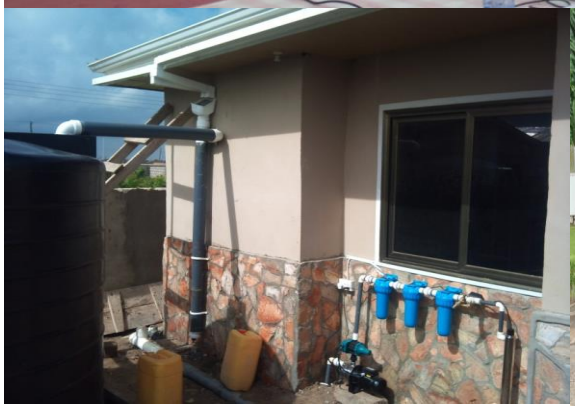
**REPORT FROM RAIN WATER HARVESTING PROJECT STAKEHOLDERS WORKSHOP**

**JUNE 2015 - ACCRA, GHANA**

# UPSCALING RWH IN GHANA: CHALLENGES AND OPPORTUNITIES




**Report Editors:**

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## List of Abbreviations

| | |
|---|---|
| ATTC | Accra Technical Training College |
| CONIWAS | Coalition of NGO' in Water and Sanitation |
| CSIR | Council for Scientific and Industrial Research |
| COTVET | Council for Technical and Vocational Education and Training |
| CWSA | Community Water and Sanitation Agency |
| GREDA | Ghana Real Estate Development Association |
| GSA | Ghana Science Association |
| GSGDA | Ghana Shared Growth Development Agenda |
| GWCL | Ghana Water Company Limited |
| MESTI | Ministry of Environment Science Technology and Innovation |
| MMDAs | Metropolitan Municipal and District Assembly |
| MWRWH | Ministry of Water Resources Works and Housing |
| NBSSI | National Board for Small Scale Industry |
| NCF | Nordic Climate Fund |
| NDF | Nordic Development Fund |
| NGO | Non-Governmental Organization |
| NRWHS | National Rain Water Harvesting Strategy |
| NVTI | National Vocational Training Institute |
| R&D | Research and Development |
| RWH | Rain Water Harvesting |
| SINTEF | Stiftelsen for Industriell og Teknisk Forskning |
| STEPRI | Science and Technology Policy Research Institute of CSIR |
| WHO | World Health Organization |
| WRC | Water Resource Commission |
| WRI | Water Research Institute of CSIR |

# Executive Summary

Rainwater Harvesting (RWH) has been identified as one of the innovative and alternative solutions to the impact of climate change on water availability in Ghana. Successive governments have all demonstrated their commitment to the adoption and promotion of RWH to which a number of policy frameworks have been developed. The implementation of these policies however, has not been successful due to a number of challenges such as low awareness, negative perceptions, among others. Results from the research project "Rainwater Harvesting resilience to climate change impact on water availability in Ghana" pilot installations indicate that the quantity of the harvested rainwater meets the needs of most households and the quality of the treated water meets the WHO standard for drinking water. The socio-economic monitoring shows that time and money savings have been made by beneficiaries. These findings call for an upscaling of the RWH technology to the wider public. In relation to this, a stakeholder workshop was organized with participants from research institutes, private sector, Ministries and agencies, NGOs, Ghana Water Company and the media to explore strategies and ways to achieve the set objective of wider acceptability and adoption of RWH systems in Ghana. Some of the recommendations from stakeholders are that government should facilitate access to credit with flexible terms to encourage many to install RWH systems in their homes, in addition to employing both motivational and compulsive measures to get the public to adopt the systems. In order to increase acceptability, a rigorous awareness campaign to disseminate information on RWH is required. Among others, this could include a documentary in the local languages with messages carefully selected and framed so as to meet different social groupings. Also in the educational front, RWH should be encouraged through school curricula from the basic level right through to tertiary level. Training of artisans for local business development through customizing and installing RWH systems should continue, and the approach should be both formal and informal. To increase affordability, the high initial cost of installation needs to be reduced, by encouraging economies of scale and local fabrication of RWH components.

# 1.0 Introduction

## 1.1 Addressing climate change impacts on water availability in Ghana

There is no doubt to the reality of climate change and its impacts on society. In Ghana, vulnerability to the effects of climate change is evident in rise in sea level, high intensity of rainfall, flooding and long periods of droughts among others. As a result of these impacts and other factors such as rapid population growth, urbanization, and the inability of the Ghana Water Company (GWCL) to meet the demand, many households and institutions in Ghana have inadequate access to potable water while others have to resort to other alternative sources. This challenge is likely to increase in future, and places a high demand for alternative and innovative sources of water. This demand motivated a collaborated research project between SINTEF and the Science and Technology Policy Research Institute (CSIR-STEPRI) and Water Research Institute (CSIR-WRI), both of the Council for Scientific and Industrial Research.

The project, which is funded by the Nordic Development Fund (NDF) and titled "Rainwater harvesting (RWH) for resilience to climate change impact on water availability in Ghana", has been implemented in Greater Accra since February 2013 and is due to end in September 2015. The focus has been on identifying and testing RWH designs that are sustainable under local conditions, while training artisans in how to make business out of implementing the technology, to stimulate its uptake on a larger scale. With the National Rainwater Harvesting strategy in place and the amendment of the building code to include mandatory RWH systems in all building design, together with the findings from this research project, all is set for the up scaling of RWH in Ghana. It is for this reason that a stakeholder workshop was organized on the 11$^{th}$ June, 2015 at CSIR-STEPRI with participants from research institutes, private sector, Ministries and agencies, NGOs, Ghana Water Company and the media, to explore strategies and ways to achieve the set objective of wider acceptability and adoption of RWH systems in Ghana as pertains in other countries both in Africa and the other continents. The following is a synthesis of the main activities that took place at the workshop.

## 2.0 Introductory remarks by key stakeholders

The stakeholders' workshop began with a prayer followed by the introduction of chairman. The chairman, Dr Joel Sam accepted the position to be the chair for the stakeholders' workshop and acknowledged the various speakers present. Dr. George Essegbey, the Director for CSIR-STEPRI, welcomed the audience emphasizing that he sees the ending of the project and the closing workshop as the beginning of another phase, with even broader collaboration between the stakeholders for up-scaling RWH as adaptation to climate change. In particular, he made the point that the involvement of local artisans is important, to ensure that RWH is promoted by competent actors at every level and at the same time providing new business opportunities for people at the grass-root.

Dr Joseph Ampofo, the Director of CSIR-WRI, stressed that water is essential for life. He claimed that just as Ghana currently is focusing on energy, with power rationing and shortage affecting core functions and everyday lives of large parts of the population, there will come a new phase soon, when the concern will be with water. Considering the current climate change projections, this will even be a global challenge, with a considerable potential for conflict both within and between nations. Dr. Ampofo also demoaned the rate at which illegal mining is destroying water bodies and the negative effect on water supply in the country will be very precarious. Ground water and rain water are the country's main hopes as rain water harvesting and ground water tapping would be the sources of water for water crisis. He hoped that people will tap into the idea of RWH and conserve it as the country next challenge is water hence there is the need to be serious about technologies that will help tap rain water and able to treat the water for drinking.

The Chief Director of MESTI, Madam Salamata Abdul-Salam pointed out that, there is the need for the Ministry of Water Resource Works and Housing to commend the RWH project team for its collaborative efforts. She emphasized that, the project "Rainwater harvesting (RWH) for resilience to climate change impact on water availability in

Ghana" is not for the benefit of households only but will also increase economic activities of the country. She explained that, the nation is already water stressed due to low level of water in the Akosombo Dam (which receives less and less rain water). She further drew attention to the rainy season, emphasizing that as it rains in Accra, rainfall in Northern Ghana is even more. The amounts of rain in the North are such that there could be a great potential for rainwater harvesting, but its uneven distribution across the year and the high evaporation makes the adoption of the RWH technology challenging. Coming up with solutions that could benefit these and other parts of the country is an important part of the work that lies ahead. She urged the Minister of MWRWH to scale up the implementation of the project to communities that are already hungry for water. Thus when RWH is scaled up a larger population will benefit. She encouraged that the project should be sustained for the benefit of the country at large.

## 3.0 Workshop Presentations

There were four main presentations at the workshop. The summaries are as follows:

### 3.1 Experiences from the SINTEF-CSIR project

Project manager Sigrid Damman presented preliminary results from the project "Rainwater harvesting (RWH) for resilience to climate change impact on water availability in Ghana". She

mentioned that the project has assessed the social, economic and environmental sustainability of 36 design alternatives for rainwater harvesting from roofs in Greater Accra. She explained that the designs were made based on a range of water consumptions, roof sizes, storage volumes and water treatment alternatives, and grouped into three main categories depending on complexity and cost. These categories of designs were basic, intermediate and advanced designs. The three designs she noted have been piloted in 20 households and one school. The performance of the pilots has been tested over one year, including detailed monitoring of the quantity and quality of harvested water. 25 local artisans have undergone a training program to develop business out of customizing and implementing the three designs according to the standards provided by CSIR and the suppliers of the various components. In addition, there has been activity to market the systems and engage private and public stakeholders in the promotion of RWH.

Mrs. Damman also shared with participants some promising results from the project so far. She mentioned that the quantities of harvested water meet the expectation. In most cases, there will be the need to supplement with water from other sources now and then, as the rainfall varies from season to season and year to year, but during the monitoring period most of the pilot users relied mainly on rainwater. The water quality tests show that in the urban environment disinfection is required to produce drinkable water. The raw water contains varying levels of bacteria, but is still good enough for many uses, while filtration removes particles and results in cleaner, more delicate water. The best results are those after UV filtration, where most samples meet the WHO standard for good drinking water (Figure 1).

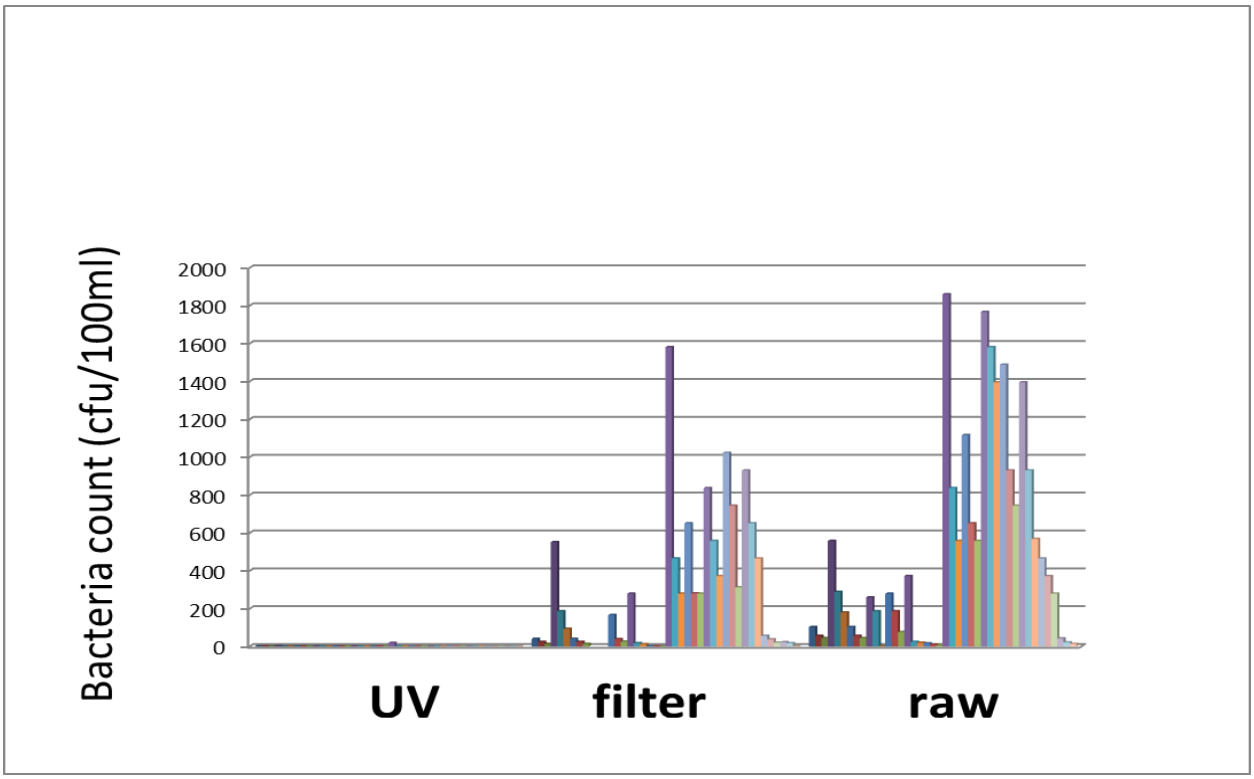



**Figure 1: Coliform levels at 2 treatment stages, samples from the first 9 household installations.**

Later in her presentation, she revealed to that the artisans who were involved in the project collaborate in a newly formed business cluster, where some presently are putting up another 18 systems with support from COTVET and others are pursuing RWH as a purely commercial business on their own. She also mentioned that there is a considerable interest from potential customers, who see the long-term savings associated with RWH and would like to know where their water comes from without experiencing any salinity problems. She indicated that a main barrier is the initial costs of a professional RWH system. As illustrated in figure 2, the initial costs of the pilot systems were quite high. She however showed that, when the costs are categorized according to function, the costs may come down considerably, depending on the use/need for water treatment, storage alternatives and roofing systems in place, and last but not least on the organization of the business and the extent to which it is possible to achieve economies of scale.

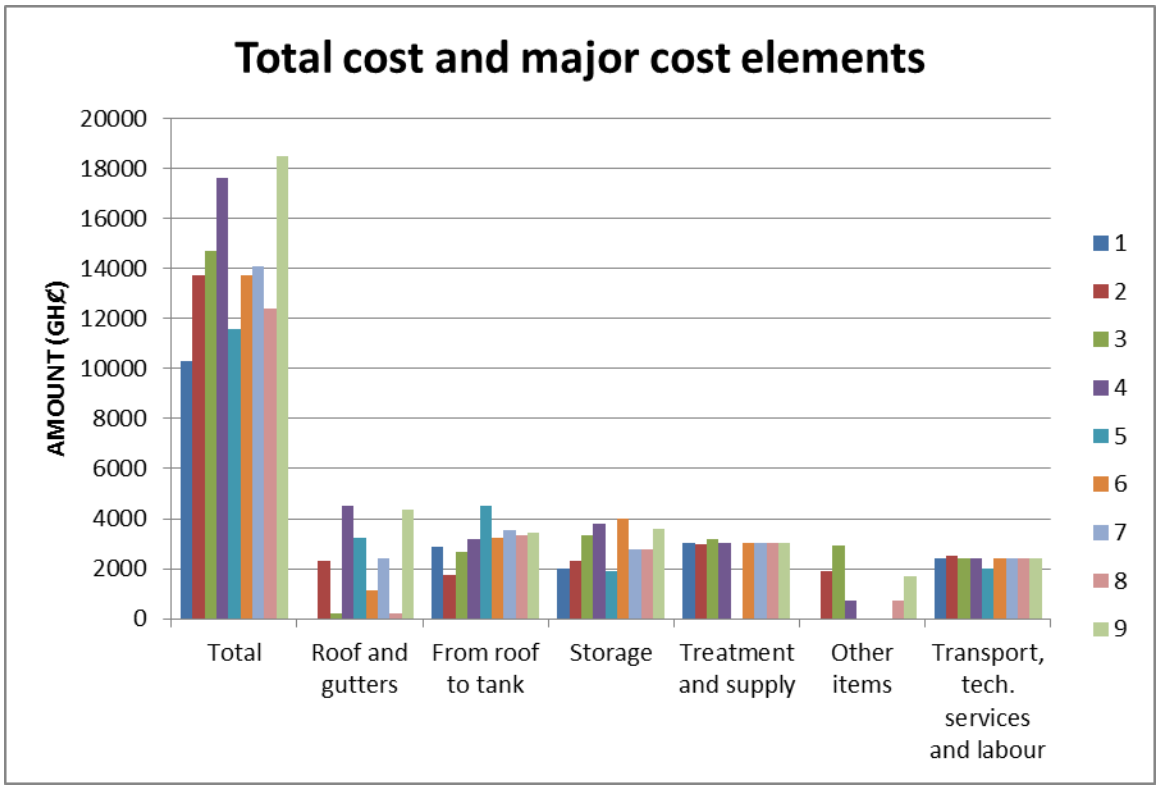



**Figure 2: Total costs and cost elements for nine different households.**

### 3.2 Current status of National Rain Water Harvesting Strategy

Rev. Stephen Osei spoke on behalf of the Director for Water, Ministry of Water Resource Works and Housing, Mr Fred Addai who had to leave to attend to equally important national assignment. He made a presentation on National Rain Water Harvesting Strategy Current Status.

He explained that as Ghana faced a deficit of water supply already from the year 1983 to 2000, the country has long seen the need for the country to revisit Rain Water Harvesting. Effort has been made by the past successive governments, including His Excellency John Agyekum Kuffour, late John Evans Atta Mills and the current president His Excellency John Dramani Mahamma, to emphasize the need to harvest rain water. He noted that a team lead by Water Resources Commission was tasked to develop the National Rain Water Harvesting Strategy

(NRWHS) and this was completed in 2011 with four main objectives:

- Develop and implement effective regulatory and institutional framework for the institutionalization of RWH
- Stimulate interest and promote support for RWH through sustained awareness creation campaigns
- Strengthen human and institutional capacities to carry out key RWH mandates
- Improve knowledge base on technology options and water quality of RWH systems through research.

The implementation of the strategy is ongoing. He also enlightened participants that the National Water Policy of 2007 states that, in order to supplement water received from Ghana Water Company Limited, there is the need to harvest rain water and develop a technology to treat and use it for a greater part of the year.

He informed participants that, the MWRWH has revised the National Housing Policy, including the building code which makes it mandatory to incorporate RWH systems in all building design. From beginning, inclusion of RWH is actually a requirement for the issuance of building permits. However the Ministry has not been able to enforce this new policy. This calls for a much broader consultation and engagement with stakeholders. He clarified that, despite these issues, there are new strategies that have been developed to address weak water resource management in Ghana which is shown in Ghana Shared Growth and Development Agenda (GSGDA) and added that the Ministry is happy to collaborate with CSIR and SINTEF in the implementation of this Rain Water Harvesting research project in Ghana. He again reiterated that the demand for the institutionalization of RWH as alternative source of water has been high. A case in point is in late 2014 where a group of Chiefs from the Volta region wrote a letter to the Chief of Staff of Ghana appealing to government to make a policy enjoining all government institutions to harvest rain water for their use and cleaning purposes to supplement treated water supply from Ghana Water Company Limited (GWCL).

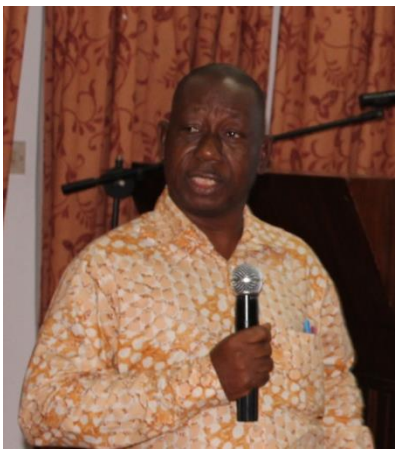
Rev. Osei indicated that moving forward, a strategy needs to be developed to visit the radio and TV stations in order to engage the public and to answer their questions bothering on the adoption

of RWH technology. He further stated that a meeting should be scheduled for the plastic manufacturers to discuss how best fabrication of RWH system components in the country could be done to reduce the cost of installation and thereby make the price affordable. He concluded his presentation by suggesting that there should be a task to liaise with MESTI, CSIR and/or STEPRI and other stakeholders and meet periodically to spearhead the uptake of RWH technology beyond the completion of the project.

### 3.3 Strategies for up scaling RWH in Ghana

The presentation by Dr. Barnabas Amisigo on strategies for up scaling roof RWH in Ghana educated participants on some uptake challenges and way forward. He indicated that some of the barriers to adoption of the roof RWH systems in the country include;

- poor awareness of the quality and benefits of rain water
- unsuitable roof types and designs for good RWH systems
- high cost of RWH system components.



He however stated that to address the identified barriers, the following key measures must be considered. He mentioned that there is the need for a more rigorous awareness creation programs; promoting RWH as a business; making RWH systems more accessible to the general populace by for example, government providing tax rebates and other incentives for dealers in system components; and undertaking persistent and consistent advocacy on RWH. He also added that joint efforts by all national stakeholders including engagement with foreign partners are needed in order to up-scale RWH and enable the technology to make a real difference as a climate change adaptation strategy for the country. SINTEF and the CSIR have identified four key areas for further collaboration with stakeholders. These areas are

- Development of advanced adaptive housing solutions: That is how to integrate optimized RWH solutions in modern building designs, in ways that satisfy the needs and

preferences of customers while advancing current standards for 'green' climate friendly housing in Ghana.

- Increasing resilience through broad-based implementation ofregulative, economic, and communicative instruments facilitating RWH: Develop an enabling environment by adapting best governance practices from comparable countries while addressing specific drivers and barriers in the Ghanaian context.

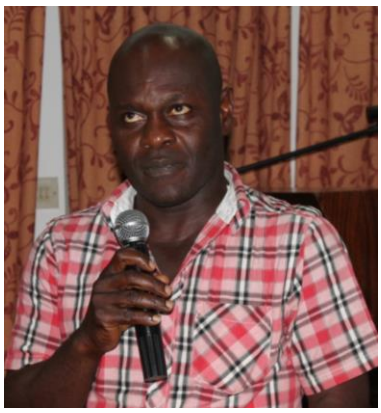
- Capacity-building through continued RWH cluster development: Strengthen and develop RWH business through continued network-building, joint research and development with local as well as international partners, and knowledge transfer and development emanating from the established RWH cluster.

- Smart and safe RWH solutions via simple means: Develop sustainable and safe RWH solutions tailored to the rainfall, needs, and resources in a more peripheral and vulnerable communities with limited infrastructure.

### 3.4 Challenges and opportunities: A perspective of the RWH business

The last presentation was made by Mr. Michael Mallet who is the CEO of Rainwater Solutions and a member of the RWH Cluster. Rain Water Solutions has been in business since 2011. Some the services they provide include consulting services in the planning and execution of buildings to include rain gutters, onsite estimation service for all projects, installation of rainwater gutters, and supply of rainwater components and rain water harvesting based on the needs of the client. The company has executed many projects across the country. The wealth of experience acquired has given the company a better understanding of the market and customers' needs. Mr. Mallet said that in his interaction with house owners, he finds that most do not consider RWH at first. However, once they get to understand how RWH systems work and realize what benefits they provide, as an alternative source of water to serve their needs for a greater part of the year, they then buy into the idea. In areas with no access to water from GWCL, there is great interest and a considerable market potential. On the other hand it is more difficult to convince house owners in areas with less acute water needs. In view of that, there is the need for awareness creation for RWH as there is limited information available for potential users of the Rain Water Harvesting Technology.

He added that architects' desire to complicate roof designs also tends to increase the cost of installation. This, he said deters potential users from adopting the technology, so it is important to encourage architects and entrepreneurs, too, to think of their environmental responsibility and join efforts to promote RWH. He outlined other challenges affecting RWH business with most of the RWH systems components being imported from Europe. While it takes a very long time to get the items into the country, the custom duty charged on these items are often high. Slow bureaucracy at the port and an unstable forex regime are other factors militating against RWH business in Ghana as at now. In view of such challenges it is challenging for local RWH suppliers to meet delivery times and ensure customer satisfaction. In his conclusion, Mr. Mallet alluded to the huge RWH business potential in Ghana. He proposed that local producers should be encouraged to use local materials for the fabrication of tools or components of RWH systems to reduce their import. Rain Water Solutions has advanced plan of setting up a factory at Dodowa in Greater Accra Region in the nearest future. He also called for collaboration and support with key stakeholders in the promotion and adoption RWH systems in Ghana.



## 4.0 Workshop outcomes

The technical session included 3 parallel sessions which focused on making RWH system more accessible, creating an enabling environment, and marketing and acceptability of RWH systems. Workshop results from each breakout session are discussed below. The discussion included a range of activities that will likely require input and collaboration across multiple disciplines and institutions.

### 4.1 Making RWH system more accessible

This group discussion was chaired by Ms. Adwoa Paintsil of WRC. The group first defined what it means to make the system more accessible: More accessible refers to how easily people can have access to the product. Accessibility here is looked at in two ways; i.e. easily available and

affordability. The group further identified some factors that can make RWH system more accessible:

- Reducing prices of system drastically: In order for interested people to access the RWH system, prices of system need to be reduced drastically. Prices of RWH systems can be reduced drastically when the (i) suppliers collaborate with microfinance companies to give them soft loans (ii) government give tax incentives to companies involved in the fabrication of RWH components (iii) government subsidies cost of RWH system.

- Train artisans nation-wide: Training more artisans will help the beneficiaries have easy access to expertise in the RWH system installation in the country. Thus artisans should be trained nation-wide to make installation of RWH system easily accessible for beneficiaries.

- Creating awareness: Awareness creation is very important in order for interested beneficiaries to know about RWH system and its benefits. Awareness creation informs the beneficiaries about the existence of the system, where to go and access the system and where to get the expertise.

- Create information centres: Most people do not know where to go for information on rainwater harvesting technology in Ghana. Thus having information centres where interested citizens can go to be educated on the system is necessary. GWCL should consider hosting programs on RWH in the country since they are the main focal point to anything relating to water. CSIR-Water Research Institute can also be considered as one of the centers for the dissemination of information through R&D activities.

- Technical training for GWCL Staff: Ghana Water Company Limited can train their plumbers and other technical staff to pilot the use of RWH system in peri-urban areas in the country.

- Have "one stop shops": For easy accessibility of RWHs materials, it will be necessary to have one stop shops nation-wide.

- Develop appropriate technology and integrating local materials: Development of appropriate technology making use of locally produced materials will help reduce the price of RWH system material.

- Mass installations: Installing RWH systems for clusters of houses located in an area at a go will reduce the cost of installation.

- Community involvement in installations: Involving the community is another way to make RWH systems more affordable and accessible. For example, the community can be involved in the construction of the storage system, thus reducing the costs of labour.

### 4.2 Creating an Enabling Environment for RWH

This group was chaired by Mr. Emmanuel Gaze of CWSA. The discussion started with a quick round on policy frameworks, where it was concluded that a good basis is place. The main part of the discussion therefore turned on the implementation of the policies to promote RWH. Some of the militating factors identified included:

- Limited information available for potential users of RWH technology: Some potential users do not have enough knowledge of how rain water can be used as an alternative source of water.
- Relatively high cost of RWH systems: The amount involved in the purchase of components as well as installation is relatively high and this makes it difficult for certain classes of society to afford the technology.
- Limited documentation on RWH installation: There is a dearth of material on the procedure and processes for artisans to easily install RWH systems.
- Lack of dialogue between the Ministry, policy institutions and private sector: There is a disjointed relationship between relevant stakeholders to promote and ensure the implementation of the policies.
- Lack of focus on RWH among private sector/estate developers: Some building designers and estate developers do not incorporate Rain Water Harvest system as part of the overall building design. Others have complex and complicated roofing styles which makes the construction of Rain Water Harvest system difficult.

- Negative perceptions: Some people have the perception that rain water is not potable for drinking.

The group further discussed some strategies and proposals to address issues that militate against the implementation of policies. These included:

- Provision of funding and support from government
  - Promote 'green' intervention for the district assemblies to draw from
  - MMDAs should involve the private sector to implement or to benefit from the established fund
- Incorporate the teaching of RWHs technology into schools' curricula;
  - Establish a committee to review the school curricular from basic to tertiary to incorporate RWHs technology
  - Ensure school buildings are RWH-friendly and connected
  - Sensitization workshop for national and district directors, heads of relevant department and schools as well as teachers
  - Facilitate and support the development of training materials such as books and equipment for RWHs installation.
  - Encourage schools that can afford to put up RWHs
- Devise effective and efficient systems for encouraging private sector and estate developers to include RWHs in building designs.
  - Provision of incentives for private sectors and estate developers to uptake the RWHs technology
  - Identify private sectors and estate developers and encourage them
  - Actively involve association of GREDA for technology upscale
- Provide motivation and compulsion measures to public and private sector to adopt RWHs technology
  - Educate, walk and compel potential users to adopt the technology.
  - Target district assemblies and provide to them a legal document that backs the technology.

- Collate and provide a database of technological designs that have been developed and are being used in various parts of the country for RWH installation;
- Embark on public awareness campaign about the benefits of installing RWHs

- Provide incentives to motivate manufactures of RWHs components so as to reduce cost incurred for installation.
  - Importers and producers of RWH equipment should be given tax rebate
  - Encourage local producers to use local materials for the fabrication of tools or components of RWHs
- Develop a national strategy for incorporating RWHs in communities
  - Sensitization workshop for district assemblies about the installation of RWHs.
  - Rigorous marketing into pruned areas
  - Encouraging cluster approach to implementation in various communities
  - Identify key institutions and assign roles and responsibilities
  - Facilitate and provide resources for implementation of the strategy

### 4.3 Marketing and Acceptability of RWH systems in Ghana

The group was chaired by Mr. Wisdom Sylvanus Sebuava of Ghana Science Association. It was tasked to explore strategies to market and how to make RWH systems widely acceptable in Ghana. This was done in reference to the following headings; Making RHW more attractive, Education, Awareness creation, Standardization, Best Practices, Environmental Consideration and Servicing and Maintenance.

The group agreed that education is key in marketing and acceptability of RWHs because the present generation has lost touch with the benefits of RWH. The participants recommended that:

- Education should be made part the educational curricula especially in the sciences from the primary level through to the tertiary level.
- Learning from German's where treated water is not allowed to be used for other purposes such as flushing of toilets, car washing and watering of lawns.
- Inculcating in the children the need to conserve water. Building a belief system in conserving water.

In reference to Awareness Creation, the group agreed that not much have been done to generate interest in the system and proposed a number of measures that can be adopted. These include:

- Production of documentary highlighting the socio-economic and environmental benefits of having RWH systems.
- Talk shows on television and radio.
- Print Media: The print media could adopt a 'Content for cash" approach, to encourage wider dissemination of pictures and articles on RWH and its benefits in ways that provide information to the general public.
- In order to reach out to the rural areas with the documentary, the Information service vans from the Ministry of Information given to the various municipalities and district assemblies could be employed.
- Drama/ videos should be in the local languages to increase the level of understanding and appreciation of the information.
- It is important that the content of the message should address the quality issues and negative perception people associate with RWH. The message should focus on quality and environmental gains beneficiaries stand to obtain, and especially on how harvested water can be treated for potable use.
- Testimonies from people who already are benefitting from RWH should be involved in this exercise.
- Ministry of local government/ MMDA could be engaged to get the message to the grass root level.

Making the RWHS more attractive to Society, the group concluded on the following;

- The message sent out should be well segregated to meet the different levels of society.
- The Affluent are not concerned with the water for re-use. For such, the focus should be on the environment to reduce flooding, also should be encourage to use RWH for flushing, watering of lawns.
- For the low income earners, though they are in need of water, affordability is a problem to most of them.
- Wants champions in the business, the engagement of big businesses like Polytanks could really make a difference when it comes to marketing and promotion

- Recommend: Having different designs for different segments of society.
- There is the need for more thorough market research
    - To address negative perceptions and identify the best approaches to communicate the benefits for increased acceptability by the wider public.
    - Need to combine the practical expertise of marketing institutions with the knowledge and methods prevailing in the universities and other research institutions.

The group stressed the need for Capacity Building. The group noted that;

- The need to proceed with the RWH training under the project and this should be linked with other training institutions such as NVTI, to train artisans in the installation of the systems.
- To this end two approaches were proposed, formal through institutions such as NVTI, NBSSI, GRATIS, ATTC and informally through business associations.
- For the uneducated ones, practical training is key, in addition to the basic business training required for formal business expansion.
- For manufacturing of RWHs components, there is the need to identify basic components for harvesting rain and the basic materials to be used.
- Also, specifications for the design and dimensioning of RWH systems for different uses and contexts of use are important.
- Therefore it is necessary to provide basic standards to guide the training offered to informal sector operators.

The following aspects should at least be included:

- Construction: document all design and construction processes.
- Optimal use: Constant usage of the water, allowing the first rains to flow out, cleaning of tanks and other components periodically, changing filters where applicable, etc.

- Periodic servicing and maintenance: Inspection by artisans to detect leakage, and the owners also has a responsibility to ensure that the systems are well maintained to get quality and quantity of water demand.

**Sections during group discussions**

## 5.0 Conclusion

The impact of Climate Change on water availability is increasing the demand for alternative and innovative water solutions in Ghana. Rainwater Harvesting has been identified as a promising technology, and there is a national strategy to promote its adoption on a wider scale. The experience from the project "Rainwater harvesting (RWH) for resilience to climate change impact on water availability in Ghana" shows very promising results as regards water quality and quantity, as well as the overall social, economic, and environmental sustainability of the piloted systems. Key stakeholders from the public and private sectors share the view that RWH should be promoted and developed through further joint efforts. While the business opportunities in RWH are increasing, there is the need for further work to develop the market and overcome barriers in the form of high initial costs, limited awareness, limited dialogue between public and private stakeholders, and limited capacity to implement relevant policies. To this effect, participants at the workshop brought forward a range of recommendations and proposals, which may be summarized in the following key points:

- There should be efforts to develop the market, by further implementation of the national RWH strategy and enforcement of the revised Building Code.
- Government and lead financing institutions should facilitate access to credit with flexible terms to encourage more people to install RWH systems.
- The initial costs of RWH systems could be reduced by way of tax incentives for importers and local producers of components.
- There should be more engagement and collaboration between stakeholders in the building industry, to develop and incorporate RWH into new, adaptive building designs.
- There should be continued efforts to develop RWH systems for various uses and user groups, including affluent as well as less privileged communities in all parts of the country.
- There is the need to develop standards and build more capacity, among bureaucrats as well as technology providers and local artisans.

- There is the need to provide more education and information to the general public, to correct misconceptions and build awareness of the benefits of RWH.

These recommendations highlight the need for more collaboration between public and private actors, backed by research partners with a focus on applying science for business and social development. They also underscore the need to address social and economic, as well as the environmental sustainability, when upscaling and continued development of RWH technology is concerned.

## Appendix 1: Programme

**RWH PROJECT STAKEHOLDERS WORKSHOP, 11TH JUNE, 2015 AT CSIR-STEPRI PROGRAMME**

| | | |
|---|---|---|
| **08:00- 9:00** | **Registration of Participants** | All |
| **09.00- 09.05** | General Introduction of participants | Facilitator Mr. Masahudu Fuseini |
| **09:05-10:00** | **Official Opening:**<br>• Introduction of Chairman<br>• Chairman's Remarks<br>• Welcome Statement and brief about RWH Project<br>• Statement<br>• Statement on Project implementation, results and workshop objectives<br>• Statement by MESTI<br>• Chairman's Closing Remarks<br>• Group Photograph | <br>• Miss Winfred Arthur<br>• Dr.Joel Sam (Director CSIR-INSTI)<br>• Dr. G.O Essegbey (Director CSIR-STEPRI)<br>• Dr. Joseph Ampofo (Director CSIR-WRI)<br>• Sigrid Damman, Project Leader (SINTEF-Norway)<br>• Chief Director, MESTI<br>• Dr Joel Sam (Director CSIR-INSTI)<br>• All |
| **10:00-10:25** | National RWH Strategy Current Status | Mr. Fred Addai (Director Water, MWRWH) |
| **10:25-10:40** | Health Break | |
| **10:40-11:05** | Needs perspective of the RWH Business | Mr. Michael Mallet (CEO Rainwater Solutions & Member RWH Cluster) |
| **11:05-11:30** | Strategies for upscaling RWH in Ghana | Dr. Barnabas Amisigo (CSIR-WRI) |
| **11:35-12:20** | Questions | - |
| **12.20-13:20** | Lunch Break | |
| | **Technical Session** | |
| **13:20-14:25** | **3 Parallel Session**<br>• Making RWH System more Affordable<br>• Creating Enabling Environment<br>• Marketing and Acceptability of RWH System | Coordinator Mr. Roland Asare |
| **14:25-15:30** | Plenary Session<br>Presentation & Discussion | Group Leaders |
| **3:30-3:45** | The Way Forward &Closing Remarks | Dr. G.O. Essegbey & Sigrid Damman(Project Leader) |

## Appendix 2: List of Participants

| | | |
|---|---|---|
| 1. | Gabriel Ahiabor | Graphic |
| 2. | Sigrid Damman | SINTEF |
| 3. | Herman Helness | SINTEF |
| 4. | Joel Sam | CSIR-INSTI |
| 5. | B. A. Amisigo | CSIR-WRI |
| 6. | K. Kankam-Yeboah | CSIR-WRI |
| 7. | Frank Teye Oblim | CSIR-WRI |
| 8. | Margaret Macanley | GWCL |
| 9. | Ben Arthur | CONIWAS |
| 10. | Deborah Ofori | CSIR-WRI |
| 11. | Masahudu Fuseini | CSIR-STEPRI |
| 12. | Stephen Awuni | CSIR-STEPRI |
| 13. | Mavis Akuffobea | CSIR-STEPRI |
| 14. | Gaze Emmanuel | CWSA |
| 15. | Emmanuel Tetteh | CSIR-STEPRI |
| 16. | Dr. S. A. Ampofo | CSIR-WRI |
| 17. | Dr. Fredrick Amu-Mensah | CSIR-WRI |
| 18. | Michael Mallet | Rainwater Solutions |
| 19. | David Gamey | King Jahbs |
| 20. | Fred Addae | MWRWH |
| 21. | Benjamin Addo | MWRWH |
| 22. | Rev. S.Y Osei | MWRWH |
| 23. | Felix Addo-Yobo | NDPC |
| 24. | Regina Banu | CSIR-WRI |
| 25. | Dr. K.A. Asante | WRI |
| 26. | Adwoa Paintsil | WRC |
| 27. | Forson Dzotor | GSA |
| 28. | Wisdom S. Sebuava | GSA |
| 29. | Logah Frederick | CSIR-WRI |
| 30. | Justina Onumah | CSIR-STEPRI |
| 31. | Ahmed J. Iddrisu | NBSSI |
| 32. | Tony Lawal | Tovila Water Solutions |
| 33. | Daniel Adinortey | Raincoat Roofing |
| 34. | Roland Asare | CSIR-STEPRI |
| 35. | Dr. George Owusu Essegbey | CSIR-STEPRI |
| 36. | Salamatu Abdul-Salam | MESTI |
| 37. | Winifred Arthur | CSIR-STEPRI |