

Integrating Knowledge from Computational Modeling with Multi-stakeholder Governance (PN40)

Objectives

Managing land and water resources in river basins in an economically efficient, environmentally sustainable and socially acceptable way

Where: White Volta Basin, Upper East Region of Ghana

Method/Activities

- Developing integrated simulation models in close collaboration with multiple stakeholders
- Promoting their use as decision-tools in multi-stakeholder governance systems.

The project conducted analysis of multi-stakeholder governance structures, and developed two decision-support tools:

- Mathematical-Programming-Based Multi-Agent Systems (MP-MAS), which combine economic, hydrological and agronomic models and allow for simulating policy scenarios;
- Influence-network mapping (Net-Map), a participatory method for research and organizational development.

Key Achievements

- Key innovation was the development of the decision-support tool in close interaction with multiple stakeholders, including water user associations and members of the irrigation and agricultural administration. This ensured that the MP-MAS simulations addressed the needs and priorities of different stakeholders and took their local knowledge into account.
- MP-MAS showed that farmers who have access to irrigation would triple their fertilizer use if they get access to credit, even without subsidizing the fertilizer. This is an important insight in view of the international policy debate on fertilizer use in Africa. It shows how relevant access to irrigation is in making fertilizer more profitable. Farmers in the semi-arid North of Ghana who do not have access to irrigation will not move out of poverty, even if they have access to fertilizer and credit. Pumping out water directly from the river is not a viable option under current price relations.
- Net-Map is an innovative method for research and organizational development, which combines social network analysis with participatory mapping techniques. It is easy to use and makes it possible to identify, visualize and understand how different stakeholders can better interact with each other to achieve their desired outcomes. The method was used in Ghana to support the establishment of the White Volta Basin Board.

Conclusions

- Investing in small-scale reservoirs is a promising strategy to expand access to irrigation in Northern Ghana, but this strategy is confronted with major governance challenges.
- Procurement and construction of the reservoirs were identified as major problems, next to shortcomings in the required technical expertise. The findings suggest that donor agencies, before investing in new small reservoirs, should address these problems.

Value/relevance for the BDC

- Volta BDC project V4, *Sub-basin management and governance of rainwater and small reservoirs*. The decision support tools developed by PN40 are directly applicable to project V4, which focuses on improving governance structures and mechanisms required to enable and support integrated management. V4 also will adapt and further develop integrated models for managing land and water resources at landscape or sub-basin levels, amongst which Multi-Agent Systems could be developed and fine-tuned further
- Volta BDC project V3, *Integrated management of small reservoirs for multiple uses*. This project will develop strategies for the integrated management of individual reservoirs, taking into account how land and water resources are used in surrounding areas as well as broad trends in rural transformation and economic development. It will also identify uses and users, assess their respective needs, and identify the social and ecological factors needed to support water management for multiple uses. In this context the development by PN40 of integrated simulation models in close collaboration with multiple stakeholders is highly relevant and applicable.