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**ACCESS TO SANITATION AND SAFE WATER:  
GLOBAL PARTNERSHIPS AND LOCAL ACTIONS**

**Visualisation of problems and solutions to ensure access  
to water resource**

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*Usually, before construction of small reservoir infrastructure in the Upper East Region of Ghana, the future users of the reservoir are given the opportunity to give feedback as to their needs, want and concerns through a series of participatory approaches. The future of the infrastructure is also discussed and communities are stimulated to form various types of associations to ensure that levies are paid and maintenance is carried out. However, once the infrastructure is physically ready, developers leave the communities and the extension agents to deal with this new infrastructure, relatively unsupported. This paper discusses the results from a small research project which studied the infrastructure problems that water-user communities are faced with after reservoir construction. The focus of the research was on the use of visualization methods as communications means between researchers, water-user communities and agricultural extension agents to examine how they can collectively come up and discuss solutions to deal with these problems.*

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**Introduction**

In order to gain access to water resources means, infrastructure of some kind has to be developed so that water can be caught, stored and transported. In the Upper East Region (UER) of Ghana, small reservoir systems have been constructed to catch the run-off during the rainy season. This water is stored for small-scale irrigation, livestock watering, fishing and domestic (non-drinking) use during the dry season.

Managing a water resource, however, does not only mean establishing how water is caught and how the supply is distributed. It also means making sure that the source and water transport systems are maintained. But, for the water-user communities in the UER it has been difficult to carry out maintenance on the reservoir systems. This has led to large-scale investment by development organizations in small reservoirs rehabilitation projects. The investment has ensured that the reservoirs are (somewhat) functional again. The lack of maintenance issue, however, has apparently not been solved.

This paper presents research which is being conducted on 12 small reservoir sites in the UER. The research is still in progress and is part of a larger research project which was initiated in part to search for answers as to why maintenance is not carried out and how the water-user communities can be educated or stimulated to do so. In search of these answers researchers have gone into the region to find that there is little documentation on the reservoir sites and their specific problems. Most information is stored in minds of the water-user communities and the agricultural extension agents (AEAs). Thus conflicting and confusing stories about the problems at hand have been gathered, which is why the research team has, so far, applied a mapping approach. In this approach visualisation methods were used to determine whether and how these could be applied in the future for development of a basis for common dialogue between water-user communities, researchers and agricultural extension agents.

**Involvement of water-users**

Integrated Water resources Management and the Dublin Principles remind those of us involved water development and management that it “should be based on a participatory approach, involving users, planners and policy makers at all levels.” (Principle 2, Dublin Statement Conference Report, 1992)

Involvement of these stakeholders implies communicating with them and enabling them to express their opinions about and suggestions for development and management. Deciding upon the manner in which to communicate, however, is often difficult, especially when it concerns communication between stakeholders who have different cultural, language, education and experiential differences.

The “perceived problems of outsiders missing or mis-communication with local people in the context of development work,” (World Bank, 1996, Appendix I) was one reason why a shift in the rural development paradigm took place. This shift from the old “traditional” development paradigm to a new development paradigm showed its first signs some thirty years ago. As that shift took place we were introduced to *Rural Appraisals* by Chambers in 1983, and the use of terms such as *participatory approaches*, *participatory rural appraisals*, *participatory learning* and *participatory action research* (Chambers 1993, Cornwall, 2002) in the 1990s. According to Chambers (1993, after various articles of D.Korten and of F.Korten and Bagadion, 1985), the “new” paradigm is more focused on rural development as a learning-process approach. In this approach it is postulated that rural complexity be taken into account and viewed, not as a problem, but as an opportunity (Chambers 1993) to seek out new possibilities rather than to concentrate on that which has already been identified not to be working.

In the case of small reservoirs, something that has previously been identified as *not working* is the carrying out of maintenance. In the 1950s and 60s this would have been attributed to water-user ignorance and so water-users were taught. In the 1970s and 80s lack of maintenance was considered to be due to farm-level constraints and inputs were brought in. In the 90s it was identified that the technology did not fit and so water-user participation was encouraged to enhance water-users’ competence. (after Chambers, 1993) This research project, however, is working with water-user communities and AEAs to seek out new possibilities for maintenance which are feasible for water-users to start themselves considering the conditions at the sites. Through a mapping approach the researchers examined with the water-users and AEAs why maintenance is not or can not be carried out and, in the second place, to learn about and discuss actual possibilities for maintenance activities.

In this mapping approach pictures and drawings were made by the water-users and then used to gain feedback in order to stimulate dialogue between the water-users, AEAs and researchers. In terms of communication, pictures and drawings are representational media; they are a physical means of converting a message (where the water-users view problems are) into signals (Fiske, 1990) which can be transmitted to the other stakeholders. Another manner in which researchers in this project gained and gave feedback, was through the making of scale-models of the situation and the possible solutions. Water-users, AEAs and researchers learnt from each other through the collective development of the scale model, making changes to it and giving comments about it and the made changes. The applied approach is described below.

## Approach

The approach follows the ideas behind action research as proposed by Kurt Lewin, whereby research proceeds in a cyclical manner where in the steps include planning, acting, observing and evaluation of results. (McTaggart, 1997) Since the results are dependant on how the various groups interact, research plans need to be flexible and responsive. The described phases therefore build up on the results of the previous phase. They all focus on examination of the possibilities that water-users feel are present, starting in phase I with examination of the general idea that some kind of improvement in the reservoir situations is desirable. Field conditions and stakeholders’ desires then led to narrower focus per phase and at each site.

The applied approach includes various aspects of participatory approaches or tools such as transect walks, community mapping, household sketches, base mapping and community meetings. The general focus of the research project is on how to share information concerning maintenance possibilities between researchers, small reservoirs water-users and stakeholders such as the agricultural extension agents and the department of agriculture. The focus of the activities described below was on examination of:

- how local water-users perceive and communicate the problems they encounter at their reservoir sites;
- the manners in which stakeholders exchange or receive information and the manners in which they would prefer to do so.
- how problems are solved or can be solved considering the scarce access to resources as experienced by the water-user communities.

These activities were carried out in three phases over the course of a year.

## Phase I

In the first phase research work was geared towards:

- Gaining insight in the general status of small reservoir rehabilitation projects in the region;
- Gaining insight in the issues that the district directors of agriculture view as most important to tackle in the relatively short- to middle long-term;
- Gaining a first impression of the situation at the 12 chosen reservoir sites;
- Introducing the project and its ideas to and gaining feedback from the 12 water-user communities and the district directors of agriculture about these ideas;
- Gaining an initial impression of the situation with which the 12 communities are dealing
- Determining which time of the year is most “ideal” for researchers to ask communities for further time and input.

The research team held semi-structured interviews with the district directors of the departments of agriculture and held transect walks and small group discussions with the water-user communities at 12 chosen reservoir sites. The most important findings from these first phase activities were that:

- Despite some large-scale projects that worked to fill them, directors and agricultural extension agents still felt there were gaps in the manner in which agricultural extension agents and departments are able to work with the water-users;
- Water-user communities and extension agents had many ideas for solving problems, but these generally required many materials such as heavy machinery (as can be seen in photograph 2) which are not readily abundant and therefore were waiting for funding. In the meantime they were unsure of what to do;
- Water-users and AEAs were well aware of the effects of “irregular” maintenance of the reservoir infrastructure. However, they indicate that there is not enough time, man power or money for regular or for large-scale maintenance;
- One of the best times to communicate with the various water-users is during the dry season and after the Christmas harvest.

The information concerning the problems at the reservoir sites, however, showed some discrepancy with the information gathered from other researchers of the larger project who had also been to a number of the same reservoir sites. Past research often focused on teaching the water-users that they needed to carry out maintenance. Such teaching, however, was not done from a water-users point of view and often required water-users to do or understand thing which they are not familiar with. Problems were therefore often attributed to a lack of understanding, a lack of feeling of ownership or laziness. Sometimes this was the case, but the initial meetings already showed that lack of maintenance was more likely caused by something else. For example, saving up money is not a common-place as it is to the foreign researcher and therefore the concept has not found its footing everywhere.

Thus, the second phase of the research was focused on finding ways to make identified problems more explicit so that other stakeholders (such as foreign researchers or organisations or even agricultural extension agents) could better understand what was going on. The phase was aimed towards determining whether drawings would help in this explication and to overcome difficulty in communication due misunderstanding about terminology or because of pre-fixed ideas about the situation of the water-users, the researchers, the organisations and the AEAs.

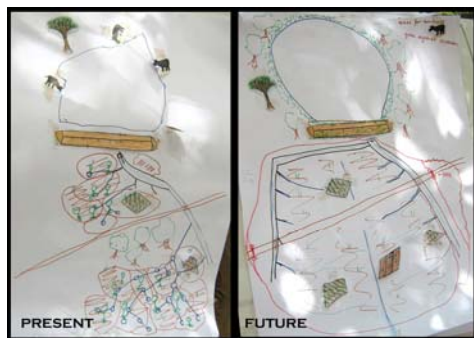
## Phase II

The first step towards determining how problems could be made more explicit, the activities described in Table 1 were carried out during Phase II.

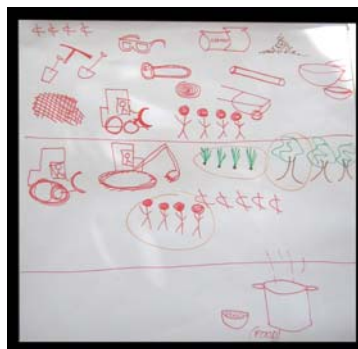
<b>Table 1. Activities carried out by the research team, Phase II</b>		
<b>Activity</b>	<b>With which stakeholders</b>	<b>With what purpose</b>
A. Discussion groups	Water-user Communities	To identify how problems concerning the small reservoirs are expressed to other stakeholders

<p>B. Mapping approach through drawing          - drawing of site          - identification of problem areas          - indication of future situation          review of materials needed            (see photograph 1)</p>	<p>Water-user Communities</p>	<p>a.          To develop a map which is used to help explain situation to researchers and agricultural extension agents          b.          To indicate where the problems are          c.          To identify water-users community's desired future situation          d.          To list materials and resources needed to achieve that future situation</p>
<p>C. Group discussion: resource and responsibility identification            (see photograph 2)</p>	<p>Water-user Communities</p>	<p>a.          To determine availability and access to identified resources          b.          To determine who are, who should be and who can be responsible for supply of resources.</p>
<p>D. Review Discussion</p>	<p>Water-user Communities</p>	<p>To evaluate the mapping approach</p>
<p>E. Semi-structured interviews</p>	<p>Agricultural Extension Agents</p>	<p>a.          To identify which problems they know or feel are at the small reservoir sites          b.          To discuss the communities' drawings and identified problems          c.          To start identification of limiting and enabling factors to problem solving</p>

An example of the results of activity B and part of C is given in Photographs 1 and 2, which show drawings made by the water-users. In Photograph 1, water-users have drawn the present situation at their dam site on the left and the envisioned future on the right (result of activity B). Photograph 2 shows the drawing of the materials needed to realise that envisioned future, whereby the materials which the water-users could supply are circled (activity C).



**Photograph 1. Mapping of present and future situation**



**Photograph 2. Mapping of needed and available resources**

The drawings made during activity B provided more clear information to the researchers than did the discussion group talks of activity A. During activity D, the drawings were generally positively reviewed by the water-users as a means for communication since they allowed the users to see what had been drawn by others and everyone could still include aspects they found important. However, the groups stressed that an explanation of the drawing would need to be given; it could not stand on its own to give all information. At one site the group attempted to draw what crops would look like when they had a disease and what would

happen if you try to get rid of the insects with water or with what the water-users call DDT (see photograph 3). The water-users felt that the drawing was not clear enough and that actual photographs of the plants when healthy and when sick would be more useful.



**Photograph 3. Plant disease drawing**

The results of activity E showed that the notion of *problems* differs between the AEAs and the water-users; AEAs tended to focus more on problems relating to managerial aspects, while water-users focused on problems with the physical infrastructure. Through use of the drawings made by the water-users, researchers and AEAs were able to organise their discussion more clearly on the problems perceived at the site first, and then to cover the problems which the AEAs felt were present. Such a manner of discussion was appreciated by the AEAs and water-users to focus the discussions more so than is possible through open discussions.

As part of a large scale rehabilitation project AEAs had received some previous training in participatory approaches, they therefore expressed an appreciation for demonstration as a means to communicate about certain issue with the water-users. They had not yet carried out an approach similar to the mapping approach but evaluated it as an interesting one to use in the field and for communication with water-users and researchers. Yet, the AEAs expressed hesitation about carrying it out themselves because they were concerned about the availability of and access to materials such as paper, pens and pencils. The research also shows that AEAs are hesitant about increased activities at the sites because this would require extra visits. Extra visits means that more fuel is needed. Buying more fuel requires more money, and the AEAs identified problems with gaining sufficient means for the fuel as it is already. This is a point for further examination.

### **Phase III**

In line with the AEAs enthusiasm and appreciation for demonstration as a means to communicate with water-users, phase III of the research focused on the application of small scale solutions in a learning-by-seeing or by-example set-up. The small scale solutions were defined together with water-users. Solutions were not necessarily technically ideal, but were easily achievable (especially in the short-term) considering the lack of access to resources such as money, powerful tools and expensive materials. So even while communities were active in acquiring assistance from funding organisations and the department of agriculture, these small scale technical solutions would help enable farmers to at least produce some crops.

At a few of the sites, it became clear that the problems identified by the water-users were not necessarily the source of the situation at hand. For example, one problem which the water-users identified was that cement irrigation canals were needed. Further questioning suggested that the actual problem was not necessarily related to lack of cement canals, but rather to the control over the water once it flowed through the outlet valve. Water would flow freely over the land and thus also to fallow land; water-users felt the water was wasted.

One suggested and tested small scale solution was to use the abundant polyethylene bags which are given with virtually all foodstuffs bought at the market, as [temporary] lining for hand dug ditches. In this manner the water gets less chance to infiltrate where it is not needed and can be led to places where it is needed more readily. The water-users were initially enthusiastic about this solution, which they tested in the field and were making plans to save the bags up until the dry season. However, further research will be carried

out during the upcoming dry-season to determine amongst other things whether this lining technique will really be adopted and the reasons why or why not.

### **Concluding remarks**

The results presented in this paper have shown that the use of pictures, drawings and scale-models gave the researchers and the other stakeholders something clear to talk about. Problems, issues and envisioned solutions were drawn out so that there were clear visual reference point to discuss about despite language, education and experiential differences. This clarity enabled concise communication about the issues at hand in order to establish the fundamentals of these issues and to discuss possible solutions. The results show water-users are quite aware of maintenance urgency and how infrastructure problems can be solved. However, the main cause for lack of maintenance is the lack of access to perceived resources needed to carry out maintenance activities.

The results of the research also show that drawings do not lend themselves for communication about all types of issues, for example for plant diseases. Water-users and AEAs felt that explanation of drawings would need to be given; they could not stand on their own to give all information. Also, the results show that while application of mapping approaches as described is appreciated and enjoyed by the AEA's and water-users, they are hesitant to carry them out themselves. This hesitation was also influenced by the difficult access to materials necessary to carry out the activities (paper, markers, pencils) due to lack of financial resources. Finding possibilities to overcome such hesitation will be point of focus of ongoing research. Further research will also further examine to what extent implementation of small scale solutions through demonstration is feasible for water-users to carry out considering the lack of access to various resources.

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