# Volta Basin Phase I Projects

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# Key Research Highlights: Main Topics

- Rainwater use and management
  - Rainwater and nutrient use efficiency (PN5)
- Farming practices innovations
  - Strategic innovations in dry-land areas (PN6)
- Small and medium scale reservoirs
  - Small multi-purpose reservoir ensemble (PN46)
  - Improved fisheries in tropical reservoirs (PN34)
  - Integrating governance and modeling (PN40)
- Groundwater use
  - Shallow groundwater irrigation in the White Volta Basin (PN65)
- Waste water use
  - Safe peri-urban vegetable production (PN38)
  - Waste water irrigation: opportunities and risks (PN51)
- Transboundary water governance
  - African models of transboundary governance (PN47)





# PN 5. Rainwater and Nutrient Use Efficiency

- Micro-dosing combined with a 'warrantage' system increases rainwater productivity and farmer revenue, and gives farmers better access to credit. In Burkina Faso, micro-dosing resulted in an increase in yield of 25-40%.
- In-field rainwater harvesting (tied-ridging) and fertilizer application increased crop and water productivity, and the response to fertilizer tends to increase with tied-ridges, by up to 20%.
- The **amount and distribution of rainfall** poses a higher risk to efficient use of mineral fertilizer on **soils** with low organic matter (bush farm).





# PN 6. Strategic Innovations in Dry-land Farming

- New cowpea varieties (6) with high grain yield under semi-arid conditions developed: 2 of these genotypes are very early in maturing, and suitable for pre-rice/maize/sorghum cropping systems in the Guinea savannah zone of Ghana.
- Improved methods for stocking dugouts and production of Tilapia in small metal cages under conditions of declining water volume in the reservoirs

conditions of declining water volume in the reservoirs These have successfully been tested in some of the communities' dugouts. The use of the metal cages also prevented predation by crocodiles.





# PN 46. Small Multi-Purpose Reservoir Ensemble Planning

- Dissolving the myth that small reservoirs are inefficient.
- Evaporation from a cascade of small reservoirs would be no greater than from the same water stored in a single large reservoir.
- At basin scale the downstream impact of small reservoirs is minimal, e.g. in the Volta Basin, even the number of small reservoirs x 4 would result in the consumption of less than 1% of the total available water.
- Small Reservoirs Toolkit for technical professionals with ~ 30 tools for:



- 1) Intervention Planning,
- 2) Hydrology,
- 3) Health & Ecology,
- 4) Governance & Economy.







# PN 34. Improved Fisheries in Tropical Reservoirs

**Development of fisheries enhancement techniques: Ghana, India, Egypt** Shore of Lake Volta, Ghana: Small-scale cage culture technology Technical feasibility; adopting and adapting of 20 cage operations Post harvest interventions on fish processing and fish trading

It is the socio-economic settings that eventually shape the human production enhancement possibilities of the reservoirs, while the natural biophysical constraints of the reservoirs define the ecological production processes.



The environmental sustainability of yield enhancement technology will depend to a large extent on the intensity and density of cages, enclosures and the invasiveness of introduced species.

-> These impacts are easier to manage in smaller reservoirs.



# PN 34. Improved Fisheries in Tropical Reservoirs

- Role of **socio-institutional and policy processes** in influencing overall capacities of local actors to engage/invest in technical innovation
- Increase the capacity of fisher communities in low-cost harvest and post-harvest technologies to increase project impact
- Technological approaches may have only indirect positive impacts on the poorest. Investment in these technologies limits direct participation of the poorest groups.
- Consultation and participation with local institutions and stakeholders can reduce conflicts, but in situations of extreme poverty, the extent to which privately-owned investments in common pool resources can contribute simultaneously to increased productivity *and* poverty reduction is limited.



# PN 40. Integrating Governance and Modeling

#### Small reservoirs as a *potentially* promising strategy

- With serious problems to make them work for irrigation
- Need to better understand small reservoirs, esp. their multiple uses: livestock watering, fisheries, construction
- Need to explore alternative strategies for irrigation

#### Use of knowledge for decision-making

- White Volta Basin Board: Multi-stakeholder governance structure
- Net-Map as a promising tool for integrating governance & modeling

### Household strategies differ by land size

- Middle-size farmers deserve special attention
- Access to agricultural finance and extension low
- Use of fertilizer low, but not of purchased seeds
- Adoption of sustainable land management practices



# PN 65. Shallow Groundwater Irrigation in the White Volta Basin

Preliminary results

**Highly heterogeneous shallow groundwater aquifer**: varies in thickness from 2.6 m to 13.7 m with a median value of 6.6 m

A map of the aquifer thickness reveals that we are in presence of several perched aquifers and if farmers were advised to dig well at the appropriate location they would have more water and spend less time digging wells with very low yields.

**Permanent wells** are increasing in numbers in the study area and they are increasingly used for dry season irrigation which has become a very lucrative activity in the study area.



PN 38. <u>Safer peri-urban vegetable production</u> PN 51. <u>Waste water irrigation: opportunities and risks</u>

- Assessments of simple and low-cost methods showed that complementing **on-farm and post-harvest risk reduction measures** will manage public health risks from using polluted water in vegetable farming.
- Provision of recommendations and input to the World Health Organization (WHO) guidelines (governing the use of wastewater in urban vegetable production in Ghana) and input into Accra city
- Project has many links to or initiated other projects beyond the CPWF: RUAF, FAO-IDRC-WHO, Google



# PN 38. Safer peri-urban vegetable production

PN 51. Waste water irrigation: Opportunities and Risks



# PN 47. African Models of Transboundary Governance

Assess **local level water governance structures + strategies** to distill key principles for transboundary institutions:

- Local water institutions more respected when incl. traditional + modern institutions' elements.
- Local principle was 'some for all,' water consumed with awareness of other (downstream) users.
- Parties endeavor to avoid conflict over water, not to be excluded from decision-making processes;
- Customary institutions take a holistic approach and minimize risk by accessing multiple water sources for multiple purposes;
- Highly gendered the traditionally powerless remain so.

**Translating and incorporating local experiences** to the national and transboundary levels remains a challenge, due to e.g. varying interpretations of equitable and efficient water use and distribution based upon perspective and scale.



# Preliminary Volta Basin Development Challenge (BDC) CPWF Phase II

### **Rainwater Management & Small Reservoirs**

### **BDC Summary**

Institutional and technical mechanisms to develop and sustain small reservoirs and other rainwater management approaches to improve the livelihoods of the poor in the dry-lands of Burkina Faso and Northern Ghana, taking into account downstream and upstream water uses

### **BDC projects**

- Small reservoirs and other technical approaches to improved rainwater management
- Institutional and governance issues
- Coordination



# Rainwater Management & Small Reservoirs

### **Examples of Research Questions**

- Can a **rainwater management system** be developed for the dry-land areas of the Volta River Basin?
- What **agricultural practices** are needed to make the most efficient use of rainwater, while mitigating land degradation?
- What kinds of **complementary irrigation technologies** can be employed to ensure efficient and sustainable water use?
- How can small reservoirs be better managed to meet women's interests and needs, and those of their households?
- What are the *institutional and technical causes* of small-reservoir management success?



### Institutional and Governance Questions

- What types of **local institutions** should be built upon in order to assure well-managed and maintained small reservoirs?
- How *effective* are existing local institutions at managing and maintaining small reservoirs, and how **'robust'** are these?
- What combination of **communal and district institutional arrangement** is likely to improve small-reservoir management and maintenance?
- How does a combination of communal and district institutional arrangement affect small-scale reservoir maintenance and management?



### Institutional and Governance Questions

- What kinds of **conflict** arise over small reservoirs (at both local and basin scales), and how can these be solved or reduced via institutional solutions?
- Does it make sense to think about small reservoirs as a transboundary resource requiring management support at this scale? If so, what kind of management would this imply?
- In what ways do women benefit (or not) from current institutional management of small reservoirs?
- How can **land tenure and allocation** be changed so as to improve small reservoir management?
- What **marketing infrastructure**, support and systems are required to enable small-reservoir producers to get their produce to market?



# Merci pour votre attention



