Rainwater Harvesting as a Resilient Approach to Mitigate Water Crisis

Mohammad Rafiqul Islam (Ph.D Student)

INVITE (Innovative Verona university's Inter-disciplinary, Inter-sectoral and International Training Experience), ESR (Early-Stage Researcher)

Graduate School of Law and Economic Science

Ph.D Programme in Economics and Management

Verona University, Italy

IWRA XVII World Water Congress (Daegu, Korea, November 29 to December 03 2021)

Acknowledgement: This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 754345.

Presentation Outline

- Introduction
- Conceptual Understanding
- Methodology
- Results
- Conclusion



The Daily Star
Monday, October 14, 2019 | YOUR RIGHT TO KNOW

Grab every opportunity to get more fr
Find out more >
HSBC | Select

12:00 AM, August 09, 2019 / LAST MODIFIED: 03:09 AM, August 09, 2019

Heavy rains to cause flash floods again

Met forecasts for northern districts

PHOTO: COLLECTED

- Rainwater harvesting is the process of collecting, storing, and utilizing runoff from roofs or ground surfaces for productive use in domestic water supply, agricultural use, and environmental management (Falkenmark et al. 2001; Liniger et al. 2011; Worm and Hatum, 2006).

Conceptual Understanding

- To find a reliable and resilient water supply system for the community is one of the major challenges at the local, regional, national, and international levels (Daniel and Tan, 2019).
- Reliable water management intervention is important in managing resilience (Lebel et al. 2006).
- Resilient approach (Gunderson and Holling, 2002) can contribute to natural resource management (e.g., rainwater).
- Walker et al. (2004) provided four important attributes of resilience such as latitude, resistance, precariousness, and panarchy.
- ✓ In this study, resilience is the ability of RHS to mitigate water crisis, sustainability against stresses, and system's stability.

Methodology

- Main Research Question: How we can measure the resiliency of RHS as a water supplier?
- Sub research questions are: Q1 What proportion of the year it can resist the water crisis? Q2 How much infrastructure of rainwater harvesting can recover after extreme events (e.g., flood, cyclone)? How long households need to wait to use it after uncertainties? Q3 Is it a stable water supply system? Q4 How we can measure the overall resilient level of this water supply infrastructure?
- Study site: Mongla, Bagerhat, Bangladesh
- ✓ Data collection tools: FGD, household survey, field observations
- ❖ Methods: Mixed methods, descriptive statistics

Cont…

Methodology

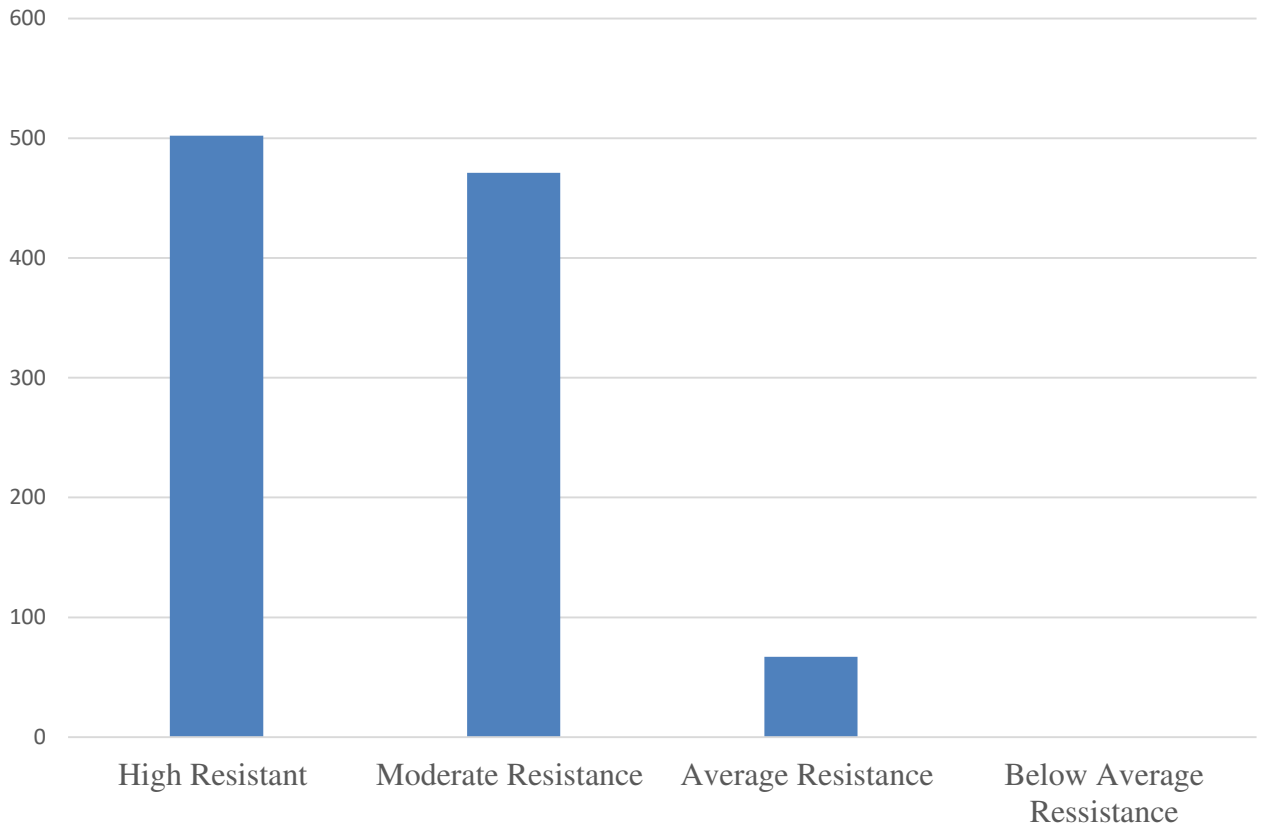
- Sustainability Measurement Indicator:

Wait		Expenditure		Recovery		Assigned
Day	Description	US$	Description	Level	Description	Value
30+	Too Long	28+	High Exp.	0.0 - 0.25	Below Av.	0.25
21-30	Moderate Long	21 - 28	Moderate Exp.	0.26 - 0.50	Average	0.50
11-20	Average Long	12 - 20	Average Exp.	0.51 - 0.75	Moderate	0.75
0-10	Below Average	0 - 12	Below Av. Exp.	0.76 - 1.00	High Rec.	1.00

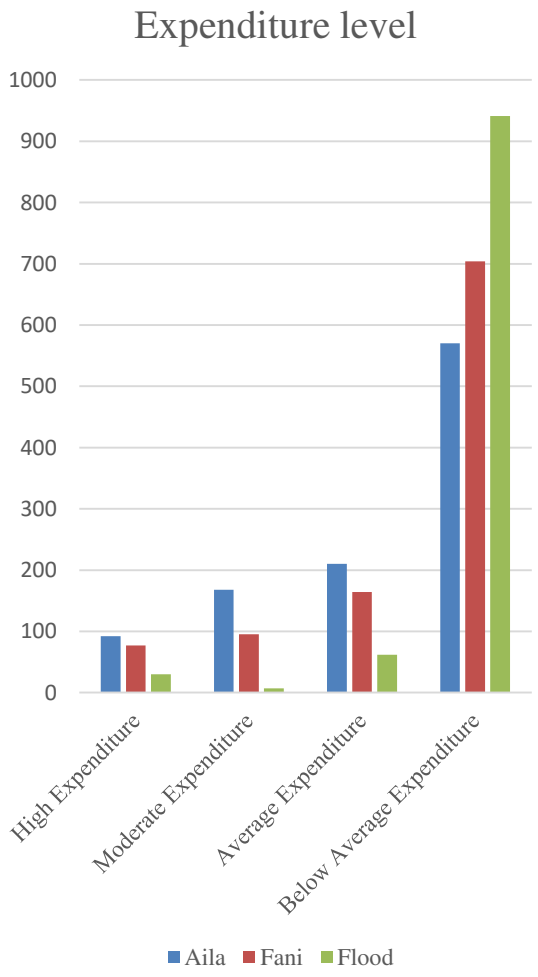
- Resilient Measurement Indicator:

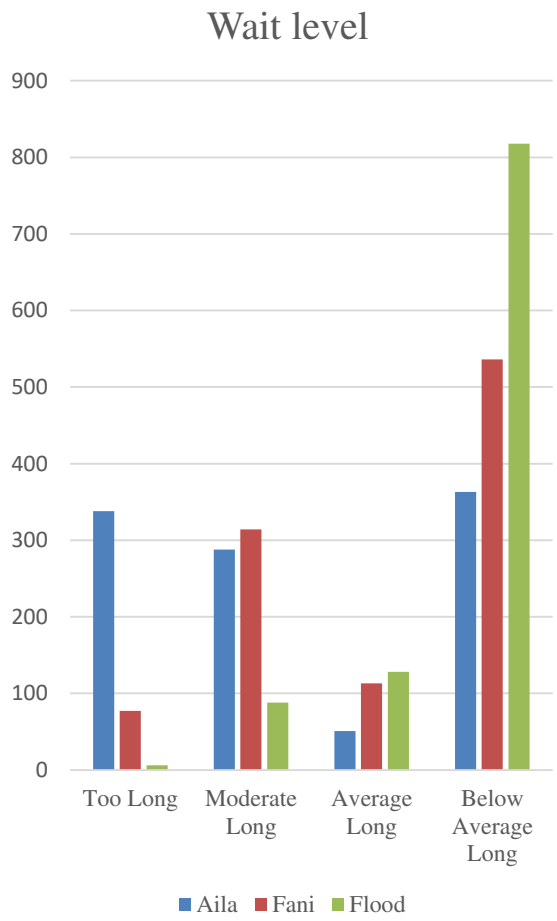
Combine value (Res. Sus., and Sta.,)	Resilient Indicator
2.5+	Highly Resilient
2.0 – 2.5	Moderate Resilient
1.5 – 2.0	Average Resilient
Less than 1.5	Below Average Resilient

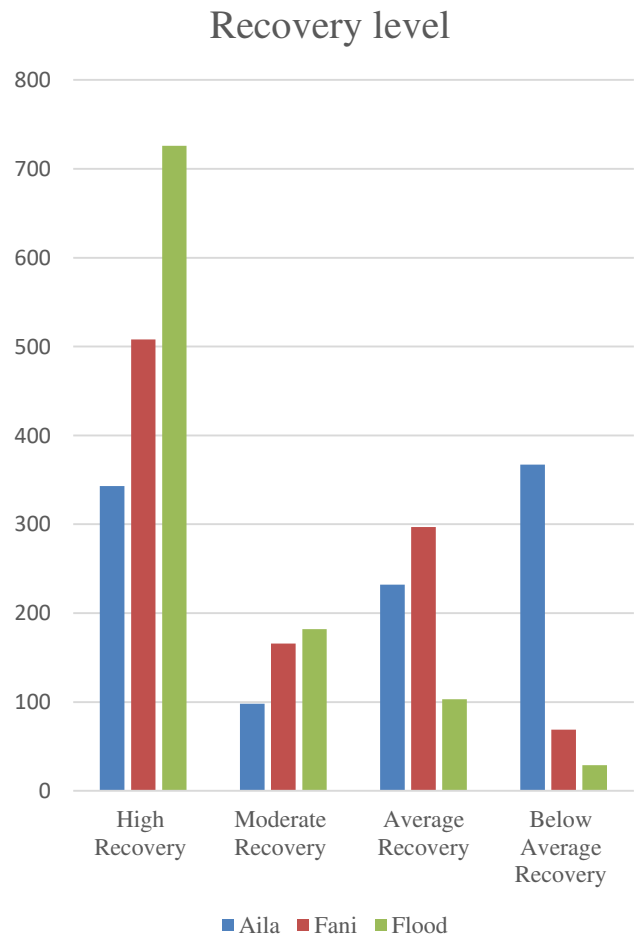
Result (Resistance to Water Crisis)



Result (Sustainability Against Extremes)



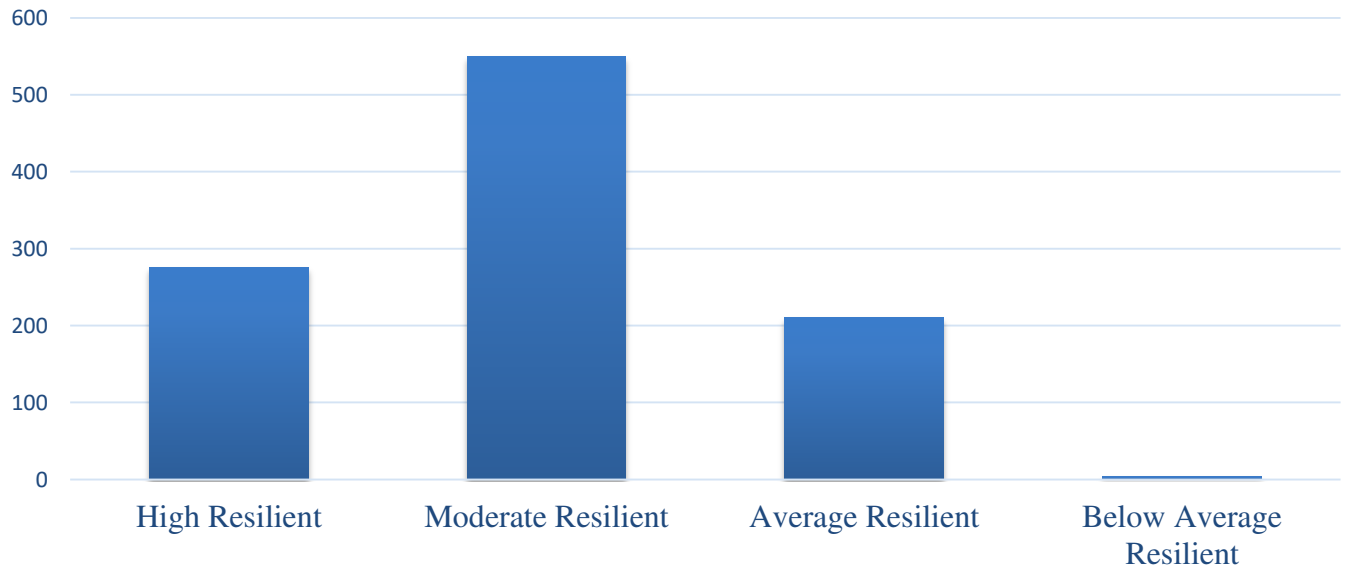




Result (Stability)

Variable	Mean	Median	S.D	Min	Max
Family	0.976	1.0	0.153	0.00	1.00
Local Community	0.558	1.00	0.497	0.00	1.00
Organization	0.36	0.00	0.480	0.00	1.00

Overall Resilient Level



UNIVERSITÀ di VERONA

invite

REGIONE DEL VENETO

Conclusion

- The extension and diversified use of rainwater through rainwater harvesting is the major foundation for the resilient approach of water crisis mitigation.
- Current top-down water management practice is not suitable for maintaining this system.
- ✓ Community freshwater pond initiative is a good example.
- RHS is a resilient approach to mitigate the water crisis problem in terms of resistance, recovery, and stability of the system.
- It can mitigate the water scarcity by 79.5%, recover **72.66%** of infrastructure material, wait 9.43 days, and spend $ 6.84 after calamities.
- ✓ Overall, 79.42% of households belong to high and moderate resilient levels.

Thank you for your kind attention

Fellow's Contacts:

e-mail address: mohammadrafiqul.islam@univr.it

Univr: http://www.dse.univr.it/?ent=persona&id=54335&lang=en

INVITE: http://sites.centri.univr.it/invite/the-invite-phd-candidates/mohammad-rafiqul-islam/

ResearchGate: https://www.researchgate.net/profile/M_Rafiqul_Islam2

Other contacts: https://www.linkedin.com/in/mohammad-rafiqul-islam-77514189/ (LinkedIn)