

## **Volta Basin Development Challenge: Management of Rainwater and Small Reservoir for Multiple Uses**

Final Science Workshop Report

Ouagadougou, Burkina Faso. 17-19 September 2013



**Olufunke Cofie. 2013. *Volta Basin Development Challenge: Management of Rainwater and Small Reservoir for Multiple Uses*. Final Science Workshop Report**



RESEARCH  
PROGRAM ON  
Water, Land and  
Ecosystems



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## **List of Acronyms**

AWM	Agricultural Water Management
CPWF	Challenge Program on Water and Food
CGIAR	Consultative Group on International Agricultural Research
CLE	Comités Locaux de l'Eau or Local Water Committee
DSS	Decisions support tool
ECOWAS	Economic Community of West African States
GNRGP	Ghana Northern Rural Growth Program
IP	Innovation Platform
LBDC	Limpopo Basin Development Challenge
NBDC	Nile basin Development Challenge
R4D	Research for development
ROPPA	Le Réseau des organisations paysannes et de producteurs de l'Afrique de l'Ouest / Network of Farmers' and Agricultural Producers' Organizations of West Africa
NGO	Non-Governmental Organization
TAGMI	Targeting AGricultural water Management Interventions
VBA	Volta Basin Authority
WASCAL	West African Science Service Centre on Climate Change and Adapted Land Use

## 1. Workshop Background and Objectives

The final science workshop for the Challenge Program on Water and Food (CPWF) in the Volta Basin, the Volta Basin Development Challenge (VBDC) program, was held from 17-19 September 2013 in Ouagadougou, Burkina Faso. The objective of the meeting was to share the research outputs and outcomes from the 3-year program, highlight lessons learnt and present recommendations for future related research for development (R4D) programs in the region. The VBDC had an overall objective of addressing institutional, socio-economic and technical options for improving the management of rainwater and small reservoirs in order to ensure equity for multiple purposes. This was placed within the context of significant drivers that influence the basin including but not limited to high degree of climate variability; demographic pressure; associated trans-boundary issues over water sharing; increased demand for water outside of agriculture. The workshop comprised of two days science meeting and one day Knowledge fair and policy round table events. The meeting was opened by the Minister for Water Resources, Burkina Faso, Mme. Mamounata Bélem/Ouédraogo with the support of the Director for Volta Basin Authority, Dr. Charles Biney, the Director for CPWF, Dr Alain Vidal and the CPWF-Volta Basin Leader, Dr. Olufunke Cofie. A total of 82 people from the research / academia, government departments, development organizations and farmer based organizations participated at the workshop. There were 65 males, 17 females, 15 young professionals (mostly M.Sc. and PhD students of the CPWF), participants from other CPWF African basin programs namely the Nile Development Challenge (NBDC) and the Limpopo Basin Development Challenge (LBDC) programs. The list of participants can be found in the ***detail workshop proceedings*** enclosed in Annex 1.

## 2. Presentation of Research Results

The VBDC program team presented the results of their research using PowerPoint presentations and posters. Presentations were followed by round table discussions where participants brainstormed on the results from the various studies and came up with additional comments/questions, suggestions and recommendations as elaborated in the workshop proceedings. Summary of the main results from each of the presentations as well as the potential user of the result and the research gaps that were identified during discussions are all presented in Table 1. More information on each of the presentation can be found on the ***slideshare*** link indicated in the table as well as in the ***Book of Abstracts*** in Annex II.

**TABLE 1: HIGHLIGHTS OF PRESENTATIONS**

<b>PRESENTATION TITLE</b>	<b>MAIN RESULTS</b>	<b>POTENTIAL USERS</b>	<b>RESEARCH GAPS</b>
Barron et al. <a href="#">Targeting Agricultural Water Management Interventions in the Volta &amp; Limpopo Basins</a>	A decision support tool called TAGMI was developed with stakeholders to guide investments in agriculture water management in the basins	Planners; Development agencies; Researchers; Academics; Donors,.	-Low predictability level of TAGMI. -Tool should take into account future drivers eg. climate change, marketing /economic drivers etc.
Annor et al. <a href="#">Setting up Successful Agricultural Water Management Interventions - An Analysis of a Consultative Approach in Volta and Limpopo Using Participatory GIS (PGIS).</a>	-Little evidence of successful out-scaling of AWM technologies over the past 50 years. -It is critical to support AWM technologies technically and financially. -Ownership of technology by farmers is very important.	Donors, governments, project initiators, researchers	-What drivers are being used to address 'research fatigue syndrome'? -Data flow protocol needed for updating the TAGMI -Could enabling factors be barriers for out-scaling?
Balima et al. <a href="#">PGIS Synthesis on Agricultural Water Management Technology in Burkina Faso</a>	-Main indicators of success as defined by stakeholders for Burkina Faso are: food security, revenue of beneficiaries, number of beneficiaries and sustainability of benefits derived from technology	Donors, planners, researchers	-How does each factor affect success/impact?  -What are the generic factors and at what scales are these variables important?
Morris et al. <a href="#">Agricultural Water Management Technology Expansion and Impact on Crop Yields in Northern Burkina Faso (1980-2010).</a>	-Multiple evidence of provincial level adoption of AWM (33-39% of total crop area in northern Burkina Faso is under SWC) -Development of yield curves (kg/ha) for major cereals crops (1984-2008) at 3% rate of increase	Policy makers, researchers, program/project Managers	-Cost implications of AWM adoption not known
Annor et al. <a href="#">Monitoring Small Reservoirs in the Volta Basin of Ghana</a>	-Development of a basic algorithm and model to monitor hydrological data of small reservoirs eg. evaporative losses	Planners, dam builders, researchers	-Could an online tool be developed to help manage small reservoirs?

<b>Fowe et al.</b> <a href="#">Hydrological Modeling of the Boura Dam - Burkina Faso.</a>	-Model developed to monitor hydrological data eg. volume of water available in the dam and/or amounts of water used by the different water users	Researchers, program managers	-Water for livestock and people need to be included in the model - Groundwater losses need to be measured and accounted for.
<b>Poussin et al.</b> <a href="#">Performances of Irrigated Scheme Downstream Small Reservoirs: The Cases of Boura (Burkina Faso) and Binaba 2 (Ghana)</a>	-Quantification of crop yield, income and labour  -Low exploitation of the water resource (SR) as a result of suboptimal agronomic practices and poor production	Governments, development agencies, local communities	-Long term viability and chemical exposure of this reservoir not yet considered
<b>Cecchi et al.</b> <a href="#">Agricultural Intensification and Aquatic Ecology: Impact and Trade offs</a>	-Eutrophication and chemical contamination as a result of intensified agricultural activities threaten the sustainability of agro-ecosystem	Researchers, policy makers, local communities	Need for more study and better understanding of the ecology and ecotoxicology of small reservoirs
<b>Dare et al.</b> <a href="#">Analyzing the Evolution of the Knowledge of Water Users in Boura Dam to Account for the Effects of the Participatory Approach: Methodological Proposal</a>	-Ownership of resource not felt by communities	Policy makers, community members	-What are the immediate benefits to the community to enhance ownership?
<b>Dare et al.</b> <a href="#">Crossed Contributions of Two Participative Approaches in Burkina Faso and in Ghana: Example of the Project V4 to Support IWRM Policies</a>	-Usage of the ComMod approach to support existing IWRM initiatives through multilevel participatory process	Project implementers; water management institutions	-Long term monitoring of IWRM projects and feedback required -Detailed information on all stakeholder involvement
<b>Kizito et al.</b> <a href="#">Targeting Interventions to Reduce Catchment Sedimentation: The Case of a Sub-Watershed in the White Volta Basin</a>	-Using erosion models to target erosion control; using vegetative buffers can reduce sedimentation by (15%) in small reservoirs	Governments, development agencies, NGOs	-Urban areas, roads etc not considered in the model

<b>Dare et al.</b> <a href="#">Building Water Citizenship - Practices of Integrated Water Resource Management in Burkina Faso and Ghana</a>	-Citizenship as a “bundle of rights” was based on three interconnected pillars: legitimate representativeness, autonomy in decision making and accountability	Researchers, governments, development agencies, water managers	
<b>Torou et al.</b> <a href="#">Constructing Space: The Practices of Water Policy in Burkina Faso</a>	-Top down approach not favourable to local IWRM	NGOs, CLEs, government agencies	-Address the Legitimacy and lack of decision power of CLEs in Burkina Faso
<b>Douxchamps et al.</b> <a href="#">Agricultural Water Management and Livelihoods in the Crop-livestock Systems of the Volta Basin</a>	-Access to services and information will increase income of smallholder farmers	Ministry of Agriculture NGOs, development agencies, researchers	
<b>Payan et al.</b> <a href="#">Farm-level Best-fit Rainwater Management Strategies and Soil Improvement Methods for Seed and Biomass Yield in a Maize-soy bean Intercrop</a>	-Combined rainwater management & soil improvement techniques increase maize seed & biomass yields  -Enormous plant biomass generated has the potential to address dry season feed needs and sustain crop-livestock systems	Development agencies, extension agents, NGOs	-What accounts for the success or otherwise of technologies for different crops?
<b>Swans et al.</b> <a href="#">Performance of Innovation Platforms in Crop-Livestock Agro-Ecosystems in the Volta River Basin in Burkina Faso</a>	-Importance of IP approach in ensuring effective linkages between different actors for better access to technical & financial services  -The running of IPs should be documented and monitored systematically	Researchers, donors	
<b>Zwedie et al.</b> <a href="#">Impact of innovation platforms on marketing relationships - the case of Volta Basin integrated crop livestock</a>	-IPs created options along the value chain e.g interactions via platforms contributes to improvement in market access and reduction in transaction costs.	Government officials, aid agencies and extension officers	-Need to know if IP has different effects in areas with or without water infrastructure?

<a href="#">value chains in Ghana</a>	
<b>Teno et al.</b> <a href="#">Impact of V2 Innovation Platforms (IPs) on Improvement of Crop and Livestock Production in Four Villages of Yatenga Province, Northern Burkina Faso</a>	<div> <div>- IPs are useful for exchange of information and improvement in the value of agro-pastoral production.</div> <div>- Positive impacts of IPs on its members' practices: human &amp; social capacities were built, increase in crop &amp; livestock production</div> </div> <div> <div>NGOs, researchers, technical departments, extension agents</div> </div>
<b>Greenough:</b> <a href="#">Change and Innovation in the VBDC</a>	<div> <div>-Communication and innovation are related. Innovation rarely happens in the mind, office, laboratory or workshop of a single individual rather it is in the exchange of ideas and information</div> </div> <div> <div>Researchers, donors, governments</div> <div>How does a project promote local involvement which is motivated by interest of local partners in advancing the project?</div> </div>
<b>Cofie:</b> <a href="#">Synthesis of results from the VBDC</a>	<div>Key messages are elaborated in chapter 3 in this document</div>



### 3. Key Messages from the VBDC Research

The key messages from the VBDC work cover aspects of targeting agricultural water management, improving the management of small reservoirs, understanding water governance options, using innovation platforms to strengthen value chains and lessons from research for development.

#### ***Targeting Agricultural Water Management Interventions***

**Message 1**, Research evidence from the VBDC indicates that there are still opportunities to support further AWM adoption and adaptation in the Volta basin for improved income and livelihoods. Replicating successful agricultural water management interventions in new locations requires consideration of *economic, biophysical, institutional, and cultural factors* to realize these potentials.

**Message 2**, Small reservoirs do clearly promote diversification of activities at local scale. Technical options may increase productivity but access to market constitutes the main bottle-neck in terms of improvement. This is beyond the power of the community and requires policy guidance to optimize the use of small reservoirs.

**Messages 3**, Trade-offs between agricultural intensification and the effects on the aquatic ecosystems have to be thoroughly considered in order to ensure the sustainability of the socio-ecological system.

#### ***Understanding Water Governance Options***

**Message 4**, Successful integrated water resources management depends on interactions between multiple actors at different scales, which is often beyond everyday considerations. *Companion modeling* approach is a good framework that enhances interactions between actors and allows for a collective decision-making process to unfold. Collaboration with existing integrated water resources management institutions, such as local water committees and basin agencies ensures that research can inform local, national and basin-level knowledge and thinking and encourages sharing of experiences between institutions, development practitioners, researchers, and local stakeholders.

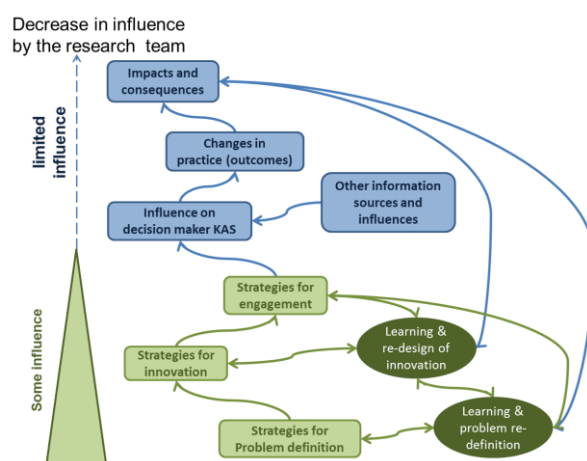
#### ***Using Innovation Platforms to Strengthen Value Chains***

**Message 5**, Innovation platforms provide space for a wide range of stakeholders to exchange knowledge, learn, and develop joint initiatives to solve agricultural development challenges. Successful innovation can only happen when stakeholders have a sustained interest in working together to acquire new knowledge and find solutions; the research community cannot bring about innovation on its own. Livelihood

options and indigenous experiences shape the ways farmers manage rainwater. Changing water management practices, and making them more productive, requires joint learning as well as technical, institutional, and policy support.

### ***Lessons on Research for Development (R4D)***

**Message 6**, R4D takes time and resources and must be supported long enough for innovations to emerge and be evaluated. It does not take place in a laboratory, office or at desks, but in meetings and interaction between people. See model shared from research to outcomes and impact.



## **4. Discussion on Scientific Presentations**

Based on the presentations and contributions from the participants, some key recommendations were drawn. Points were noted on how, through what media/platform and formats these findings could be used effectively and even beyond VBDC. Also, discussions and points were given on how to address the research gaps that were identified. The main submissions are presented below:

- Community-based participatory research is very crucial in R4D programs. This refers to applied collaborative approach that enables community residents to more actively participate in the full spectrum of research from conception to design, conduct/methods, analysis of data collected, interpretation of results and recommendations, followed by the dissemination of results to different stakeholders. The aim of this is to influence a change in community orientation, systems, programs or policies. In other words, the community members and researchers can then combine their knowledge and action for social change to improve community understanding. Also, academic and (or) research as well as community partners can join to develop models and approaches to building communication, trust and capacity, with the final goal of increasing community participation in the research process.
- In this context, it is important to use people “within project” to take messages/lessons forward and engage the policymakers which is very critical. In order to up-scale the message/results/findings, it is important to also consider the district authorities and agricultural extension agents.
- To be able to use these results more effectively, the following can be done: participate in policy dialogue, organize advocacy events, communicate with political leaders and get closer to the private sector. In addition, it is important that there is an increase in the use of media - both social and conventional media (radio, television, and telephone). The effectiveness of these can also be promoted through

the inclusion of the Civil Society Organization (CSOs) and coupled with engaging Donors.

- In the course of the meetings, the following gaps were identified most of the projects were too ambitious / too complex and in some cases time too short for any significant results to be achieved.

## 5. High Panel Forum: Response of Key Stakeholder

The key messages as well as the more detailed scientific presentations received very positive feedback. Representatives of policy makers and development agencies responded along three main questions: (a) How can CPWF research be used in the Volta River Basin? (b) What concrete opportunities are available to use VBDC research?, (c) What could be the next steps? The panelist were five key representatives from the following organizations: Water Resources Coordination Unit of ECOWAS, Directorate of the Volta Basin Authority (VBA), Burkina Faso Ministry of Water and Sanitation (advisor), Ministry of Food and Agriculture in Ghana / IFAD funded Program for Northern Rural Growth in Ghana and the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) Program. They emphasized the aspects of the VBDC research which has good potential to be taken up and indicated areas where the VBDC work aligns with some of their own organizational mandates and plans.

### **ECOWAS -Ms Anna TENGNAS, Water Resources Coordination Centre of ECOWAS:**

“The West African Water Resource Policy and Action Plan will be validated in 2013. The presented research appears are in line with the priorities in the region. For example, IWRM implementation and water quality focus are key focus areas for the Water Resource Coordination Centre in Ouagadougou; hence the results are very interesting from our perspectives. Here we can aim at connecting research to policy making. ECOWAS wants to establish policy norms. CPWF therefore has the opportunity to feed into these regional initiatives. CPWF has some good practices to share with regards to the 2<sup>nd</sup> priority of action plan to promote investments and the 3<sup>rd</sup> priority, which is the promotion of regional integration, i.e. the establishments of three new river basin organizations. A key role of the ECOWAS water centre is to share good practices and interventions, while capacity at the moment is still building up – regional water observatory is planned, CPWF could feed into this. Key aspect underway is the directive on large scale infrastructure for West Africa developed with IUCN. There are six recommendations, one of which is on how to ensure local participation; actors are represented as beneficiaries etc. Challenge is to work out how to best share experiences, and lessons. ECOWAS is seeking a good tool/ mechanism to ensure that the policies and research is aligned and how best to achieve this (mechanism) is another opportunity for the CPWF results to be utilized”.

**Volta Basin Authority - Dr. Charles Biney:** “Firstly, CPWF efforts are very relevant to the Volta basin because VBA has strategic plan of five strands, CPWF work relates to four of these five. These are to do with strengthening of knowledge base in the basin, harmonizing policies, coordination of management and actions, as well as dealing with stakeholders. Secondly, the application of the results that come out of the VBDC is seen as the task and responsibility of the VBA. This is because you have worked in selected areas but from the basin point of view we need to improve livelihoods across the whole basin as well as improve sub-regional integration. Thirdly, we can only do this jointly with other stakeholders including researchers. Finally, how we move forward needs to be in a systematic way. VBA can move forward taking some of these things but we cannot do this alone, we need to be in partnership with you on this. So now we need to prioritize in the short and long term, if you add that to what we can do directly then we can see where we can find the most effective way of moving forward for impact”.

**Burkina Ministry of Water, Hydraulics and Sanitation** - The objectives set by the government include: ensuring food security across the country and sub region. Burkina is said to be a Sahelian country across two regions and we know that our agro pastoral production is subject to climate impacts. We want to improve productivity and production and this can only be achieved if we have control over water. Because then the producers can secure, intensify production, and improve it. Water mobilization in Burkina is a key concern of the government. Water is a rare and valuable good. Agricultural water demand competes with other sector demand and it requires tools and mechanisms to avoid conflicts, both at the national and riparian countries level. Burkina Faso does not have access to the sea and even then require treatment. We are therefore working on IWRM and we want and need to engage all stakeholders. We need to engage at the local level primarily but as government cannot be responsible for the daily management of water, we are engaging in capacity building of local water groups/managers. Mobilization and quality of water resource is done by building dams and other infrastructures. Hence the VBDC research results are relevant to our needs

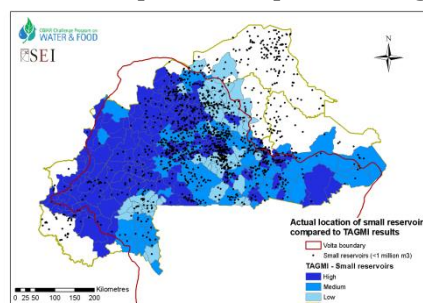
**Ministry of Food and Agriculture, Ghana - Mr. Roy Ariyiga, Director GNRGP.** “In Ghana, We accuse Burkina Faso of giving us too much or too little water. The use of innovation platforms is really thinking outside the box. This will help with national security by reducing potential for conflict over water. Policy has a role to play. I see that fantastic research work has been done through CPWF. AWM and water governance as well as value chain focus is great. But the question is where do we go from here? More people need to know about the results. What is the communication strategy now? Sometimes researchers think and deliberate too much about whether the results of their research are 100% correct, they worry too much about potential uncertainty. So they hesitate to share their results, but governments want quick fixes. We need things that improve livelihoods now. It’s all about putting more money in the pockets of farmers. Schemes that make money for farmers are successful. Therefore we need to begin by asking what the market wants. Then work back from that to get buy-in from farmers. In this way governance structures will also be strengthened. Let’s try to

publish and communicate now and see what we can do now with all this research results. Let's use the networks we've established to achieve positive results for everyone. Multi-disciplinarity is the way forward".

**WASCAL - Dr Boubacar Barry, Director of WASCAL Competence centre, Ouagadougou.** "Congratulations to all of the CPWF team. WASCAL can learn from these findings. There is no model for climate change in Africa or in West Africa. WASCAL is working on this and on integrating changes in land use in the model. The issue of small reservoirs as a climate change adaptation measure as highlighted by this research is interesting. WASCAL findings show that there is no negative impact on water resources by using small reservoirs for water storage. This research has helped to reduce the potential for conflict between Ghana and Burkina Faso. How to bring everyone to the table was a key question for the initiative and it seems that innovation platforms are a useful way to achieve this. These platforms allow to know exactly what the farmer's concerns are and to be more informed towards helping them address their food insecurity. Would propose the development of a platform, through WASCAL, so that these models can talk to each other, so that the socio-economic models and the bio-physical models are integrated in such a way as to be useful to policy makers in planning and decisions. Important to remember that the first and primary decision maker is the farmer. Therefore, we need to focus there first.

**CGIAR Research Program on Water Land and Ecosystems, Dr. Andrew Noble** Director: WLE hopes to build on the networks and relationships developed through CPWF. These are invaluable. Some thoughts on individual topics that were presented:

- The TAGMI (an Interdisciplinary decisions support tool (DSS) in agricultural water management out-scaling for the Volta River Basin) DSS developed by SEI and partners is a tool that could and should be further assessed in targeting AWM interventions in the basin that has a focus on small reservoirs. A map indicating the outputs from the DSS and the current distribution of small reservoirs (SR) in Burkina Faso is shown here.
- The general conclusion from this work was that there was a relatively low correlation between the current distribution of the SR and the DSS outputs. This approach to targeting the out-scaling of AWM is extremely useful and should be further assessed as it has practical implications for implementing SR projects along with other AWM interventions as it also included soil conservation interventions in the study. This would complement the work from the AgWater Solutions initiative.



## 6. Knowledge Fair

The Knowledge Fair session was a great success with over 50 participants. It was organized for half a day and invited stakeholder representatives, next users as well as end users of the VBDC results. These were representatives from NGOs (SNV Ghana), regional (ROPPA) and local farmer organizations, West Africa (ECOWAS) and Africa (AU) wide organizations. 60% of the additional participants decided that they wanted to stay over the whole meeting period, 40% came only for Day 3. The Knowledge Fair had three major components: 1) Launch of the draft [VBDC video](#), 2) Interactive booths in which key outputs were demonstrated ([TAGMI tool](#), [Companion Modelling tool](#), and [Innovation Platforms](#)) 3) Manned poster exhibition of VBDC work and other initiatives in the SSA region (NBDC, LBDC, WASCAL, WLE). Participants engaged with great interest in the presented work and excellent feedback (See Annex I for details) was received on how the presentations could be utilized and improved.

## 7. Workshop Evaluation

Generally, response from participants on the 3-day workshop was positive and encouraging. Participants expressed their views and opinions on what intrigued them the most from the proceedings, how to improve upon the outcomes/findings, the lessons learnt and finally gave some recommendations for future use of results.

### ***What was liked***

The proper and coordinated nature in which the knowledge fair was organized was appreciated by most participants (contents and structure of proceedings) and especially the fact that there was no information overload. The articulate manner in which the power-point and poster presentations were made gave very good expositions on the various subject matters. Dissemination of information and knowledge sharing were further improved through the demonstration of the various water management tools developed as well as footage of the video clips. Coordination and interactions between all the VBDC projects also gave a clearer and better understanding of the projects' activities. The appropriate setup of the booths allowed for open interaction between presenters and participants as well as exhibitors. Overall, the bilingual nature of the facilitators and presenters also accounted for the huge success of the fair.

### ***How to improve***

Diverse ways and measures were given on how to further improve and enrich on-going and future research. Particular emphasis was placed on how and when to bring all stakeholders on board when projects are being carried out in order to achieve a holistic result. For instance ownership of interventions introduced into local communities would be enhanced if they are involved at the planning/designing stages rather than the implementation stage. Findings/results from the various research projects would be further enhanced if stakeholders' capacities are built through trainings and workshops. The scope of stakeholders (external bodies or individuals) can be enlarged especially

during scientific workshops to enrich outputs from these workshops and improve results. The intervention scale of projects can be reviewed to prevent repetition of activities carried out already thus saving time and money. Current findings can also be publicized and all works put on CDs and USB sticks to make dissemination of information and knowledge much easier.

### ***Lessons learnt***

All the methods employed by researchers led to good results but key among them was the participatory approaches used. This approach brought on board all stakeholders (researchers, producers, donors, etc.) to work on projects which yielded much more productive results. Positive improvements in the livelihoods of rural populace are anticipated through the results of the research done.

### ***Recommendations for the future***

The following recommendations emerged:

1. The structure of financing projects by donors should be reviewed e.g. 5 year term intervals
2. Research outcomes should be disseminated to the right stakeholders/decision makers for the appropriate decisions to be taken and such outcomes exploited through developmental projects
3. Capacity building should be a continued process especially training of young researchers.
4. Data captured should be kept for future use and main findings and publications should also be published online.

### **Acknowledgments**

This report is a summary of the Volta Final Science Workshop held on the 17-19 September 2013 in Ouagadougou, Burkina Faso. We acknowledge EC/IFAD for funding the research work through the CPWF. We acknowledge gratefully the contribution of all the partners and stakeholders that participated in the VBDC research and all the workshop participants



VBDC Final Science  
Workshop Proceedings

### **Annex 1: Workshop Proceedings**



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### **Annex II: Book of Abstracts**