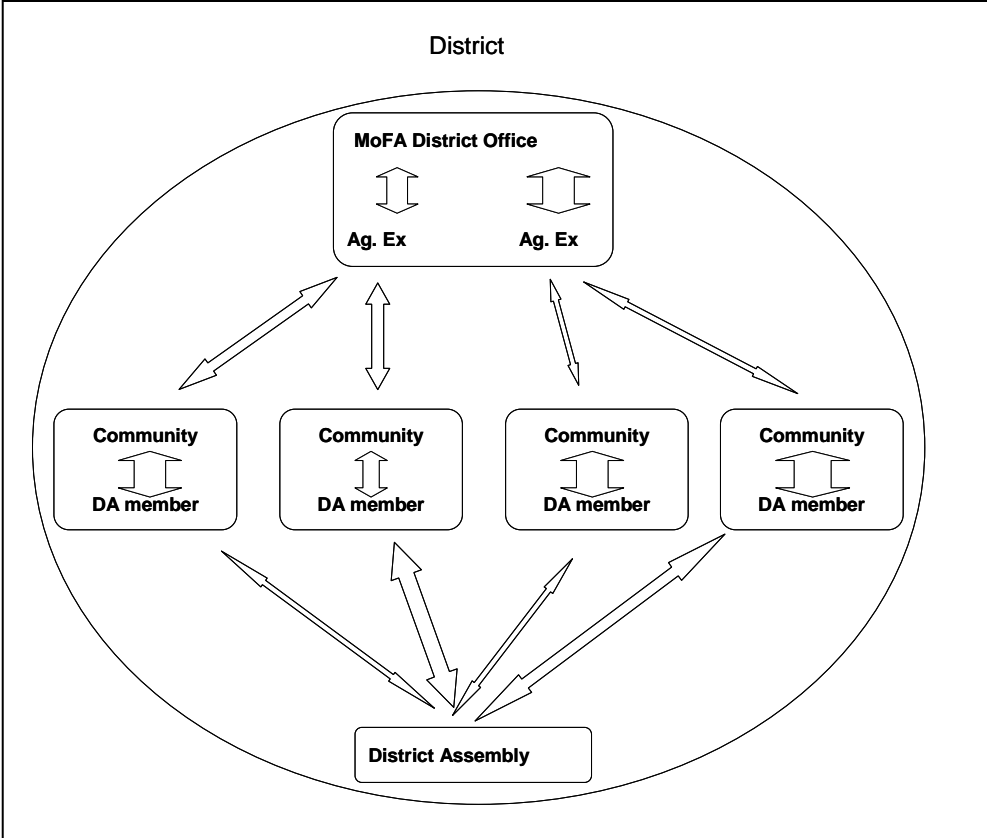
The second gap observed concerns the link between knowledge and decision making. The questions that have to be tackled here are:

- What kind of knowledge is most likely to impact on decision making of different actors?
- How can it be packaged for easy use in the policy process?
- What are the other factors impacting on decision making?
- And who will use information and knowledge to what aim?

The hierarchical information flows were the easiest to assess, as they normally follow well documented procedures. However, the researchers observed that reality tended to differ distinctly from these formal procedures. Stakeholders on each level of the hierarchy complained about delays in their exchange with partners from the other levels. The gap was especially prominent between the Districts and the actors below the district level. Information flows between communities and their representatives and the district level officials were often described as sporadic at best. The involvement of the different communities in the information exchange varied strongly. Reasons for that were seen both in spatial biases (accessibility of communities) and personal networks.

Two important actor groups that are supposed to ensure the information flow between the district administration and the communities are agricultural extension officers and the elected members of the District Assembly. The system gives both of them specific structural strengths and weaknesses in linking the district with lower levels. The agricultural extension workers are normally based in the district capital and go out to the field from there. This means that it is relatively easy for them, to gather district level information. On the other hand the "delivery" of information to or gathering information from the community level bears a considerable cost for them (transport, time, effort).

Figure 6. Hierarchical information flow between district and communities (own source)



The elected Assembly members normally stay in their electoral areas / the communities. They are expected to come to the district capital to attend Assembly meetings. These are supposed to be quarterly, but in Bawku Municipal for example, local conflicts have prevented Assembly meetings for a number of years in a row. So the Assembly members are in a position where the sharing of information with the community can be accomplished at low cost. However, the acquisition of knowledge from the District level or delivering community level knowledge to the district can be costly and sporadic.

7. CONCLUSION

For those involved in the communication processes on various levels, the fact that these communication processes are patchy can lead to significant drawbacks if for example development agencies spend money on repeatedly collecting the same information, farming innovations used in one community are not known to the next or communities and individuals with less pronounced networks fail to find out about funding opportunities for infrastructure.

Given the nature of the Region with low access to modern information technologies and a spread-out rural population, the communication challenge is one of the obstacles that all development actors need to include in their strategic planning and actions to be successful in their activities. As shown above, a strong potential lies in brokerage between different sectors, areas, agencies and communities of knowledge. While brokerage often occurs as a spontaneous process or by-product of other activities (e.g. work migration), the experience in Northern Ghana shows that agencies can consciously develop structures and opportunities that encourage and facilitate brokerage on different levels, from community exchange visits to multi-stakeholder commissions.

For researchers who aim at influencing policy making and governance decisions it is important to bear in mind that in these governance settings information often only serves as contributing factor to decision making and a more integrated view of all driving forces might improve the impact of research as it guides the researchers as to where and how to present research findings.

Further research will be needed to establish, how the gap in information flow between communities and districts could be reduced. An especially promising approach would be a comparison between communities with strong and those with weak linkages.

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