HEIDELBERG UNIVERSITY

MASTER THESIS

Super duper fancy title. DONT FORGET TO CHANGE THIS!

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Declaration of Authorship

I, Bosse SOTTMANN, declare that this thesis titled, "Super duper fancy title. DONT FORGET TO CHANGE THIS!" and the work presented in it are my own. I confirm that:

- This work was done wholly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

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“”Can’t A Guy Make One Mistake?””

Baloo, The Jungle Book

Abstract

Super duper fancy title. DONT FORGET TO CHANGE THIS!

by Bosse SOTTMANN

Ensuring water security is considered as one of the major challenges of the twenty-first century. The trend of increasing demand and diminishing supplies is putting pressure on the availability of water worldwide. Particularly in the Horn of Africa, drought impacts determine the life of millions of people. Somaliland is in the midst of a years-long drought and water sources become more important than ever. Yet, information particularly about the most important water source type of berkads is incomplete and outdated.

Insufficient data availability can severely hamper disaster risk reduction measures, especially with regard to Forecast-based Financing (FbF), a proactive natural disaster response approach that has recently become increasingly widespread. Triggered by predicted disaster impacts, Anticipatory Actions (AAs) attempt to counteract impacts before the disaster occurs, rather than responding to post-disaster impacts. However, drought is a relatively novel application focus for this approach and is highly dependent on relevant information about local impacts.
One way to gather these information can be Citizen Science (CS), which has successfully been applied to provide data for acting on environmental issues primarily in North America and Europe. In addition, sub-categories of CS such as community-based monitoring, together with mobile crowdsensing, already form the conceptual backbone for the Somalia Red Crescent Society's health-related Community-based Surveillance project.
Building on the combination of these concepts, the aim of this study is to first develop a new and transferable approach for community-based participatory mapping and monitoring of water sources for water-scarce and resource-limited settings to facilitate relevant AAs in the context of FbF. This framework will subsequently be applied to create an implementation roadmap for the SRCS, ultimately aiming to improve water governance and information availability to address water scarcity in Somaliland.

The work is embedded in a primarily inductive design of an exploratory, iterative case study, and guided by a mixed-methods approach combining literature analysis and expert consultations. The results indicate that it is conceptually possible to integrate the concepts of FbF and CS for monitoring water sources in resource scarce settings to eventually trigger AAs within one framework. Moreover, in the case of Somaliland, it can also reasonably be assumed that the practical feasibility of this integrated framework is given. On this basis, future work will be able to integrate and assess local information in a pilot study, thereby overcoming the main limitations of this work due to resource, time and information constraints.

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Chapter 1

Conclusion & Outlook

This chapter concludes the study by summarising the main research findings in relation to the research questions and aim. It highlights the value of its contributions and suggests possibilities for future research.

This study has investigated the intersection of Forecast based Financing policies and techniques, Citizen Science approaches and methods, and water management structures and procedures in Somaliland. This investigation was driven by the aim to *adapt and apply an approach for community-based participatory mapping and monitoring of water sources in a water-scarce and resource-limited setting in collaboration with a national non-governmental organization to facilitate respective Anticipatory Actions in the context of Forecast based Financing, with the goal of improving water management and availability to address water shortages*.

Guided by two research questions and a mixed-methods approach combining literature analysis and expert consultation, a tailored framework could be developed and an implementation roadmap created. The results indicate that integrating the concepts of Forecast based Financing and Citizen Science for monitoring water source levels in resource-scarce settings to ultimately trigger Anticipatory Actions into one framework is theoretically possible. In the case of Somaliland, the practical feasibility of this integrated framework can also be assumed to be feasible based on the results.

This work further diversified the literature on Citizen Science projects by contributing a case study in regions other than North America and Europe. The development of the adaptable and replicable Six Stage Design Roadmap and Project Requirements Catalogue framework in this context may allow other work with similar aims and conditions to have a closer start of reference for designing their own project. Specifically in this context, the thesis laid a starting point for the implementation of a practical pilot study by the Somalia Red Crescent Society. Ultimately, this could lead to better data on water sources, which in turn could contribute to the implementation of Anticipatory Actions to address water shortages.

This study was primarily constrained by a modest number of interviewees, no opportunity for on site work and general time constraints. Therefore, the work remained at the conceptual stage and could not be evaluated against a practical application. Other evaluation options, such as direct comparison with other similar projects, were not feasible due to the novelty of the project and the consequent lack of similar ones. In addition, no concrete technical approaches and possibilities for data triangulation could be formulated as decisions at management level

had not yet been finalised.
Future research can directly continue where this work left of by implementing an on site pilot study, continue to dig deeper into one of the many questions that have arisen or focus on overcoming the current limitations. A pilot study could potentially address most of the primary constraints of this work and continue to adapt, implement and evaluate it locally. There are several questions worth asking in such a case study. Apparent areas of interest are the investigation of the water level measurement method and corresponding codes and the assessment of triggers and AAs. In terms of community engagement, exploring ways of integrating Integrated Water Resource Management with prevailing local practices on an equal footing, asking what the involvement of community elders might look like, and addressing issues of community heterogeneity and gender inequalities may all be potentially fruitful enquiries. Also of great interest is what benefits a two-way communication with the participants could further yield. Particularly in terms of receiving and integrating local and indigenous knowledge and providing weather and climate predictions and warnings. Furthermore, investigations and evaluations in various other fields will be required when further exploring a practical implementation.
The limitations of low external and internal validity and the question of whether the framework can be applied to other contexts may be addressed by further case studies in similar contexts and by including other methods such as upscaled surveys. The further investigation of the link between the water level proxy, vulnerability and impact may add further value to the argument of constructed validity. In addition, inter-project comparisons as well as comparisons with other methods, e.g. (remote-) sensor networks could be investigated. Besides these application-related questions, it would be interesting to examine more closely the recognised positivity bias and its effects in Citizen Science guidelines and frameworks.
In conclusion, the situation of water in Somaliland could be identified as a highly complex and challenging environment. The combination of Forecast based Financing and Citizen Science concepts could be identified as potentially fruitful for the monitoring of water sources. A further, especially practical, investigation into the issue and linking it to preventive measures may contain great value. In addition, proof-of-concept, -value and -use may be demonstrated by going the last research mile.

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