

# **Impact assessment Report**

**of**

**WaterAid Bangladesh's  
Initiatives related to promotion of rainwater harvesting**

***Submitted to***

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## Table of Contents

	Page
Acknowledgement	i
Executive Summary	iv
LIST OF TABLES	vii
LIST OF FIGURES	vii
LIST OF BOX	vii
ACRONYM USED	viii
<b>Chapter I</b>	
WaterAidBangladesh"s initiatives related to promotion of URWH	
1.1 Background	1
1.2 Rain water harvesting in WaterAid Bangladesh agenda	1
1.2.1 Training program	2
1.2.2 Rain Forum	2
1.2.3 Rain centre and demonstration plants	3
1.2.4 Curricula development	4
1.3 Assessment of WAB"s initiatives in promoting URWH	5
1.4 Objectives of the assessment	5
1.5 Methodology of the research	5
1.5.1 Primary data collection	5
1.5.1.1 Survey	5
1.5.1.2 Key informant interview (KII)	6
1.5.1.3 Observation	6
1.5.1.4 Workshop	7
1.5.2 Secondary data analysis	7
1.6 Data analysis and interpretation	7
1.7 Scope and limitations of the assessment	7
1.8 Structure of the report	8
<b>Chapter II</b>	
Literature review	9
2.1 Rainwater harvesting	9
2.2 Practice of rainwater harvesting: A historical overview	9
2.3 Rain water harvesting practice in Bangladesh	11
2.4 Context of rain water harvesting in Bangladesh	11
2.5 Water policies in Bangladesh	12
2.6 Rain water harvesting system in Building Codes of Bangladesh and India	13
<b>Chapter III</b>	
Major findings of WaterAidBangladesh"s initiatives related to promotion of rain water harvesting	15
3.1 Profile of the survey respondents of URWH training	15
3.2 Participation in urban rain water harvesting training	16
3.3 Rain Forum and its activities	19
3.3.1 Membership in the Rain Forum	20
3.3.2 Satisfaction level about Rain Forum"s performance	21
3.4 Rain Center	21

3.5 Rain water harvesting plant	22
3.6 Dhaka declaration	24
3.6 Success of WAB initiative	26
<b>Chapter IV</b>	
Performance of WaterAid initiative and Way Forward	27
4.1 Introduction	27
4.1.1 Introduction of rainwater harvesting into BNBC	28
4.1.2 Training on URWH	28
4.1.3 Rain Forum	29
4.1.4 Demonstration plant	29
4.1.5 Rainwater harvesting in the academia	30
4.2 Way forward or recommendations	30
4.3. Conclusions	32
References	33-35
Annexure A:	36-39
Annexure B: Terms of References	40-43
Annexure B: Questionnaire for survey	44-47
Annexure C: Guide question for FGD and KII	48-51

## Executive Summary

WaterAid envisions a world where everyone has access to safe water and sanitation, and has a mission to transform lives by improving access to safe water, hygiene and sanitation in the world's poorest communities. The organization started working in Bangladesh in 1986 to improve access to safe drinking water; sanitation and hygiene (WASH) for poor and marginalized communities. It implements projects in rural and urban areas and influences stakeholders and policy decision makers for integrating WASH in development policy. The organization also prioritizes rain water harvesting as one of its advocacy issues considering water security.

WaterAid has been working on urban rainwater harvesting (URWH) since 2010 with technical support from Centre for Science and Environment (CSE). As per partnership agreement between CSE and WAB, CSE is to conduct training for skill enhancement; provide technical advice and support for implementing projects related to rain water harvesting; offer knowledge support for preparing manuals, curriculum development for universities/colleges, setting up of rain centers, contribute in arranging workshops, etc. After few years of joint collaboration with CSE and other stakeholders, WAB has decided to conduct an impact assessment of its work on promotion of rainwater harvesting since 2010 with support from an independent external consultant team. In the assignment, the consultancy team is required to provide a set of guide for WaterAid to plan forward with URWH program.

The research team employed multiple methods like secondary data analysis and documents review in the area. Both quantitative and qualitative approaches were applied to collect primary data. For survey the research team collected list of 142 training participants and e-mailed the questionnaire to them. But only 52 trainees returned the completed questionnaire (on line) after repeated request through phone call. A number of trainees could not be contacted for the reasons that either their cell phone number or e-mail is no more in use or they are not in the country.

In addition, the research team conducted key informant interview (KII). The team interviewed members of Rain Forum, university teachers and staff, public officials, NGO personnel, and officials of CSE through Skype, and visited knowledge center, rain water harvesting plants and others. The team could not talk to some of the important stakeholders as for their busy schedule or non-cooperation (few cases). Some of the major findings of the assessment are:

Under the initiative 142 people from different professions (public officials, university teachers, and persons from business, NGO staff and others) got four days training on URWH conducted by CSE and organized by WAB from 2010 to 2014. Among the survey respondents most of the respondents remarked that the training enhanced their knowledge, clarified perception and provided good understanding about URWH. In general higher number of respondents rated training contents, materials and quality, technical knowledge, application scope, etc. as good.

Participants mentioned that they used training learning for awareness raising, research purposes (either themselves or helping students under their guidance for thesis writing), academic purposes i.e. taking classes on the issues or taking sessions in training program (like some of the university teachers mentioned that they take one or two sessions on rain water harvesting as part of ongoing courses, and advise students for thesis writing on the issue), curriculum development initiative, distribute training materials, demonstration project on rain water harvesting, contribute in policy decision, supporting others in designing rain water harvesting and provide technical support on the issue, etc. As such majority of the respondents found the training useful like 48% commented that training was very useful and 44% told of quite useful.

Rain Forum is a voluntary platform and membership initiative managed by participants of URWH training for replication of the idea. The forum aims to work for capacity building, develop scopes and techniques of rainwater harvesting, promote application rainwater for domestic purposes, assist in organizing seminars, meetings, conferences, and provide consultancy services on rainwater harvesting, support different stakeholders in installing rainwater harvesting system, conduct research on relevant issues, publish books, magazines, etc.

In the past forum members have supported several initiatives of URWH like organizing training, workshop, discussion meeting, rain day celebration, publication, consultancy services, etc. Among training participants two-third of the respondents are its members. Due to its limited initiatives, one third of the members make time for different programs of the Forum. As such, 45.7% opted to be in the middle position regarding its performance like neither satisfied nor dissatisfied, while close one third of the respondents commented that they are happy with Forum's activities.

About four/five universities were supported with computer, modem, chair, table, reading materials, etc. under the initiative of establishing „knowledge center“ to facilitate teachers and students for conducting research on URWH. The research team has a mixed experience about the utilization of the facilities. It was found that the students prefer to consult the teachers instead of looking for materials in the computer or books. It seems it will take some more time to harvest full benefit of the facilities.

With technical support from CSE and ITN-BUET, and financial supports from WAB demonstration plant (some modifications made by ITN-BUET) for rain water harvesting was installed in four places for promotion of rain water use, replication, etc. Three plants that the team visited use rain water for different purposes like floor cleaning or toilet washing, or hand washing only or washing, bathing, cleaning, toilet use, etc.; other than that all the plants have rain water discharging facilities. Regarding rain water use it seems there are different opinions like some recommend that it should be used only for cleaning and toilet flushing (and there should not be any human contact like washing mouth); on the other hand, there evidence that

people claim that they use rain water for all purposes apart from drinking. There are also debates about at what level the rain water can be discharged and does the rain water reaches to the level from where we get underground water in Dhaka City pumped by WASA or if it reaches whether it is safe for use.

Inclusion of rainwater harvesting in the Bangladesh National Building Code (BNBC) (draft) is a result of the initiative from WAB. The code has a chapter that specifies rainwater harvesting requirements, application and approval process, roof top rainwater harvesting system including catchments area, storage, treatment of rainwater, ground water recharging, and design, installation and maintenance of rain water drainage systems. The policy needs to be finalized and guidelines prepared like installation of the harvesting plant public or private building, old or new building, use of the water, training of people like plumbers (who can handle installation of the system), cost-effectiveness, benefit of rain water use including environmental one, motivational factors for individual house owner to go for the option, role of private real estate developers, respective government departments and others.

Majority of training participants remarked that WAB is successful in its interventions for URWH promotion. For reaching the message and benefits to wider population or beneficiaries, WAB may need to consider following issues in its future course of action like network and lobby for approval of BNBC code and its implementation and monitoring mechanism; come up with appropriate design of rainwater harvesting for different types of building, costing, technical support, repair and maintenance assistance availability, etc.; conduct research about technological details and safety issues of artificial recharging of rainwater into the ground, and work on rainwater recharging system in fly-over, foot over bridge, airport buildings, rail stations, highways, stadium and feasible open areas; take measures so that Rain Forum has got formal entity with specific mandate, organization structure, office space, personnel, activities, etc.; involve private sector, real estate companies, private construction firm and others with the initiative; prepare training module on URWH and organize tailor-made training courses for different groups of people; identify relevant stakeholders in the area and share responsibilities among them; get media involved with the initiative and play a role in popularizing URWH; publish and distribute leaflet, sticker, poster, brochure, etc. for common understanding and motivation for rainwater harvesting and artificial recharging, etc.

Information from different sources and discussion with diverse stakeholders reveal that URWH is a well-timed and important initiative for water scarcity urban areas like Dhaka City. Past few years activities about URWH started by WAB have enhanced knowledge, skill and motivation on the issue among academicians, professionals (private, public and not-for profit), provided scope for experimentation of rain water harvesting, use, discharging and others, and policy framework for URWH promotion. It is hoped the lessons learned from the pilot schemes would guide different stakeholders to adopt rainwater harvesting in the development process.

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1.1 Survey respondents from different areas	6
3.1 Occupation of the respondents	15
3.2 Training participating year	16
3.3 Membership in the Rain Forum	20
3.4 Opportunities for gathering in the Rain Forum	20
3.5 Satisfaction level about performance of Rain Forum	21

## LIST OF FIGURES

<b>Figures</b>	<b>Page</b>
3.1 Knowledge about URWH (%)	16
3.2 Training assessment (%)	17
3.3 Application of training knowledge (%)	18
3.4 Usefulness of training (%)	19
3.5 Success of WAB in promoting URWH (%)	26

## LIST OF BOX

<b>Boxes</b>	<b>Page</b>
3.1 Dhaka declaration	24

## ACRONYM USED

BCR	Bangladesh Construction Regulation
BNBC	Bangladesh National Building Code
BTTB	Bangladesh Technical Education Board
BUET	Bangladesh University of Engineering and Technology
CSE	Center for Science and Environment
CUET	Chittagong University of Engineering and Technology
CSP	Country Strategic planning
FGD	Focus group discussion
GoB	Government of Bangladesh
HBRI	House Building Research Institute
IUB	Independent University of Bangladesh
KII	Key informant interview
IAB	Institute of Architects Bangladesh
IEB	Institute of Engineers Bangladesh
ITN	International Training Network Center
LGED	Local Government Engineering Department
MIST	Military Institute of Science and Technology
MOU	Memorandum of Understanding
NGO	Non-government organization
NSU	North South University
PEDP	Primary Education Development Program
PWD	Public Works Department
RAJUK	RajdhaniUnnayanKartipakh
RWH	Rain water harvesting
SUST	Shahjalal University of Science and Technology
TOR	Terms of Reference
UIST	University of Information Technology and Science
ULAB	University of Liberal Arts Bangladesh
UNEP	United Nations Environment Programme
UN-HABITAT	United Nations Human Settlement Programme
URWH	Urban rain water harvesting
VERC	Village Education and Resource Center
WAB	WaterAid Bangladesh
WASA	Water and Sewage Authority
WASH	Water, sanitation and hygiene

## Chapter I

### WaterAid Bangladesh's initiatives related to promotion of URWH

#### 1.1 Background

WaterAid, a leading international non-government organisation, was established in 1981 with a vision of a world where everyone has access to safe water and sanitation, and a mission to transform lives by improving access to safe water, hygiene and sanitation in the world's poorest communities. WaterAid select countries to work based on criteria, like potential of effective and a long-term positive impact, lies at lower end of United Nations Development Programme Human Development Index with a significant part of the population lacking access to water and sanitation, opportunity to co-ordinate with others, potential to influence other organisations to improve access to safe water and sanitation, and opportunity to widen experience and knowledge for increasing credibility to influence global change (WaterAid's

Global strategy: 2009–2015; WaterAid's Global Strategy 2015-2020). Considering all these criteria, WaterAid started to work in Bangladesh in 1986 to improve access to safe drinking water; sanitation and hygiene (WASH) for poor and marginalized communities. It works in partnership with NGOs, civil society groups, government institutions, academic and research institutes, and other development agencies to implement projects in rural and urban areas and influence other stakeholders and policy decision makers for integrating WASH in their development policy, priority and business plan (WaterAid, 2006; Jahan, 2013).

WaterAid prioritises rainwater harvesting as one of its advocacy issues considering water security aspects in future. Bangladesh faces shortage of potable water, especially in the urban areas, due to over extraction of groundwater. In Dhaka city, the groundwater table is depleting at a rate of 2-3 meter per year. On the other hand, urban flooding has become a regular phenomenon due to the increase of paved areas, encroachment of water bodies and poor drainage management. Unfortunately, no attention so far has been given on recharging groundwater or efficient management of water. Inequity in water distribution is another area that requires attention. A significant amount of highly subsidised water from utility agencies (like Dhaka WASA) is being used for toilet flushing, whereas the slum dwellers do not get minimum required water. The scenario is almost similar in all cities of the country. The situation is aggravated further due to unplanned urbanisation and rapid urban population growth. The city authorities are not being able to meet water demand of the increasing population.

#### 1.2 Rain water harvesting in WaterAid agenda

In 2010, during the preparation of Country Strategic Plan (CSP) for 2011-2016, WaterAid Bangladesh conducted a study on water and sanitation situation in Bangladesh, where water crisis in urban areas had emerged as an area of concern (Jahan, 2013). Considering water security aspects in the coming future and realizing

potential of rainwater harvesting to combat the water crisis, WaterAid Bangladesh started working on Urban Rain Water Harvesting in 2010 with technical support from Centre for Science and Environment (CSE), India with a long-term vision to contribute to management of water crisis in Bangladesh (Jahan, 2013; WaterAid, 2013; ProthomAlo, 16 June 2014).

As an advocate of URWH, Water Aid Bangladesh organized and introduced following programs in Bangladesh:

- Training of professionals and stakeholders on RWH
- Development of a platform to promote awareness among the wider audience
- Inclusion of RWH in academic curricula
- Support academic institutes with demonstration plants for research and academic purpose and establishment of „Knowledge and Research Hub“ in those institutes.

### **1.2.1 Training program**

In 2010, WaterAid Bangladesh sent two architects from Bangladesh to attend a workshop on “Urban Rain Water Harvesting” offered by CSE, India. In the same year, WAB organized two seminars and the architects shared their knowledge with members of mInstitutes of Engineers Bangladesh (IEB) and Institute of Architects Bangladesh (IAB).

WaterAid with support of CSE organized training programs with the vision of building capacity of sector professionals including academics, researchers and practitioners on URWH. Since 2010, about 142 participants have been trained so far from various disciplines. Primary aim of the training program was to expose trainees with the concept and technical aspects of RWH. It was expected that the broad spectrum of trainees would act as change makers, disseminate their learning and promote rainwater harvesting in their work and create awareness among city people.

Simultaneously WaterAid Bangladesh organised three exclusive seminars with Institute of Engineers Bangladesh (IEB), Institute of Architects Bangladesh (IAB), and Bangladesh Institute of Planners (BIP) to create awareness among policy makers and practitioners to capitalize role of professional for disseminating and strengthening potentials of rainwater harvesting in Bangladesh (Jahan, 2013).

### **1.2.2 Rain Forum**

A non-profit voluntary platform „Rain Forum“ had been emerged from participants of the training programme with support from WaterAid for reaching the wider audiences to promote rainwater harvesting in Bangladesh (Jahan 2013; ProthomAlo, 2014). The forum has been formed to build a water literate society in Bangladesh through development of a network among the professionals and stakeholders to help developing sustainable practices in water management sector (Alum, 2013).

To create awareness among mass people and popularize rainwater harvesting, WaterAid Bangladesh started celebrating Rain Day in each year on the first day of *Ashar* (first month of the rainy season of Bangla calendar), which is an open event with participation of people from different strata of the society. The program aims to create mass awareness and disseminate information regarding potentials of rain water harvesting in Bangladesh (Jahan, 2013). Moreover, they took initiative of organizing National Convention on Rainwater Harvesting in collaboration with BUET, Institute of Water Modeling (IWM) and Rain Forum to connect academician and researchers on the same platform and promote good practices. Till date, Rain Day has been celebrated in the years 2011, 2013 and 2015, and National Convention on Rainwater Harvesting has been organized in the years 2012 and 2014.

### **1.2.3 Rain center and demonstration plants**

With a vision to contribute jointly and work together on promotion of rainwater harvesting, WaterAid Bangladesh partnered several institutes, i.e. International Training Network Center, Bangladesh University of Engineering and Technology (ITN-BUET), North South University (NSU), Independent University of Bangladesh (IUB), Shahjalal University of Science and Technology (SUST), Military Institute of Science and Technology (MIST), University of Liberal Arts Bangladesh (ULAB), Brac University, etc. To create a knowledge hub on RWH for students and researchers, WaterAid Bangladesh established Rain Centre – a dedicated resource centre on rainwater harvesting at the mentioned institutes for allowing wider audiences to access information related to rainwater harvesting (Jahan, 2013). To ensure youth engagement in rain water harvesting promotion, some competitions titled „Stockholm Junior Water Prize“ and „Champions of earth“ were organized in collaboration with House of Volunteer and Earth Club of NSU.

WaterAid extended its support to the academic institutes by building demonstration plants for research and academic purposes at Bangladesh University of Engineering and Technology (BUET), Public Works Department (PWD), Independent University of Bangladesh (IUB), Shahjalal University of Science and Technology (SUST), University of Information Technology, and Science (UITS) and an NGO premises - Village Education and Resource Center (VERC) for transformation of hands-on technical knowledge (Dakua, 2013; Faruk and Arifuzzaman, 2013; Jahan 2013). WaterAid also provided Technical support in the Primary Education Development Program (PEDP) of Local Government Engineering Department (LGED) in incorporating rainwater harvesting in the school designs according to their request.

ITN-BUET in partnership with Rain Forum organised two training programmes on „Rainwater Harvesting: Exploring Rainwater as a tool for Sustainable Water Management in Bangladesh“, and two-day long workshops in December 2012 and March 2013, and facilitated a day-long workshop for architects organised by Institute of Architects Bangladesh (IAB) in December 2012 at ITN-BUET seminar room. Moreover, the center undertook a research on „Storage and Recharge Potential of

Rainwater in Dhaka City to Promote Ideal Practice of Rainwater Harvesting System in Urban Areas” from October 2012 to September 2015. Under the program researchers monitored impacts of rainwater harvesting system installed at BUET, IUB, UIST and VERC premises.

#### **1.2 4 Curricula development**

To institutionalize the knowledge production process and mainstreaming rain water harvesting in educational systems through inclusion of rain water harvesting in curricula for future generation, researchers of ITN-BUET in collaboration with WaterAid Bangladesh and CSE developed curricula for under-graduate and post-graduate students, contextualizing the need of rain water harvesting with other subjects, which are to be included in the curriculum of different technical institutes, i.e. Bangladesh Technical Education Board (BTEB), UITS etc. A number of institutions have already started incorporating relevant contents of rainwater harvesting under different courses (Jahan, 2013). Furthermore, WaterAid signed strategic Memorandum of Understandings (MoUs) with renowned universities like NSU, SUST, and UITS for joint initiatives regarding inclusion of rain water harvesting in course curricula, initiation of relevant researches and establishment of knowledge hubs (Jahan, 2013). Considering the long-term prospects, WaterAid is currently working on mainstreaming rainwater harvesting into the curricula of engineering institutes through course curricula development towards green technology in Chittagong University of Engineering and Technology (CUET) by introduction of new Masters/PhD level course.

Along with these projects, WaterAid Bangladesh has taken initiative to influence and advocate policy decision makers for integrating rain water harvesting technology in their policy, and plan. As a result of its continuous efforts, rain water harvesting and groundwater recharge were highly emphasized upon in the National Water Policy, 2013 appreciating value of awareness building through education and development of efficient human resources through technical training (Al-Muyeed, and Rahman, 2014). WaterAid Bangladesh and Rain Forum provided inputs for incorporating practical aspects of rain water collection, reuse and recharge into designated chapter of Bangladesh National Building Code (BNBC) (draft) titled „Rainwater Management”, which is currently under approval process (Haq, 2013; Jahan, 2013; Al-Muyeed, and Rahman, 2014; Al-Muyeed, and Islam, 2015; Samakal, 2015). It indicates norms for harvesting rainwater through rooftop harvesting as well as artificial groundwater recharge in areas where there has been over development and subsequent exhaustion of underground aquifers (Al-Muyeed, and Rahman, 2014; Al-Muyeed, and Islam, 2015; Samakal, 2015).

#### **1.3 Assessment of WAB’s initiatives in promoting URWH**

The primary focus of the assignment is to assess WaterAid’s work about promotion of rain water harvesting since 2010, and suggest how WaterAid should take the plan

forward. To carry out the project work within due time, a well-organized professional team has been mobilized developed with full conformity of the TOR. The project was commenced from 21<sup>st</sup> of June, 2015.

#### **1.4 Objectives of the assessment**

Objectives of the study are to:

- assess collaboration between WaterAid and CSE regarding capacity building initiative and suggest how it can be utilised more effectively in future;
- figure out whether and to what extent RWH trainees play a role in promoting urban rainwater harvesting, and suggest how they can contribute more effectively and strategically in the area;
- analyse current roles, strategic position, and potentialities of different stakeholders (GoB and relevant departments/agencies, universities/technical/research institutes, NGOs and donor agencies) and general people regarding RWH promotion, and professionals' contribution involved with the initiative;
- understand change/s in attitude (if any) of concerned policy makers, developers (public and private) and relevant stakeholders;
- assess WaterAid's contributions, success and areas of improvement in influencing concerned stakeholders on RWH regarding practice and policy changes, and suggest directions on WaterAid's future strategy;
- identify value addition or influencing work of WaterAid through its engagement or initiatives taken like Rain convention, Rain day observation, contribution of RainForum etc., and explore how WaterAid can be involved with wider audiences through influencing for further promotion of RWH and its sustainability;

#### **1.5 Methodology of the research**

Both primary and secondary data was used for the study, and several methods were applied for data collection.

##### **1.5.1 Primary data collection**

Primary data were collected through quantitative and qualitative methods. Survey, focus group discussion (FGD), key informant interviews (KIIs), field visit and observation were conducted for information collection of the assessment. A brief description of the study methodology is given below:

###### **1.5.1.1 Survey**

A survey was conducted on the participants of the RWH training program organized by Water Aid Bangladesh (WAB) and CSE India from 2010 to 2014. The survey questionnaire was prepared in consultation with WAB personnel involved with the project (Annexure C) to capture information related to study objectives like impacts

of URWH training programs on the participants in their knowledge, attitude and behavior, and use of training learning.

The research team collected list of the trainees (142) from Water Aid who had received training on URWH from 2010 to 2014. Due to time and resource constraints face to face interview for survey was avoided and questionnaire for survey was emailed to the participants. About 52 trainees responded to the questionnaire. Contact addresses of some trainees are no more valid. Some of them left the organization even the country in last few years. As a consequence the survey took longer time than initially expected. The participants who did not respond were tried to be reached over telephone and through personal contacts several times. Though it was an online survey but in few cases upon request of the respondent a face to face interview was conducted. Details of training participants and survey respondents of different years are mentioned in Table 1.1.

Table 1.1: Training participants and survey respondents

Training participants situation	Training year					Total
	2010	2011	2012	2013	2014	
Participants that replied to the questionnaire	11	13	5	11	12	52
Non-response participants	10	7	7	9	15	48
Participants that cannot be contacted	9	10	10	12	1	42
<b>Total</b>	<b>30</b>	<b>30</b>	<b>22</b>	<b>32</b>	<b>28</b>	<b>142</b>

Source: Training participant list of WAB and survey questionnaire

### 1.5.1.2 Key informant interview (KII)

Researchers carried out semi-structured interview with around 10/15 key informants from different agencies involved with the URWH program. The key personnel from CSE were interviewed through a skype meeting. Relevant persons from concerned agencies, universities/technical institutes were interviewed to understand the impact of RWH program initiated by WAB in their institutions. The key personnel also shared their views regarding future course of strategies to promote URWH. They also discussed on scope and limitation of the program and its sustainability.

### 1.5.1.3 Observation

A number of institutes have established demonstration projects for rain water harvesting in their campus with support from WAB like BUET-ITN, MIST and VERC. The research team physically visited these sites and collected data of performance and status of the projects. During the survey, FGD and KII the researchers took note of the processes how people (trainee or non-trainee, relevant stakeholders and others) perceive, interact and behave regarding URWH, environment, effectiveness and impact of project intervention. Researchers observed and listened to their stories and results of the initiative in their context.

#### **1.5.1.4 Workshop**

As part of the assessment process one workshop was organized by WAB where Chairman of RAJUK, Executive Director of Pratical Action and former Country Director of WAB, present Country Director, other members of the organization and NGOs, participants of URWH, members of Fain Forum and others were present. The study team presented findings of the review followed by feedback, clarification, question and answer session with active interaction among the participants, study team and facilitator. At later part of the workshop, the participants were asked to give their opinion about way forward of URWH in three areas (activities, for whom and expected results). Details of the group work are included in Annexure A, Box 1.

#### **1.5.2 Secondary data analysis**

Information regarding project objectives, achievement, results, effectiveness, impact, sustainability, lessons learned, future strategies, working with stakeholders from the public, private, not-for-profit, professionals, academics and others has been collected from different documents produced by WaterAid, websites, proceedings of rain conventions, media coverage, etc. National and international policies, codes and rules such as Bangladesh National Building Code (draft), Bangladesh Water Policy, Dhaka Building Rule 2012 and others were consulted to understand the regulatory and legal status and scope of URWH. In addition academic research works, reports, policy papers, and reports related to the program were studied.

#### **1.6 Data analysis and interpretation**

For quantitative data particularly survey, Microsoft Access was employed to input and clean data; and Statistical Package for Social Sciences (SPSS) was used for analysis of the information, and preparing table including frequency and percentage; and Microsoft excel was applied for data presentation in the form of graph, chart, etc. The qualitative data collected through KIIs and observation were recorded and categorized based on content, pattern and grouping. Furthermore, concept mapping, insight, empathy, reasoning, imagination and discernment were employed in making conclusion of certain issues. Qualitative data also helped to verify and validate information collected through survey.

#### **1.7 Scope and limitation of the study**

The research team had discussion with WaterAid team to understand the background and expected outcome from the study. A questionnaire was prepared and agreed with WAB personnel to conduct interviews of the trainees who had received training on URWH training jointly organised by WaterAid and CSE. The primary objective of the survey was to understand the impact of the training on the participants, benefit of the training and how do they apply learning of the training in their professional fields. The research team had elaborate discussion with the key personnel of Rain Forum, Rain centre and demonstration plants to understand how it

is playing roles for promotion of rainwater harvesting within and beyond the sector. Skype communication was made with the relevant personnel of CSE. Demonstration projects were visited and responsible person were interviewed. The research team had a plan to collect feedback from all the 142 trainees but a significant number of them could not be reached because their contact addresses are no more valid and some of them did not reply to the questionnaire even after several reminders. This report includes responses of 52 trainees. Expected cooperation and time was not extended by some of the officials involved with RWH program of certain institutes. These limitations could have been overcome if more time was available for the researchers.

### **1.8 Structure of the report**

The assessment report has been organized and presented in four chapters. Chapter I describes background, objectives, methodology, scope and limitation of the study. It also discusses about the agenda, role and activity of WaterAid Bangladesh regarding promotion of rain water harvesting in Bangladesh. Chapter II mainly comprises of literature reviews stating the conceptual framework of the rainwater harvesting. It gives brief historic overview of rain water harvesting in different parts of the world, and includes a section on rain water harvesting in building codes and national policies. Chapter III describes major findings of the assessment like demographic information of the respondents, effectiveness of the training, utilization of the training knowledge, functions of Rain Forum and how successful the forum is in achieving its objectives, utilization rain center facilities, rain water demonstration plant and use of water from the plant, analysis of Dhaka declaration, its present state and impact, WAB's success in promoting URWH. Chapter IV critically analyzes findings of the assessment, describes major findings and provides future direction of the initiative.

## Chapter II

### Literature Review

#### 2.1 Rainwater harvesting

Rainwater harvesting is a way of accumulating and preserving the superfluous water during rainy seasons and making it available for different purposes, i.e. agriculture, livestock, and domestic water supply (Amha, 2006; Al-Muyeed and Rahman, 2014). A rainwater harvesting system is comprised of four key components (Daily and Wilkins, 2012):

- Collection or Catchment Area – roof surfaces provide an opportunity for rainwater capture.
- Conveyance System – used to transfer water and is comprised of gutters or flat roof drainage holes, and downspouts and piping.
- Water Storage – may be above or below ground and can be comprised of a single container or multiple containers.
- Filtration – to keep debris out of the system

With the increase in world population, demand for water for different purposes has increased extensively. In contrary decrease in water supply occurred due to lack of surface water or polluted surface water sources, inaccessible groundwater, and water source with salty, acidic, arsenic contaminated or otherwise unpleasant water or unfit to drink, etc (WaterAid, 2013). The situation of water crisis is worsening due to ever increasing population, climate change and water pollution (Al-Muyeed and Islam, 2015). This scarcity/stress of water is not only occurring in arid or semi-arid regions but also in high rainfall areas, which resulted in increased need for rainwater harvesting system (UN-HABITAT, 2005; Sivanappan, 2006). Along with increase in demand for rainwater harvesting system, technology has also changed significantly from natural materials of early practice to artificial means of 20th century technology for increasing runoff from precipitation (Sivanappan, 2006).

#### 2.2 Practice rainwater harvesting: A historic overview

Rainwater harvesting system has been used for different purposes in various geographical and climatic regions of the world since ancient times, some of which continued to remain in use (Pandey, Gupta and Anderson, 2003). In early stage of civilization, rainwater harvesting was utilized by different cultures for agricultural purposes (UNEP, 1998). The technology was mostly used in the arid and semi-arid areas where rainfall is generally insufficient to meet the basic needs of crop production (Amha, 2006).

In Middle East, rainwater harvesting was practiced as early as 4500 B.C. by the people of Ur city in Mesopotamia (now Iran) (Sivanappan, 2006). The practice existed about 9,000 years ago in Jordan, and about 4,000 years ago the Negev

Desert of Israel (Amha, 2006). In the Negev desert, runoff storing tanks hillsides allowed the inhabitants to preserve water for both domestic and agricultural purposes with as little as 100 mm of rain per year (UN-HABITAT, 2005; CRD, 2015). In some parts of Palestine cisterns were the main or sometimes even the only source of drinking water (UN-HABITAT, 2005).

The evidences of roof catchment systems date back to early Roman times. In 2000 B.C. roman villages and even whole cities were designed to take advantage of rainwater as the principal water source for drinking and domestic purposes (UN-HABITAT, 2005; CRD, 2015). The world's largest rainwater tank is probably the Yerebatan Sarayi in Istanbul, Turkey, which was constructed during the rule of Caesar Justinian (A.D. 527- 565) (UN-HABITAT, 2005; CRD, 2015). At recent times, Germany is also adopting rainwater harvesting technology (UN-HABITAT, 2005).

Rain water storage reservoir technology was developed by the Mayan people in Mesoamerica around 3000 years ago in response to the recurrent droughts, where rainwater storage was a major source of water supply during dry season in the seasonally dry tropics of southern Maya lowlands (Pandey, Gupta and Anderson, 2003).

The earliest known evidence of rainwater harvesting technology use in Africa comes from northern Egypt, where tanks ranging from 200-2000 m<sup>3</sup> have been used for at least 2000 years, many of which are still operational today (UN-HABITAT, 2005).

The small-scale collection of rainwater from roofs and courtyard of the house in cities as well as in the countryside has been practiced in Asia for thousands of years (UNEP, 1998; UN-HABITAT, 2005). India has a long tradition of rainwater harvesting where Indian history indicates that rain water systems have been in use since 3000 BC (UNEP, 1998; Amha, 2006; Kumar, Patel and Singh, 2008; Rathore, 2011). In past rainwater harvesting was essential for farmers for emergence and diversification of food production to adopt with the fluctuating climate. Rainwater harvesting system intensified with the increase in aridity in this region. According to archaeological evidences, ponds, tanks and step-wells were used in Thar Desert at the time of Indus-Saraswati civilization (2894–2643 BC). During 13–18th century palaces and forts developed elaborate water-harvesting systems (Pandey, Gupta and Anderson, 2003). Formal recognition of rainwater harvesting system in India is a recent subject and rainwater harvesting technology has been adopted in many states and cities in India, i.e. central state of Maharashtra, Gujarat, Hyderabad, Jodhpur, etc (UN-HABITAT, 2005; Sivanappan, 2006; Kumar, Patel and Singh, 2008; Rathore, 2011). Rainwater harvesting is practiced on a large scale in many Indian cities like Chennai, Bangalore, Tamilnadu and Delhi where it is a part of the state policy (UN-HABITAT, 2005; Al-Muyeed and Rahman, 2014; Al-Muyeed and Islam, 2015).

In Sri Lanka, the history of rainwater harvesting is recent one. The initiative was formally recognized after the establishment of Lanka Rainwater Harvesting Forum at

the beginning of 1996 by a small group of interested persons from a range of government and non-government institutions, which was officially launched in 1997 with a vision to lead the nation in rain water harvesting technology, construction and utilization to sustain water needs. Moreover Rain Center was established at the same time to promote, create awareness, and build capacity on rain water harvesting technology. The Sri Lanka Rain Water Harvesting Act was enacted on 2007 (Al-Muyeed and Islam, 2015; Lanka Rain Water Harvesting Forum, 2015).

Japan and Taiwan are also adopting the technology among other South-East Asian countries (UN-HABITAT, 2005). The technology has also long been used in some regions of China among other East Asian countries (UNEP, 1998). Thus, realizing the efficiency of rainwater harvesting technology, it has long been recognized and utilized in different countries in various regions.

### **2.3 Rainwater harvesting practice in Bangladesh**

Rainwater harvesting technology is not new in Bangladesh (Sultana, 2007). The evidence of rainwater harvesting system was found in UariBoteswar dated back to 450 BC (ProthomAlo, 2014). The economical condition as well as absence of water supply facility prompted low income groups to harvest rain water for household and essential uses in rural and hilly areas of the country (Sultana, 2007; ProthomAlo, 2014; Samakal, 2015). People living in the coastal regions of the country also practice rainwater harvesting to get rid of saline water (Sultana, 2007). Indigenous people living in the hilly areas of Bangladesh have practiced water harvesting for centuries, where as many 52 indigenous methods have been identified that are being practiced by tribal people of Bangladesh for rainwater harvesting (Kabir and Faisal, 1999). Flat land farmers of Bangladesh also practiced many small and large scale indigenous rainwater conservation methods, i.e. small ditches within the crop fields, ponds, *beel*, *hoars*, etc. (Kabir and Faisal, 1999)

### **2.4 Context of rainwater harvesting in Bangladesh**

Being a tropical monsoon country, Bangladesh receives heavy rainfall during the rainy season (Sultana, 2007; Choudhury and Sultana, 2012). The annual average rainfall is 2,500 mm in the country varying from 1,200 mm in the extreme west to over 5,000 mm in northeast (WaterAid, 2006; Haq, 2013). The annual rainfall pattern is not uniform over the year, about 75% rainfall occurs from April to October (WaterAid, 2006). Thus, rainwater harvesting is viable among other technologies for Bangladesh due to heavy monsoon rain (WaterAid, 2006; Sultana, 2007; Al-Muyeed and Rahman, 2014). From rain 280 million cubic meter water can be preserved during rainy season, which is more than the water pumped out of aquifers; therefore, harvesting and recharging rainwater will have important contribution towards sustainability (ProthomAlo, 2014; Sumon and Kalam, 2014; Samakal, 2015). Thus, water crisis can be dealt with by harvesting rainwater in the monsoon (Kabir and Faisal, 1999; Choudhury and Sultana, 2012). Rainwater harvesting can help to

conserve groundwater and recharge water table if it is undertaken as a serious investment (Kulkarni, 2011).

In Bangladesh most of the water use for different purposes are extracted from surface and under-ground, and these sources are deteriorating due to several reasons such as extensive population growth, over exploitation of water sources without considering recharge capacity (Sumon and Kalam, 2014). The surface water bodies are getting lost due to encroachment of house as for increasing population growth (ProthomAlo, 2014; Samakal, 2015). Moreover, 11% of existing water bodies is already polluted with indiscriminate disposal of domestic, commercial and industrial waste (Sumon and Kalam, 2014; Al-Muyeed and Islam, 2015). Due to such contamination in surface water, the cost of water supply from surface water treatment is getting very high (Sumon and Kalam, 2014).

Since ground water is used as main source for water supply, increasing population in the urban and rural areas is putting increased load on underground aquifers which is resulting in depletion of water table (Sultana, 2007; Choudhury and Sultana, 2012; Sumon and Kalam, 2014; Al-Muyeed and Islam, 2015). All these factors have pushed to the brink of major water crisis (Al-Muyeed and Rahman, 2014). Water crisis will get worse in coming years with increased in population growth (Kabir& Faisal, 1999; Sumon and Kalam, 2014; Al-Muyeed and Islam, 2015). Thus, water issue remains a major policy concern in Bangladesh due to increasing scarcity of safe water of sufficient quantity, and water related problems like water logging, salinity in coastal regions, arsenic contamination and ground water depletion (Kabir and Faisal, 1999; Islam, Arif and Nomaan, 2013; Al-Muyeed and Rahman, 2014; Samakal, 2015).

Moreover, in urban areas excessive runoff in the rainy season causes water logging due to increased paved areas and decreased green spaces, hampering groundwater recharge process. In such situation, water availability from both surface and underground sources is getting limited or costly which might become nearly impossible to avail eventually.

## **2.5 Water policies in Bangladesh**

Problems regarding water crisis has been addressed in different policies, Acts, Rules, and Codes of the country. National Water Policy 1999 clearly identified the problems associated with over-use of surface and ground water, i.e. depletion and pollution of ground water resulting in salt-water intrusions and arsenic threats, etc. and set policies in various aspects to improve water resources management and environmental protection. In the National Policy for Safe Water Supply and Sanitation 1998, rainwater was considered as an option for safe water supply. The Bangladesh National Building Code (draft) included a chapter on rainwater harvesting. The Bangladesh Construction Regulation (BCR) 2006 and 2007 dictated

to construct buildings covering 50 to 67.50% of the plot area and instructed to keep 50% of the area as green space to ensure groundwater recharge (Haq, 2013).

In 2000, the Prime Minister had instructed to install rainwater harvesting system in design of buildings under government owned projects (Haq, 2013). In response to such instruction, Public Works Department (PWD) under the Ministry of Housing and Public Works (MoHPW), in collaboration with the Department of Architecture (DoA), published a “Manual on Rainwater Harvesting” in Bengali in February 2002, which has been followed in some public projects in a limited way (Haq, 2013). In the proposed Bangladesh Building Construction Rules (BCR), rainwater harvesting and ground water recharge has been made mandatory for new houses in Dhaka Metropolitan Area; i.e. buildings having ground coverage more than 200 square meter shall have to incorporate ground water recharging system and for every 1000 square meter or part thereof shall have one recharge well (Fatemi, 2013; Haq, 2013; Hasan, Hyder and Jahan, 2013).

## **2.6 Rainwater harvesting system in building codes of Bangladesh and India**

The Bangladesh National Building Code (draft) includes chapter titled „Rainwater Management”<sup>1</sup> which is a significant progress towards application of rainwater harvesting in Bangladesh. The chapter mentions that every building having space of 300 sqm and above should have rain water harvesting system. It also specifies rainwater harvesting requirements, application and approval process of plans for existing (only for addition or for alteration) or new building or for any other premises by Building Authority, licensing of plumbers by the plumbers” examination board established under Building Authority, roof top rainwater harvesting system and its different components including catchments area and determination for collecting and storage of rainwater, and methods for treatment of rainwater according to the purpose of use, ancillary works of ground water recharging such as perforated piping, pits and inspection chambers, and design, installation and maintenance of elements for rainwater drainage systems around the building and others.

According to the code, plan and work for rainwater harvesting and drainage work shall be done by licensed plumber, but number of trained persons in the area is insignificant as per requirement. Moreover, sessions are organized in two or three days training and workshop program are insufficient to make them qualified enough for the purpose. So, more initiatives regarding training of plumbers for rainwater harvesting and management shall be organized. Again, efficient manpower in the Building Authority will have to be increased to ensure proper assessment of the rainwater harvesting plans and examination of plumbers for license.

In different states of India minimum plot or building size for installation of rainwater harvesting system is specified by legislation. In Himachal Pradesh all commercial and institutional buildings, tourist and industrial complexes, hotels, etc. existing or

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<sup>1</sup><https://law.resource.org/pub/bd/bnbc.2012/gov.bd.bnbc.2012.08.07.pdf>

coming up and having a plinth area of more than 1000 sqm will have rain water storage facilities commensurate with the size of roof area. In Ahmedabad rainwater harvesting is mandatory for all buildings covering an area of over 1,500 sqm. In Bangalore, residential sites exceeding an area of 250 square meters shall have rain harvesting facility.

In Chennai rainwater harvesting has been made mandatory in three storied buildings (irrespective of the size of the rooftop area). In New Delhi rainwater harvesting has been made mandatory in all new buildings with a roof area of more than 100 sqm and all plots with an area of more than 1000 sqm, which are being developed. In Indore (Madhya Pradesh) rainwater harvesting has been made mandatory in all new buildings with an area of 250 sqm or more. In Kanpur (Uttar Pradesh) rainwater harvesting has been made mandatory in all new buildings with an area of 1000 sqm or more. In Hyderabad (Andhra Pradesh) rainwater harvesting has been made mandatory in all new buildings with an area of 300 sqm or more.

The government of Tamil Nadu has made rainwater harvesting mandatory for all buildings, both public and private. In Haryana rainwater harvesting has been mandatory in all new buildings irrespective of roof area. In Rajasthan, the state government has made rainwater harvesting mandatory for all public and establishments and properties in plots covering more than 500 sqm in urban areas. In Mumbai the state government has made rainwater harvesting mandatory for all buildings that are more than 1,000 sqm in size. In Gujarat, rainwater harvesting has been made mandatory for all government buildings<sup>2</sup>.

Above discussion clearly reveals that rainwater harvesting has been in practice in different parts of the world since ancient time. In recent years, many countries are showing sincere efforts to promote rainwater harvesting and have included the issue in their water policies and building codes. WaterAid Bangladesh is playing pioneer role in creating awareness about rain water harvesting in the country. The inclusion of RWH in the National Building Code (draft) is a major success. Implementation of rules, regulations and codes is a major challenge in the country. The minimum plot size for installment of rainwater harvesting system mentioned in the BNBC needs to be specified after further research considering the physical development trend and affordability of the residents in urban areas.

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<sup>2</sup>[www.rainwaterharvesting.org](http://www.rainwaterharvesting.org)

## Chapter III

### Major findings of WaterAid Bangladesh's initiatives related to promotion of rainwater harvesting

WaterAid Bangladesh (WAB) and Centre for Science and Environment (CSE) had partnership agreement from May 2012 to support implementing a three years project called „Learning and Development“ for building capacity on WaSH sectors towards influencing change in relevant policies for promoting rainwater harvesting. As per contract CSE would arrange training for skill enhancement of the targeted participants; provide technical advice and support for implementing projects related to rainwater harvesting; offer knowledge support for preparation of manuals for practitioners, curriculum development for universities/colleges, setting up of rain centers, contribute in arranging workshops/seminar, etc. Present chapter includes findings of the survey, KII, observation of URWH training, workshop, discussion session on relevant issues, knowledge center, demonstration, plant, etc. and results of the initiatives<sup>3</sup>.

#### 3.1 Profile of the survey respondents or URWH training

Among survey respondents (participants of urban rain water harvesting) majority (88.5%) are male, and 11.5% are female (Annexure A, Table 1). In regards to age of the participants around half of them (50%) belong to the group of 30-39 years, followed by respondents (21.2%) who are less than 30 years, 17.3% within 40-49 years and 9.6% in the age group 50-59, and only one is 60 years old or above (Annexure A, Table 2). About educational attainment half of them (50%) have Diploma or BSc degree, followed by 34.6% completing master degree studies, 15.4% has PhD degree (annexure A, Table 3). Respondents having PhD degree are mostly from the academes (public and private universities).

Table 3.1: Occupation of the respondents

Sl. No.	Respondent's Occupation	Frequency	Percentage (%)
1.	Private sector	6	11.5
2.	Government departments	13	25.0
3.	College/university teacher	17	32.7
4.	Not-for profit sector	12	23.1
5.	UN agencies	2	3.8
6.	Others (self-employed and un-employed)	2	3.8
	<b>Total</b>	<b>52</b>	<b>100.0</b>

Source: Survey; n = 52

In regards to occupation, close to one-third (32.7%) are in teaching occupation (mostly in public and private universities), about quarter (25%) are in public or

<sup>3</sup> Partnership agreement between CSE and WaterAid Bangladesh

government services, followed by 23.1% in non-profit sector, 11.5% in private / business, 3.8% in UN agencies and 3.8% currently do not do any job (Table 3.1)

### 3.2 Participation in urban rainwater harvesting (URWH) training

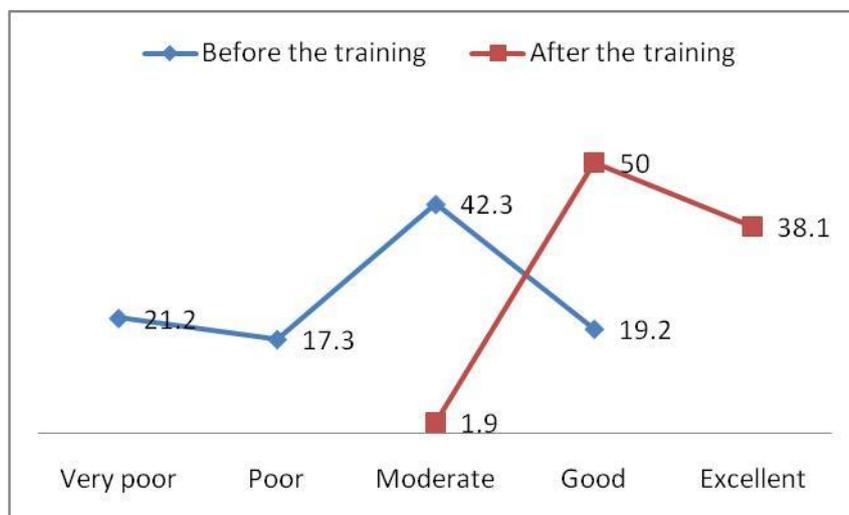
From the participants of URWH training organized jointly by Center for Science and Environment (CSE) and Water Aid Bangladesh (WAB) from 2010 to 2014 (during five years), trainees of 2011, 2014 and 2010 replied to the questionnaire at higher rate such as around quarter (25%) are from the year 2011, 23.1% from 2014 and 21.1% from 2013 and 2012 respectively (Table 3.2).

Table 3.2: Training participating year

Sl. No.	Respondent's training participation year	Frequency	Percentage (%)
1.	2010	11	21.2
2.	2011	13	25.0
3.	2012	6	11.5
4.	2013	10	19.2
5.	2014	12	23.1
<b>Total</b>		<b>52</b>	<b>100.0</b>

Source: Survey; n = 52

Figure 3.1: Knowledge about URWH (%)

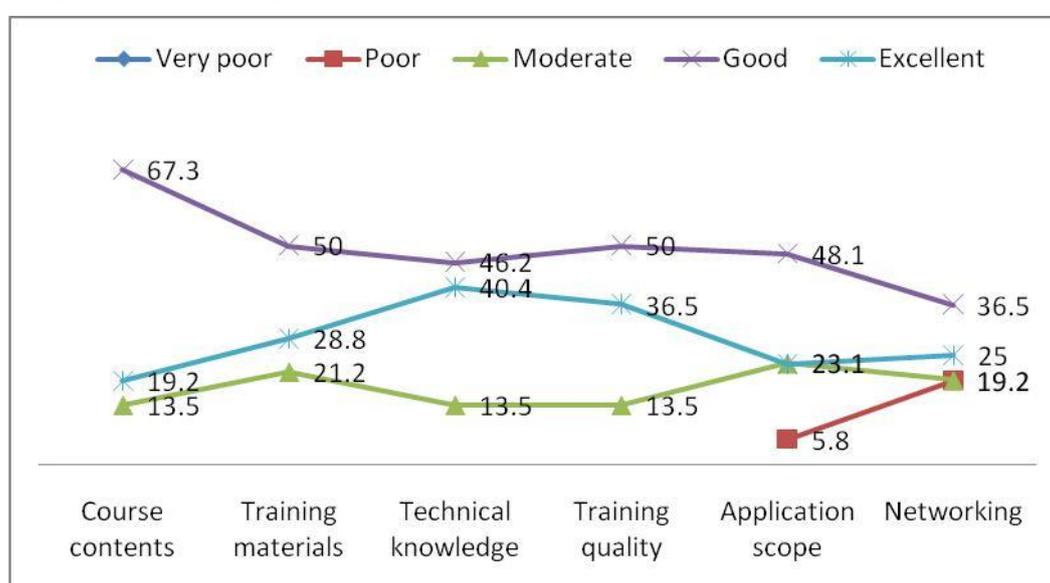


Source: Survey, n = 52

While comparing knowledge on rainwater harvesting before and after the training in the five points scale, around 21.2% of the respondents stated that they had very poor idea about it before the training, 17.3% had poor understanding, 42.3% remarked of having moderate knowledge on it, and 19.2% mentioned that they had good grasp about the issue. On the other hand, 50% of the respondents told that after the training they got good understanding about rainwater harvesting, and around same percentage (48.1%) remarked of receiving excellent insight on the issue (Figure 3.1).

The participants were asked to appraise URWH training in different aspects like course contents, training materials, technical knowledge, training quality, training application scope and networking among the trainees. In general more respondents rated different aspects of training as good in five points scale (like very poor, poor, moderate, good and excellent). More than two-thirds of the respondents (67.3%) remarked course contents as good; around 50% stated training materials and training quality as good, close to half of the trainees (48.1%) mentioned about application scope and technical knowledge (46.2%) as good. On the other hand, around two-fifth respondents (40.4%) ranked technical knowledge of the training as excellent, more than one-third (36.5%) stated training quality as excellent; while only one-fifth (19.2%) of the participants remarked training as poor in regards to scope for networking with other participants, and none of the participants rated training as very poor in any of the six issues (Figure 3.2).

Figure 3.2: Training assessment (%)



Source: Survey, n = 52

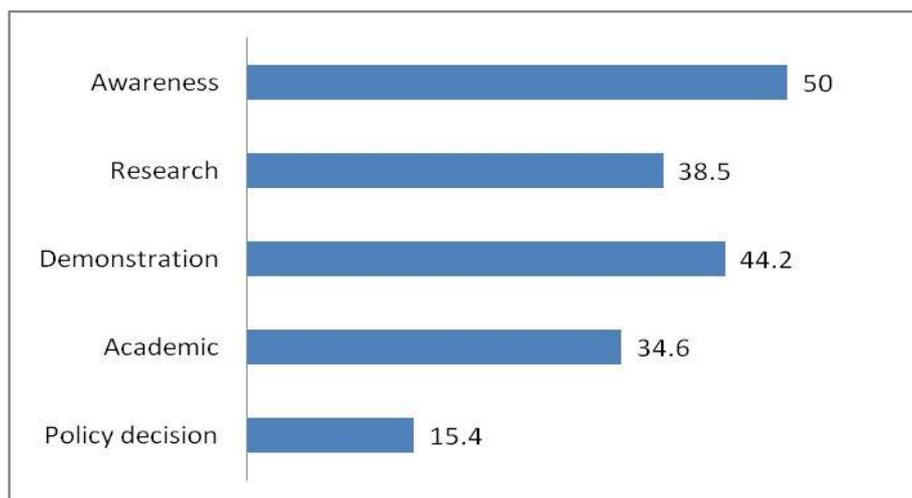
Regarding use of training knowledge around 50% respondents opined that they could apply knowledge of the training for awareness raising, followed by 44.2% could make use of the knowledge in helping others for demonstration project on rainwater harvesting, 38.5% for research purposes (either themselves or helping students under their guidance for thesis work), 34.6% stated that they made use of the learning for academic purposes i.e. taking classes<sup>4</sup> or taking sessions in training program on it; while 15.4% mentioned that they utilized them for favorable policy decision (Figure 3.3).

In regards to application of knowledge derived from training, majority (88.5%) stated that they discussed about URWH with others on different occasions, 38.5%

<sup>4</sup> Some of the key informants told that they take one or two sessions on rain water harvesting as part of the course curriculum in relevant subjects:

distributed training materials among others, 36.5% made formal presentation in different forums or gathering, around one fourth (25%) told that they debated about it with others, and 15.4% made use of training knowledge in organizing workshop for different stakeholders (Annexure A, Figure 1). Some of the training participants reported that when opportunity arises they speak about it and take sessions on rainwater harvesting, motivate others to have rainwater harvesting facilities in their industry, government building; some even helped interested parties in designing and implementing rainwater harvesting facilities in their buildings.

Figure 3.3: Application of training knowledge (%)



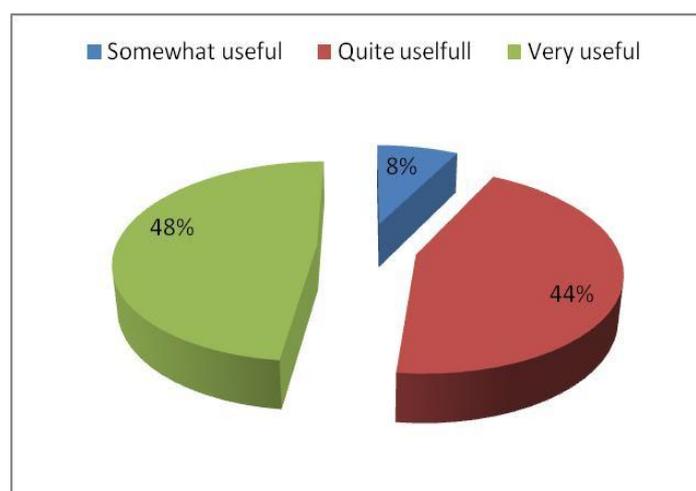
Source: Survey, n = 52

About supporting factors that helped the participants to use their training learning, 42.3% mentioned that they had opportunities to get engaged with projects on rainwater harvesting, 30.8% undertook research projects on it, 26.9% could get involved with curriculum development initiative, and around one-fourth (25%) mentioned that they had scopes to take sessions in training program, workshop, and give presentation in the meetings, etc. (Annexure A, Figure 2).

Training participants also faced diverse challenges in implementing the learning, like 25% realized that they do not have enough authority to implement the knowledge, 23.1% stated that ideas are not applicable in their working environment, 13.5% remarked that they do not have policy support to utilize it, 3.8% recognized that they faced resistance from management to apply training ideas (Annexure A, Figure 3). Even if there are difficulties, but majority of the respondents (96%) assume that they still have opportunities to use knowledge of the training (Annexure A, Figure 4).

About helpfulness of the training in understanding the concept and its application, around half of the participants (48%) remarked that it was very useful in understanding about URWH, 44% stated that it was quite useful and 8% told that it was somewhat useful (Figure 3.4).

Figure 3.4: Usefulness of the training (%)



Source: Survey, n = 52

The participants were inquired if they would recommend the training to other participants, majority of the respondents (90%) replied positively i.e. more than half (57%) affirmed that they would highly recommend (very likely) it, around one-third (33%) mentioned that they would recommend (likely) others to participate in such training; on the other hand around 8% said that they would not recommend others for the training (with 6% who will never recommend), and 2% are in the middle position i.e. neutral (neither recommend nor discourage) (Annexure A, Figure 4).

### 3.3 Rain Forum and its activities

Rain Forum is a non-profit voluntary platform for knowledge sharing and promotion of rainwater among scientist, engineers, architects, planners, academicians, practitioners, administrators, students and others who are directly or indirectly concerned about rainwater harvesting.<sup>5</sup> The forum has 15 member governing body, with president, vice-president, secretary, two joint secretaries and 10 general members<sup>6</sup> to perform its responsibilities, and support the forum in different activities; other than that there is a panel advisors of eight members (within the country) and two international advisors<sup>7</sup>.

Some major areas of its operation are capacity building of relevant stakeholders, enhance social responsibilities of citizen on it, explore existing rainwater harvesting practices, research, develop scopes and techniques of rainwater harvesting, promote application rainwater for domestic purposes through information and knowledge dissemination, work in collaboration with others, assist in organizing

<sup>5</sup> <http://www.rainforum.org/>, but it does not mention anything about its legal entity; whether it is registered with any entity of the government to carry out its activities;

<sup>6</sup> <http://www.rainforum.org/about-us/organizational-detail.html>

<sup>7</sup> The website does not provide details of the activities of the general body; it also does not give other information like duration of the Governing Body, how new body will be formed and other relevant issues;

conferences, seminars, meetings, discussions, debates and others, provide consultancy services on rainwater harvesting, support different stakeholders in installing rainwater harvesting system, conduct research on relevant issues, publish books, magazines and others.<sup>8</sup> The website gives a long list of objectives and activities of the Forum. Furthermore it extended tremendous support to WAB and BUET in organizing training, workshop and installing rain water harvesting plant, rain day celebration and others on several occasions. If someone visits the Forum website s/he will realize that it is really rich in information on rainwater harvesting.

### 3.3.1 Membership in the Rain Forum

After training program, the participants are encouraged to be a member of the platform called Rain Forum so that they have regular communication, opportunity to work together, participate in different initiatives related to rainwater harvesting, and reach to wider audiences in promoting rainwater use in urban areas, particularly Dhaka. Even if training was initiated in 2010, Rain Forum started to be operational from 2011. Table 3.3 shows that around two-third of the trainees (67.3%) of different training years are forum's members, and one-third of the respondents (32.7%) are not its members yet as it has only one office in Dhaka and participants from other areas find it difficult to have regular communication and participate in different programs organized by the forum.

Table 3.3: Membership in the Rain Forum

Sl. No.	Membership in the Rain Forum	Frequency	Percentage (%)
1.	Yes	35	67.3
2.	No	17	32.7
<b>Total</b>		<b>52</b>	<b>100.0</b>

Source: Survey, n = 52

More than half of the participants (51.4%) became forum members in 2011 (as it started its journey in that year and trainees of 2010 and 2011 became member when it begun its operation), followed by 20% of the trainees joined the forum in 2013 and 2014 respectively, and only 8.6% (3) trainees became members in 2012 (lowest number of participants) (Annexure A, Table 5).

Since Rain Forum is a membership based organization, it is expected that members will gather together for its program at certain interval. When asked how often they attended the program/s arranged by the forum, around two-third mentioned that they could not come for such event, around 14.3% respondents participated forum's program once in a year, followed by 8.6% quarterly and 5.7% congregated six monthly or once in a month respectively (Table 3.4)<sup>9</sup>.

<sup>8</sup> <http://www.rainforum.org/about-us/who-we-are.html>

<sup>9</sup> This reflects functionality of the forum, it has limited activities, and members also cannot get engaged with them.

Table 3.4: Frequency of attending activities of Rain Forum

Sl. No.	Attending activities of the Rain Forum	Frequency	Percentage (%)
1.	Once in a month	2	5.7
2.	Every three months	3	8.6
3.	Every six months	2	5.7
4.	Once in a year	5	14.3
5.	More than one year	1	2.9
5.	N/A or cannot make time for any meeting	22	62.9
<b>Total</b>		<b>35</b>	<b>100.0</b>

Source: Survey; n = 35

Rain Forum is in process of getting recognized entity from respective government agency. After it has approval of operation, it can have its formal structure, office, executive body, personnel, finance and others to take initiatives for achieving its mission, and will allow its members to be more organized and engaged with different activities. Forum leaders will have to look for options or find ways of strengthening its membership base, and make members motivated to get involved with its initiatives and contribute in promotion of rainwater harvesting amongst various target groups in the midst of their busy schedule or workload.

### 3.3.1 Satisfaction level about Rain Forum's performance

When asked how satisfied the participants are about performance of the Rain Forum, around half of the respondents (45.7%) opted to be in the middle position i.e. neither satisfied nor dissatisfied with its efforts made; on the other hand, 31.4% stated that they are satisfied with forum's work, and only one person (2.9%) said s/he is highly satisfied, and 5.7% are dissatisfied with its activities (Table 3.5).

Table 3.5: Satisfaction level about performance of Rain Forum

Sl. No.	Respondent's training participation year	Frequency	Percentage (%)
1.	Highly satisfied	1	2.9
2.	Satisfied	11	31.4
3.	Neither satisfied nor dissatisfied	16	45.7
4.	Dissatisfied	2	5.7
5.	Highly dissatisfied	-	-
5.	No response	5	14.3
<b>Total</b>		<b>35</b>	<b>100.0</b>

Source: Survey; n = 35

### 3.4 Rain Center

As part of URWH promotion, WAB commenced rain center for knowledge sharing and research in 4/5 universities (both public and private) in cooperation with respective departments. The package includes one computer, modem, table, chair

and reading materials on RWH so that interested student/s can search for materials related to their interest and use them for research or educational purposes.

During assessment period the consultancy team visited two of these centers. As per instruments are concerned in one place table, chair and books are the designated place, but the computer is being used by one of the institute staff member for official works. The reasons for such situation as shared by the respective person are that students prefer to talk to faculty members and get relevant information for their study or research paper instead of searching for them in the computer.

At another place, equipments like computer, chair, table and books are available in the department library and is being used for library purposes (even though it took long time to convince the university management to find a place to keep them), not for research and knowledge sharing on URWH, as no courses on rainwater harvesting has started yet in the university. The respective person is hopeful that after introduction of courses on RWH at master level, there will be sessions on URWH and students will use the facilities for their study and research purposes.

The initiative has allowed WAB working with different educational institutes to strengthen knowledge base on urban rainwater harvesting promotion. Observation and discussion with relevant persons reveal that if the institute is ready for utilization of the machineries and materials, and has the commitment of employing them for the purposes that they have been provided, it gives better results.

### **3.5 Rain water harvesting plant**

With technical support from BUET-ITN, WAB has begun a three years program on initiating and managing four rain water harvesting plants (three universities and one NGO) with technical assistances from CSE and necessary financial and other supports from its own (WAB) sources aiming to explore how rain water can be harvested in urban areas, use rain water for daily activities like cleaning, washing, flushing toilet, and discharging water into a level so that it gets mixed with the ground water, and when it is pumped again people can access to safe water and use them, and as such contribute in reduction of groundwater declination level.

Field visit, observation and discussion with respective persons at three plants revealed different perspectives. One of such plant is located at BUET auditorium building and cafeteria complex where rooftop of the building is being used as catchment of rainwater. The collected rainwater is purified at three different stages as per the system and use of ultra violet light (latest addition or modification in the system designed by CSE for killing bacteria). Rooftop tank is connected with running water system and linked with bath room and basin in the washing places. During rainy day and water is available, and it is used for cafeteria floor cleaning, toilet use and hand wash, while other time running water is used.

Other part of the system is discharging rain water into the ground (10 meters above the ground water level). Quality of water discharged at certain level when tested was found safe. There are different opinions, whether the water that is being discharged really reaches to the level from where we collect sample, and if underground systems makes the rainwater purified and potable<sup>10</sup>.

The NGO that has rainwater system installed has capacity of 26,000 litre reservoir of water preservation at ground floor of the building, and other part of the system is to discharge rainwater into the ground (80 feet from the surface) into a sand level so that water get mixed and do not overflow. Responsible person from the NGO for rainwater usage remarked that during rainy season office uses rainwater for different purposes like washing, toilet flush, cleaning, bathing, etc. (not for drinking). According to him the users cannot differentiate rainwater and ground water, and make no complain about quality of the rainwater or feel discomfort about the water. For drinking purposes office staff, trainees, guests and others use deep tube-well water.

During normal time the office uses deep tube-well (ground water) for office staff and training participants. It is the guard who operates machine to pump underground water of six-storied building roof tank. It seems the guard generally prefers to get ground water for daily supplies. In many cases they are to be reminded to pump rainwater when the reservoir is full. But when the person is out for official work, this cannot be monitored or ensured that rainwater is being pumped. During field visit the reservoir was full and it did not appear to be clean, which means for couple of days or weeks water from that tank was not pumped, even if it had been raining for couple of days during that time.

In another demonstration plant placed at a private university has system of rainwater use and discharging in the ground. The rainwater is collected from the top of one-storied GI sheet building, and from reservoir the water is pumped to a 500 litre tank around 15 to 20 feet high above the ground, and one tap connected with the tank for water use. The rainwater from that tank is mainly used for washing hands after laboratory work during weekends when students come for practical classes. University administration will start construction for its main campus shortly in that location. In that case it will have to demolish all the infrastructures including rainwater harvesting plant.

Demonstration plant has provided an opportunity to have alternative sources of water for city dwellers that face serious crisis during dry season. Three rainwater harvesting plants reveal that rainwater can be used for different purposes like floor cleaning, toilet use, washing hands, bathing and others.

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<sup>10</sup> It is said because there is no scientific evidence and adequate research to claim that discharging water reaches to the ground water level in the same area; furthermore, some even remarks that discharging rainwater may go to other areas of ground water level;

Discussion with people from diverse background reveals that there are different opinions about the extent of rainwater use. It seems that further research is needed to clarify safety of rain water use for different purposes. Even if there is crisis in getting ground water in different parts of the city, but still city dwellers prefer to use existing ground water supply as it is sweet and easily available. If there would be water shortage situation like in the area of salinity, iron and arsenic contaminated places, city dwellers in Dhaka might be more interested to use rainwater.

### 3.6 Dhaka declaration

Facilitating stakeholders to realize importance of rainwater harvesting and introducesystematic harvesting and groundwater recharge, first convention on rainwaterharvesting was organized in 2012 by WaterAid Bangladesh in association with itspartner agencies, where among others Minister of Water, from Sri Lanka and Vice-Chancellor of BUET were present. In closing ceremony of the convention there was a declaration called „Dhaka Declaration 2012' that emphasized inclusion, integration and implementation of rainwater harvesting and recharging into national policies,procedures and infrastructures.Details of the declaration, its present status andimpact are presented in the Box 3.1:

Box 3.1: Dhaka Declaration (Bangladesh Convention on Rainwater Harvesting 2012)

Sl. No.	Declaration	Present state	Impact (change)
1.	Rainwater harvesting should be popularised through formal and informal education and awareness creation initiatives	In tertiary level some educational institutes have provisions for taking one / two sessions on RWH as part of other subject	Responsiveness has been created among teachers and students to discuss and conduct research on UWH;
2.	Rainwater harvesting should be incorporated in the policies of Government of Bangladesh including the National Building Code, National Housing Policy of and other related policies of GoB	Rainwater harvesting is incorporated in BNBC (draft), but implementation details and process has not started as expected;	Rainwater harvesting in BNBC has created scope to incorporate RWH in building design;
3.	RajdhaniUnnayanKortipokkha (RAJUK) and other city/municipal authorities are to formulate necessary protocol to translate the relevant local code/ by laws into operational form. Monitoring mechanism should also be established for ensuring proper implementation of rainwater harvesting	No significant initiative has been observed from RAJUK or other development authorities in promoting RWH; furthermore, no monitoring system of rainwater harvesting has not been developed yet; The regulatory bodies need to initiate discussion regarding implementation strategies;	Not applicable
4.	Rainwater harvesting systems should be made mandatory for all government buildings including schools, cyclone shelters and local	Rainwater harvesting is not mandatory for government buildings including schools in the urban center;	There are discussion and pressure from different stakeholders to include rainwater harvesting in

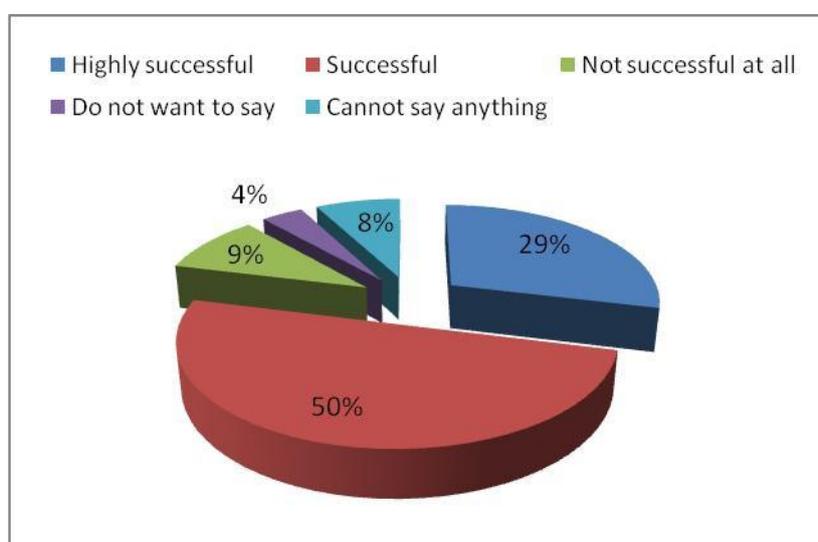
	government institutions, etc.		new government buildings;
5.	Demonstration plants should be constructed and good practices should be up scaled for promoting water efficient (water smart) buildings.	Four demonstration plants have been constructed in different places under the initiative, and two of them appears to be performing well;	It offered an prospect of rain water use for different purposes and make necessary changes in the system to make the water safe
6.	Rainwater harvesting systems should be made mandatory for potential infrastructures like fly-over, foot over bridge, airport buildings, rail stations, highways, stadium, other feasible open areas etc.	No such initiative is seen in the area; though a number of fly-over are under construction or in the planning process in the city;	There are discussions and articles written about taking necessary measures regarding arrangement of rainwater harvesting in those public places;
7.	Private sector especially, the real estate companies should be enforced for implementing rainwater harvesting systems in their projects. Government should make provisions for promotional incentives.	Few personnel from private sector were included in URWH training; but no real estate company has started installing rain water harvesting in their buildings; and there is no promotional incentives from government for such initiative	Inclusion of real estate companies in different discussion forums is being talked about, and they are to be asked to include rainwater harvesting in the buildings that they construct as per BNBC;
8.	Rainwater harvesting technologies should be incorporated in the curricula of all technical institutes	Rainwater harvesting is included in the curricula of polytechnic institute, but its current status could not be figured out. Civil Engineering and Urban and Regional Planning Department of BUET included RWH in relevant courses	A standardized teaching materials is in the process of development;
9.	Research and training institutes should promote technology transfer and build capacity of professionals and practitioners	BUET-ITN appears to be active in research and technology transfer, and share findings of its research as for its agreement with WaterAid Bangladesh;	Still there is knowledge gap regarding wide scale application of RWH at local context. Thus it is necessary to conduct extensive research in this field considering the scientific and socio-economic phenomenon.
10.	Standardize design and cost estimates for rainwater harvesting plants needs to be made available by relevant agencies	Standardize design and cost estimation of rainwater harvesting is not available in the market	More research is needed for appropriate design and cost estimation;
11.	Funding for research on rainwater harvesting should be provided by the government and initiatives should be taken to link research with implementation	Research initiative on rainwater harvesting is not significant;	There are some articles in the newspapers or research by individual person

12.	Rejuvenation of water bodies and incorporation of new ones must be given priority in development projects	No significant initiative is seen in the area except HatirJheel Project. Structure plan and detailed area plans are violated and filling out designated flood flow zones, water bodies, canals and rivers are evident.	Regulatory bodies failed to conserve the designated water bodies which results in severe environmental degradation, causing urban flooding and so on.
13.	Rainwater harvesting technologies should be promoted first in water scarce coastal regions and draught prone areas including safeguarding of ponds to be used for drinking water.	Beyond the scope of this assignment.	
14.	In all sorts of rainwater harvesting quality of water shall be ensured by the developers for its best use for public health and environment as well.	BUET-ITN has conducted some studies regarding water quality.	

### 3.7 Success of WAB initiative

Organized effort in promoting rainwater harvesting in urban area particularly from non-profit sector is new in the country. Training participants were asked to give their opinion about extent of WAB's achievement in promoting the initiative. Majority of the survey respondents (79%) opined that WAB is doing well in promoting URWH and among them 29% remarked that the agency is highly thriving in the field, while around 50% stated that it is doing well in upholding urban rainwater harvesting; while 9% stated that it is not so successful at all in the area, 4% did not want to comment on its performance and 8% could not say anything about its achievement level at this moment (Figure 3.5).

Figure 3.5: Success of WAB in promoting URWH



Source: Survey, n = 52

## Chapter: IV

### Performance of WaterAid initiative and Way Forward

#### 4.1 Introduction

Dhaka WASA is mandated to supply safe and potable water to the city dwellers, and improve sewerage and drainage system for enhancing their living standard. Water demand in Dhaka is estimated around 2,100 to 2,300 million liter per day (MLD) with seasonal variation. Production capacity of WASA in 2013 was 2,240 MLD (ground water (78%) and surface water (22%)), but it could never reach its production target and actual production, and as such there remains a demand-supply gap of 160 MLD. Moreover, if 31.7% unaccounted for water (UFW) or system loss between production and end-user level is counted then real supply would be 1,426.18 MLD, which means around half of the population in Dhaka are deprived of getting WASA projected standard water requirement (150 l/p/d).

In Dhaka ground water extraction starts from 100 meters and in some cases the well goes up to 300 meters to reach the main aquifer. Taking into account current ground water depletion trend at 2.81 m/y, some prediction says that ground water table will be lowered down to 120 meters by 2050 from the existing level. This depletion will hamper constant water supply as many of the operating deep wells may shut down due to water unavailability, and production cost will rise. Study findings show that potential ground water recharge for Dhaka is 1.33 m/y while depletion rate is 2.81 meter per year. Therefore, despite sufficient amount of rainfall, there is 1.48 m/y ground water recharge deficit every year. Increasing rate of urbanization and decreasing surface water bodies will worsen the situation in the future<sup>11</sup>.

Rainwater harvesting can be one of the lucrative ways of dealing with water situation in Dhaka. Many studies have recognized effectiveness of rainwater harvesting for washing and cleaning purposes in urban areas, and reduction in demand on ground water sources, energy savings due to reduced pumping, etc. conserving water, safeguard of water from various types of pollution. It is true that there are challenges with rainwater to keep the collection surfaces (rooftops) and storage facilities free from contamination and mosquito breeding. With adequate operation and maintenance of collection areas, filter and tank systems, good quality of water may be obtained by collecting rainwater from rooftops<sup>12</sup>.

With the aim of popularizing rainwater harvesting in urban centers particularly in Dhaka, WaterAid Bangladesh has started initiatives of urban rainwater harvesting (URWH) promotion from 2010 under its core strategy of influencing and enabling environment with technical support from CSE, and in cooperation with relevant

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<sup>11</sup> [http://www.unnayan.org/documents/RightsParticipation/water\\_supply\\_dhaka.pdf](http://www.unnayan.org/documents/RightsParticipation/water_supply_dhaka.pdf)

<sup>12</sup> [http://www.unwater.org/downloads/Rainwater\\_Harvesting\\_090310b.pdf](http://www.unwater.org/downloads/Rainwater_Harvesting_090310b.pdf)

government departments such as DPHE, WASA, HBRI, RAJUK, PWD, LGED and others, public and private universities, private sector, NGOs and others. Some major areas of its operation within last five years are – training for professionals (university teachers/professors, professionals like engineers, architect, public employees in different government departments, private sector and NGOs), curricula development on URWH, introducing URWH into polytechnic institutes and technical universities (in master level studies) as subject or sessions on URWH, training module development, knowledge centers in 4/5 universities so that teachers and students can use them for further research, demonstration plant for rainwater harvesting (use rainwater for different purposes) and artificial recharging of rainwater into the ground at a certain level and water quality test, organize workshop, discussion meeting, seminar on URWH, rain day celebration, rain convention, writing articles in different newspapers, facilitation and operation of Rain Forum by training participants, etc.

Some major findings of the assessment on URWH by WAB are:

#### **4.1.1 Introduction of rainwater harvesting into BNBC**

WaterAid Bangladesh worked incessantly for inclusion of rainwater harvesting into Bangladesh National Building Code through discussion meeting, lobby, being present on different occasions and writing relevant parts of the code with other members of code preparation team. As a result there is a 17 pages Chapter (7) on rainwater harvesting in the code. After approval of the code by the government, and finalization of directives, procedural and other issues RAJUK will be able to go for its implementation.

Internationally WaterAid UK has tremendous contribution regarding inclusion of „Ensure availability and sustainable management of water and sanitation for all“ Sustainable Development Goal of UN (Goal 6).

#### **4.1.2 Training on URWH**

Within last six years, WAB conducted training for 142 participants for five days on URWH from different occupations like university teachers, government, private sector and NGO employees, and others. In general the training helped them gaining good to excellent understanding on the issue, while before the training they had very poor to moderate idea on it. In its assessment, by and large around half of the respondents rated training as good in areas like course contents (76.3%), training materials, technical knowledge, training quality and application scope (even 46.2% participants ranked technical knowledge part of the training as excellent). Most of the participants made use of their training learning through discussing on it, raising awareness of general people, taking classes in academia and sessions in training program, organize workshop and seminar, support students to conduct research, design RWH system in different infrastructures, engage with demonstration plant on rainwater harvesting, participate in rain day celebration and convention, etc. As such

more than 90% of the respondents find the training useful and feel that they will recommend the training for the interested candidates.

In the past training on URWH was arranged with technical support from CSE, but at present since a good number of professionals are trained in the area, they can work as facilitator in the training if there is a training module particularly the members of the Rain Forum can be of good assistance in this field. There are also discussions for having training module for different groups of clients, like professionals, students, individual household owner, people involved with real estate and house building company, diploma engineers, plumbers and others.

#### **4.1.3 Rain Forum**

Rain Forum is a platform for the trainees of URWH for their regular communication, work, participation in rainwater harvesting related initiatives, and reach to wider audiences in promoting rainwater use in urban areas. Information reveals that two-third of the trainees (67.3%) of different training years are forum's member. Around one-third of the members can make time for Forum's activities; others for their busy schedule cannot give time for its functions. As such 34.3% of the respondents are satisfied about Forum's performances, rest are either in the middle position (neither satisfied nor dissatisfied) or refrain from making any comment.

The Forum web site is rich in various informations like training, workshop, photos, models of rainwater harvesting and other materials. It is yet to get its formal entity, like registration, office space, personnel, equipments and others. WAB for some reasons could not provide necessary supports on its journey in the past to operate as professional and technical group for promotion of URWH, but it seems the agency is in a position to extend necessary assistance for strengthening Forum's operation.

#### **4.1.4 Demonstration plant**

Four rainwater harvesting plants (three at university and one at NGO level) were experimented with technical assistances from CSE and BUET-ITN to see how rainwater can be harvested at rooftop in urban areas, use rainwater for daily activities like cleaning, washing, flushing toilet, and recharging of water into the ground. Research findings of BUET-ITN reveal that rainwater can be harvested successfully at building rooftop in Dhaka and use the water safely for cleaning and washing purposes. Further research might be required to increase assurance level of safety of ground water recharging.

Demonstration plants on rainwater harvesting were tried out at institute level where there are enough spaces, and single authority or collective arrangement of operation is at place for making it functional. More research is needed at household level or flat building for appropriate design, costing, and cost effectiveness, availability of technical support, and repair and maintenance assistances, rewarding/inceptive system for such arrangements (like tax exemption or other benefits) and others for

rainwater harvesting. House Building Research Institute (HBRI) and BUET-ITN can come up with appropriate design of rainwater harvesting for different types of building with technological and maintenance support, costing and other issues. Government buildings can easily go for rainwater harvesting, as they are not concerned about making surplus of its infrastructures like the real estate companies.

For artificial recharging of rainwater into the ground more research needs to be conducted and come up with details of technical and safety issues. Other than household level, recharging of rainwater can be initiated in the fly-over, foot over bridge, airport buildings, rail stations, highways, stadium and feasible open areas with secure technical arrangements. With Local Government and Engineering Department (LGED), Public Works Department (PWD) and others, Water and Sewage Authority (WASA) also can join with the initiative of artificial recharging of rainwater, because it pumps highest quantity of ground water and supply to the city dwellers for diverse usages.

#### **4.1.5 Rainwater harvesting in the academia**

Under the initiative course curriculum has been developed for polytechnic institutes, and sessions (two or more) on rainwater harvesting are being taken at undergraduate and post-graduate level at some technical universities. During assessment it was felt that there is a need for documentation of the intervention and its results. Study participants at different levels recommended for having customized courses (of one or two units) at post graduate level. Knowledge centre support (computer, chair, table, books, etc.) at tertiary level allows teachers and students for conducting researches on rainwater harvesting. Experience shows that need based assistances in this area provide good results particularly in utilization of the facilities and arrangements.

#### **4.2 Way forward or recommendations**

Based on findings of the assessment and discussion with different stakeholders the study team would like to recommend following measures for way forward or future success of the initiatives:

- Continue discussion meeting, lobby, etc. with respective officials at government for approval of the draft BNBC, and work with RAJUK on formulating necessary procedures and directives for implementation of the code. Take measures so that a separate entity under the MoHCW like Bangladesh Building Regulation Authority as per the code is formed or a separate unit under RAJUK can be started for monitoring of rainwater harvesting initiatives.
- Conduct more researches at household level or flat building for appropriate design of rainwater harvesting, costing, and cost effectiveness, availability of technical support, and repair and maintenance assistances, rewarding / incentive system for such arrangements (like tax exemption or other benefits)

and others. HBRI and BUET-ITN can come up with appropriate design of rainwater harvesting for different types of building with technological and maintenance support, costing and other issues.

- Government buildings can take the lead for rainwater harvesting, as they are not concerned about making surplus of its infrastructures like the real estate companies.
- Carry out more research about technological details and safety issues of artificial recharging of rainwater into the ground. Research call can be arranged annually like in the month of 1<sup>st</sup> Ashar for different groups of people i.e. professionals, academe, students, researchers and others to generate ideas, model and other issues on URWH.
- Begin rainwater recharging system in fly-over, foot over bridge, airport buildings, rail stations, highways, stadium and feasible open areas with secure technical arrangements. WASA should start artificial recharging of rainwater, because it pumps highest quantity of ground water in Dhaka.
- Prepare training module for different groups of clients, like professionals, students, individual household owner, people involved with real estate and house building company, diploma engineers, plumbers and others, and organize tailor-made training courses for different types of the participants with support from the trained professionals like members of the Rain Forum.
- Involve private sector, real estate companies, private construction firm and others in different discussion meeting, training, workshop, seminar and others, and create opportunities so that they understand the need of rainwater harvesting and take measures in integrating rainwater harvesting in their infrastructures in planning process.
- Prepare mapping of the key actors in the area like government departments, educational institutes, real estate companies, construction firm, NGOs, and figure out how each of the stakeholders can contribute for promotion of rainwater harvesting, and work with them closely for enhancing the initiative.
- Take measures so that Rain Forum has got formal entity with specific mandate, organization structure, office space, personnel, activities, regular review process, and provide professional services on regular basis.
- Have specific objectives for various interventions under promotion of RWH like rainwater demonstration plant, knowledge center and others, and strong commitment of the organization/institute so that they are effective and serve their purposes.
- Rain Forum should become a focal social platform which link relevant research and knowledge, conduct advocacy and act as a help desk to provide technical support to the city dweller and key stakeholders.
- Involve media (print and electronic) with the initiative so that they are committed to popularize rainwater harvesting through publishing articles, features, discussion results, and telecasting need for rainwater harvesting,

cases of successful interventions, use of rainwater and artificial recharging, and their benefits, etc.

- Continue working with the government departments to impose strict regulation of new structure plan 2015-2035 in conserving wet lands, flood flow zones, rivers, canals, lakes and other natural water bodies.
- Have strong documentation system of what are being done, achievement, results and others, and systematic monitoring of the initiatives and make necessary arrangements where required.
- Publish and distribute leaflet, sticker, poster, brochure, etc. on rainwater harvesting, artificial recharging, and its benefit, design of rainwater harvesting, costing, benefit (economic and environment), technical, financial, repairing and maintenance support availability and others, so that people from different sector get idea on it and are motivated for taking the option.

### **4.3 Conclusion**

Urban rainwater harvesting is a well-timed initiative for city like Dhaka where its residents suffer from water crisis seriously during summer. For supplying safe water for the city dwellers, WASA pumps 78% of its water from underground. This high dependency on underground will make it difficult for the agency to get adequate quantity of water in the future. In this situation rainwater harvesting is a feasible and safe option addressing the water need of the people in Dhaka. WaterAid Bangladesh has started the initiative of rainwater harvesting through policy framework, capacity building, demonstration plant, research, consultation with different stakeholders, organizing various relevant programs and others. Till today the organization has been successful in its innovative intervention, and with cooperation and support from respective government departments, academe, private sector, NGOs, common people and others. The success to achieve the target objective of WAB can be fulfilled through implementation of indentified activities as way forward.

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**Box 1: Group work**

<b>Group No. 1</b>		
<b>Activity</b>	<b>For whom</b>	<b>Expected results</b>
Capacity Building training/workshop for real estate, corporate, business companies and REHAB	- For real estate, corporate business companies, REHAB, BGMEA, etc. (planner and engineers) - Board members and investors	Participants will be oriented on technology and implement the technology
Research on post harvesting water quality and maintenance	Government departments (DPHE, LGED and others)	Motivation of community
Revise and implementation	Concerned government department	Extensively incorporate in design, plan of government, fund for super structure
<b>Group No. 2</b>		
Research on ground water contamination, ground water research potential and cost benefit analysis	Concerned sector professionals (RAJUK, WASA, general public), policy makers, etc.	Address issues that are preventing implementations of URWH
Develop materials for policy makers including the benefits and current challenges of RWH, which would help them to understand	RAJUK and WASA	Promote the users
<b>Group No. 3</b>		
Mainstreaming Inclusion of URWH in DOE's environmental clearance process, forcing GW user to adopt for GW recharging, Development of Brochures	DOE, Public and Private Entities using GW, People who are going to construct buildings	Forced adoption of URWH, reduce GW depletion, awareness and adoption
Capacity building and awareness, training for capacity development, training of trainers, training for awareness development	Plumbers and technicians, academicians, Officials of DOE, building contractors, previously trained people, REHAB personnel, consulting firms, media personnel, politicians;	Capacity development of different group, specific training to groups, diverse training modules, more media coverage
Research on GW contamination, cost and benefit analysis, case studies	Academicians, researchers, practitioners	Will make people confident on using URWH, Policy makers will accept idea more easily, identify good examples
<b>Group No. 4</b>		
Capacity development and awareness, round table talk show (invite policy makers), strategic partnership with development authorities, workshop with private practitioners, electronic and	Policy makers, RAJUK, HBRI, DOE, REHAB, general people	Inclusion in Policy regulation and implementation, design and implementation, mass awareness

print media		
Mainstreaming policy tools development, design more permissible infrastructure	Developers, government agencies	Inclusion of URWH at HH level, natural infiltration of RW
Technology adaptability, research on O&M, WQ, cost analysis, life cycles, pay back publication, technical notes	Researchers, teachers and students and general people	Knowledge generation, feasibility determination, knowledge dissemination

Table 1: Sex of the respondents

Sl. No.	Sex of the respondents	Frequency	Percentage (%)
1.	Male	46	88.5
2.	Female	6	11.5
	<b>Total</b>	<b>52</b>	<b>100.0</b>

Source: Survey, n = 52

Table 2: Age of the respondents

Sl. No.	Respondent's age	Frequency	Percentage (%)
1.	Less than 30 years	11	21.2
2.	30-39 years	26	50.0
3.	40-49 years	9	17.3
3.	50-59 years	5	9.6
4.	60 years and above	1	1.9
	<b>Total</b>	<b>52</b>	<b>100.0</b>

Source: Survey; n = 52

Table 3: Educational attainment of the respondents

Sl. No.	Respondent's educational attainment	Frequency	Percentage (%)
1.	Diploma and BSc	26	50.0
2.	MSc/Masters	18	34.6
3.	PhD	8	15.4
	<b>Total</b>	<b>52</b>	<b>100.0</b>

Source: Survey; n = 52

Figure 1: Sharing Training knowledge (%)

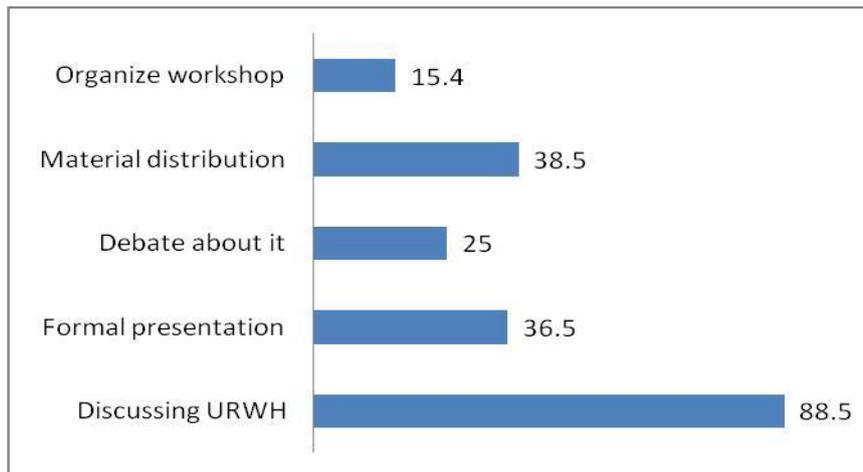


Figure 2: Supporting factors (%)

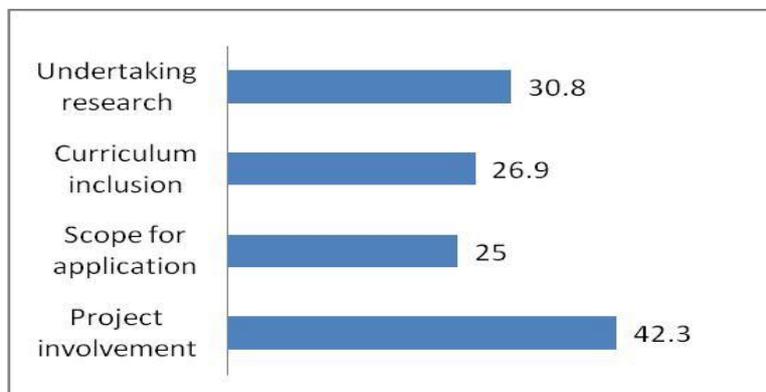


Figure 3: Difficulties in implementation (%)

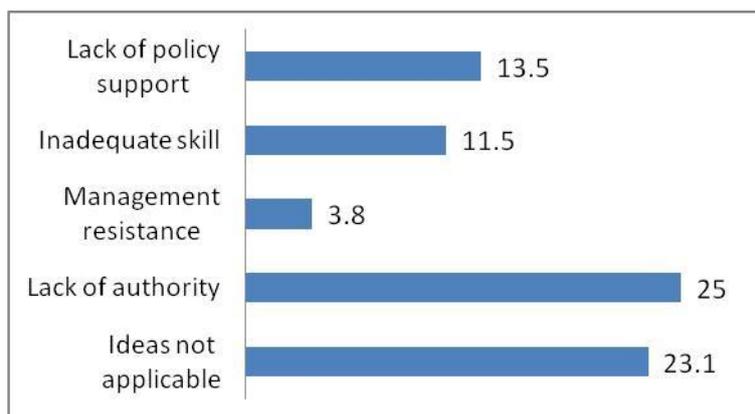


Figure 4: Opportunities of using training learning (%)

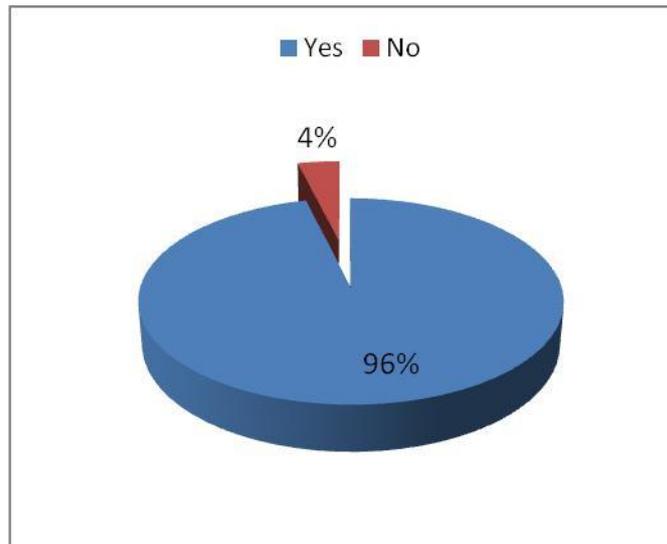
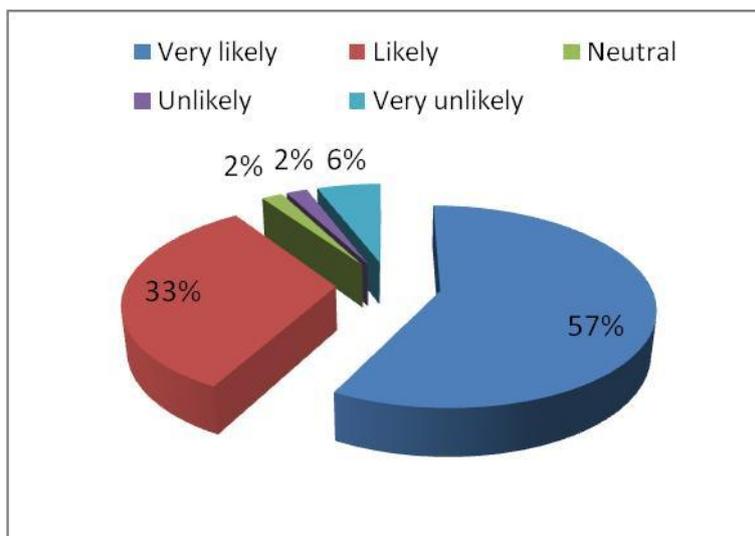


Table 4: Training participants' membership in the Rain Forum

Sl. No.	Respondent's membership in the Rain Forum	Frequency	Percentage (%)
1.	2011	18	51.4
2.	2012	3	8.6
3.	2013	7	20.0
4.	2014	7	20.0
<b>Total</b>		<b>35</b>	<b>100.0</b>

Source: Survey; n = 35 (not applicable 17)

Figure 5: Recommendation of such training (%)



## ***Annexure B: Terms of Reference (TOR)***

### **Terms of reference (TOR) for assessment of WaterAid Bangladesh's initiatives related to promotion of rainwater harvesting**

#### **Introduction**

WaterAid Bangladesh (WAB) is a leading international non-government organisation in Bangladesh, working in the country since 1986 to improve access to safe drinking water, sanitation and hygiene (WASH) for poor and marginalised communities. WaterAid works in partnership with NGOs, civil society groups, government institutions, academic and research institutes, and other development agencies. Apart from implementing projects in rural and urban areas with its partner NGOs, WaterAid believes in maximising the impact of its work through influencing other stakeholders and policy decision makers.

WaterAid prioritises rainwater harvesting as one of its advocacy issues considering water security aspects in the coming future. Bangladesh faces shortage of potable water, especially in the urban areas, due to over extraction of groundwater. In Dhaka city, the groundwater table is depleting at a rate of 2-3 meter per year. On the other hand, urban flooding has become a regular phenomenon due to the increase of paved areas, encroachment of water bodies and poor drainage management. Unfortunately, no attention so far has been given on recharging groundwater or efficient management of water. Inequity in water distribution is another area that requires attention. A significant amount of highly subsidised water from utility agencies (like Dhaka WASA) is being used for toilet flushing, whereas the slum dwellers are not even able to get the minimum requirement. The scenario is no different in other cities. The situation is aggravated further due to unplanned urbanisation and rapid urban population growth. The city authorities are not being able to meet the water demand of an increasing population.

Under these circumstances, WaterAid took the initiative of promoting urban rainwater harvesting (URWH) in 2010 with technical support from the Centre for Science and Environment (CSE) with a long-term vision to contribute to the management of water crisis in Bangladesh. Under this initiative, WaterAid and CSE are jointly building capacity of the sector professionals including academics, researchers and practitioners on URWH and more than 150 participants have been trained so far. The expectations from the trainings were that the trained personnel will act as the change makers and promote rainwater harvesting within their scope of work. A voluntary platform „RainForum“ had been emerged from the trainees of rainwater harvesting and WaterAid also patrons this platform for reaching the wider audiences. WaterAid extends its support to the academic institutes by building demonstration plants for research and academic purposes (at BUET, UITS, IUB, SUST and MIST) and establishing Rain Centres as knowledge and resource hubs at the same institutions. Considering the long-term prospects, WaterAid is currently working on mainstreaming RWH into the curricula of engineering institutes while it had already been successful to include the same into the curricula of Polytechnic institutes.

WaterAid organises the Bangladesh Convention on Rainwater Harvesting bi-annually with the objective to bring academics and practitioners on the same platform and promote good practices. WaterAid remained instrumental in providing technical inputs into the Bangladesh National Building Code which is under approval process together with the

RainForum. WaterAid is very keen in bringing this issue into policy dialogues and is continuously working on the same.

Apart from the engagement with the professional arena, WaterAid is trying to popularise this concept of rainwater harvesting among the mass people for raising awareness sat potential institutions observing the 1<sup>st</sup> day of Ashar (rainy season) as the Rain day every year.

### **Purpose of this assignment**

The purpose of this assignment is to assess WaterAid's work related to promotion of rainwater harvesting since 2010, and suggest how WaterAid should take this agendum forward. WaterAid is therefore seeking experienced, skilled and familiar consultant(s) to carry out this assessment.

### **Specific objectives of this assignment**

- Assess the collaboration between WaterAid and CSE in terms of building sector capacity and suggest how this initiative could be utilised more effectively in future
- Assess whether and to what extent the RWH trainees play a role in promoting urban rainwater harvesting, and suggest how this resource pool could be utilised more effectively and strategically
- Critically analyse the current roles, strategic position, and potentialities of the different stakeholders (GoB and relevant line departments/agencies, universities/ technical/ research institutes, NGOs and donor agencies) as well as general people regarding promoting RWH, and any contribution of the professionals involved with this initiative of WaterAid to other stakeholders.
- Assess the change in attitude, if any, of the concerned policy makers, developers (public and private) and relevant stakeholders
- Assess WaterAid's contributions including success and areas of improvement in influencing concerned stakeholders on RWH in terms of practice and policy changes, and provide directions on WaterAid's future strategy based on this assessment.
- Assess the value addition or influencing work of WaterAid through its engagement or initiatives taken like Rain convention, Rain day observation, extended contribution of the RainForum etc. and explore how WaterAid could be involved with the wider audiences through influencing for further promotion of RWH and ensuring sustainability in the long run.

### **Scope of work including, but not limited to**

- Discussion with WaterAid team to understand the assignment, the background and expectations from the study
- Interviews with selected trainees from different disciplines who have received training on URWH to understand the direct and indirect impacts of the URWH training jointly organised by WaterAid and CSE
- Skype / e-discussion with the relevant personnel of CSE
- Discuss with the key personnel of RainForum to understand how it is playing roles for promotion of rainwater harvesting within and beyond the sector

- Meet and discuss with selected relevant personnel/ stakeholders who might have not received training but remained active in persuasion of rainwater harvesting
- Discussions with relevant persons from the concerned line departments/ agencies, universities/technical institutes to understand how they are perceiving the importance of rainwater harvesting, influencing role of WaterAid and the impacts of the joint efforts of collaboration between WaterAid and CSE
- Review different documents/documentary produced by WaterAid, websites, proceedings of rain conventions, media coverage, draft Bangladesh National Building Code, draft circular –Dhaka Building Rule 2012 etc.
- Assess the quality of training and impacts of the same in terms of building capacity in the sector and suggest how the resource pool could be utilised more effectively and strategically in future
- Visit few demonstration rainwater harvesting plants and Rain Centres and discussions with contact persons
- Regular liaison with contact person of WAB to provide updates on progress.
- Final document incorporating feedback on draft version from WAB.

#### **Deliverables**

1. Draft report of the assessment
2. Electronic and paper copy of the final assessment report

#### **Time span**

The contracted agency or individual consultant(s) shall submit a tentative work plan with key milestones within two weeks of signing of the contract, which will be reviewed and approved by WaterAid.

It is expected that the document will be delivered to WaterAid within two months from signing of the contract.

#### **Payment**

The payment will be made in two instalments:

<b>Instalments</b>	<b>Percentage</b>	<b>Time</b>
First instalment	40%	After signing the contract agreement
Final instalment	60%	Upon submission & approval of the final report

Note: Income Tax (IT) from the total amount and VAT will be deducted at source as per government rules.

#### **Coordination**

The focal person from WaterAid will be Abdullah Al-Muyeed, PhD, Technical Adviser-WASH ([abdullahal-muyeed@wateraid.org](mailto:abdullahal-muyeed@wateraid.org)).

## **Contents of the proposal**

The interested agency or individual consultant(s) shall submit the proposal to execute the assigned task and the proposal must contain the following:

- a) Technical proposal must contain at least the following,
  - Appreciation of the TOR
  - Detailed methodology to deliver the desired outputs
  - Tentative work plan including timelines
  - Brief CV of proposed person(s) having relevant qualification and experiences. It is preferable that the team leader may have the academic background of Engineering or Architecture.
- b) Financial proposal must contain fees to be charged for this assignment with detailed breakdown (The fees will be inclusive of income tax & VAT, to be shown separately)

## **Submission guideline**

- a) Proposal needs to be submitted electronically by 29 March 2015 (23:59 BST) at [WaterAid-Tender-TA@wateraid.org](mailto:WaterAid-Tender-TA@wateraid.org)
- b) Proposals submitted to any other e-mail account except the above and exceeds the time limit will be treated as disqualified.
- c) Attach your financial and technical proposal along with all required documents with the email, and put all attachments in one zip folder in the name of you/ team leader.
- d) The subject of the email should be "Assessment of RWH initiatives"

## **Terms and conditions**

- WaterAid reserves the right to accept or reject any proposal without giving any verbal and or written rationale whatsoever
- All reports & photographs produced during the assignment will be treated as WaterAid's property and cannot be used elsewhere without prior approval
- WaterAid reserves the right to monitor the quality and progress of the work during the assignment
- Failure of producing outputs exceeding deadline will result penalty
- Income tax and VAT deduction will be made at source as per government rules

## Annexure C: Questionnaire for Survey

### Assessment of WaterAid Bangladesh's initiatives of URWH

#### Consent of the Interviewee

Greetings! Water Aid Bangladesh (WAB) has been working on urban rainwater harvesting (URWH) since 2010 with technical support from Centre for Science and Environment (CSE). Under the program WAB arranged training for around 150 participants (sector professionals including academics, researchers and practitioners) to build capacity on URWH with the objectives that the trained person would act as change maker and promote rainwater harvesting within their field. After few years of work in the area, WAB has decided to conduct an assessment of its work on promotion of rainwater harvesting and suggest how it should take the plan forward. As part of the evaluation process, we would like to request you to complete the under mentioned questionnaire about different aspects of the issue for about 30 minutes. We thank you very much for your readiness to participate in the survey, and assure to you that information provided by you will be kept secret and used only for the study purpose. We appreciate your time and patience in answering the questions and request you to e-mail back the filled out questionnaire to the following e-mail address by 15 July 2015.

***This study will be conducted by the Management Consultancy Services Limited under the direction of Dr. Ishrat Islam, Professor of Urban Planning, BUET.***

#### A. General Information (Please put a ✓ mark before the relevant/appropriate option)

**(A\_1) Name of the Respondents:**.....

<b>(A_2)</b>	<b>Please indicate your sex?</b> Answer: 1 = Male; 2 = Female;	<input style="width: 80%;" type="text"/>									
<b>(A_3)</b>	<b>Which range includes your age?</b> Answer: 1 = Less than 30, 2 = 30 - 39 years, 3 = 40 - 49 years, 4 = 50 - 59 years, 5 = 60 years and above;	<input style="width: 80%;" type="text"/>									
<b>(A_4)</b>	<b>What is your highest educational attainment level? (Please mention name of the degree) Answer:</b>	<input style="width: 80%;" type="text"/>									
<b>(A_5)</b>	<b>Thinking of your main job (for pay), which of the following sector best describes your current work?</b> Answer: 1 = Private sector, 2 = government department, 3 = college/university teacher, 4 = non-profit sector, 5 = self-employed; 6 = Un-employed, 7 = Others, please specify .....	<input style="width: 80%;" type="text"/>									
<b>(A_6)</b>	<b>Name of your organization and your designation</b>										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Issue</th> <th style="width: 35%;">When you attended the training</th> <th style="width: 35%;">At present</th> </tr> </thead> <tbody> <tr> <td>Organization's name</td> <td></td> <td></td> </tr> <tr> <td>Designation</td> <td></td> <td></td> </tr> </tbody> </table>	Issue	When you attended the training	At present	Organization's name			Designation			
Issue	When you attended the training	At present									
Organization's name											
Designation											

#### B. Training related information (Please put a ✓ mark before your choice)

<b>(B_1)</b>	<b>When did you participate in Urban Rainwater Harvesting training?</b> Answer: 1 = 2010, 2 = 2011, 3 = 2012, 4 = 2013, 5 = 2014;	<input style="width: 80%;" type="text"/>																
<b>(B_2)</b>	<b>Please assess your knowledge/idea about URWH before and after your participation in the training program (please ✓ in the appropriate column and give necessary comments)</b>																	
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Context</th> <th style="width: 10%;">No knowledge</th> <th style="width: 10%;">Very poor 1</th> <th style="width: 10%;">Poor 2</th> <th style="width: 10%;">Moderate 3</th> <th style="width: 10%;">Good 4</th> <th style="width: 10%;">Excellent 5</th> <th style="width: 20%;">Comment</th> </tr> </thead> <tbody> <tr> <td>Before the</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Context	No knowledge	Very poor 1	Poor 2	Moderate 3	Good 4	Excellent 5	Comment	Before the								
Context	No knowledge	Very poor 1	Poor 2	Moderate 3	Good 4	Excellent 5	Comment											
Before the																		

training								
After the training								

**(B\_3) How would you rate the following aspects of the training? (please √ in the appropriate column and give necessary comments)**

Issues	Very poor 1	Poor 2	Moderate 3	Good 4	Excellent 5	Comment
Course contents						
Training materials						
Technical knowledge on the issue						
Training delivery or training quality						
Scope for application in the field						
Networking with other participants						
Others, specify						

**(B\_4) In which of the area you have applied knowledge you learned from the training. (Please √ in the appropriate column and give necessary comments)**

Area of application of URWH knowledge from the training	please √ the column	Brief description of your contribution to adopt /promote URWH	
Policy decision			
Academic curricula development			
Demonstration			
Research project			
Social awareness/Advocacy			
Not applicable/could not use learning from the training			

**(B\_5) Have you been able to share ideas/knowledge gained from the training program to others?**

Area of application of URWH knowledge	please √ the column	Brief description of the task to disseminate information to others	Number of people you communicated	
Discussing URWH with colleagues				
Make formal presentation on URWH				
Debated about the issue with others				
Distribution of training materials				
Organize workshop on the issue				
Not applicable/did not disseminate				

**(B\_6) What factors supported or facilitated the application of your learning from the training program?**

Issues	please √ the column	Brief description of the context and people supported you	
Involved in a project to apply knowledge			
Office authority had scope to utilize my knowledge			
Had scope to include in the academic curriculum			

Had scope to undertake research/demonstration project			
Other			
Not applicable			

**(B\_7) Which of the following difficulties did you face in promoting URWH in your work place?(multiple response possible**

Issues	please √ the column	Brief description of the difficulty you faced in promoting URWH	
Ideas are not applicable in my working situation			
Do not have authority to implement it			
Resistance from the management			
Do not have required skills to implement the learning			
Lack of policy/legal support			
Not applicable/did not disseminate			

**(B\_8)** Do you see more opportunity to use learning of the training in future?  
**Answer:** 1 = yes, 2 = no

**(B\_9)** If the answer is „yes“, what are they (please mention maximum three areas)

**(B\_9\_1)**

**(B\_9\_2)**

**(B\_9\_3)**

**(B\_10)** If you do not see further scope, what will be the reasons for it? (maximum 3)

**(B\_10\_1)**

**(B\_10\_2)**

**(B\_10\_3)**

88 = Do not want to share, 99 = Not applicable/don't know

**(B\_11)** **To what extent do you find the training useful in promoting URWH?**  
**Answer:** 1 = Not useful, 2 = Somewhat useful, 3 = Quite useful, 4 = Very useful;

**C. Rain Forum**

**(C\_1)** **Are you member of the Rain Forum?**  
**Answer:** 1 = Yes, 2 = No; (If the answer is no, then go to D\_1)

**(C\_2)** **If yes, when did you become a member of Rain Forum? (Please write name of the year:**

**(C\_3)** **If you are member of Rain Forum, how often can you sit for discussion?**  
**Answer:** 1 = Every month, 2 = Every 3 months, 3 = Every 6 months, 4 = Once in a year, 5 = Others, please specify; 99 = Not applicable/could not make time for any meeting

**(C\_4)** **What is your role in the Rain Forum? (please mention at least three activities that you perform in the forum)**

**(C\_4\_1)**

**(C\_4\_2)**

(C_4_3)	
	99 = not applicable/do not do anything in the Rain Forum
(C_5)	<b>Do you observe or see any change in the area as a result of activities that you do in the Rain Forum (please state maximum three)</b>
(C_5_1)	
(C_5_2)	
(C_5_3)	
	77 = Cannot say anything; 99 = Not applicable / do not see any change

**(C\_6) How satisfied are you regarding the performance of Rain Forum?**

Issues	please √ the column	Brief explanation of your assessment	
Highly satisfied			
Satisfied			
Neither satisfied nor dissatisfied			
Dissatisfied			
Highly dissatisfied			
Not applicable			

**D. Individual appreciation of URWH program**

(D_1)	<b>How likely is it that you would recommend training on URWH to your friend/colleague?</b> <b>Answer:</b> 1 = Very likely, 2 = Likely, 3 = Neutral, 4 = Unlikely, 5 = Very unlikely;	<input type="text"/>
(D_2)	<b>According to your opinion how successful WAB is in promoting URWH?</b> <b>Answer:</b> 1 = Highly successful, 2 = Successful, 3 = Not successful at all, 77 = Donot want say anything about it; 88 = Cannot say anything about;	<input type="text"/>
(D_3)	<b>According to your understanding what different stakeholders can do for promotion of URWH?</b>	
(D_3_1)	a) Government department:	
(D_3_2)	b) Educational institute:	
(D_3_3)	c) WAB:	
(D_3_4)	d) Others, please specify:	
	99 = Not applicable / no answer	

Signature of the respondent: .....

Date: .....

### **Annexure C: Guide questions for FGDs and KIs**

**Rain Forum**(FGD–1/2 depending on the numbers of participants available, for each FGD we need around 10/12 participants)

Can you please tell us your name, occupation, and one thing that you like to do most?

When did you participate in the URWH training organized by WaterAid Bangladesh? According to your observation how effectively facilitators from CSE, India could conduct the training sessions? Do you find their training package sufficient enough to understand urban rain water harvesting?

Can you please share new learning of the training about URWH? What aspect/s or areas of the training you could use within this time?

How long are involved with the rain forum? How did you get involved with it? How many are you in the forum? Do you have any guideline for working in the rain forum, can you please share about that?

What do you do in the rain forum? How often can you gather together? Do you have a regular place for gathering? How do you perform your activities of the forum – by yourselves or in collaboration with others?

Do you receive any support from WAB in performing your activities? How sufficient are they? Do you need additional assistance from WAB in doing your work?

Do you get any support from others (individual, organizations, etc. other than WAB) for your work in the forum? From whom do you get support and what are they? To what extent they help you in performing your activities?

Can you share some of your significant achievement in the forum? What are the factors that help to perform your activities or in your achievement?

Do you see any change among the people that you work for and with?

Do you face any problem/s in doing your work in the forum, and how do you address them?

According to your observation what are the obstacles for promotion of URWH and how they can be solved?

Do you see initiatives from other stakeholders for promotion of URWH? What are they?

According to your opinion, what others like government departments, academe, private sector, not-for-profit organization, etc. can do in enhancing rain water use in urban areas?

What is your future plan? Do you need any support from others in implementing your plan? Do you need any support from WAB in your future initiative, what are they?

Do you have any suggestion for enhancing URWH initiative so that more people get benefit from it?

### **Rain day observation** *(covered by FGD with participants of Rain Forum)*

When do you observe rain day in the year? What are the objectives of observing rain day? What activities do you take for that day? How many people and what categories of people participate in the program? Do you feel that objectives of rain day celebration are achieved?

What is the reaction of different stakeholders about observing rain day?

Do you see any changes among the participants as a result of rain day observation?

According to your opinion what more can be done for promotion of URWH?

### **URWH in the academe**

#### **Curriculum development** *(institute and university teachers) (observations and discussion) (Visit to 2/4 institutes)*

Were you involved with curriculum development of URWH? For which institute you have done that? What motivated you in doing so? Have you received any support in preparing the curriculum from others?

Do you know where the curriculum is being used? Do you know how well it is being accepted by the faculty and students?

Do you get any feedback for its revision or present form is OK? Do you get any information, how it is being used? Who use them most?

What is your feeling for being engaged with the initiative?

### **Teaching**

Do you teach URWH in the institute or university? Where do you teach?

What are general reaction among other faculty members and students about URWH for being included as one of the subject?

Do you see special interest among management, faculty, students and others about URWH? What is their perspective? Do they consider it as other additional subject/s, or it is something that is important for future survival?

Do you see any changes among the students regarding promotion of rain water harvesting? What are they?

Do you face any challenges in performing work in the area, and how do solve them or can be solved?

Do you have any suggestion about dissemination of knowledge on rain water harvesting among students and others in coming days?

**Knowledge center** *(University–observation and discussion) (visit to 2 centers)*

Can you please tell us when was the rain center started in your place? How did it happen? Who started the center? Who provided resources for it?

Who are in management of the center? What do you have in the center like books, computer, chair, table, and other furniture and equipment? How the finance of the center was arranged?

What is the schedule of the center? Who uses the center and for what purposes? Do you keep record of the users? To what extent the users are satisfied with the services of the center?

Do receive any complain about the center’s facilities and how are they addressed?

Do you face any problem in running the center and how do you handle them?

Do you have any suggestion so that the center serves purpose of promoting urban rain water use for wider clients?

**Rain water harvesting plant** *(Observation and discussion–visit to 2 plant)*

When was the rain water harvesting plant started? Who were involved in initiating the plant? Who provided the finance?

Who is responsible in management and maintenance of the plant?

For what purposes the rain water is being used? Who uses the water? For how long (days in the year) the water is used?

If people do not use the rain water, what are the reasons for it? Do you see any disinterest among different group of people about using rain water? What do you do to convince people that it is safe to use the rain water for certain purposes?

What about satisfaction level of the users – are they satisfied using the rain water or do they complain about it, what are they? Do you do anything to address their complaints?

Do you face any problem about management of the plant, and how do you deal with them or solve them?

Do you have any recommendation for better management of the plant (if it does not serve its purposes), and take steps so that more people are motivated to use rain water?

**Policy and its implication** *(KII–personnel from WASA and others suggested by WAB)*

Do you feel that present policy regarding rain water harvesting is favorable for promoting URWH? Is there any addition required in the policy or it is comprehensive?

Do you whether that policy is being implemented? Can you give example of it? If it is not being, what are the constraints/reasons for it? Can you do anything to solve them or what can be done to solve them?

Do you feel that different actors (government department, designer, developer, owner and others) are interested about rain water harvesting; if not what are the reasons, what can be done so that they get interest in it?

As INGO what WAB can do for multi-stakeholders approach in promoting URWH?

What more can be done so that people at different levels are aware about importance of URWH and take steps of harvesting rain water and use them?

**Personnel at CSE** *(KII with facilitators of the training from CSE over Skype)*

Can you please share with us about training on urban rain water harvesting – objectives, contents, participants and other issues organized by WaterAid Bangladesh (WAB)? What about your assessment about the training?

Can you say that objectives of the training are achieved? To what extent participants have learnt new information, skill and motivation for promotion of rain water harvesting in the urban areas from the training? How do you assess the performance of the training?

What is your assessment about the joint collaboration between CSE and WAB? According to your observation what went well and what areas need improvement?

According to your understanding what issues or areas are required for promotion of URWH?

What suggestion/s do you have to make about promotion of urban rain water harvesting in Bangladesh?