

A report on Participation in Second South Asia Rainwater Network (SARNET) International Conference on “Rainwater Harvesting: A Sustainable Solutions for Climate Change Resilience and Achieving SDGs”, Colombo, Sri Lanka, from 17 to 22 May 2023

Organized by: South Asia Rainwater Network (SARNET) in collaboration with Lanka Rainwater Harvesting Forum (LRWHF)



MAY 26, 2023

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1. Introduction:

The South Asia Rainwater Network (SARNET) was established in 2019 as a regional network of organizations, practitioners, activists, researchers, and rainwater enthusiasts working in the rainwater sector to enhance collaboration and experience sharing on rainwater harvesting practices in the South Asia Region. In association with Lanka Rain Water Harvesting Forum (LRWHF) and International Water Management Institute (IWMI), SARNET has organized second international conference on “Rainwater Harvesting: A Sustainable Solutions for Climate Change Resilience and Achieving SDGs” in Colombo, Srilanka from 17 to 18 May 2023 and followed with SARNET planning meeting on 19 May 2023 and field visit from 20 to 22 May 2023. The conference provided an open platform to present research and experience and networking with the key players in rainwater harvesting in the South Asia Region and other countries. The papers presented at the conference mainly focused under key areas “Rainwater harvesting as a means of achieving safe WASH services at household level”, “Rainwater harvesting in urban areas”, “Policies and Institutions”, and “Socioeconomic benefits and Disaster Risks Reduction through RWH”.

2. Objective of Conference:

- To explore the role of rainwater harvesting in the South Asia Region concerning the SDGs and mitigation of the effects of climate change.
- To support the growing lobby for investment and rainwater harvesting policies by providing evidence of success stories from South Asia and other parts of the globe.
- To provide a platform for practitioners, activists, researchers, and rainwater enthusiasts to showcase their research, products, innovations, and services related to rainwater harvesting.

3. Schedule of the Conference and Field Visit:

The major schedule of the conference is as specified below, and details photographs, presentation slides are attached in ANNEX I and II.

Date	Activities
17 May 2023	Opening, Technical Session (Paper, Poster, Videos Presentations)
18 May 2023	Technical Sessions (Paper Presentations, Poster, Videos Presentations), certification and adjournment
19 May 2023	SARNET Planning Meeting at SARNET/LRWHF Office
20 May 2023	Field visit - Rainwater Harvesting Project sites in Anuradhapura
21 May 2023	Field visit - Ancient Rainwater Harvesting Systems in Sigiriya
22 May 2023	Meeting with JRDC Peradeniya on “Rainwater Harvesting as a safe drinking water supply to meet SDGs in South Asia”

4. Detail Description of the Conference:

Day -1, 17 May 2023

The conference was organized at International Water Management Institute (IWMI)’s Head Office, Colombo. The conference started with an inauguration session, following experts and guests have

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presented their experiences on water and rainwater harvesting with welcome and vote of thanks from organizers in inauguration session. Time from 9:00 am to 10:40 am.

1. Mr. M.M.M. Aheeyar, Chairman, LRWHF – Welcome speech
2. Mr. Ramveer Tanvar, Pond Man of India – Guest Speaker
3. Mr. R.M.W.S. Samaradiwakara, Secretary to Ministry of Water Supply and State Infrastructure Development – Address
4. Mr. Kevin Dean, Director, USAID Srilanka and Maldives – Address
5. Dr. Matthew McCartney, IWMI – Keynote speaker
6. Dr. Tanuja Ariyanandam CEO, LRWHF and convenor of SARNET – Vote of Thanks



Conference Participants

There were two technical sessions in Day – I for various research papers presentation and discussion:

Technical Session – I: Theme: Rainwater harvesting is a means of achieving safe water and sanitation at the household level.

In total seven papers, videos, and stories were presented by experts from different countries related to rainwater harvesting. The session was chaired by Er. Syed Zaheer Hussain Gardezi, Pakistan and Rapporteur was Ms. Sony Pun from Nepal. Time from 11:10 am to 2:10 pm.

Technical Session – II: Theme: Rainwater harvesting in Urban areas, operational policies, and institutions.

In total eleven papers, videos, posters, and stories were presented by experts from different countries. The session was chaired by Mr. M.M.M. Aheeyar, Srilanka and rapporteur was Dr. Jos Raphael, India. Time from 2:10 pm to 5:15 pm.

Day - 2, 18 May 2023

Recap of Day – I: 9 am to 9:20 am

Technical Session – III: Socioeconomic Benefits and Disaster Risk Reduction through Rain Water Harvesting (RWH)

In total, twelve papers, videos, posters, and stories were presented by experts from different countries in South Asia, including Uganda, Malawai, and Iran. On behalf of NEWAH, I have presented the paper on “**Rainwater Harvesting: Climate Change Adaptation Strategy for Achieving SDG 6 in Nepal**”. Major focus area of my presentation is NEWAH’s innovative monitoring mechanism i.e., hello monitoring, toll-free call center and sensor monitoring to assess the functionality of the WASH systems, and causes behind the partial and nonfunctional WASH projects, our experience on rainwater harvesting and satisfaction level assessment of RWH user’s and rainwater harvesting is one of the major climate change adaptation strategies to achieve the SDG 6. The presentation was appreciated by the participants, panelists, rapporteur, and session chair. Conclusion, recommendation, and future has been presented in terms of rainwater harvesting. The session was chaired by Dr. Sarika Kulkarni and rapporteur was Dr. Manoj P. Samuel, India. After the completion of technical session – III, experience sharing from participants of technician training program on rainwater harvesting tanks was done, the training was conducted from 11 to 16 May 2023 in Sri Lanka.



Panel Discussion:

After the completion of various papers presentation panel discussion was organized. Mr. Han Heijinen, International Rain Rainwater Harvesting Alliance (IRHA), Dr. Sarika Kulkarni, Mr. Rajindra Ariyanbandu, former chairman of LRWHF, Er. Syed Saheer Hussain Gardezi were the panelists. Panel discussion was held among the above-mentioned panelists, paper presentations and participants on the overall conference presentations, findings, recommendations and conclusions.



The conference was adjourned by the organizer by making the concluding remarks and further planning.

5. SARNET Planning Meeting: 19 May 2023

Visited LRWHF office at Colombo, Srilanka and got opportunity to observe rainwater harvesting system models, IEC materials, documents, booklets, brochures etc. demonstrated in LRWHF Office. SARNET had organized a planning meeting on 19 May 2023 at SARNET secretariat, LRWHF office Colombo, Srilanka. The progress made so far by SARNET was presented by Ms. Dhanushi Senanayake, Regional Coordinator of SARNET, and she had also presented the key



plannings for coming days. I have presented a brief introduction of our organization's vision, mission, goal, and strategic plan 2022-2026, and presented our experience in RWH and future planning.



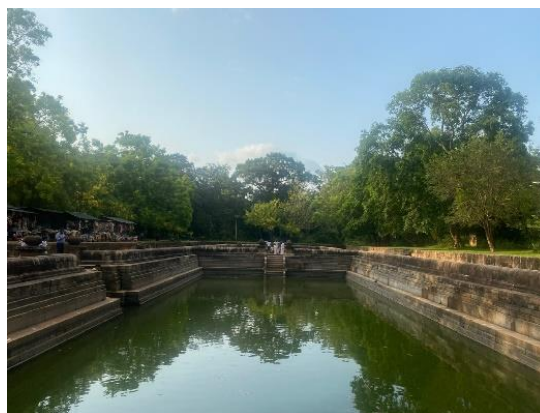
Furthermore, I have revealed to plan for the formation of SARNET Nepal chapter or rainwater alliance in Nepal in coordination with SMART WASH Solution, Kanchan Nepal, and other like-minded organizations to promote the rainwater harvesting in Nepal and to exchange the learnings among the member organizations. Moreover, NEWAH and SMART WASH Solution also discerning to organize the international conference focused on RWH and

climate change in Nepal in 2024, which would be the great opportunity to explore the local, national, and international practices on RWH in the context of climate change impacts and adaptation strategies.

6. Field Visit: 20 – 22 May 2023

Day – 1, 20 May 2023

Travel to Anuradhapura District and observed the RWH system in public school named Horuwila School at Wilpaththu Road, Horuwila. Two rainwater harvesting tanks have been recently constructed with the financial support of USAID and technical support of Lanka Rain Water Harvesting Forum (LRWHF). As per the school principal, there is a traditional well which was used for drinking and other purposes, now



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which is contaminated with salination water and school children haven't access to clean and safe water for drinking and other uses. After construction of those rainwater harvesting tanks, now students and teachers are planning to use rainwater for drinking and other purposes in the school. There are all together 500 students studying in the school, among them about 50% are girls. The both tanks size is 15 m³.



We have visited various types of traditional rainwater ponds in Anuradhaura, which still provides water for irrigation and other needs. The history of rainwater harvesting in Sri Lanka can be traced back to ancient times, specifically during the Anuradhapura period (377 BC-1017 AD). The first water policy regarding rainwater was proclaimed by King Parakrama Bahu the Great (1153-1186 AD), emphasizing the importance of utilizing every drop of rainwater for the benefit of humanity rather than letting it flow into the sea. Rainwater collection methods were commonly observed in rural areas, but in the early 1990s, a more advanced and systematic approach to rainwater harvesting was reintroduced. Travel and night stay in Sigiriya.

Day – 2, 21 May 2023

Visited traditional rainwater harvesting systems in Sigiriya i.e., ponds, water collection chambers, traditional duct/pipes used for the rainwater collection and supply. As per local people there are about 32000 manmade rainwater collection ponds/lakes constructed in ancient time for irrigation and ground recharging in Sri Lanka. Those ponds still provide water for irrigation and other needs and in ancient times those ponds were used for drinking water as well. Travel to Peradeniya via Kandy.



Day – 2, 22 May 2023

Meeting was organized on “Rainwater Harvesting as a safe drinking water supply to meet SDGs in South Asia”, JRDC Peradeniya, Sri Lanka on 22 May 2023 in China Sri Lanka Research Centre, JRDC Peradeniya. Dr. S.K. Weragoda presented the background, rationale, and activities of the

China Sri Lanka Research Centre. Furthermore, Dr. Tanuja Ariyananda, CEO, LRWHF presented about the water quality management aspects of rainwater harvesting for domestic purposes, including for drinking water. Similarly, Dr. Nishanth Nanayakkara presented on the chronic kidney disease of unknown origin (CKDu) Sri Lanka. Likewise, Mr. Han Heijinen presented on the drinking water supply situation globally (JMP 2021) and in South and East Asia. His presentation was focused on the policies, obstacles and way forward required for institutionalizing the rainwater harvesting. Participants from different countries and other institutions invited by the JRDC shared their experiences on rainwater harvesting, policies, water quality etc.



7. Key Takeaways:

Observing the findings, conclusions of research, experiences, and successful stories from the wider range of presentations from different organizations, and participating in discussion, and field visit, the following key takeaways are summarized: Which could be replicated in our projects and for new proposal development in the coming days.

- Rain Water Harvesting (RWH) is one of the major adaptation strategies to cope with climate change-induced disasters, i.e., flooding, landslides, drought, etc and its impacts.
- Due to climate change, groundwater sources, i.e., springs and wells, are either depleting or drying up. Therefore, RWH is the best way to recharge the groundwater, and ultimately, it helps to revive the groundwater sources.
- The very impressive success story of Pond Man of India Mr. Ramveer Tanwar presented himself in the conference. The experience of Pond Man can be adopted in the Terai region of the country for conservation or restoration of the ancient ponds for ground recharging, irrigation, exploring tourism, lakes for recreational activities in urban areas to minimize urban flooding, other needs, solid waste management to avoid ground water contamination, and planting forests for environment protection.
- NEWAH had implemented RWH projects in various parts of the country from 1998 to 2015. Based on our experience and knowledge gained from the conference, different kinds of techniques can be adopted by improving past technology to minimize issues related to first flush, water filters, cost, etc. for rainwater quality improvement before harvesting the rainwater.
- Local RWH tanks "Pumpkin Tanks," a cost-effective ferro-cement tank used in Sri Lanka, and "Calabash Tank" used in Africa can be replicated in Nepal for RWH in rural areas of the country where natural water sources are not available, and lifting is not feasible.

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Kanchan Nepal, a local NGO in Kaski district, has already constructed a pumpkin tank in Kaski. This local technology has the following advantages:

- Local materials and skills can be used.
- cost-effective and durable.
- Tank size can be increased in comparison to a traditional ferro-cement tank to meet the HHs water demand.
- Improved filtration, first flush, and inlet system.
- Easy for operation and maintenance.
- Lid or cover to prevent algae formation and insect breeding.
- Blending groundwater and rainwater treatment reduced mineral concentrations in groundwater and successfully improved water quality. 1:1 blending ratio (equal proportion of groundwater and rainwater).
- In the community participatory approach, three principles are used for the sustainability of the projects: educate, engage, and facilitate.
- "If the rainwater is not tapped and utilized properly, it will runoff into the drain systems and turn into wastewater. This indicates a larger gray water footprint".
- Rainwater harvesting and recharging systems not only help to increase water levels but also minimize tanker costs, save electricity bills, and improve groundwater quality.
- Recharging ponds for rainwater harvesting are a crucial measure for reviving springs. Spring source recharge ponds and techniques can be learned from other organizations by organizing exposure visits, training, etc.
- Rainwater quality for drinking is a major concern. However, household water treatment can secure safe drinking water.
- Especially, rainwater harvesting contributes to achieving the 6.1 goal of the SDG to provide safely managed drinking water services by contributing to accessibility, availability, quality, and affordability.
 - Located on premises – Accessibility
 - Available when needed – Availability
 - Free of faecal and priority chemical contamination – Quality
 - Cost-effective and less operational and maintenance const – Affordability
- **Research and development (R&D)** are crucial for generating knowledge from field activities implementation, and they provide knowledge, insights, and ways to improve for minimizing resources in an efficient way. Therefore, it is necessary to focus on various studies and R&D activities in the future for proper documentation and knowledge management (KM). R&D and KM are crucial to developing new ideas, concepts, and proposals for fundraising. Besides regular activities, some additional studies are recommended, as below:
 - Impact study of RWH projects
 - Potential scope and feasibility of RWH projects as a climate change adaptation strategy in rural, semi-urban, and urban areas
 - Climate change impact on water sources and adaptation strategies
 - Assessment of the functionality and sustainability of WASH projects
 - Piloting new technologies and study on key learnings
 - Looking back study
- Develop proposals for new opportunities and submit proposals to international funding organizations working in the rainwater and WASH sectors.

- Integration of RWH activities into regular WASH projects. Hybrid types of projects can be designed to cope with water sources drying up or depleting issues and minimize the initial and operational costs of lifting projects. However, it depends upon the site conditions, source type, source yield, etc.
- NEWAH HQ can be developed as a **knowledge hub and learning center** for the WASH sector of the country by constructing rainwater harvesting models, smart toilet models, a library, making publications, developing other WASH-related models etc.
- **To make a demonstration model of the RWH system** and use the rainwater for kitchen gardening, cleaning, and other purposes in the NEWAH HQ office, a rainwater harvesting and recharging model can be constructed in NEWAH HQ with the latest technology of the "Pumkin Tank of Sri Lanka" in coordination and collaboration with Kanchan Nepal and Kaski. Along with the construction of a rainwater harvesting system in NEWAH Headquarters, **capacity building training for technical staff** can be organized.
- To explore the learning of rainwater harvesting practices and experiences, we can plan for **organizing the regional or international conference in Nepal in coordination** with the International RAIN Water Harvesting Alliance (IRHA), SARNET, LRWHF, SMART WASH Solution, Kanchan Nepal, IWMI, and other local, national, and international organizations.
- As we discussed in the SARNET planning meeting, it is planned to establish a **SARNET Nepal chapter or rainwater harvesting partners alliance of likeminded organizations** in Nepal.
- NEWAH can facilitate and coordinate with concerned stakeholders for SARNET chapter formation and organizing **an regional or international conference in Nepal**.
- Rainwater harvesting is a technique that involves collecting and storing rainwater for later use. It is considered one of the major climate change adaptation strategies because it helps conserve water sources and mitigate the impacts of water scarcity, which is becoming increasingly common due to climate change. Therefore, we need to incorporate rainwater harvesting systems as an adaptation strategy or/and alternate water source into NEWAH's strategic plan at the time of review.

Acknowledgement: I would like to express my sincere gratitude to the SARNET Regional Coordinator, Ms. Dhanushi Senanayake, Dr. Tanuja Ariyananda, Convenor of SARNET and CEO of LRWHF, Mr. Han Heijin, President of IRHA, and members of the organizing committee for giving me this opportunity to share our study findings and experience on RWH and WASH at an international conference. I am also grateful to all the dignitaries, paper presenters, participants, and logistic team for their support, cooperation, and hospitality. I am very much indebted to Nepal Water for Health (NEWAH) Board and management team for providing this opportunity and Mr. Umesh Basnet, NEWAH and other team members who were directly or indirectly associated with the study and findings presented in the conference.

Report Prepared and Submitted By:



Resham Jung Singh, Director, NEWAH, Date: 26 May 2023

ANNEX I: Photographs



Paper Presentation and Certification after completion of Conference

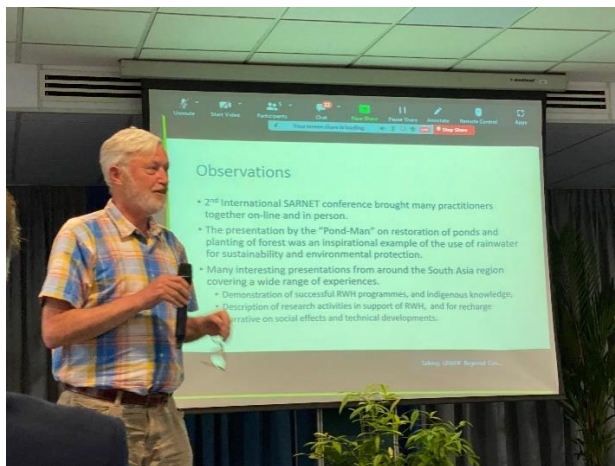




NEWAH Annual Report 2021-2022 handover to Mr. Han Heijin, President, IRHA



NEWAH Annual Report, brochure, strategic plan demonstrated in conference exhibition.



Conference observation presented by Mr. Han



Pond Man of India presenting his experience of pond conservation



Lanka Rain Water Harvesting Forum' Office and demonstrated various RWH models/activities



Pumpkin Tank





Field Visit in Anuradharapura to observe Rainwater Harvesting System in School



Presentations on Rainwater Harvesting, as a safe drinking water supply to meet SDGs in South Asia, JRDC Peradeniya, Sri Lanka

Typical Model of Calabash Tank (African technology for RWH)



ANNEX II: Presentation Slides

Rainwater Harvesting: Climate Change Adaptation Strategy for Achieving SDG 6 in Nepal

Presented By: Er. Resham Jung Singh
 PhD Scholar, Infrastructure University Kuala Lumpur (IUUKL), Malaysia and Director, Nepal Water for Health (NEWAH)

2nd International Conference on “Rainwater Harvesting: a Sustainable Solution for Climate Change Resilience and Achieving SDGs”

17th and 18th May 2023
Colombo (Sri Lanka)




1

IMPACTS OF CLIMATE CHANGE AND WATER SECURITY

Fig: Cause and effects of Climate Change (Sharma et.al, 2021)

SN	Climate Hazards	Possible Physical Impacts on WASH
1	Drought	Water sources depletion leads to choose unsafe source and more time to fetch water, deteriorate water quality. Effect due to insufficient water for flushing toilets and lack of maintaining proper individual hygiene (handwashing facilities)
2	Flooding	Possibility of deterioration in water quality by contamination of water supply system from pits and septic tanks, obstruction to access toilets. Chances of water borne diseases.
3	Landslide	Physical infrastructure damage and effect on functionality of water system, increase turbidity, chances of increase in water borne diseases
4	Heat waves and Cold Waves	Possibility of increase in pathogens in water, which causes water borne diseases
5	Melting glaciers and snow	Reduction of water availability in summer

Source: MoFE, 2021

Springs are the major source of water in the mid-hill region of Nepal, there has been a steady depletion in spring water source around 30% in over 30 years (MoFE 2021).

2

CLIMATE CHANGE IMPACTS AND RAIN WATER HARVESTING

- RWH technology isn't something new. Its' history can be traced as far back as to the ancient times, some 3,000 years ago to the 850 BC, if not even farther
- **As a part of sound adaptation, why does RWH matter more today?**
 - a. The Joint Monitoring Program (JMP) report states that if the current trends persist 19 % of the world's population won't have access to safe drinking water, 33% won't have safe sanitation services, and 22% won't have basic hand washing facilities by 2030
 - b. Because the human population will grow faster and per capita availability of freshwater will decrease in the coming century
 - c. Climate change will cause a general intensification of the earth's hydrological cycle influencing water quality
 - d. RWH can be a good alternative source of water for communities where water sources are either depleting or drying-off
 - e. RWH system, is particularly useful to address vulnerability and adaptation process to environmental stresses at the local scale.



Conventional RWH System in Nepal



Constructing Modern RWH System in Nepal

3

RESEARCH METHODS

Research Sites: Gorkha and Tanahu for Questionnaire survey and FGDs; **Sindhuli, Baglung, Chitwan, Dhading and Nuwakot for Hello Monitoring;** Sindhuli Baglung and Chitwan for Toll Free Number and **Sindhuli and Baglung for Sensor Technology**



For identifying Climate change impacts on existing water resources:

- a. Hello monitoring: Conducted with 364 WSSs in 2022
- b. Toll Free Number: 35 Call received from March 2022-April 2023
- c. Sensor Technology: Installed in 825 water stands since 2019 to 2023

Secondary data from published reports, articles and journals



For identifying communities' satisfaction using RWH:

- a. Questionnaire Survey: 150 random sampled households (2019)
- b. FGDs: 10 FGDs conducted with Mothers' Group (2019)
- c. Field Observation (2019)
- d. Field Verification (2019)

E.coli and turbidity test to ensure quality of water

4

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NEWAH'S PAST INTERVENTIONS ON RWH

- NEWAH introduced the RWH technology for the first time in September 1998 from Tanahu district
- Implemented RWH systems within 13 districts of Nepal Gorkha, Dhading, Surkhet, Baglung, Ilam, Sunsari, Tanahun, Parbat, Baitadi, Kaski, Udayapur, Syangja and Dhankuta
- 38 Projects with 1334 households and 9634 beneficiaries and 5 schools benefiting 9194 students
- Constructed the RWH system with the capacity of 2000L, 4000L and 6500L
- Implemented roof top rainwater harvesting projects.

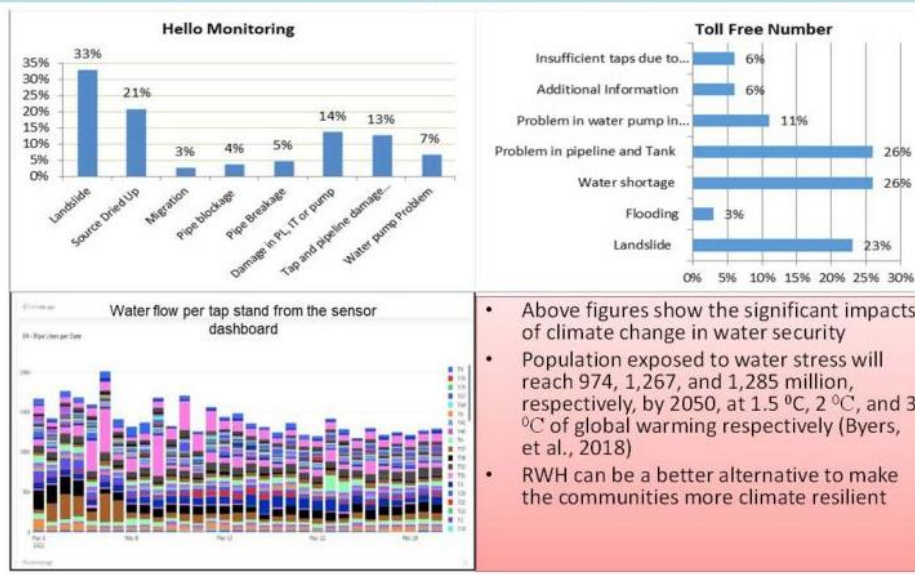


RWH technology installed at NEWAH HQ

5

Results and Findings

Findings of Climate change Impacts on Water Resources



6

Results and Findings Cont.

Finding on RWH as Adaptation measure and communities satisfaction using RWH

- The rainwater harvested is only sufficient for 8 months
- The RWHS satisfied almost cent per cent of water demand from July to January but is only able to fulfill the 40% water demand of the family during February and only 25% during the month of March
- 70% household came up with the idea to increase the capacity of the tank to 10,000L and remaining 30% were interested on constructing additional storage tank
- 80% of the samples were free of turbidity and remaining 20% were slightly turbid resulting from lack of sanitation and regular cleaning
- All samples were *E.coli* free but possibility of water contamination with faeces of birds and animals still persist
- 74% of the households were satisfied with the RWHS
- Rainwater harvesting is the feasible strategy to cope the climate change impacts in terms of climate resilience and adaptation
- Recharge ponds and other water retention structures constructed around water sources helps in water sources recharge and revive.



7

Conclusion and Recommendation

Conclusion

- Data showed major reasons behind WSSs non-functionality is due to extreme climate events; water sources depletion, source dried off or WSSs impacted by landslides and flooding
- RWH can be used as the alternative measures to provide water to the communities where access is difficult and existing sources are either depleting or drying-off
- The detail feasibility study, survey, and the design and implementation are necessary to address the community's need and priorities
- Climate change is a global issue, but it affects at local level, so adaptation strategies must be effective and applicable to grass root level

Recommendation

- Rainwater is an alternative solution and can be used extensively for various domestic as well as other water use purposes
- The construction of artificial recharge ponds benefits two ways; ground water recharges and minimizes heat stress through evaporation.
- Modification of the RWHS is essential and for this rigours community consultations are needed
- The initiatives like conservation of lakes and ponds, groundwater recharge afforestation and reforestation and promoting rainwater harvesting should be encouraged as effective adaptation strategies.

8

Strategies for NEWAH's RWHS

Quality

- Improve maintenance through education
- Implement automatic first flush device
- Self cleaning screening on downpipe
- Cover on abstraction tap

Quantity

- Use existing 6500L tank volume for households
- Increase catchment areas to at least 30m²
- Prioritise rainwater for cooking and drinking

Education

- Increase education of operation and maintenance of RWHS especially for women
- Develop Water Safety Plan with each household
- Use RWHS in schools to facilitate education

Monitoring and Evaluation

- Adapt evaluation manual from Rainwater Cambodia to monitor and evaluate NEWAH's RWHS
- Use results from monitoring and evaluation to identify unknown issues with the system and improve

: Strategy for NEWAH's RWHS.

**THANK YOU SO MUCH FOR YOUR
PATIENCE AND ATTENTION**

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