

## Participatory Health Impact Assessment

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### Scope: questions/ challenges the tool addresses

This tool contains guidelines intended to reduce the health risks and increase the health benefits from small reservoirs. Guidelines are structured in a step-wise manner, beginning with the identification of relevant health issues and concluding with small reservoir design and operation for improved human health. The different steps (and the methods and approaches used by each) are discussed sequentially, in separate sections.

Guidelines specifically focus on:

- Major water-related diseases associated with small reservoirs in Africa
- The added value of community participation in health impact assessment
- Opportunities to mitigate risks and improve human health through better planning and operation of small reservoirs at local and cluster levels
- Improved planning of larger numbers of small reservoirs, and design and management options for individual small dams.

### Target group of the tool

Target groups for this tool include planners, designers, builders, managers, and users of small, multi-purpose reservoirs who wish to increase health benefits and reduce health risks from these reservoirs.

### Requirements for tool application

Knowledge of participatory approaches, contacts with relevant health and water authorities.

Materials: logistical support, meeting room, flip charts, markers (materials needed vary across steps).

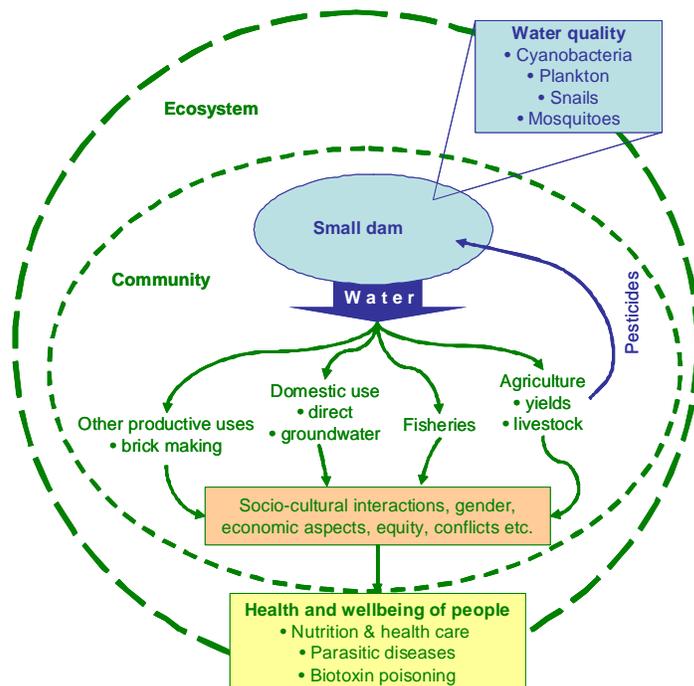
### Tool: description and application

#### *Approach*

When small reservoirs are planned and constructed in Africa, it is not unusual for formal environmental or health impact assessments to be neglected (McCartney et al. 2007). But small reservoirs can have very significant local impacts on public health – impacts that conventional planning and design procedures are unlikely to foresee. When clusters of reservoirs are built, their cumulative impacts can be even more difficult to anticipate.

Each small reservoir has its own unique set of circumstances that need to be addressed. Most are managed locally by representatives of end-user communities. In order to understand the health consequences of a reservoir in the context of local agroecosystems and agricultural and water management practices, there is no substitute for a local participatory health impact assessment. Only in this way, through an on-the-ground integrated assessment, can locally manageable solutions be identified and implemented. Findings from participatory health impact assessments can be quickly used to make suitable adjustments in reservoir management. By combining subjective perceptions with scientific data, participatory processes can identify locally-relevant suggestions for improved reservoir operation and maintenance as well as improved management of the wider environment. Assuming there are no major conflicts, participatory processes can enhance ownership and accelerate implementation of health risk mitigation measures.

The authors of these guidelines have taken an interdisciplinary, participatory ecosystem approach to water management, agriculture and health. This approach was developed during applied research on health impacts of small reservoirs in Ethiopia, Morocco and Burkina Faso since 2001, hence its emphasis on Africa. A visual impression of this approach is shown in Figure 1.



**Figure 1:** Conceptual model of inter-relations between small reservoirs and human health to be used in participatory health impact assessments. Several of the aspects mentioned are addressed in other tools.

The approach starts with a *scoping* exercise to determine which health issues should be assessed, in which geographical area and with which partners. This helps focus secondary data collection and provides the context within which other steps are implemented. Once a site is selected, the next step is a *participatory appraisal* or community self-assessment of health issues related to small reservoirs. The third step is a targeted selection of *biomedical studies* to collect primary information for use by the health sector. The fourth step is to develop a *synthesis* of the site-specific information that has been collected. This synthesis typically

features the use of different indicators and mapping techniques. The final and fifth step is then to transform the results into *practical options* for reservoir design and operation.

Throughout the process, various rounds of community feedback are used to clarify issues, formulate hypotheses, test recommendations, and ensure that the assessment maintains a focus on the right priorities. Although steps are described as being sequential they may sometimes overlap. Some of the methods used in different steps can take quite some time to complete. In fact the process is fairly flexible and need not be restricted to a rigid unyielding sequence. In the final phase of intervention analysis, participatory tools are again applied. The entire process, including preparation, team building, and meetings, can take as long as a year – or even longer if seasonal variation needs to be captured.

## Step one: Scoping

### *Secondary data*

Secondary data from government and NGO archives can help guide site selection, by enabling researchers to take account of current prevalence and past incidence of different diseases. Key informants can provide complementary insights. Though often qualitative and incomplete, information from these sources can be used in taking decisions on stratified or clustered site selection, identifying specific study communities, and highlighting health indicators that merit priority. In this step, the data to be collected are typically limited by their availability and accessibility. Data collection may also be unconsciously restricted by the interest and focus of the team. It is important to be aware of this bias and be open to other health issues that the community may bring up during the participatory steps in the approach.

### *Team and partners*

This step involves different stakeholders, within the research team as well as within the community. The team must be interdisciplinary, with professionals from the agricultural and water sectors as well as from the health sector. The optimization of water resources development requires a good understanding and efficient communication with professionals outside the water sector. Similarly, health professionals will benefit from interactions with water and agriculture professionals: in many cases, solutions to community health concerns lie outside the health sector. For example, in northern Ethiopia the shading of larval breeding sites with reeds and fruit trees was one of the few malaria control measures available to communities during a period when health services were restricted because of a border conflict (Yohannes et al. 2005). (These measures are described in more detail in a separate tool focusing on vector studies.)

Local communities, civil society representatives (NGOs and CBOs), researchers, local and regional health authorities, and local development authorities all have to be involved in this investigation. Sometimes there is a convergence of perspectives, but often different stakeholders have a very different understanding of the public health consequences of small reservoirs. A more inclusive framework typically leads to a greater sense of stakeholder ownership and increased sustainability of beneficial impacts on livelihoods from small dams.

### *Site selection*

The selection of study sites is very context-specific. Sometimes the site will be pre-selected before the study begins, for example, when an implementing agency requests *ex-ante* or *ex-post* health impact assessments. This often is the case with large-scale water resources development projects, but rarely for small reservoirs, even though the impact of many small projects may be larger than that of a single large project (McCartney et al. 2007). Note that a generalizable insight may be sufficient to improve the planning and design of numerous small reservoirs in a certain region.

A simple way of selecting small reservoirs for detailed study is to overlay maps showing the location of reservoirs with maps showing the spatial incidence of key diseases, then to select a range of combinations, including the extremes. In most cases, this information is not available, however, and other criteria for site selection must be used (accessibility, previous projects, partners' preferences, and so on).

*Example from Burkina Faso: In the SRP studies in Burkina Faso, site selection was based on agro-ecological zone, density of small dams and density of the human population. At selected dams a community was selected that lived close to and had many interactions with the small reservoir, and a control community with roughly the same demographic profile, but without access to the reservoir and at least 1km from the water body.*

### *Health issues*

Many health issues can be related to small reservoirs. The impacts of a small reservoir are of an entirely different magnitude than those of a large dam or of a collection of smaller dams in the same watershed or basin. Often the presence of new bodies of water influences peoples' mobility and, consequently, the human reservoir of pathogens. People moving into an area may bring pathogens and start a new transmission cycle. People previously unexposed to water-borne or water-related diseases (for example, pastoralists, seasonal laborers from highland areas and sometimes even children) may be drawn to the water, increasing their own risk of disease as well as raising the risk factor for others. This tool focuses on water-related infectious diseases because these are most closely linked to small reservoir design and management.

Assessing health benefits from small reservoirs is even more difficult than assessing their hazards. There are several reasons for this. Measurement of positive impacts usually requires longitudinal studies that compare "with" vs. "without", and "before" vs. "after" the implementation of a small dam. Numerous variables need to be considered, among them food and energy intake, and micro-nutrients at the individual and household level. Data need to be disaggregated by age, gender and social category, so that impacts on vulnerable vs. less vulnerable groups can be ascertained. Typically, these kinds of information are not available. Therefore, this tool focuses on overall community indicators, using experiences from clinical, socio-economic and environmental surveys carried out in Kaya and Koubri (Burkina Faso), Assgherkiss (Morocco) and to a lesser extent in Tigray (Ethiopia).

While all aspects of human health might be considered in participatory approaches, a closer focus is needed for biomedical studies: one to three key diseases should be selected. The choice

of these depends on the local context, including factors such as the importance of the disease, its relation to water management and available data or expertise.

*Examples from Burkina Faso and other countries:* In the case of Burkina Faso, malaria, urinary schistosomiasis and geohelminths were selected in collaboration with local partners. Reasons included the wide spread of urinary schistosomiasis and its long association with water-resources development including small dams, and the fact that the transmission of urinary schistosomiasis is less dependent on socio-economic status and sanitary facilities than other water-related diseases. Geohelminths are often covered by the same control programs as schistosomiasis and have recently received more attention because the morbidity is much higher than was previously assumed. Malaria is an important cause of childhood mortality and has an important economic impact because of lost working days for mothers.

For other countries, infectious diseases such as trachoma or Chagas disease (in Brazil) could provide an interesting focus. Though not directly related to water bodies, these are infections that might be reduced through increased availability of water for hygiene. Hence they could be indicators of improved health after introduction of small reservoirs. Interestingly, for local and national health authorities in Morocco, bird flu was perceived as a future threat because of migratory birds frequenting small reservoirs.

Closely related to the transmission of water-related diseases is the ecology of the small reservoir with its related environment, including upstream catchments and streams, drains and canals, and fields and seepage areas. In this integrated approach to health, the entire ecosystem is considered but water quality remains an important interface between people and pathogens. Depending on the local context, it may be necessary to do more in-depth analysis of water quality for biological indicators such as *Cryptosporidium* and fecal coliform bacteria (see also Step Three).

## Step two: Participatory assessment

### *Selecting from available tools*

A wealth of literature is available on participatory rapid appraisals (PRA) as well as on health impact assessments by experts. A good review of the literature on participatory approaches, and the merits and risks associated with different methods, is provided by Da Silva (2006). Utzinger (2004) published a similar overview for health impact assessment. Of particular interest are methods involving participatory village transects, focus group discussions, and various ways to map the health impacts of small reservoirs.

An advantage of using participatory tools is that the community shares the responsibility for identifying and solving water-related health problems. A disadvantage is that trained facilitators are needed who can guide disciplinary professionals into a new process of listening to local perceptions.

*Example from Burkina Faso:* In April 2007 a participatory health impact assessment was carried out around a small reservoir in Tanvi-Nakamtenga (Koubri, Burkina Faso). First a planning meeting was held with representatives and leaders of two communities to present the objectives of the study and the methods to be used. Time arrangements were discussed and suitable stakeholders identified to participate in semi-structured interviews, questionnaires, focus group discussions and transect

walks. The meeting was also attended by representatives of the reservoir committee (*Comité de Réservoir de Tanvi*) and a local NGO working on small reservoirs (*Programme d'Appui aux Barrages de Kouabri in the Belgian-funded NGO Broederlijk Delen, based at the St. Benoit monastery*).

*Participatory tools were used in data collection. These tools included a semi structured interview with three key informants and resource persons in the village of Tanvi-Nakamtenga; a questionnaire administered to a set of 10 persons randomly selected among Tanvi community members; two focus group discussions; and a transect walk.*

*The assessment helped to identify the major health concerns for the community (malaria and diarrhea), institutional issues (reservoir ownership), socio-economic aspects (small reservoirs contribute significantly to income generation among farmers and pastoralists and to a lesser extent fisher folk), and environmental concerns (reduction of soil fertility, erosion of the lands and siltation of the reservoirs). While not all these concerns are directly related to human health, they do provide useful insights into the communities served by the small reservoirs. To foster sustainable use of small reservoirs, it might be best if all identified problems were addressed simultaneously.*

School surveys combine elements of participatory approaches with elements of biomedical research. Especially for schistosomiasis in West Africa, school questionnaires have been developed as a mass-screening tool by the Swiss Tropical Institute (Utzing et al. 2000; Lengeler et al. 2002; Raso et al. 2005). Forms are filled in by teachers for each student. Questions are asked about symptoms, diseases, and the student's socioeconomic profile. Such questionnaires could be adapted to local circumstances and used elsewhere (In Burkina Faso the questionnaire covered malaria as well as schistosomiasis). When epidemiological studies are carried out at the same time, a local quantitative relationship between measured and reported infection rates can be established. Then the questionnaire could be applied in larger areas to assess transmission patterns. (School surveys are discussed further in a separate tool.)

### Step three: Measurements

Any study or assessment that looks at human health needs to “speak the health sector language”. Planners and managers who wish to be taken seriously in their attempts to address water-related public health issues need to collaborate with health care professionals. In many places in Africa and Asia, health information is not readily available and some primary data collection is needed.

The participatory assessment conducted in step two will have narrowed the health focus and pointed at opportunities for improvement, so that more expensive biomedical studies can be well targeted. The studies described in this section use more standard approaches, yielding the “hard data” required by health professionals for them to diagnose health care issues and suggest interventions. It may also be necessary to collect primary information on changes in water availability and water consumption. Methods for doing this are described in a separate tool.

*Epidemiology (also available as a separate tool)*

Depending on the key diseases that are selected, standard biomedical methodologies are available to determine infection rates. For schistosomiasis and other intestinal parasites, urine and stool samples are collected and analyzed. Normally this is done for children under 14

years of age (often between 5 and 10 years) because they can easily be sampled at school. For malaria, blood smears are taken from finger pricks. If anemia is also studied, a few drops of blood can be collected in micro tubes for determination of hemoglobin levels.

When blood samples are collected from the children, ethical clearance is required. Usually this has to be given by the Ministry of Health, but many health research institutes and universities have umbrella arrangements that can be used by a project. In all parasitological surveys it is important to provide treatment for infected people, usually free of charge and according to national or WHO guidelines. For example, in the case of urinary or intestinal schistosomiasis, praziquantel has to be given at 40 mg/kg body weight. Albendazole is the proper treatment for soil-transmitted helminth infections, with doses dependent on species according to the World Health Organization (WHO Expert Committee 2002). For malaria the most recent local protocols need to be followed because of fast-developing resistance.

*Ecology: vector studies (also available as a separate tool)*

Around selected communities, or schools, different types of water bodies (for example, reservoirs, canals, drains, seepage areas, pits, and rain puddles) are identified and mapped. After the first inventory, a sample of water bodies is monitored monthly for mosquito larvae and snails. Sampling for *Anopheles* larvae is done with standard dippers (350mm), the number of dips depending on the size of the site (Amerasinghe et al. (2001). Snails are sampled quantitatively using a drag scoop in deep water bodies whereas in shallow habitats quadrates are sampled, depending on surface and morphological variation of the sites (Laamrani et al. in preparation).

Adult mosquitoes can be captured in various ways, for example, by indoor and outdoor spray catches, by netting sweeps of the vegetation, by human or animal bait catches or by light traps. The latter methodology is standardized and the most widely accepted.

*Example from Ethiopia:* In the late 1990s, Mekelle University was involved in an integrated research project that quantified the impact of small dams in Tigray. Irrigation led to improvements in socio-economic status, but transmission of schistosomiasis and malaria also increased. While several community-led interventions were identified and pilot projects started, none of these were followed up because of the border conflict with Eritrea, though there are indications that some measures were successful (Yohannes et al. 2005). A research project under the CGIAR System-wide Initiative on Malaria and Agriculture (SIMA) then evaluated some of these experiments (entomological aspects only) using mainly biomedical approaches to vector monitoring.

Six dams with their communities were selected for the study, including one where environmental malaria interventions were implemented by the population 3-5 years ago. For this site some more background data on malaria, entomology and socio-economic impacts were available. For each dam site a field assistant was hired, who lived in the community. The six assistants received five days training for biweekly sampling of mosquito breeding sites for larvae and collection of adult mosquitoes from light traps. A manual was prepared for them in straightforward English so they could at all times check on the objectives and exact methods of the study. The identification of both larvae and adult mosquitoes was confirmed by a trained entomologist.

*Environmental malaria interventions carried out in 2000/01 included filling, draining, and shading potential breeding sites. These activities were all carried out by the community. Canals that were leaking due to termite activities were lined with concrete. Papyrus and other marshy plants introduced by researchers were maintained by the community and spread vigorously downstream covering the seepage area, the gully below the dam and other waterlogged areas. Supported by the Bureau of Agriculture, farmers also grew fruit trees and fodder crops in waterlogged areas, along their fields, and in the gully below the dam. The gully became thick with vegetation, rendering many of the earlier crossing points of livestock and people inaccessible, thereby reducing the creation of suitable Anopheles breeding sites.*

*Fifteen months of entomological studies 3-5 years later, showed the effectiveness of the control measures. The types of positive breeding sites recorded were similar between the years and breeding occurred all the year round in the study area. However, the extent of breeding and the species composition of Anopheles varied significantly before and after intervention. The majority of the Anopheles-positive habitats in the pre-intervention year came from the seepage area (28%), followed by pools from leaking canals (16.4%), and streambed pools from the dam (13.1%). Right after the intervention and four years later dam riverbed pools constituted the majority of the positive pools recorded. Seepage pools and rain pools were the second during the intervention and post intervention years, respectively. These findings provide evidence that environmental management was able to reduce the number of malaria vectors with minimal interventions, using local resources (Yohannes et al. 2005). The most effective methods were draining of the swampy area below the embankment, propagation and maintenance of swampy plants in water-logged and construction of simple drainage canals. These methods targeted exactly the most favorite breeding sites of the main malaria mosquito in the area.*

In the epidemiology of schistosomiasis, in addition to snail sampling, the observation of water use patterns is also important because this disease is contracted through water contact. Often popular water use sites combine organic pollution with high snail densities, thus creating ideal circumstances for transmission (Boelee & Madsen 2006).

*Ecology: water quality (also available as a separate tool)*

Users of small reservoirs often have concerns about the water quality, sometimes because of observed water pollution and sometimes because of widespread symptoms of disease in the community. In these cases, a selection of chemical and biological water quality measurements should be done, depending on available information and perceptions. Usually national institutes have the expertise to carry out all kinds of water quality assessments.

## Step four: synthesis

*Triangulation*

In the approach described in this tool, qualitative and quantitative measures are combined with participatory methods, reflecting the transformative potential of participatory health impact assessment in terms of knowledge and practices. Triangulation is used to cross check validity of tools and ensure validity of results.

*Indicators (also available as a separate tool)*

In discussions with the community and local experts at the beginning of the study, specific health, water quality and performance indicators are identified. These may be later complemented by standard, well-tested scientific indicators. Some of the information collected by various methodologies is best collected in a time series. It is important to align the sub-studies as much as possible so that data can be compared over space and time. Indicator definitions should be compatible with the literature and the field experience of the involved. Some indicators should be used in on-going community-managed monitoring and evaluation of small reservoir health impacts.

### *Mapping*

Existing topographic or agricultural maps, remote sensing imagery, and community-drawn maps can be entered into a single Geographic Information System (GIS). Where possible, indicators and their values (whether from secondary or primary data sources) should be geo-referenced and entered into the GIS.

The GIS can help explore the possible relationships between health and water indicators, and potential explanatory factors, for example, altitude, vegetation, topography, distance from water sources, and so on. It may be possible to combine this into a formal model. Some caution should be used however: formal modeling can be time consuming and at times can lead to spurious accuracy. Model results are only as reliable as the least reliable information used as input. In addition, skilled staff and adequate computing power to run models are sometimes lacking. On their own maps can be very powerful in providing insights to local communities and decision makers. Chambers (2006) has written a good evaluation of the combined use of community mapping and GIS.

### *Feedback*

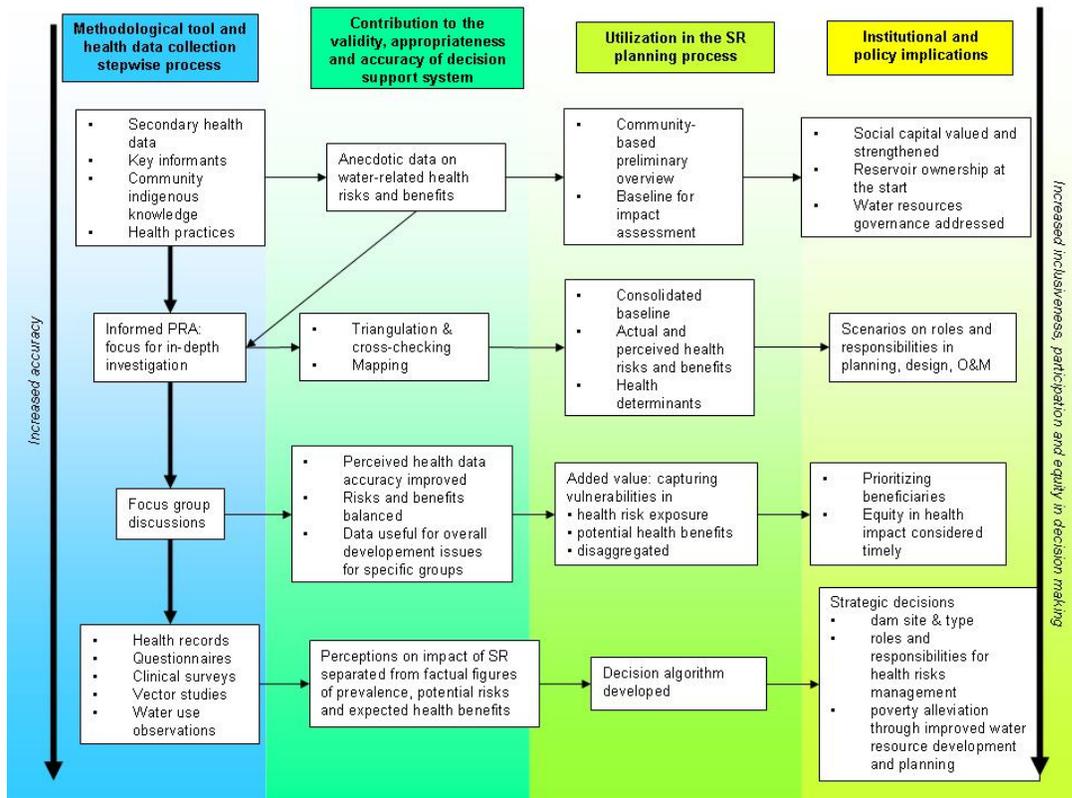
After the initial participatory phase, feedback sessions with the community should be conducted at each step in the assessment (Ait Lhaj & Laamrani 2007), even, for example, to present findings from the biomedical surveys. GIS maps with perceived and measured information from various disciplines are very suitable for feedback sessions with communities and other stakeholders. These sessions offer interesting opportunities for early stage brainstorming on possible interventions (mitigating measures). The authors have good experiences with this in Akka (Boelee & Laamrani 2004) and elsewhere (Laamrani et al. 2001).

## **Step five: from analysis to implementation**

In recent years, the authors have used the above steps in research on small reservoirs in Morocco, Burkina Faso and Ethiopia. The most salient finding was that the exact methodology used in each location was dictated by local circumstances, for example, different sets of parasites, different kinds of partners, and different political processes and relationships. The data that were collected were somewhat different in each case, and recommendations for improving the planning, design, and operation of small reservoirs were different as well.

## **Lessons learned**

Small community reservoirs do not operate with the aid of the clear policy guidance and support given to large dams. Hence planning, construction, operation, and maintenance of small reservoirs do not have the same level of institutional, technical, and financial backup from government agencies. This can lead to water-related health risks such as disease transmission. At the same time, development interventions capable of mitigating these health risks may be overlooked.



**Figure 2:** Diagram representing the links between various steps in the participatory health impact assessment.

In above sections, examples have been provided from case studies in Ethiopia, Morocco and Burkina Faso. In none of these case studies were formal impact assessments performed of the positive and negative consequences of small reservoirs. No *ex-ante* or *ex-post* formal evaluation of environmental, health or socioeconomic impacts had been carried out. Those studies that *have* been done have usually focused on water-related vector-borne diseases such as malaria and schistosomiasis. In contrast, health benefits from small reservoirs are poorly understood and poorly documented.

Still, according to community members across these varied agro-ecological, socioeconomic, and institutional conditions, the perceived overall health impacts of small reservoirs are positive. Generally “with and without” or “before and after” analysis based on recall of reliable informants tends to be supportive of small reservoirs. That does not mean, of course, that their performance cannot be improved, or that water-related health risks cannot be mitigated.

Our approach to participatory health impact assessment combines multiple information sources (retrospective medical data, current health issues both perceived and measured, prospective

risks associated with changes in socio-ecological systems resulting from the introduction of small reservoirs) in order to better understand how benefits generated by small reservoirs can be optimized. Many interventions to improve benefits can be implemented by the communities themselves. Behavioral changes in hygiene, prophylaxis, and health seeking behavior are all dependent on awareness and require adequate health information. In as much as generic messages are not likely to lead to sustainable outcomes, the health information should be adapted to the setting, with site specific messages related to the use and management of the small reservoirs.

In terms of tools, there are tradeoffs with regard to available resources (both financial and time) and the accuracy, quality, and validity of the data collected. The tools used in this participatory health impact assessment have no special intrinsic value. Their value is in the way they are combined and used: mixing complementary quantitative tools (measurements) with qualitative tools such as participatory methods leads to more in-depth understanding of the health issues than using any one approach in isolation.

The three case studies led to the conclusion that a combination of mapping, questionnaires and focus group discussions can produce consistent health data that can be cross checked against clinical data records. Moreover, the combination of these tools can even shed light on community health concerns and priorities as part of overall strategies for community development. Local governance determines the extent to which options for improved planning, design, and management of small reservoirs for improved health are implemented. The findings from the various sites demonstrated that changes are often required in local institutions.

Stakeholders need to think about and work on small reservoirs as a cross-cutting issue that touches all sectors of rural development including water, agriculture, environment, livestock, animal health, education, and infrastructure. They should make harmonized interventions with properly coordinated tasks. For instance, site selection for the construction of dams has a technical component that requires expertise external to the community. But water allocation, use, and infrastructure maintenance are all community issues that should be based upon the existing social capital. The devolution of power to local stakeholders may result in better decisions being made.

## Recommendations

Feedback from stakeholders and our own experience suggest that research has a role to play in optimizing health impacts of small reservoirs at various levels and stages: from planning, design and implementation to day-to-day operation and maintenance.

At the planning stage, a risk assessment via participatory health impact assessment should focus on two major concerns: (1) multiple uses of water and water quality (each use has quality requirements for water entering from upstream – but each use also affects downstream water quality) (2) suitability of the new environment (including the human dimension) to existing vectors and pathogens and those likely to be introduced. This can help to identify options for risk mitigation at policy, institutional and technical policy levels. These players could be networks, decision makers, users, managers, informal local organizations, and constructors,

health officials, remote pastoralists, and fisher folk living nearby. Some sort of ‘power holder’ should be identified at an early stage to ground the governance of small reservoirs and establish viable forms of dialogue and consensus building. This might be the only way to ensure health equity in the two directions of accessing health benefits and of exposure to health risks.

From the beginning, planning and management should be adaptive. This means that mechanisms need to be established to adapt to unexpected challenges in the design, construction, and management of small reservoirs.

In the process of planning and implementing small reservoirs, communities should be treated by the planners and policy makers as endogenous change agents, not merely clients. Community preparedness strategies are likely to be of value if based on a participatory approach where community members (including the voiceless and disadvantaged) have a say as to which mechanisms are chosen. A community-needs-assessment can be used to tap this potential for knowledge and action. At the same time new capacities should be identified which will be needed to optimize the health impacts and mitigate risks associated with small reservoirs.

In summary, principle recommendations are:

1. Build at the planning stage on community-level institutions supported by a clear policy that is community-oriented
2. Build research capacity to anticipate risks and address them in a timely manner
3. Create a framework for monitoring and evaluation.

### Limitations of the tool

The participatory health impact assessment we propose here should not be perceived as a standalone exercise. It is part of the multiple faceted small reservoirs toolkit for better planning, implementation and management. It provides a different perspective from those such as hydrology, remote sensing assessment, aquifer recharge and water quality risk assessment, WEAP, socio-economics, aquatic ecosystem health and pollution/ eutrophication. We believe that this approach is inclusive and provides a good entry point for community engagement in assessing benefits, risks, mitigation measures, and community preparedness.

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### **Selected websites on Health Impact Assessment**

IMPACT - International Health Impact Assessment Consortium <http://www.liv.ac.uk/ihia/>

Health Impact Assessment according to the World Health Organization  
<http://www.who.int/hia/en/>

Health Impact Assessment according to NSW Health Australia  
<http://www.health.nsw.gov.au/public-health/ehb/buildings/hia.html>

HIA Gateway, managed by West Midlands Public Health Observatory on behalf of the  
 Association of Public Health Observatories UK  
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### **Further reading on small reservoirs and methodologies**

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