



Photo: Paul Amankwaah (Reflex Images)

New IWMI office building in Accra, Ghana.

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## 2015 in review

*This newsletter highlights new projects and major stories from IWMI West Africa in 2015.*

### IWMI celebrates 30<sup>th</sup> anniversary with a series of events in Ghana

#### Opening of the new IWMI office for West Africa and the Africa region

The new International Water Management Institute (IWMI) office for West Africa and the Africa region was officially opened by Hon. Opong Fosu, Minister of State at the Presidency, on April 29, 2015. The ribbon-cutting ceremony was carried out in the presence of Letitia E. Obeng, retired Director, Council for

Scientific and Industrial Research - Water Research Institute (CSIR-WRI), Ghana. Jeremy Bird, Director General, IWMI, and Donald Blackmore, Chair, IWMI Board of Governors, highlighted that the new office represented IWMI's commitment to the region, and to the development agenda and goals of Ghana and, more broadly, West Africa. The event included a cultural display followed by a tour of the new building.



Photo: Paul Amankwaah (Reflex Images)

Letitia E. Obeng, retired Director, CSIR-WRI, Ghana, and Hon. Opong Fosu, Minister of State at the Presidency, cutting the ribbon to officially declare the opening of the new IWMI office in Ghana.

## High-level panel discussion

A high-level policy dialogue was also held to mark the official opening of the new IWMI office in Accra, Ghana. The theme of the dialogue was 'Managing

water and agroecosystems for food security and economic development in the Volta Basin'. The dialogue provided an opportunity for the IWMI Board of Governors to discuss the region's key water and land management challenges

with the main stakeholders in the region (national government, and country and regional representatives of international development organizations in Ghana).

## Young Researcher Award ceremony

Twenty postgraduate students who are currently involved in IWMI's research projects were invited for a special anniversary event, and seven of them briefly presented their work and contribution to the Institute's research for development in Ghana and West Africa. Timothy O. Williams, Director, Africa, IWMI, welcomed the participants and provided an overview of IWMI over the last 30 years. This was followed by an overview of IWMI's research and strategy in West Africa by Olufunke Cofie, Head, IWMI West Africa Office. Contributions were also made by three former postgraduate

students – Memuna Mattah (university lecturer), Harold Esseku (private sector) and Philip Amoah (IWMI) – who have collaborated with IWMI in the past and were supported by the Institute on research conducted as part of their postgraduate studies. Coverage of the event was broadcast by the TV3 network in Ghana and the Ghana News Agency (<http://www.ghananewsagency.org/social/recognise-the-abilities-and-capabilities-of-researchers-institute--93336>).



Participants, press and students listening to the presentations during IWMI's 30<sup>th</sup> anniversary celebrations.

## New projects

### Building climate-smart farming systems through integrated water storage and crop-livestock interventions

This project, supported by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), aims to improve the climate resilience of farmers in northern Burkina Faso and Mali through the following:

- Improving water availability for crops, livestock and humans throughout the year.
- Stabilizing cash flows from crops and livestock over time.

- Establishing a reliable value chain for crops and livestock.

Furthermore, the project is testing the 'climate smartness' of various water storage and crop-livestock interventions in relation to food security, and climate change mitigation and adaptation. It will also identify barriers and constraints that prevent farmers from actually taking up and using these potential solutions. The project is being implemented jointly by IWMI,

### Crop-water livestock system



Crop-water livestock system (source: Tim Ellis and Marloes Mul [IWMI]).

International Livestock Research Institute (ILRI), Institut de l'environnement et de recherches agricoles (INERA), Burkina Faso, and Institut d'Economie Rurale (IER), Mali.



Typical briquettes produced by IWMI with locally collected solid waste.

### Creating and capturing value: Supporting enterprises for urban liquid and solid waste recycling for food, energy and a clean environment (CapVal)

The Creating and capturing value (CapVal) project, funded by Ghana WASH Window – Sustainable Water Fund (GWW-FDW), was started in 2015. Partners (including Jekora Ventures Ltd., Volta Ghana Investment Co. Ltd., Training, Research and Networking for Development [TREND], World Agroforestry Centre [ICRAF], Resource Centres on Urban Agriculture and Food Security [RUAF] Foundation, and Kumasi Metropolitan Assembly) are collaboratively working

towards implementing the following solutions:

1. A co-composting facility that will annually transform 5,000 m<sup>3</sup> of fecal sludge and 300 tons of organic solid waste into 200 tons of safe (pelletized) compost (*Fortifer*).
2. A 1,000 tons/year briquette plant at Affienya.
3. An African catfish aquaculture production business at the Chirapatre wastewater treatment plant in Kumasi.

These solutions have a high potential to incentivize local sanitation planning and management in Ghana.

## Giving 'latecomers' a head start: Reorienting irrigation investments in the White Volta Basin to improve ecosystem services and the livelihoods of women and youth

This project is a collaboration between IWMI and the Ghana Irrigation Development Authority (GIDA), University for Development Studies (UDS) and the Department of Women in Agriculture Development (WIAD) of the Ministry of

Food and Agriculture (MoFA). The aim of this project is to evaluate the impacts of selected irrigation systems in the White Volta Basin, in northern Ghana, at three scales (small, medium and large). First, the study examines the contribution of each irrigation system to enhanced rural livelihoods, and gender and generational equity; and how ecosystem services underpin this development and are affected by it. Second, a comparative analysis of systems at the three scales is to be undertaken to assess and

explain relative differences in their contributions to livelihoods, equity and healthy ecosystems. Finally, based on this comparison, the project will examine the potential for up- and out-scaling irrigation investments that provide women and youth with a 'head start', and the changes in policy and skills needed to provide them with positive incentives for the sustainable management of ecosystems and their services. This project is funded by the CGIAR Research Program on Water, Land and Ecosystems (WLE).

## Supporting investment decisions in water and land management across the rural-urban continuum in the Volta-Niger focal region (Invest in Water)

The IWMI West Africa Office hosted a two-day inception workshop for the project entitled 'Supporting investment decisions in water and land management across the rural-urban continuum in the Volta-Niger focal region' on March 12-13, 2015, in Accra, Ghana. The objective of the project is to assess the economic and environmental/ecosystem effects of selected agricultural water management (AWM) as well as resource recovery and reuse (RRR) solutions, and provide recommendations on what AWM and RRR solutions to use and where. The project also aims to provide indications of business-focused feasibility, and identifying successful strategies for expanding the use and benefits of these solutions. This is [one of six research projects under the Volta-Niger Focal Region](#) of WLE. It is led by IWMI in partnership with WIAD, Kwame Nkrumah

University of Science and Technology (KNUST), West African Science Service Center on Climate Change and Adapted Land Use (WASCAL) and IDE Burkina Faso.



Participants at the *Invest in Water* project workshop.



Bagrepole irrigation scheme.

## Managing Bagré water infrastructure for equity and ecosystems

IWMI, in collaboration with Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), Institut de recherche pour le développement (IRD), Laboratoire Citoyennetés (LC) and Bagrépole, launched a new project that aims to provide practical

answers on how to manage large water infrastructure for social and environmental benefits. The project, funded by WLE and led by CIRAD, will recommend options to manage irrigation investment processes, so that the positive impacts of large water infrastructure on equity and the environment are enhanced and their negative externalities become limited (project website: <https://wle.cgiar.org/project/v11-managing-bagr%C3%A9-equity-and-environment>).

## Flood-recession agriculture for food security in northern Ghana

This project is a collaboration between the International Food Policy Research Institute (IFPRI) and IWMI, with funding from the United States Agency for International Development (USAID) – Feed the Future initiative. The main objective of the project is to explore the opportunities for improving the productivity of flood-recession agriculture (FRA), and its contribution to food security and local livelihoods in northern Ghana. In 2015, the project team reviewed the current state of knowledge about FRA in

Ghana and identified the knowledge gaps; undertook mapping and hydrological characterization of flood-prone areas in the Upper East and Upper West regions of Ghana; and carried out an assessment of the socioeconomic challenges and opportunities for improving FRA. The project also established agronomic field trials to evaluate different rice varieties for flood tolerance under floodplain ecology. The project is being implemented in collaboration with CSIR-Savanna Agricultural Research Institute (SARI), Savannah Accelerated Development Authority (SADA), MoFA, CSIR-WRI and Wienco (Ghana) Limited.



Rice experiment in Pwalugu, Upper East Ghana.

## Targeting agricultural innovation and ecosystem service management in the northern Volta Basin

IWMI in collaboration with Bioversity International, Washington State University, University of Minnesota, Natural Capital Project, International Center for Tropical Agriculture (CIAT), ICRAF, Stockholm Resilience Centre, SNV World, King's

College London, UDS and CIRAD launched a new project that aims to improve the capacities of nongovernmental organization (NGO) and extension workers in the Volta River Basin to identify and implement irrigated and rainfed technologies that increase adaptability and transformability of local livelihoods and close yield, nutrition and ecosystem service gaps. The project, funded by WLE

and led by Bioversity International, involves the co-development of benefit-sharing mechanisms with stakeholders, and also trainings, professional development and the introduction of targeting tools (<https://wle.cgiar.org/project/targeting-agricultural-innovation-and-ecosystem-service-management-northern-volta-basin>).



Participants at the Feed the Future Innovation Lab for Small-scale Irrigation (ILSSI) inception workshop in Tamale, Ghana, on April 10, 2015.

## Innovation Lab for Small-scale Irrigation

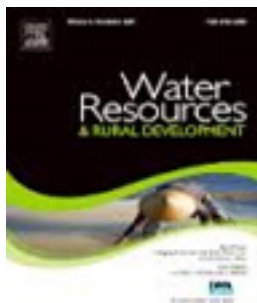
The Feed the Future Innovation Lab for Small-scale Irrigation (ILSSI) project held an inception workshop on April 10, 2015, in Tamale, Ghana, to agree on the irrigation interventions to be implemented in Ghana and to kick-start base surveys and field activities. The project is identifying promising small-scale

irrigation technologies and practices that have the potential to improve agricultural productivity, reduce farmer risks, improve nutritional quality and diversity, reduce poverty and empower women farmers. The project is being implemented in Ghana, Ethiopia and Tanzania under the overall leadership of Texas A&M University (<http://ilssi.tamu.edu/>). Other partners in the team in Ghana include IWMI, UDS, CSIR-Animal Research Institute (ARI) and ILRI.

## Publications

### Journal articles

#### Water management for sustainable agricultural intensification and smallholder resilience in sub-Saharan Africa

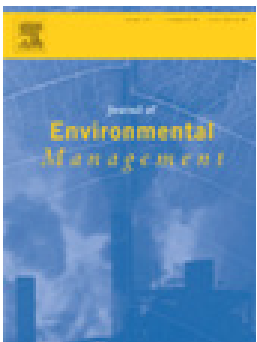


This special issue of the *Water Resources and Rural Development* journal (volume 6) discusses a range of water management practices in three African river basins that were part of the CGIAR Challenge Program on Water and Food (CPWF) research on basin development challenges from 2009 to 2013. It presents an overview of the results of studies conducted on agricultural water management in sub-Saharan Africa, and provides recommendations for better planning and implementation of interventions to benefit smallholder farmers.

Cofie, O.; Amede, T. 2015. Water management for sustainable agricultural intensification and smallholder resilience in sub-Saharan Africa. *Water Resources and Rural Development* 6: 3-11.

<http://www.sciencedirect.com/science/article/pii/S2212608215000194>

#### Integrated cost-effectiveness analysis of agri-environmental measures for water quality



This paper presents an application of an integrated methodological approach for identifying cost-effective combinations of agri-environmental measures to achieve water quality targets. The methodological approach involves linking hydro-chemical modelling with economic costs of mitigation measures. The utility of the approach was explored for the River Dee catchment in Northeast Scotland, examining the cost-effectiveness of mitigation measures for nitrogen (N) and phosphorus (P) pollutants.

Balana, B.B.; Jackson-Blake, L.; Martin-Ortega, J.; Dunn, S. 2015. Integrated cost-effectiveness analysis of agri-environmental measures for water quality. *Journal of Environmental Management* 161: 163-172.

<http://www.ncbi.nlm.nih.gov/pubmed/26172106>

## Microbial hazards in irrigation water: Standards, norms, and testing to manage use of water in fresh produce primary production

**Comprehensive  
REVIEWS**  
in Food Science and Food Safety

This study was undertaken to review the status of, and provide suggestions for, consideration by different stakeholders on water and sanitation, and its impact on food safety and public health. Data gaps have been identified with regard to baseline studies of microbial pathogens in water sources in many regions, the need for agreement on methods and microbial parameters to be used in assessing water quality, the fate of pathogens in water, and their transfer and persistence on irrigated/processed produce.

Uyttendaele, M.; Jaykus, L.-A.; Amoah, P.; Chiodini, A.; Cunliffe, D.; Jacxsens, L.; Holvoet, K.; Korsten, L.; Lau, M.; McClure, P.; Medema, G.; Samper, I.; Jasti, P.R. 2015. Microbial hazards in irrigation water: standards, norms, and testing to manage use of water in fresh produce primary production. *Comprehensive Reviews in Food Science and Food Safety* 14(4): 336-356.

<http://onlinelibrary.wiley.com/doi/10.1111/1541-4337.12133/full>

## A transdisciplinary approach to the economic analysis of the European Water Framework Directive



The aims of this paper were to: (1) develop a set of steps for implementing this transdisciplinary approach, and (2) critically reflect on the challenges of integrating different strands of knowledge to the specific context of the economics of the European Water Framework Directive (WFD). Results are used to help set the research agenda for more practical specification of economically sound and socially acceptable ways to deliver the WFD.

Martin-Ortega, J.; Perni, A.; Jackson-Blake, L.; Balana, B.B.; Mckee, A.; Dunn, S.; Helliwell, R.; Psaltopoulos, D.; Skuras, D.; Cooksley, S.; Slee, B. 2015. A transdisciplinary approach to the economic analysis of the European Water Framework Directive. *Ecological Economics* 116: 34-45.

<http://www.sciencedirect.com/science/article/pii/S0921800915001548>

## Conference proceedings

### Can current land and water governance systems promote sustainable and equitable large-scale agricultural investments in sub-Saharan Africa?

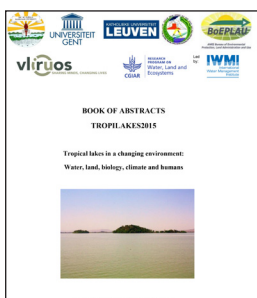


Based on field-level research conducted in Ghana and Mali, which covered six large-scale agricultural investments, this paper analyzes the current land and water governance systems in these two countries through the lens of land and water acquisition and initial outcomes. It highlights missed opportunities for sustainable and equitable large-scale agricultural land investments, due to un-coordinated governance systems and failure to rigorously apply detailed rules and regulations that are already in place. It offers suggestions for revamping land and water governance to promote large-scale investments that will lead to equitable distribution of benefits and sustainable management of natural resources.

Williams, T.O.; Sidibe, Y. 2015. Can current land and water governance systems promote sustainable and equitable large-scale agricultural investments in sub-Saharan Africa? In: *Global Water Partnership (GWP); International Land Coalition (ILC); International Water Management Institute (IWMI). Proceedings of the Joint GWP-ILC-IWMI Workshop on Responding to the Global Food Security Challenge through Coordinated Land and Water Governance, Pretoria, South Africa, June 15-16, 2015*. Stockholm, Sweden: Global Water Partnership (GWP); Rome, Italy: International Land Coalition (ILC); Pretoria, South Africa: International Water Management Institute (IWMI). 9p.

[http://www.gwp.org/Global/About%20GWP/Publications/Proceedings%20papers%20Pretoria%20June%202015/3\\_Tim\\_Williams\\_final.pdf](http://www.gwp.org/Global/About%20GWP/Publications/Proceedings%20papers%20Pretoria%20June%202015/3_Tim_Williams_final.pdf)

## Trade-offs or synergies? Assessment of ecosystem services in multi-use small reservoirs in Burkina Faso



The presentation explores the existence of trade-offs and/or synergies in multi-purpose, small reservoirs. Crop yield, water quality and human health impacts were identified as the three key indicators to represent the economic, environmental and social aspects, respectively, of small reservoirs. Trade-offs were assessed qualitatively using a community-based approach and quantitatively using trade-off curves. Anecdotal data indicate that small reservoirs exhibit trade-offs between crop yield and water quality on the one hand, and community health (especially incidence of malaria) and yield on the other.

Balana, B.B.; Mul, M.; Cofie, O.; Barron, J. 2015. *Trade-offs or synergies? Assessment of ecosystem services in multi-use small reservoirs in Burkina Faso*. A presentation at the International TropiLakes2015 Conference, September 23-29, 2015, Bahir Dar, Ethiopia.

<https://biblio.ugent.be/publication/6952960/file/6952961.pdf>

## Consumer preference and willingness to pay for fish farmed in treated wastewater in Ghana



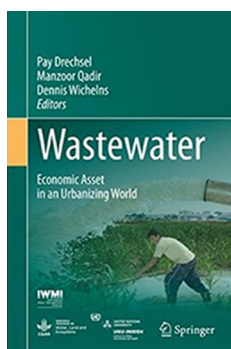
The paper utilized a dichotomous-choice contingent valuation methodology to estimate the willingness to pay for fresh tilapia and smoked catfish farmed in treated wastewater, and analyze factors that affect consumer choice. Consumers in the survey ranked price, size and quality of fish measured by taste and freshness as being the most important product attributes influencing their decision prior to purchasing fish.

Gebrezgabher, S.A.; Amewu, S.; Amoah, P. 2015. *Consumer preference and willingness to pay for fish farmed in treated wastewater in Ghana*. In: Selected paper prepared for presentation at the 2015 AAEA and WAEA Joint Annual Meeting, July 26-28, 2015, San Francisco, California.

<http://ageconsearch.umn.edu/handle/200415>

## Books and book chapters

### Business models and economic approaches for recovering energy from wastewater and fecal sludge

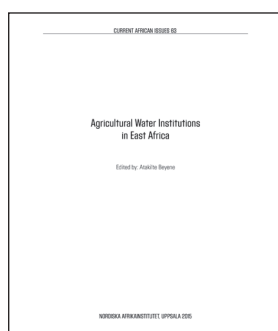


This chapter presents an overview of successful and emerging business cases for recovering energy and other useful products from wastewater and fecal sludge in low- and middle-income countries. The business cases are analyzed for their business concepts and opportunities, and challenges for scaling up and scaling out. Key policy implications and conclusions for supporting the business model approach in the developing world are discussed.

Gebrezgabher, S.; Rao, K.; Hanjra, M.A.; Hernandez-Sancho, F. 2015. Business models and economic approaches for recovering energy from wastewater and fecal sludge. In: *Wastewater: Economic asset in an urbanizing world*, eds., Drechsel, P.; Qadir, M.; Wichelns, D. Dordrecht, Netherlands: Springer. Pp. 217-245.

[http://link.springer.com/chapter/10.1007/978-94-017-9545-6\\_12#page-1](http://link.springer.com/chapter/10.1007/978-94-017-9545-6_12#page-1)

### Climate change, pro-poor schemes and water inequality: Strengths and weaknesses of Kauti Irrigation Water Users' Association, Kenya



This study evaluated the strengths and weaknesses of Green Water Saving (GWS) schemes implemented in the Muooni Catchment of Kenya. It focuses on the results of the Political, Economic, Social, Technological, Legal and Ecological (PESTLE), and Strengths, Weaknesses, Opportunities and Threats (SWOT) analyses of Kauti Irrigation Water Users' Association (Kauti IWUA) and presents findings based on the responses of 101 farmers, 20 key informants and a Focus Group Discussion (FGD).

Luwesi, C.N.; Kinuthia, W.; Mutiso, M.N.; Akombo, R.A.; Doke, D.A.; Ruhakana, A. 2015. Climate change, pro-poor schemes and water inequality: Strengths and weaknesses of Kauti Irrigation Water Users' Association, Kenya. In: *Agricultural water institutions in East Africa*, ed., Atakilte, B. Uppsala, Sweden: The Nordic Africa Institute. Pp. 43-60.

<https://www.researchgate.net/publication/283894091>

## Working papers

### Overview of the scientific, political and financial landscapes of Climate-Smart Agriculture in West Africa: Sector of water resources

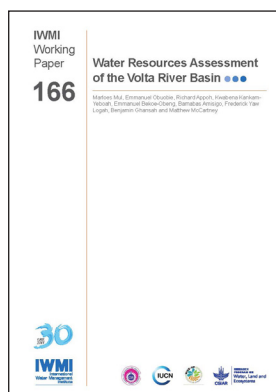


Various agricultural water management (AWM) solutions have been proven to improve agricultural productivity and can significantly reduce the problems posed by variability in rainfall, runoff and recharge. However, these solutions have not been scaled up partly due to lack of policy and institutional support, and partly due to incomplete knowledge of large-scale impacts (including greenhouse gas [GHG] reduction as adaptation co-benefits). Decisions on investments in water resources, at various levels, should concentrate on easing the factors limiting adoption, and enhancing system productivity while maintaining ecosystem services.

Mul, M.L.; Williams, T.O.; Cofie, O. 2015. Overview of the scientific, political and financial landscapes of Climate-Smart Agriculture in West Africa: Sector of water resources. In: *Overview of the scientific, political and financial landscape of climate-smart agriculture in West Africa*, eds., Zougmore, R.; Sy Traoré, A.; Mbodj, Y. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Pp. 47-59. (CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) Working Paper 118) (Also in French).

<http://cgispace.cgiar.org/rest/bitstreams/56232/retrieve>

## Water Resources Assessment of the Volta River Basin



Both natural and built infrastructure provide benefits. Some benefits, such as hydropower, are only provided by built infrastructure, but there are others, such as water treatment and flood control, that can be provided by both natural and built infrastructure. In addition, natural infrastructure supports the performance of built infrastructure, through the provision of water of a certain quantity and quality. Degradation of natural infrastructure is a key concern in the Volta River Basin and may affect the performance of downstream dams. On the other hand, natural infrastructure may be affected by the development and management of built infrastructure, as observed downstream of the Akosombo Dam.

Mul, M.; Obuobie, E.; Appoh, R.; Kankam-Yeboah, K.; Bekoe-Obeng, E.; Amisigo, B.; Logah, F.Y.; Ghansah, B.; McCartney, M. 2015. *Water resources assessment of the Volta River Basin*. Colombo, Sri Lanka: International Water Management Institute (IWMI). 78p. (IWMI Working Paper 166).

[http://www.iwmi.cgiar.org/Publications/Working\\_Papers/working/wor166.pdf](http://www.iwmi.cgiar.org/Publications/Working_Papers/working/wor166.pdf)

## Major events

### International Conference on Faecal Sludge Management (FSM3) in Hanoi, Vietnam

Olufunke Cofie and Josiane Nikiema together with a few other colleagues attended the 3<sup>rd</sup> International Faecal Sludge Management (FSM3) Conference on January 17-24, 2015, in Hanoi, Vietnam. Olufunke presented on '*Converting faecal sludge to fertilizer pellets: The case of Fortifer*'. She was also a panelist in the closing session.

### High-level forum of climate-smart agricultural stakeholders in West Africa

On behalf of IWMI, Marloes Mul participated at this event in Bamako, Mali, and presented a paper on the '*Overview of the scientific, political and financial landscapes of Climate-Smart Agriculture in West Africa: Sector of water resources*' which is available in English and French. The set of presentations set the stage for the 4-day forum, with the aim of adopting the 'Economic Community of West African States (ECOWAS)/Comprehensive Africa Agriculture Development Programme (CAADP) intervention framework' and launching the 'West Africa Climate-Smart Agriculture (CSA) Alliance'.

## Community engagements

### Fortifer demonstration in Klagon (Tema Metropolitan Assembly, Ghana)



Fortifer application by farmers.

IWMI has been involved in demonstration activities for promoting the use of *Fortifer* in agriculture with farmers from the Resource Users Association who are engaged in farming activities at the Ramsar site in Klagon, Greater Accra. These activities were conducted in collaboration with the Department of Agriculture of the Tema Metropolitan Assembly, Forestry Commission (Wildlife Division) and Jekora Ventures Ltd.

### Participatory mapping of ecosystem services in Pwalugu, Aribu and Bisigu communities (northern Ghana)



Ecosystem service mapping in Pwalugu, Upper East Ghana.

Between the period from May 24 to 30, 2015, a team comprising Marloes Mul and Naana Amonoo (IWMI), Laetitia Pettinotti and Lucy Emerton (Basque Centre for Climate Change [BC3]), and Emmanuel Bekoe-Obeng and Sylvia Imbeah (CSIR-WRI) conducted ecosystem services mapping activities for the Water Infrastructure Solutions from Ecosystem Services Underpinning Climate Resilient Policies and Programmes (WISE-UP to Climate) project in three communities - Pwalugu, Aribu and Bisigu in the Upper East and Northern region of Ghana. The objectives of the exercise were to identify the main ecosystems and associated services, their linkage to the river flow regime, and how climate change and construction of the Pwalugu Dam may affect these ecosystems.

## Catchment instrumentation in Pwalugu and Zanlerigu (Upper East region of Ghana)



The weather station installed in Zanlerigu, Upper East Ghana, on June 18, 2015.

IWMI and partners have installed hydrological and meteorological equipment at Pwalugu and Zanlerigu in the Upper East region of Ghana for the WISE-UP to Climate project, which is being implemented in the White Volta Basin ([www.iucn.org/water\\_wiseup](http://www.iucn.org/water_wiseup)) and the ILSSI project (<http://ilssi.tamu.edu/>). Data gathered from the instruments will be used for catchment characterization.

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