CGIAR Challenge Program on
WATER & FOOD

Submission Document

Format for submitting a project proposal

Basin Development Challenges of the CPWF

August 2010

PROJECT SUBMISSION DOCUMENT (Volta/Limpopo BDC)

Introduction

Building on the Proposal Development Workshop that you have just attended as well as the EOI your project team submitted, CPWF is now asking you to complete a formal project proposal as one of five projects that make up the Volta/Limpopo BDC. Background information on the BDC, the CPWF in general, the EOI and this related commissioning process as well as contracting requirements and deadlines, can all be found on https://sites.google.com/site/cpwfbdceoi.

General guidance

Please fill in the text boxes and tables to complete this submission. Only information provided in the text boxes and tables will be sent to the reviewers.

Text must be in Calibri 12, Arial 11 or Times New Roman 12 pt; do not change the page setup: margins top and bottom 2.5cm; right and left 3.2 cm. Not adhering to these requirements may lead to a request for resubmission and delays in contracting.

Do not exceed the maximum length of parts A and B of this submission. Any pages exceeding the length will not be sent to the reviewers. Annexes are not counted towards the length of the submission.

The CPWF supports research for development that is underpinned by the core values of capacity building, interdisciplinary research, partnership, pro-active consideration of gender-and-diversity issues and adaptive management. Throughout the proposal indicate, where appropriate, how you will be guided by them. Proposals will be evaluated on this.

BDC Research and Research Projects

Please insert the relevant information into **Box 1** below:

The **Volta** BDC research program is on:
"*Integrated management of rainwater and small reservoirs for multiple uses"*
Research on the **Volta** BDC is structured into the following five projects:
V1 – Targeting and scaling out
V2 – Integrated management of rainwater for crop-livestock agroecosystems
V3 – Integrated management of small reservoirs for multiple uses
V4 – Sub-basin management and governance of rainwater and small reservoirs
V5 – Coordination and learning for adaptive management and change (coordination and change project)

The **Limpopo** BDC research program is on:
"*Integrated management of rainwater to improve smallholder productivity and livelihoods and reduce risk"*
Research on the **Limpopo** BDC is structured into the following five projects:
L1 – on targeting and scaling out
L2 – on small-scale infrastructure
L3 – on farm systems and risk management
L4 – on water governance
L5 – on learning for innovation and adaptive management (coordination project)

Tables

Please fill out the Excel table provided together with this form. Note that the table has seven tabs (worksheets): Title; Gantt; Budget; Comments; Time Allocation; $ by Output; $ by Institution. Please read carefully the instructions in each worksheet before filling the form.

Annexes to your proposal submission

A: Team leader and team member c.v.'s.
B: Gantt Chart (Annex 4 to the Draft Award Letter)
C: Budget (Annex 6 to the Draft Award Letter)

Attachments to this document

(you may wish to share these with your legal/financial department)
1: Draft Draft Award Letter.
2: CPWF Standard Clauses and Procedures (Annex 1 to the Draft Award Letter).

Deadline

Submission deadline for your proposal is **28 May 2010**. Please send your proposal by email to cpwfsecretariat@cgiar.org.

PART A: SUMMARY (Maximum 1 page)

1. Project Data

BDC: Integrated management of rainwater and small reservoirs for multiple uses
Project Title: Integrated management of rainwater for crop-livestock agroecosystems
Project Lead Organization: International Livestock Research Institute (ILRI)
Consortium partners (who receive budget): International Water Management Institute (IWMI), Animal Research Institute (CSIR-ARI), Agricultural and Environmental Research Institute (INERA), Catholic Relief Services (CRS), Wageningen University, Plant Production Systems (WUR-PPS)
Project Leader (name and contact details): Augustine Ayantunde, a.ayantunde@cgiar.org
ILRI Mali Office, B.P. 320 Bamako, Mali; Telephone: +223 20223375
Duration: 3 years, 3 months ; Target start date: October 2010 ; Finish date: December 2013
Budget requested from CPWF (in US$): US$1,225,000
Any matching funds offered (provide brief explanation): SLP (~30,000 USD) and PROGEBE (~40,000 USD) projects will provide staff time and office space costs for various ILRI team members. NARS have matching funds in terms of staff time, office space and vehicle use.

2. Project Summary

Provide a concise project summary. This should include project rationale, key activities, outputs and methodologies and likely impact. This will later be published on the CPWF website and in other relevant documentation.

With mixed crop-livestock systems projected to remain the main providers of food (animal and plant) in the coming decades, opportunities exist for smallholders to participate and benefit from emerging crop and livestock markets in the Volta Basin. Given the economic, social and environmental vulnerability due to high water scarcity and variability in the basin, improvements in rainwater management are needed for ensuring sustainable and equitable benefits. This project therefore intends to identify, evaluate, adapt, and disseminate best-fit integrated rainwater management strategies (RMS), targeted to different biophysical and socio-economic domains. The integrated RMS are comprised of technological solutions, directed at different components of the agroecosystems, underpinned by enabling institutional and policy environments and linked to market incentives that can drive adoption. The aim is to increase crop and livestock productivity to result in enhanced livelihoods and positive environmental impacts, through strengthened institutional capacity and improved equitable and gender-sensitive performance of crop and livestock value chains. Building on existing knowledge, particularly from CPWF Phase 1 Volta projects and based on participatory diagnosis of constraints, opportunities and criteria for success, integrated RMS will be inventoried and prioritized. Through interdisciplinary action research, the effects of selected promising RMS and the enabling environments for them to succeed will be assessed. Innovation platforms, built around key crop-livestock value chains and at various, but connected hierarchic levels, will be the major mechanism to facilitate the action research; participatory monitoring and learning and; scaling up and out. Tools and frameworks for integrated analysis of RMS, farming systems, gendered livelihoods and value chains will be developed, tested and adapted. Synthesis of the findings will inform the development of guidelines for integrated and targeted RMS options in specific recommendation domains. A wide range of information and communication tools will be used to disseminate the project findings to different stakeholders and to obtain their feedback. Through improved collaboration amongst actors along the value chain, their capacity to access and use relevant knowledge on integrated rainwater management will be enhanced, which will allow them to respond to emerging challenges and opportunities in the context of evolving crop-livestock systems.

PART B: PROJECT DESCRIPTION (Section 3 – 10: maximum 10 pages)

3. BDC Goals to which the project will contribute

Briefly list the BDC Goals that have been developed during the project development workshop and how the project will contribute to their achievement.

The BDC goal is "Improving rainwater and small reservoir management in Burkina Faso and Northern Ghana to contribute to poverty reduction and improved livelihoods resilience while taking account of downstream and upstream water users including ecosystem services."
This project will identify and assess the effects and institutional requirements of best-fit rainwater management strategies (RMS) in mixed crop-livestock agroecosystems in the basin. Integrated RMS take into account not only socio-technological solutions, but also the necessary enabling institutional environment and market drivers for more effective planning, implementation and adoption. Through best-fit RMS to be identified, evaluated and disseminated by the project, crop and livestock productivity will be increased in the project sites through better rainwater management thereby improving water productivity at farm level and enhancing food security of the local communities. Improvement in water productivity at farm level will also contribute positively to overall landscape water productivity. Also by mainstreaming gender perspective in the project, the implications of identified RMS on socio-economic well being of women and men in the project sites will be better understood and gender equality will be enhanced. Besides, the project will contribute to a better understanding of the division of labor and control of resources within the household as regards the RMS and the impacts on women and other vulnerable groups. Based on a thorough knowledge of the biophysical, market and socio-institutional-political context in the Volta Basin, RMS recommendations will be better targeted and the potential for out-scaling will be created. Although the project will focus at the farm scale, this will be done within a wider landscape approach, facilitating linkages to larger scale natural resources. Working through innovation platforms will allow real time learning and flexible and adaptive management. In addition, it will result in increased capacity of various actors to access and use relevant knowledge on rainwater management. The project will result in longer term and larger scale impact contributing to the BDC goal by applying specific strategies and using project outputs to influence various actors, following the outcome logic model (section 8).

4. Research questions and methodologies

Describe here what is the problem this project is aiming to address. CPWF has suggested sample questions for each BDC project (available from https://sites.google.com/site/cpwfbdceoi). Describe how your research will address these research questions and/or additional research questions you consider important. Give a brief description of the research methodologies you will use.

Crop-livestock farming systems are likely to be the major providers of food (plant and animal) in the coming decades, and smallholders have significant opportunities to benefit from rapidly growing crop and livestock markets. However, given increasing water scarcity, climate change and human population pressure, all resulting in increased vulnerability of people and their environment, farming systems will have to intensify in an environment-friendly and equitable way, if such opportunities are to be sustained. For that to happen, improvements in rainwater management in the mixed crop-livestock agroecosystems in the Volta Basin are essential. At present, rainwater management in mixed-crop livestock agroecosystems is inadequate, leading to low crop and livestock productivity, poverty, environmental degradation and high vulnerability of people and the environment. Although significant investments have been made in developing, among others, soil and water conservation measures, nutrient management strategies, improved crop varieties, and rainwater management solutions, these are often

poorly adopted by farmers and ineffectively planned and implemented by decision makers and practitioners (Mazzucato and Niemeijer, 2000). These problems are caused by a number of underlying flaws, including (1) sectoral and mono-disciplinary approaches followed by decision makers, implementers and researchers rather than integrating different disciplines (e.g. a focus on crops, whereas livestock are an essential part of the mixed systems), (2) the fact that solutions are not targeted to specific biophysical and socio-economic domains and users priorities, and therefore not always appropriate, (3) the technology focus of solutions, often ignoring the necessary link to market drivers and support by enabling institutions and policies, (4) limited understanding, communication and collaboration between various actors (decision makers, implementers, civil society, private sector, farmers, researchers) that limits the ability to share knowledge and apply adaptive learning, (5) the limited ability of smallholders to participate in markets, and (6) limited evidence-based knowledge of available solutions, their effects and the capacity to apply them in practice. This project intends to make a difference by (a) understanding and addressing the above problems and through (b) including livestock as a significant dimension in the thinking about improved rainwater management, (c) understanding how institutions and market incentives shape the reality of interventions, (d) strengthening linkages between different value chain actors, (e) improving communication and adaptive learning, (f) taking into account gender dimensions.

In the methodology section below we refer to terms that are interpreted as follows:

- Integrated RMS: strategies comprising technological solutions, supported by an enabling institutional and policy environment and taking into account market drivers for adoption. Integrated RMS are considered within mixed crop-livestock agroecosystems, which implies that solutions which could lead to improved rainwater management are not directed to crop production only, but also to livestock production and common property resources. The strategies will go beyond water management practices *sensu strictu*, as alleviating water stress will not be effective unless other constraints (e.g. low soil fertility) are alleviated simultaneously. Therefore, where appropriate, integrated RMS can take on board elements of nutrient management, animal nutrition, crop varieties and management, common property resource management, access to input and output markets, policy incentives, etc.
- Innovation platforms - dynamic and fluid platforms of actors at various levels, that support action learning and, strategies for scaling up and out. The project will take an overarching innovation platform approach that supports learning and exchange for all research areas (1 – 3) outlined below. At the local level, it will comprise of key actors along the identified priority crop-livestock value chains and will identify opportunities for innovation to enhance chain performance. At this level, the innovation platform shapes, monitors and evaluates the action research on the ground. It is a mechanism for adaptive management and learning, and capacity building of actors to access and use relevant knowledge. At higher levels, they will comprise influential actors from various sectors that are active at different geographical and administrative levels (farmers, non-governmental organizations (NGOs), private sector, decision makers, researchers) that facilitate joint learning and experience sharing, for scaling out and up. Steps that will be taken in setting up innovation platform include: 1. A participatory identification of market opportunities to select priority crop-livestock value chains in the project sites, including drawing on information available from literature and baseline information. 2. A rapid mapping of actors in the identified priority crop-livestock value chains. 3. A first meeting to set the objectives of the platform and form the coalition and agree on monitoring and evaluation mechanisms. 4. A second meeting to discuss the first set of results from the value chain analysis, to decide on specific interventions and define roles and responsibilities of value chain actors. 5. Implementation of identified options in different

segments of the value chains. 6. Action-reflection cycle implemented through a series of meetings; 7. Monitoring and process documentation. Innovation platforms will be formed around value chains in the 2 project sites in each country. Details of steps, outputs and tools involved in innovation platforms are presented in Appendix 1.

- Recommendation domain: the biophysical and socio-economic context, in which RMS are considered. Targeting and scaling out of RMS can be applied to similar domains in the basin.

The project will address the following research questions by applying relevant methodologies and approaches. For each research question, reference is made to the relevant project output.

1. What integrated RMS work best where, how, and under which enabling institutional and policy conditions? (output 1)
The "where" question seeks information about the agro-ecology, farming system characteristics, climate, soils, topography, socio-economic characteristics, and market conditions, where particular RMS are successful or not. The "how" question tries to understand the processes leading to successful application of RMS, including the role of different actors, their linkages, behaviors and practices, and the role of communication and dissemination tools. The last part of the question analyses the role of formal and informal institutional arrangements, policy incentives and governance mechanisms in shaping RMS interventions.
Building on existing knowledge and experiences from past projects including CPWF Phase 1 projects, the project will, in collaboration with V1, review secondary information (project reports, scientific papers, and grey literature) about different types of RMS and their related biophysical and socio-economic-political contexts in the basin. Through innovation platforms (as above) and various types of participatory consultations the project will conduct consultations with stakeholders at various levels, to elicit and analyze constraints, opportunities and underlying causes for success and failure in the application of RMS. At the community level this will involve local NGOs, farmer representatives, extension agents, district-level officials and different actors along the value chain. At the district, national and regional levels it will include ministry representatives, policy makers, NARS, and development agencies like USAID (United States Agency for International Development), AGRA (Alliance for a Green Revolution in Africa), CORAF (Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles) and NGOs. Criteria and indicators for success will be determined in a participatory way to reveal needs and priorities of multiple actors, and based on that, RMS will be evaluated and ranked jointly with all actors. The result of this participatory inventory will be (1) a good understanding of the landscape of actors and institutions, their relations and the policies that influence rainwater management (output 1c&1d), which will help in setting up the innovation platforms, (2) a set of best-fit RMS strategies related to a typology of crop-livestock agroecosystems (output 1e), which will be taken forward for detailed evaluation in the farm context, and (3) a refined understanding of which issues and variables need to be included in the baseline survey (output 1f) and subsequent analyses.

2. What are the effects of best-fit integrated RMS on different aspects of farm productivity and profitability, gender-specific livelihoods, equity, hydrology, ecosystem services, and vulnerability of people and the environment? And what tools, frameworks, criteria and indicators do we need to assess these effects and combine them in an integrated analysis to come up with targeted solutions? (output 2 and 3)

This research question will be addressed in 4 sites along a gradient that captures agroecology, different market conditions and value chain opportunities, as such ensuring that successful RMS options can be scaled out to similar recommendation domains in the basin. Bio-physical, socio-economic and institutional baseline characterizations will help understand the existing situation, which can be compared to desired future scenarios. Institutional analysis regarding RMS will entail institutional/network mapping (organizations involved in RMS), policy document analysis, key informants interviews to refine understanding of interactions and power relations at community level. Institutions are seen as overarching issues that will affect RMS. The project will build on institutional analysis for water management and use for Volta basin conducted under CPWF Phase 1 by Basin Focal Project (Labbé, 2007). Building on findings from Volta projects in CPWF Phase 1 (PN 5, PN 6, PN 55) and the synthesis of inventory ofbest-fit RMS by this project, interdisciplinary action research (following iterative cycles of problem definition, planning, action (on-farm trials), monitoring, evaluation, reflection and learning by different RMS actors) will be conducted to assess the effects of selected RMS on different aspects of the mixed farming systems, associated priority crop and livestock value chains and the natural resources. Special attention will be paid here to crop and livestock productivity, water flows, ecosystem services and household economy. This will be combined with an analysis of how the adoption and performance of RMS is influenced by market conditions and institutions. The action research will be shaped by the local innovation platforms through (1) deciding which integrated options to test where, how and for what, and (2) continuous monitoring and evaluation for adaptive management. Trials will be designed to compare the effects of different options with the baseline scenario.

Tools and methods for integrated assessments will build on frameworks for water productivity in mixed systems (Descheemaeker et al., 2010), gendered livelihood frameworks (Van Hoeve and van Koppen, 2006), the small reservoir toolkit (Andreini et al., 2009), and the value chain analytic approach in agri-food chains (Taylor, 2005). In addition, the Nuances framework (Van Wijk et al., 2009) will be applied to (1) understand the consequences of household level rationales in terms of resource allocations, (2) feed the field/plot level data into farm level simulations in order to understand household level impacts, (3) investigate optimal farming systems design and (4) conduct trade-off analysis at the farm level. Through continuous feedback to and from the innovation platforms the Nuances framework can be used for participatory modeling and scenario analysis (Thornton and Herrero, 2001). Whereas the nuances framework focuses on productivity indicators at farm scale as the main outcomes (livestock, crop and land) in the evaluation of RMS for different farm types, the other set of approaches put these in a broader context by performing an integrated assessment.

Depending on need, primary data collection might include measurement and analysis of crop, feed and livestock products and services, household economy, market and value chain analysis, appraisal of gender-specific access to resources and household assets, inter- and intra-household analysis of benefits and inputs, assessment of infiltration, water flows and erosion at field/plot scale, evaluation of ecosystem services and appraisal of the vulnerability of households, community groups, and their environment in relation to changes and pressures. Local MSc students will be involved in the interdisciplinary assessments.

Through gender analysis, the following questions will be addressed as relate to RMS: 1. Who does what (men, women, children, the elderly)? 2. Who has what (access and control profile)? 3. How are the activity, access and control patterns relating to RMS shaped by the socio-economic contexts? 4. What gender considerations are to be addressed regarding RMS in the project sites? Tools for integrated assessment of RMS will be tested and adapted for the specific situation in the study sites.

The knowledge and understanding gained through the above assessments will be combined with the lessons from the inventory of RMS and then synthesized to come up with RMS options targeted to specific biophysical and socio-economic-political recommendation domains.

3. How can we foster the adoption, scaling out and scaling up of improved rainwater management practices in mixed crop-livestock agroecosystems? Which institutional and policy environments and links to the value chain are needed to ensure adoption by farmers? (outputs 4 and 5)

The project will combine different approaches and strategies, geared towards influencing various actors. The logic behind it is elaborated in the outcome logic model (section 8).

The interdisciplinary baseline characterization and participatory inventory of RMS, actors and policies will enable a thorough understanding of bio-physical, market, institutional and social conditions in the study sites. This information will allow V1 to perform out-scaling of the RMS options to other similar recommendation domains in the Volta Basin.

In each site, innovation platforms comprising actors in priority crop and livestock value chains will be formed to foster joint action. Through continuous monitoring and evaluation, the innovation platforms will enable adaptive management of the project. Apart from improving understanding, collaboration and communication between the different actors, this will also build the human capacity of practitioners in various sectors to access and use relevant knowledge about rainwater management.

5. Links to previous and ongoing work

What – if anything – has been done to address the problems in the past (by your partners, other researchers and in CPWF Phase one projects) that is relevant to implementing this project? What are the key lessons learnt that you will consider in the present project? (Include in Section 16 a carefully selected list of relevant bibliographic references).

The achievements of several projects that were implemented in the first phase of the CPWF in the Volta Basin will serve as key lessons and building blocks for this project (V2). Where project sites in CPWF Phase 1 in the Volta Basin are the same as in V2 project, relevant baseline information will be used for the project activities. Publications from CPWF Phase 1 Volta projects that can be useful for synthesis of RMS in mixed crop-livestock systems are listed under the section on Bibliography (section 13). The best-bet crop, water, nutrient and natural resource management strategies that were identified by PN5 and PN6 will be considered again by V2, with the additional dimension of linking them to the livestock component of the mixed systems, and taking into account the institutional environment and value chains as the requirements and drivers for adoption. V2 will also build upon the strategic alliances that were set up by PN5 between key stakeholders. The rainwater management options identified by PN6 for increasing domestic water availability and reducing women's labor in water sourcing for domestic needs will be considered by V2 in addressing how to enhance gender equality through RMS. The toolkit and approaches developed by the small reservoir project (PN46) for intervention planning, evaluation of ecosystems, institutions and economics will be used by V2 and adapted where necessary. The whole-basin assessment by the basin focal project for Volta (PN55) provides V2 with the necessary baseline characterization and location of farming systems and a useful inventory of the researchable issues and priorities. Where appropriate, V2 will also use recommendations from PN47 on local institutional experiences in Volta basin and

how to incorporate elements of both traditional and modern institutions into the institutional arrangements for RMS by the project.

V2 will take advantage and build on the knowledge generated in several projects focusing on mixed crop-livestock systems. Past and on-going SLP (System-wide Livestock Program) projects provide useful insights for V2 on the functioning of mixed crop-livestock systems in West-Africa, in particular on the effects and trade-offs of resource use and allocation. In these projects, considerable knowledge has been gained on nutrient management, which will be vital for V2 to build upon in combination with improvements in rainwater management. Useful knowledge was also generated on how to intensify mixed farming systems through the use of dual purpose crops, crop residue and manure management, and improved animal housing and veterinary care. An IFAD-IDRC (International Fund for Agricultural Development - International Development Research Centre) project around nutrient management highlighted the need to address farmers' access to inputs and information, to strengthen community institutions and to come up with integrated technology packages. In addition, the PROGEBE (Projet régional de Gestion durable du Bétail ruminant Endémique en Afrique de l'Ouest) project experience also emphasizes the importance of market incentives for the adoption of technologies.

There are clear links and complementarities between V2 and the IWMI-led BMGF funded 'Agricultural Water Management (AWM) Landscape' and the companion IFAD project in terms of identifying and inventorying promising rainwater management options and analyzing what works where and how.

Past work on livestock water productivity in the CPWF (Nile and Indo-Gangetic Basin) and a BMZ (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung) sponsored project led to the development and adaptation of tools and frameworks for integrated analysis of water productivity and gendered livelihoods in mixed crop-livestock systems. These projects identified strategies for improvement in terms of feed, water and animal management, which can be tested and adapted in the context of the Volta Basin.

The key lessons from CRS-CIAT Learning Alliances and ILRI's engagement in IPMS (Improving Productivity and Market success of Ethiopian farmers) and DFID (UK Department for International Development) funded Fodder Innovation Project in India and Nigeria are that innovation and learning platforms can facilitate ownership creation, institutionalization, monitoring of project processes and outcomes, and scaling up and out of good practices and solutions. With some of these same scientists in V2, the project will take advantage of these experiences.

6. Links to other BDC projects

Please fill out the following table.

Research outputs	Dependencies on other BDC projects to produce it	Use of research output by other BDC projects	Risks and assumptions
1c: local level stakeholder and policy mapping		V4 will use the identification of local stakeholders and governance mechanisms	
1d: value chain analysis		V3 could benefit from the market opportunity identification and value chain analysis	
1e: inventory of RMS	- V1 will organize a larger level consultation	- V1 will need specific information on livestock	Timely organization of

	workshop in which V2 will participate - V1 and V2 collaborate on a typology of crop-livestock farming systems and related RMS	related interventions and their success - V1 and V2 will collaborate on the inventory and identification of criteria and indicators for success	consultation workshops
2b: effects of RMS assessed	Information from V3 on the multiple uses of reservoir water could be used by V2 in analyzing effects of small reservoirs on farm level productivity, economy and livelihoods	- V3 will use the upstream plot level information on erosion and runoff for the assessment of hydrology and siltation of reservoirs - V4 will use the farm level information on economics and environmental effects of RMS	V4 will communicate to V2 what kind of input data and variables they need to run the models
2d: targeted RMS		V1 could use this for the outscaling modeling	
3a: frameworks for integrated analysis		V2 and V3 collaborate on adapting the frameworks for integrated analysis of multiple uses of reservoir water	
4a: learning alliances	V5 to set up and facilitate overall learning alliances, in which the other projects (V1-4) can engage		
4d: communication tools	V5 will provide the overall interactive web-based information platform		

7. Suggested sites

Taking into account sites mentioned in the description of the BDC research program, and the need to work together with other projects, where will this project work?

For site selection this project takes into account different criteria, such as:
- Location along an agro-ecological gradient, for which we consider annual rainfall, resulting in site selection along a north-south transect.
- Sites represent different conditions in terms of market access and value chains
- Sites are within the working radius of research stations of the national partners ARI and INERA

We propose four areas in the below table. Given limited resources, the level of detail of the research might differ between the sites, depending on practical issues, like student availability. Lawra and Koubri district are overlapping with 2 of the sites proposed by the V3 project. In these districts, choosing the same communities for the actual work will result in complementarities and synergies. As it stands now, we don't have any real overlap with the sites proposed by the V4 project. However, the local level information V2 will generate will be useful as an input to the modeling by V4 if general conditions are similar.

District	Location	Annual rainfall	Major soil types	Major livestock species	Major crops	Market access
Tolon-Kunbungu District	Northern region of Ghana, 15km west of Tamale. 9°-10°N and 1°-2°W	1000 – 1150 mm	Nyankpala and Tingoli series	Cattle, sheep, goats, guinea fowls	Sorghum, maize, rice, millet, groundnut, soybean, pigeon pea, cassava, yam,	Very good
Lawra district	North-West corner of the Upper West Region of Ghana. 10°30'-11°N and 2°-3°W	900 – 1000 mm	Tanchera series	Cattle, sheep, goats, pigs, guinea fowls	Sorghum, millet, maize, rice, cowpea, groundnuts, soybean, bambara nuts, yam, potato	Limited
Koubri district	Kadiogo Province of Burkina Faso $12^{o}11'$N and $1^{o}24'$W	800 mm	Lixisols	Sheep, goat, cattle	Sorghum, millet, maize, cowpea, groundnut	Very good
Ouahigouya district	Yatenga Province of Burkina Faso $13^{o}34'$N and $2^{o}25'$W	600 mm	Lixisols with gravel overlying	Cattle, sheep, goat	Sorghum, millet, cowpea	Moderate

8. Project Outcome Pathways

How do you intend to carry out this project? Please describe in the table below how the research outputs and strategies are expected to influence key targeted actors in your project (i.e., achieve outcomes). For a worked example see https://sites.google.com/site/cpwfbdceoi/proposal-development-workshop-preparatory-information.

	Actor(s) who will change in the same way	**Change in actor Practice / Behaviour**	**Change in Knowledge (K), Attitude (A) and/or Skills (S) in actor(s) required to achieve Practice change**	**Project's strategies for achieving these changes in KAS* and Practice**	**Research output(s) involved in change**	**Risks and assumptions**
Outcome pathway 1	Key actors at different levels, which are specifically targeted in pathway 2-6	Improved collaboration; More effective partnerships; More effective support to farmers; Better connection for information sharing	K: Increased awareness of other actors and understanding their agendas A: More openness towards other actors; more transparency; increased appreciation of each others' roles S: Improved skills in exchanging ideas and listening to others	Setting up and engaging actors in innovation platforms; Action research involving farmers, researchers, private sector, extension agents and NGO workers	1c: Actor and network analysis; 2a: Participatory action research; 4a: Innovation platforms	There is trust and willingness to collaborate; There is committed platform facilitation
Narrative 1	The limited nature of collaborations and partnerships is perceived as a barrier to effective planning, implementation and adoption of promising rainwater management strategies. By mapping the different actors and their linkages and involving them in innovation platforms around priority crop and livestock value chains, this project will foster transparency and create awareness of other actors and their agenda. On farm action research will also contribute to improved mutual understanding and collaboration between NGOs, Ministries of agriculture and water, extension agents, private sector, researchers and farmers.					
Outcome pathway 2	Public sector at the local, district level: relevant ministries, directorates, decision makers	More effective planning of RMS; Policies move away from sectoral towards integrated approaches; Policies create enabling environments for the private sector	K: Better understanding of advantages of integrated approach; better understanding of effects of integrated RMS A: Appreciation of participatory approach; recognition of local level knowledge on rainwater management S: Improved skills in applying tools and guidelines	Policy makers and public sector practitioners are engaged in learning alliances, project workshops, and stakeholder consultations; Policy briefs are sent to the ministries	2d: Targeted recommendations of RMS; 3c: Guidelines for developing integrated solutions; 4a: Learning alliances; 4c: Policy briefs	It will be possible to engage the public sector out of interest that their targets and agendas can be met through joint action of platforms
Narrative 2	The public sector mostly operates in a mono-disciplinary way, which impedes synergies between crop, livestock and water management and hinders tackling problems related to the interlinkages between the sectors (e.g. water degradation due to livestock drinking). To reverse this and achieve more effective planning of integrated RMS, this project will improve the 2-way communication with decision makers through (1) involving them in learning alliances and (2) providing access to evidence-based information on RMS. This project will strengthen the skills of the public sector in applying tools and guidelines for developing integrated RMS.					
Outcome pathway 3	Civil society: NGOs, farmer organizations, extension services	Enhanced capacity to take up brokerage and facilitation functions; More effective implementation and dissemination of RMS	K: Improved understanding of community needs; improved knowledge of integrated RMS, their effects and delivery mechanisms A: Appreciation of the effectiveness of integrated approaches and monitoring and evaluation; recognition of the role of various community institutions and the role of women in rainwater management S: Strengthened capacity for engaging farmers and communities	NGOs and farmer groups learn through the process of participatory action research and being involved in innovation platforms; Needs assessment and community understanding through PRAs; Various communication and documentation tools, relevant for community based extension, are used to disseminate findings	1c: Policy and institutional mapping; 2a: Action research; 2d: Targeted recommendations; 3b: Training practitioners in using integrated tools; 4a: Innovation platforms; 4d: New communications	The on-farm action research will produce generalizable and widely applicable principles and lessons; The civil society will participate actively in the innovation platforms
Narrative 3	NGOs and farmers organizations often lack the appropriate capacity to implement and disseminate successful RMS. By applying various communication tools and involving these					

	actors in action research and innovation platforms, this project will improve their understanding of the effects of integrated RMS, connect them to research and extension, and help them appreciate the added value of integrated approaches and continuous learning based on monitoring and evaluation.					
Outcome pathway 4	Private sector (traders, input dealers, agri-business)	Private sector engages in partnerships with farmers and research; Enabling environment provided for private sector functioning	K: Improved knowledge of the value chains; improved understanding of the effect of RMS on profitability A: Appreciation of the value of research outputs; appreciation of farmer knowledge S: Improved communication skills	Engagement of private sector in innovation platforms; Informing private sector through communication tools	1d: Value chain analyses; 2d: Recommendations on RMS and investment priorities; 4a: Innovation platforms	Increased knowledge by the private sector will not benefit the wealthy and marginalize smallholders
Narrative 4	The private sector in the Volta Basin is not well developed and integrated with research, extension, civil society and the farm communities. To help realize the potential energizing effect of the private sector, this project will inform them about entry points in the value chains and the effects of RMS. Through engaging them in innovation platforms, the project will foster the private sector's appreciation for research outputs and farmers knowledge.					
Outcome pathway 5	Farmers in the study sites	Adoption of RMS; Better access to information sources and services; Enhanced capacity to respond to challenges and emerging market opportunities	K: Improved understanding of the effects of RMS A: Appreciation of benefits of the integrated RMS; recognition of the role of various community institutions S: Strengthened human capacity; improved communication skills	Needs assessment through PRAs; Action research / farmer field days; Addressing community institutions; RMS options are gender sensitive Farmers are involved in innovation platforms; Various communication tools are used to disseminate findings	1b: PRA; 1c: Policy and institutional mapping; 2a: Participatory action research; 2d: Targeted recommendations; 4a: Innovation platforms; 4d: New communications	The on-farm action research will produce meaningful results; there is trust among the different farmers in the community and confidence in the researchers
Narrative 5	Farmers in the study areas often face various constraints to adopt promising RMS. PRAs and policy and institutional mapping will help us understand these constraints and the needs of the communities, so that RMS can be better targeted, gender sensitive and take into account local institutions. Another constraint in the adoption of RMS is the limited human capacity of farmers to access and use relevant knowledge, which this project will strengthen by involving farmers in action research and organizing farmer field days.					
Outcome pathway 6	Researchers (project partners, academics)	Working across disciplines; Using new approaches and tools (innovation systems, value chains)	K: knowledge of effects of integrated RMS A: Appreciation for interdisciplinary and innovation platform approaches S: Improved skills to adopt tools for integrated research	Interdisciplinary action research; Capacity building of students; Project partners are informed about tools during workshops and supported while using them	3a: Tools and frameworks; 3b: Researchers are trained in using them; 4b: Project workshops	Students will be found to enroll in MSc programs
Narrative 6	Researchers often work in their discipline only, as such failing to duly address the complexity of farming systems. This project will try to change this within project partners and collaborating academics by developing, testing and disseminating research tools and frameworks for integrated analysis of mixed crop-livestock systems. Students and project partners will learn through being involved in the interdisciplinary action research. Sharing and use of project data, and conflict resolution will be addressed by relevant clauses in the Memorandum of Understanding or Letter of Agreement to be developed with different project partners.					
PROJECT IMPACT NARRATIVE	Inadequate rainwater management in crop-livestock agroecosystems in the Volta Basin results in low crop and livestock productivity, environmental degradation, poverty and high vulnerability of ecosystems and people. Although rainwater management solutions exist, they are often ineffectively planned and implemented and poorly adopted by farmers. This project aims to reverse these flaws by tackling their underlying causes such as insufficient knowledge and capacity of practitioners, poor collaboration and understanding between different actors, sectoral approaches by researchers, decision makers and implementers, and the narrow technological angle ignoring market and institutional aspects. Apart from generating improved knowledge about the effects of integrated RMS, multiple strategies for achieving the above will be used, including (1) interdisciplinary on-farm action research engaging farmers, local rainwater management practitioners, private sector, NGOs and researchers, (2) engaging value chain actors in innovation platforms, (3) engaging in learning alliances of key decision makers at various levels to facilitate learning from the experience, (4) dedicated communication of the research findings towards different audience and getting their feedback using the appropriate tools, and (5) capacity building of different actors (farmers, rainwater management practitioners, private sector, public sector, researchers) through different methods. By influencing the behavior of the different actors, it is anticipated that rainwater will be managed more appropriately first of all in the study sites. However, because of higher level actor changes, it is believed that out-scaling and up-scaling of targeted integrated RMS can take place,					

	leading to basin-wide positive impacts in terms of crop and livestock productivity, farm profitability, environmental resilience, and improved human well-being in the longer term.

9. Activities and Implementation Plan

In the form of a **Gantt chart**, constructed as an Excel spreadsheet, please provide a tabular description of the activities leading to outputs (both research and communication) and uptake that your team will undertake. A Gantt chart is a 'timeline' that shows the sequence of activities leading to outputs and uptake and constructing it helps ensure that the sequence of activities you propose is feasible. Construct it in monthly segments over the life span of your proposed work. The Gantt Chart does not contribute to the word count. BE AWARE THAT THE GANTT CHART IS INDICATIVE and need not be too detailed because if successful your project implementation plans will be coordinated and finalized during the Inception Workshop

Send the Gantt chart as a separate document called Annex B – Project Gantt Chart.
NOTE: The Gantt chart is not included in the page count here. It is part of the Excel Table.

10. Communications

Briefly describe your communications plan.

The project will use a wide range of communication tools to disseminate different findings and products to various stakeholders and types of audiences and to get their feedback.
Innovation platforms comprising actors along priority crop and livestock value chains will serve as a mechanism to provide information and knowledge and facilitate action research at the local level. There will be one innovation platform per site in each of the countries. The innovation platforms will decide which other communication tools would be appropriate to get information and messages across to different audiences, and communication with farmers will take place during various knowledge-sharing events including farmer field days, when community farmers will visit and discuss the on-farm action research together with researchers, extension agents, private sector and NGOs.

The V2 project will also engage in learning alliances, which will be set up and facilitated by V5. With input from V2, these alliances will foster the appreciation for integrated approaches and improve the understanding of the effects of RMS at the higher levels of decision making, leading to scaling up and out. Learning alliances engage a wide range of actors from different sectors that are active at different geographical and administrative levels (farmers, NGOs, private sector, decision makers, researchers). We propose separate learning alliances for the two countries, which would meet every 6-9 months, with a few cross country meetings of the core facilitation team and selected participants as warranted. The role of the project team members will be to engage in, provide input to and support the platforms, but we hope V5 will lead setting them up and facilitating.
Different types of workshops will be organized, including a consultation workshop with various actors at the beginning of the project. Several project workshops will also take place, which are intended for smaller groups of project partners and directly involved stakeholders. During these project workshops, research protocols, tools and intermediate and final results will be discussed and evaluated, based on which future research plans will be adapted. We are also envisaging a project writeshop to be held in the last year of the project to produce research and policy briefs and synthesis reports. V2 will actively participate in the international CPWF forums, relevant topic working groups and the reflection workshops and wider BDC workshops organized by V5.
V2 will actively participate and contribute to the open-access interactive web-based information platform, which we hope V5 will set up and maintain. This platform will bring together insights, experiences and questions related to rainwater management from the different actors and partners engaged in the project. To facilitate communication within the V2 project, a wiki or other web tool will be used to share information and documents, and a central database will be kept for archiving purposes.
The project's outputs will also be communicated in scientific papers, reports, books and book chapters, and contributions at national and international conferences.

The major risk the project faces is failure to deliver in other Volta projects as delay or failure in one project may affect the achievements in other projects due to interdependencies of the projects. Another risk is delay or failure to deliver by any of the V2 project partners. These risks will be discussed during the project planning workshop where there will be further elaboration on details of implementation of project activities by different partners. Sharing and use of project data, and conflict resolution will be addressed by relevant clauses in the Memorandum of Understanding or Letter of Agreement to be developed with different project partners.

PART C: CONSORTIUM DETAILS, INDICATIVE BUDGET AND REFERENCES (Section 11-13)

11. Consortium Details

The quality and experience of your project team will help ensure the delivery of quality outputs. Please fill in the table below to describe the project team members. Indicate in particular who has responsibility for communications, M&E, knowledge sharing and gender analysis. These will be people who will normally be funded at least partly by the project. You will be requested to enter into a Memorandum of Understanding with them if successful. Attach a full c.v. for the project leader and a one page c.v. for each team member in Annex A.

Names of team members	Professional discipline	Institutional affiliation and address
[project leader] Augustine Ayantunde	Animal Science / Natural resource management; M&E	ILRI Mali Office, B.P. 320 Bamako, Mali.
ILRI/IWMI new joint appointee	Farming systems research	ILRI/IWMI West Africa Office Accra or Ouagadougou
Ranjitha Puskur	Innovation processes; knowledge sharing	ILRI Addis, P.O. Box 5689, Addis Ababa, Ethiopia
Bruno Gerard	System agronomist	ILRI Addis, P.O. Box 5689, Addis Ababa, Ethiopia
Diego Valbuena	Farm modeler	ILRI Addis, P.O. Box 5689, Addis Ababa, Ethiopia
Rainer Asse	Social scientist; gender analysis	ILRI Mali Office, B.P. 320 Bamako, Mali.
New scientist	Innovation processes; knowledge sharing	ILRI Addis, P.O. Box 5689, Addis Ababa, Ethiopia
Jean-Philippe Venot	Geographer	IWMI West Africa Office Accra or Ouagadougou
New scientist	Hydro-spatial Modeler, Ecosystem Services	IWMI West Africa Office Accra or Ouagadougou
Regassa Namara	Economist	IWMI West Africa Office PMB, CT 112, Cantonments, Accra, Ghana
New postdoc	Economist	IWMI West Africa Office PMB, CT 112, Cantonments, Accra, Ghana
Karbo Naaminong	Animal science/Farming Systems	CSIR-Animal Research Institute P. O. Box AH 20, Achimota, Accra, Ghana
Korodjouma Ouattara	Agronomy, soil science	INERA-SARIA, BP 10, Koudougou, Burkina Faso
Tom Remington	Agronomy, Innovation processes	CRS BP469, Ouagadougou, Burkina Faso
Mireille Barbier	Agro-enterprise	CRS BP 469, Ouagadougou, Burkina Faso
Mark van Wijk	Agronomy, modelling	WUR Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands

Provide a brief text statement on why the lead institution is well-placed to lead the group.

The International Livestock Research Institute (ILRI) has relevant in–house expertise for this project through its work at the crossroads of livestock, environment and poverty, towards achieving the overarching objectives of i) Sustainable intensification of smallholder mixed crop-livestock systems for increased productivity through better use of limited natural resources; ii) Reduced vulnerability in marginal systems subject to biophysical and socio-economic shocks; and iii) Sustainable increased incomes from expanding livestock markets. The recent Centre-Commissioned External Review (CCER) of ILRI highlighted the importance of rainfed crop livestock systems for poverty alleviation and natural resource management (NRM) and the key role ILRI can continue to play in this area in the coming years. Through past and current projects in West-Africa, ILRI has gained insight in the functioning of mixed crop-livestock systems, the effects and trade-offs of resource use and allocation, and sustainable pathways towards intensification of mixed farming systems. Through working in multi-partner projects ILRI has built expertise relevant for this project in nutrient management, water-livestock issues and innovation systems. ILRI's current offices in West-Africa are located in Ibadan and Bamako, hosting expertise on livestock nutrition, farming systems, economics and animal genetics. A new ILRI/IWMI joint position will be based in Accra or Ouagadougou, with expertise in water and livestock research in mixed agro-ecosystems.

Provide brief text statements on why the proposed partner institutions are qualified to carry out the proposed research.

The International Water Management Institute (IWMI) has been an important player in agricultural water management in the Volta Basin, with the objective of improving water and land management for food, livelihoods and nature and with the goal of contributing to the vision of 'A Food Secure World for All'. IWMI's research is organized around four themes: Water Availability and Access; Productive Water Use; Water Quality, Health and Environment; and Water and Society. IWMI has considerable experience in integrated water and natural resource management, from farm to basin scales. With research offices in Ghana and Burkina Faso, IWMI is in a uniquely advantageous position to undertake a project oriented towards analysis, management and governance of rainwater at the farm level in the Volta basin.

The Council for Scientific and Industrial Research – Animal Research Institute (CSIR-ARI) is one of the 13 Research Institutes under the Council for Scientific and Industrial Research, Ghana and is mandated to conduct research and development activities into livestock and related aspects to enhance technology generation, adoption and productivity. The Institute has three of its research stations strategically located in the Volta Basin in Northern Ghana. A range of expertise is available including scientists in Animal production, forage agronomy, socio-economics, and veterinary disciplines and in close partnership with other development workers will contribute to project implementation in the basin. CSIR-ARI as the lead partner institution in the basin will strongly collaborate with CSIR-SARI and the University for Development Studies (UDS) to maximize the benefits of project team multi-disciplinary and inter-institutional approach to ensure project success. Mathias Fosu and Akwesi Abunyuwa both scientists at CSIR-SARI participated in CP Phase I and will be of immense support with their expertise.

The Agricultural and Environmental Research Institute (INERA in french) is Burkina Faso's principal agricultural research agency. INERA is charged with formulating, implementing, and coordinating the country's environmental and agricultural research, and is placed under the National Center of Scientific and Technological Research (CNRST), which in turn falls under the jurisdiction of the Ministry of Secondary and Higher Education and Scientific Research (MESSRS). Headquartered in

Ouagadougou, INERA consists of an environmental and agricultural research and training center (CREAF) in Kamboinsé and five regional environmental and agricultural research centers (CRREAs)—one in each of the country's five agroecological zones. INERA has 5 departments and we work in the Department of Natural Resource Management and Production Systems. This Department is in charge of the research activities on soil fertility management, soil and water conservation, on agro-climatology and hydrology, and on the improvement of crop production systems. It handles long-term experiments on soil fertility (chemical, physical and biological fertility) and acts based on laboratories and a GIS cell.

Catholic Relief Society (CRS) is committed to having a significant impact on rural poverty at scale through agriculture. To succeed, CRS works with partners – both technical and implementing and public and private sector. CRS has a proven track record of working with both IARCs and NARS in Africa. Relevant examples include collaboration with IWMI on multiple use of water in Ethiopia and with INERA on hermetic cowpea storage. Collaborating with CIAT, CRS has developed expertise in facilitating innovation platforms and learning alliances. Through its 8 year Agroenterprise Learning Alliance, CRS has shifted from a focus on agriculture production and food security to a focus on value chains and linking farmers to markets. And CRS is a lead partner in the NETHOPE Consortium developing and deploying Information Communication Technologies for Development – including netbooks, off line e-learning content, e-monitoring forms, cell phone communication and rural radio. CRS has offices and programs in Ouagadougou and in Tamale.

WUR-PPS:
The principal scientific goal of the Plant Production Systems group of WUR is the integration of knowledge to allow analysis and design of new approaches to the dual goals of sustainable production systems: optimal production of crops and livestock combined with optimal management of natural resources in their broadest sense. We develop tools and methodologies that allow analysis and design of alternative future scenarios at local (farm), regional, national, international and global scales. A special emphasis is on the use of modeling tools, although field oriented and experimental work is also performed as an essential part of testing of our concepts. In recent years we have run a series of projects in which we have analyzed sub Saharan African smallholder farming systems in countries like Kenya, Zimbabwe and Mali. In these projects modeling tools were developed to be able to evaluate different strategies of nutrient use at farm scale and to quantify trade offs between the use of limiting natural or socio-economic resources within the farming system.

12. Indicative breakdown of budget

This is part of the project workbook.

13. Bibliography

Please list up to 10 references and key documents

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Appendix 1: Details of steps, outputs and tools involved in Innovation platforms

Value Chain Analysis	Hubs	Innovation Platforms
Purpose: Collection and packaging of information and analysis to support the Innovation Platform	***Purpose***: Facilitation of market access	***Purpose***: Facilitation of communications amongst VC actors

Step	Purpose	Value Chain Analysis	Hubs	Innovation Platforms	Detail	Outputs	Tools
1	Identify development questions of interest	Identify income generation mechanisms	Identify market access possibilities	Identify communication and collaboration mechanisms for multiple-actor action on innovation	Identify actors and their existing and potential livelihood generators	Understanding of the development challenge	Secondary data, domestic policy documents, rapid appraisal
2	To understand value addition possibilities	Establish scope of value chains of interest			Identify products, markets, attributes, actors and locations	Sketch of the value chain, inventory of actors	Expert consultation
3	To define purpose of IP and agree on modalities of its function			Initial IP meeting	Identification of shared goals and interests, mutual problem and opportunity definition.	Agreed ToR	Facilitation
4	To understand value addition possibilities	Detailed Value Chain mapping			Identification of transaction mechanisms, payments and credit, seasonality, characteristics of demand, major cost and price items	Understanding of the incentive structure in the chain	Expert consultation
5	To agree on a vision and strategy for the IP and upgrading objectives			IP meeting	Discussion of the purpose of upgrading and some initial thoughts on who would be involved and how	Vision, strategy and upgrading objectives. Ideas for VC upgrading	Outcome mapping
6	To Identify and analyze opportunities and constraints in the VC	Information collection and analysis			Collection of key cost and revenue information at different points in the chain. Formulation of budgets for each actor.	Budgets at each stage. Quantification of problems and opportunities	Value chain analysis
7	To prioritize opportunities and constraints and identify options for VC upgrading			IP meeting	Discussion of VCA results in the light of upgrading options identified earlier	Options for action. Further analysis needs	Communication of results. Ranking

8		Analysis of options				
9	To define and decide on actions to be taken, for actors within and outside IP		IP meeting	Defining tools and processes for monitoring actions for VC upgrading	Defined roles and actions for relevant actors. Identified service roles needed from outside the VC	Dialogue
10	To identify BDS needs and options for organisational and service approach to be taken	Information collection and analysis		Identification of potential providers of services. Evaluation of providers' needs and scope for delivery. Identification of organisational options	Clarity on the potential for BDS	Stakeholder consultation
11	To determine BDS availability and quality		Interviews with existing and potential BDS providers	Evaluation of availability and quality of services	Apparent sources, costs and development roles of BDS	Expert consultation
12	To develop plans for implementing options		IP meeting	Defining actiivties and actions and, roles and responsibilities of various actors in implementation	Plans for implementation, monitoring and learning from actions	Monitoring and Learning tools
13	Implementation			Going through action research cycles	Actions implemented	
14	To monitor progress of plans, make course correction and review plans		Regular IP meetings	Iterating action-reflection-learning- action cycles and, learning lessons from experiences	Meeting reports documenting experiences and lessons	Monitoring and Learning tools and, documentation