

# AWM Investments: Monitoring and Evaluation of Social, Environmental, and Economic Impacts

## Key Findings

- **Uptake of Agricultural Water Management (AWM) will have both desired and undesired environmental, social and economic impacts**
- **Monitoring and evaluation needs to be an integrated part of AWM investments to create the capacity to manage, in particular, undesired and unexpected impacts**
- **Although there are no ‘blue prints’ for indicators or thresholds for AWM interventions, there are emerging generic themes of social, economic, and environmental indicators that can guide the development of a locally relevant set of M&E indicators.**

### Impacts of AWM interventions: not always getting it right?

Agricultural Water Management (AWM) interventions in smallholder developing contexts aim to enhance farmer outputs and benefits, whilst avoiding undermining the resource base of land, water and ecosystem services. Evidence shows that AWM interventions have increased yields, which has helped areas with low productivity. At the same time, there are numerous examples where the same interventions have led to undesired changes such as the depletion of groundwater levels, reductions in stream flows, diminished aquatic and terrestrial biodiversity, and/or increased social inequities. To ensure environmental sustainability and socially acceptable outcomes, it is recommended that implementers of AWM include a well-designed and context specific monitoring and evaluation (M&E) framework alongside AWM interventions.

### Monitoring and Evaluation: learning from impacts to help get it right

Many existing monitoring and evaluation frameworks highlight the need for an interdisciplinary assessment of change over time in social, economic and environmental factors within and outside of the area of intervention<sup>1</sup> (Figure 1). However, in practice few AWM M&E systems actually assess the range of potential impacts over multiple spatial and temporal scales.<sup>2</sup> The rapid change AWM interventions can cause in local water resources as well as in other aspects of the watershed highlights the need to manage those impacts before potential negative thresholds are past. There is a need for practical M&E frameworks that investors, implementers and communities can use alongside AWM interventions to understand and manage the scale and scope of impacts.

### Different spatial and temporal scales

AWM interventions take place in complex social and environmental contexts: in a physical watershed but also within political and social networks that often have a different delineation from the watershed. Even so, when monitoring and evaluation takes place it tends to focus on either biophysical

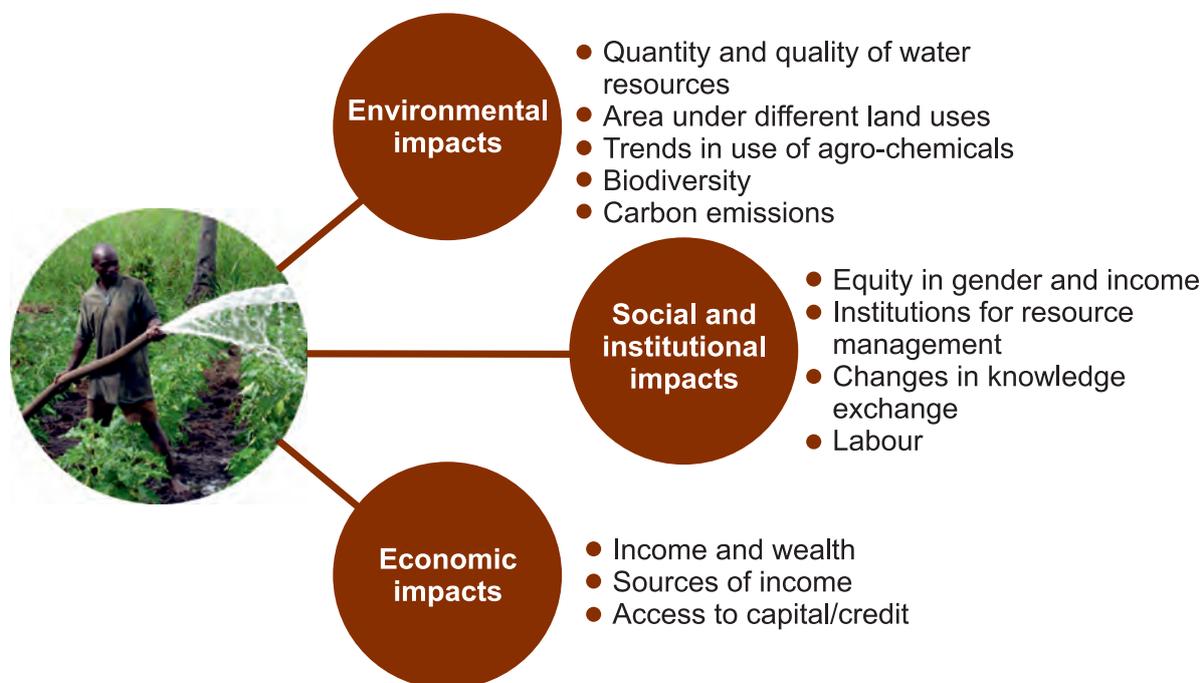


**Figure 1: Baseline assessment in Tanzania**

or socio-economic impacts within the area of intervention during or just after project implementation. Impacts on water and other resources beyond the intervention area are often not assessed and longer-term impacts are by-passed because short term benefits and returns of investments are prioritised. An M&E framework developed with local stakeholders will help to inform what changes are desired and acceptable within the context and what changes would be undesired or even unacceptable. This will also help to avoid negative impacts in the long-term and within and beyond the watershed subject to AWM interventions.

<sup>1</sup> de Bruin et al, 2010

<sup>2</sup> Barron et al, 2010



**Figure 1: Impacts of AWM interventions that need monitoring to increase the success of an intervention and avoid or mitigate negative impacts. Extract from table 'Indicator themes' in de Bruin et al, 2010.**

**Table 1: Solutions that could increase the success or could mitigate negative effects of AWM interventions, and issues that could compromise the success of an intervention (de Bruin and Barron, 2012)**

	Mkindo watershed, Tanzania			Nariarlé watershed, Burkina Faso			Jaldhaka watershed, India		
	Success	Mitigate	Compromise	Success	Mitigate	Compromise	Success	Mitigate	Compromise
<b>Social and human factors</b>									
Institutions for resource management	X	X	X	X	X	X	X	X	X
Collective action	X	X			X		X		
Equity	X		X			X	X	X	X
Agricultural training	X		X	X	X		X	X	
Health			X				X	X	
<b>Environmental factors</b>									
Soil health			X	X				X	
Water quality			X			X			X
Hydrology	X	X	X						X
Land use	X	X	X					X	
<b>Economic factors</b>									
Cost of production			X		X	X			
Assets, savings			X			X			
Access to capital/credit	X			X	X				X



**Figure 2: Participatory scenario analysis with local experts**

### **AWM and socially acceptable outcomes**

In three watersheds of the AgWater Solutions project, scenario consultations of potential AWM interventions were carried out<sup>3</sup>. Participants discussed issues compromising the success of the proposed AWM interventions and solutions that would increase the success. Despite the various different social and environmental conditions, local stakeholders analysed social and human aspects mainly as potential solutions that would increase the success of interventions by directly increasing the success or mitigating negative impacts (Table 1). First, an understanding of the roles of existing institutions in resource management is essential to successful AWM investment. Many institutions, both formal and informal, are involved in resource management at the watershed scale. If AWM investments are designed to fit within existing informal and formal frameworks, the results are likely to be more positive in terms of managing social inequity and potential negative changes. Second, investing in local institutional capacity and linkages between different institutional levels would improve the management of land and water resources overall and the ability of local stakeholders to negotiate and possibly mitigate potential negative impacts from AWM interventions. Third, engagement of different stakeholders in the planning process of land and water allocation and potential interventions would help to avoid new, or at least not exacerbate existing conflicts over water and/or land resources. Finally, agricultural training is needed, specifically on the use of agro-chemicals, which would mitigate current negative impacts on health.

### **AWM and environmental sustainability**

Environmental issues were mostly discussed as compromising the success of an intervention especially in the Mkindo and Jaldhaka watersheds. Most environmental impacts were seen to compromise an intervention by undermining the resource base through pollution of the environment due to agro-chemical inputs. Some of these impacts are beyond the direct influence of an AWM intervention as well as the local community. To ensure

that processes and thresholds are included in the M&E framework that relate to impacts of AWM interventions beyond the watershed as well as over longer time-scales, external expertise and knowledge is essential to complement local understandings of thresholds. In each of the three watersheds, external expertise showed that there is room for increased AWM development using local water resources. However, the external expertise also indicated that each watershed has a context specific threshold above which an increase in water use would mean a depletion



**Figure 3: Undertaking a baseline assessment of resource based livelihoods**

## Recommendations

- **Ensure AWM investments fit the local bio-physical and social context**
- **Define indicators and locally relevant thresholds**
- **Identify training and capacity building needs to allow communities to better plan for and track potential impacts (both positive and negative)**
- **Link with existing institutional frameworks to manage potential tradeoffs**

of ground- and/or surface water flow outside the watershed. Even though the impacts of certain AWM scenarios might deplete groundwater levels, it depends on the trade-off users of the resource are willing to make whether impacts of AWM interventions become negative or can be managed sustainably. Similar expertise could be employed to identify thresholds for water quality and soil health (Table 1). An M&E that includes a baseline assessment will help to corroborate observed changes (Figure 2) and help the analysis of monitoring data collected throughout the intervention and afterwards at multiple time- and spatial scales.

### The economic impacts of AWM investments

AWM investments can improve the income of smallholder farmers. But when these investments are combined with improved access to credit or capital, this impact is more likely to be sustained in the long-term. With some technologies, the costs involved with use and maintenance can compromise any initial benefits. If the investment is designed taking into account these potential limits, investments are more likely to be successful and might potentially be scaled-out to other stakeholders. In addition, monitoring the dependency of beneficiaries on other sources of income can help identify whether AWM investments are reducing their vulnerability.

### Setting up an M&E system alongside AWM interventions

Existing M&E frameworks, while acknowledging the need for a holistic approach, are often not implemented correctly and as a consequence AWM interventions fail to learn from negative impacts. To maximise learning, both monitoring and evaluation are processes that should be adjusted over time. Storing the collected information locally in organisations or governments in a transparent and accessible manner will decrease the costs of M&E and help build long term capacity. Because budgets for M&E are often limited, carrying out participatory scenario consultations with local communities and experts can save time.

Investment to accelerate agricultural water management for smallholder farmers will have both anticipated and un-anticipated impacts. To ensure environmental sustainability and socially acceptable outcomes, implementers and investors need to include appropriate monitoring and evaluation systems alongside AWM development.

This policy brief is based on a series of reports on monitoring and evaluation of AWM investments.

For more information about AWM intervention impacts, monitoring and evaluation frameworks or detailed results of the participatory scenario consultations please see:

- Barron, J., Noel, S., and Mikhail, M. (2010) *Review of Agricultural Water Management Intervention Impacts at the Watershed Scale: a Synthesis Using the Sustainable Livelihoods Framework*. Project Report, Stockholm Environment Institute SEI, Stockholm/York
- de Bruin, A., Mikhail, M., Noel, S. and Barron, J. (2010) *AWM Interventions and Monitoring and Evaluation: Potential Approaches at the Watershed Level*. Project Report, Stockholm Environment Institute SEI, Stockholm/York
- de Bruin, A. and Barron, J. (2012) *AWM interventions and monitoring and evaluation 2: Developing indicators and thresholds based on stakeholder consultations at watershed level*. Project Report, Stockholm Environment Institute SEI, Stockholm/York



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