Plan Overview

A Data Management Plan created using DMPonline

Title: Community-led Water Resilience in San Cristóbal: Participatory Mapping for Adaptive Infrastructure Planning in the Galápagos

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Project abstract:

In this project, we will develop water vulnerability maps for San Cristóbal Island (Galápagos) using a multidisciplinary approach that combines technical assessments with community engagement. This work is part of a broader project that addresses the imbalance between infrastructure built for tourism and that serving local residents.

We aim to integrate hydrology, water quality analysis, and social research to gain a comprehensive understanding of the island's water systems. This involves assessing both the physical infrastructure—such as the distribution network, water sources (desalination, groundwater, freshwater bodies), and their vulnerabilities to contamination or climate-related pressures—and the broader environmental context, including land use patterns, aquifer recharge potential, and exposure to pollution. At the same time, we will work closely with local communities to map their daily interactions with water systems, alternative water sources, and perceptions of institutional support. Through interviews and field-based participatory methods like transect walks, we'll explore the community's adaptive strategies, resilience, and views on the management and governance of freshwater. Together, these insights will shape a set of vulnerability maps that reflect both technical and social dimensions of water security on the island. To support this integrated approach, we will implement a robust data management and analysis framework. This includes using Natural Language Processing (NLP) and speech technology to process community interviews, enabling efficient summarization and extraction of key insights. A retrieval-augmented system will allow future researchers to query project documents for relevant information. Additionally, structured databases and visualisation tools will ensure that technical maps and related outputs are accessible to stakeholders. All data—especially sensitive demographic or household-level information—will be handled with strict ethical standards, including consent, anonymization, and responsible data governance.

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Community-led Water Resilience in San Cristóbal: Participatory Mapping for Adaptive Infrastructure Planning in the Galápagos

0. Administrative questions

1. Provide the name of the data management support staff consulted during the preparation of this plan and the date of consultation. Please also mention if you consulted any other support staff.

N/A. (Thijs Slot of HREC consulted for HREC approval) Feedback obtained on 16th Sept 2025

2. Is TU Delft the lead institution for this project?

- No – please provide details of the lead institution below and TU Delft's role in the project

The lead institution for this project is **Universidad San Francisco de Quito (USFQ)** , Ecuador.
TU Delft's role: TU Delft is a collaborative partner providing the student research team (6 students: Matteo Carrari, Margherita Marrocolo, Anish Deshpande, Isabel Hille, Thyara Lesner, Flavia Giannini) who will conduct fieldwork, data collection, and analysis for developing water vulnerability maps for San Cristóbal Island, Galápagos.
TU Delft researchers will be responsible for:

- Collecting and processing qualitative data (community interviews, field notes, transect walks)
- Creating geospatial datasets and vulnerability maps
- Processing interview data using NLP and speech technology.
- Data storage, backup, and long-term archiving through TU Delft's institutional systems (OneDrive). Also to be uploaded to the USFQ OneDrive.

Interview protocols and fieldwork are being developed in collaboration with USFQ. Data ownership is joint between the project team under USFQ's umbrella.

I. Data/code description and collection or re-use

3. Provide a general description of the types of data/code you will be working with, including any re-used data/code.

Type of data/code	**File format(s)**	**How will data/code be collected/generated?** *For re-used data/code: what are the sources and terms of use?*	**Purpose of processing**	**Storage location**	**Who will have access to the data/code?**

Personally Identifiable Information (PII) - Names/whatsapp numbers/ neighbourhood of residence/ signatures of participants..	paper, .xslx	Names/whatsapp number/neighbourhood of residence collected via a google form of participants. Signatures (not linked to names) collected via paper consent forms during field interviews in the Galápagos.	To be able to contact the subjects for participation in the research. To obtain informed consent from interview participants and maintain ethical compliance.	Google Drive of primary data manager paper folder with the research team	Anish Deshpande (primary data manager) only. Stored separately from research data.
Personally Identifiable Research Data - Demographic information: interview location data, number of people in the household, occupation	wav, .aac, .mp3, .txt .json	Collected during the semi-structured field interviews, recording with our mobile phones.	To understand community demographics, water access patterns, and social vulnerability factors for developing water vulnerability maps.	TU Delft OneDrive (restricted-access folders, encrypted)	TU Delft student team during collection. After anonymization: shared with USFQ collaborators via project deliverables
Interview and field note data (qualitative) -The interviews themselves (conversation recording) and the questionnaires with questions regarding the water infrastructure.	.wav, .aac, .mp3, .txt .json	Collected during the semi-structured field interviews, recording with our mobile phones.	To understand community demographics, water access patterns, and social vulnerability factors for developing water vulnerability maps.	TU Delft OneDrive (restricted-access folders, encrypted)	TU Delft student team during collection. After anonymization: shared with USFQ collaborators via the project delivarebles
QGIS maps	.gpkg files for creating the vulnerability and technical maps (QGIS)	Created by the researchers	As a part of the deliverables for the project alongside the report	Private Github Repository	Maps shared with USFQ team and local municipality after the research
Processing code	.py and .sh files, some .sql for a local database. .ipynb files for analysis (jupyter notebook)	Written by the researchers	To process the audios and transcribe, translate and further analyses	Private Github repository	TU Delft research team. Code later uploaded to USFQ OneDrive for reference and TU Delft OneDrive

II. Storage and backup during the research process

4. How much data/code storage will you require during the project lifetime?

- < 250 GB

5. Where will the data/code be stored and backed-up during the project lifetime? (Select all that apply.)

- TU Delft OneDrive
- GitHub/other version control repository (external) – please explain below

All the data in stored in the TU Delft OneDrive, the code for processing the data is stored in a private github repository accessible only to the researchers.

III. Data/code documentation

6. What documentation will accompany data/code? (Select all that apply.)

- Procedure – A description of data processing procedure(s) (such as laboratory setup, simulation workflows).
- Data – Methodology of data collection
- Data – README file or other documentation explaining how data are organised

The methodology of data collection will clearly be highlighted in the report

IV. Legal and ethical requirements, code of conducts

7. Does your research involve human subjects or third-party datasets collected from human participants?

If you are working with a human subject(s), you will need to obtain the HREC approval for your research project.

- Yes – please provide details in the additional information box below

I intend to apply for ethical approval from the Human Research Ethics Committee, but have not yet done so.

8. Will you work with personal data? (This is information about an identified or identifiable natural person, either for research or project administration purposes.)

- Yes

The project will work with personal data in the following ways:

For Project Administration Purposes (PII - Personally Identifiable Information):

- Names/whatsapp numbers of interview participants
- Informed consent forms (signature and neighbourhood of residence)

For Research Purposes (Personally Identifiable Research Data):

- Demographic information about participants (age, gender, household characteristics)
- Location data (approximate locations where interviews were conducted))
- Community members' perceptions, experiences, and views on water governance via a survey

- Audio recordings of interviews (where permitted with consent)

Important safeguards mentioned in the DMP:

- Informed consent obtained before all interviews dealing with personal data
- All transcripts and survey responses will be anonymized
- Audio files stored in anonymized/de-identified format, not tied to consent metadata
- Sensitive data stored with restricted access (need-to-know basis only)
- Use of pseudonyms and unique participant IDs to minimize identifiability
- Only fully anonymized data will be shared publicly or archived long-term
- Sensitive location data (e.g., street-level) shared only as aggregate statistics with participant consent

9. Will you work with any other types of confidential or classified data or code as listed below? (Select all that apply and provide additional details below.)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any other types of confidential or classified data/code

10. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question.

The data controller is the TU Delft research team for the full duration of the project.

All PII PIRD data will be handled by the research team during the project. After the project, the PII data will be deleted.

The research outcomes (the report and maps created, containing no PII/PIRD, which are the intellectual property generated) will be made public for the benefit of the local community and government in San Cristobal, the Galapagos. USFQ and TU Delft maintain the ownership/authorship, but findings are intended to be purely academic and for community awareness and benefit.

No code is reused, and that data belongs solely to the student research team. After the project the code for the project is also uploaded to TU Delft and USFQ servers (oneDrive) for reference, but not released publicly

11. Which personal data or data from human participants do you work with? (Select all that apply.)

- Proof of consent (such as signed consent materials which contain name and signature)
- Audio recordings
- Names and/or geolocation information as part of research data
- Job title and/or employer
- Telephone number, email addresses and/or other addresses as contact details for administrative purposes
- Names as contact details for administrative purposes

12. Please list the categories of data subjects and their geographical location.

Interview participants are the adult residents of San Cristobal, the Galapagos. All are healthy, in control of their information and have provided informed consent for participating in the interview and answering the questionnaire.

13. Will you be receiving personal data from or transferring personal data to third parties (groups of individuals or organisations)?

- No

16. What are the legal grounds for personal data processing?

- Informed consent

17. Please describe the informed consent procedure you will follow below.

Only written informed consent will be taken.

The researcher will inform the potential participants about the goals and procedures of the research project prior to the interview. The researcher will also inform them about the personal data that are being processed and for what purpose. In this case, it is the consent to record the interview to process and extract data about their experiences with the water infrastructure. It is being informed that the data will be anonymised and the recording destroyed after the project. The participants have the option of keeping the consent form. We also have a withdrawal of consent form if needed. The participants agree to using the data they provide for our research and calculation of statistics/creation of maps.

18. Where will you store the physical/digital signed consent forms or other types of proof of consent (such as recording of verbal consent)?

We will preserve the hard copy of the informed consent forms within the locked room of the residence of the researchers during the project, and then the physical copies will be submitted to USFQ upon the completion of the project. (The proof of consent contains no names, only signatures and area of residence).

19. Does the processing of the personal data result in a high risk to the data subjects? (Select all that apply.)

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data in your research project.

If any category applies, please provide additional information in the box below. Likewise, if you collect other type of potentially sensitive data, or if you have any additional comments, include these in the box below.

If one or more options listed below apply, your project might need a DPIA. Please get in touch with the Privacy team (privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.

- None of the above apply

23. What will happen with the personal data used in the research after the end of the research project?

- Anonymised or aggregated data will be shared with others

Aggregated statistical data will be shared, but this is not personal data. For example, the number of people who responded from a particular area. All PII/PIRD will be deleted.

24. For how long will personal research data (including pseudonymised data) be stored?

- Personal data will be deleted at the end of the research project
- Other – please state the duration and explain the rationale below

A time frame of 10 months has been mentioned in the consent form as a buffer time for processing the data/ in case any additional analyses are required by the client on the pseudonymised data for publication purposes after the completion of the project. (Eg, while writing an academic paper). But the data will be deleted by the end of the 10 months.
All personal data will be destroyed at the end of the research project, the following is the only exception to that:

Most data is anonymous, and the only pseudonymised personal data that falls under the purview of this question is the geo location of the interview, used in creating geo-spatial maps. However, this data is always noisified and randomised to fuzz the actual location while processing, differently in each of the maps that requires it. And this data will be deleted by the end of 10 months.

25. How will your study participants be asked for their consent for data sharing?

- In the informed consent form: participants are informed that their personal data will be anonymised and that the anonymised dataset is shared publicly

In the consent form, we inform that group data/aggregated may be publiished or discussed in scientific talks. And that their personal data (audio recording) will not be kept after the project/shared with anyone. And data processing will be on anonymised data.

V. Data sharing and long term preservation

27. Apart from personal data mentioned in question 23, will any other data be publicly shared?

Please provide a list of data/code you are going to share under 'Additional Information'.

- All other non-personal data/code produced in the project

code will be uploaded to TU Delft and USFQ servers
non-personal data will be used in creating our research outcomes (maps and reports), which will be shared.

29. How will you share research data/code, including those mentioned in question 23?
Select all that apply and provide additional details below.

- The data/code will be shared in a different way – please provide details below regarding the availability of a

persistent identifier (such as a DOI), licensing and preservation period of the data
- All anonymised or aggregated data, and/or all other non-personal data/code will be uploaded to 4TU.ResearchData with public access

Non-personal Data/Code is also planned to be uploaded to USFQ official OneDrive storage repository.

30. How much of your data/code will be shared in a research data repository?

- < 100 GB

31. When will the data/code be shared?

- At the end of the research project
- As soon as corresponding results (papers, theses, reports) are published

The report is scheduled to be created by the end of the research project. That is when the code and data will be shared/stored in a restricted repository. For public access, may take longer depending on the timeline for 4TU creation

32. Under what licence(s) will the data/code be released?

- MIT Licence
- CC BY

code: MIT License
data CC BY

VI. Data management responsibilities and resources

33. If you leave TU Delft (or are unavailable), who is going to be responsible for the data/code resulting from this project?

Prof. Eva Lantsoght, the supervisor for this project.
E.O.L.Lantsoght@tudelft.nl

34. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Anish Deshpande, will take the lead in data management. (a.a.deshpande-2@student.tudelft.nl)
No financial extra cost is required as the data is <10GB. 4TU.ResearchData is able to archive 1TB of data/code per researcher per year free of charge for all TU Delft researchers. We do not expect to exceed this and therefore there are no additional costs of long term preservation.

35. Which faculty do you belong to?

- Faculty of Electrical Engineering, Mathematics, and Computer Science (EEMCS)

The project is going to be conducted under the CEG (Faculty of Civil Engineering and Geosciences), and the main supervisor is from that faculty. The rest of the research team, are also from that faculty.

Planned Research Outputs

Interactive resource - "GeoSpatial Maps"

Interactive QGIS and HTML rendering of the maps that we will create for San Cristobal, the Galapagos. Regarding the water infrastructure, governance, problems, satisfaction, usage patterns etc.

Report - "Community-led Water Resilience in San Cristóbal: Participatory Mapping for Adaptive Infrastructure Planning in the Galápagos "

This project investigates how water insecurity in San Cristóbal, Galápagos, Ecuador is managed through informal, everyday practices that emerge outside formal governance structures. As an ecologically fragile and politically peripheral island city, San Cristóbal faces increasing challenges from aging infrastructure and intensifying climate stressors. The project seeks to identify weaknesses in institutional water systems while foregrounding the community-driven solutions that have emerged in response. We conceptualize these grassroots strategies as anticipatory water governance—practices that reveal how residents navigate risk and uncertainty in the absence of consistent institutional support.

Through participatory mapping and transect walks, the project locates spatial and technical deficiencies in water infrastructure while capturing often-overlooked adaptive strategies rooted in local knowledge. These methods do not merely document lived experience—they co-produce knowledge with residents, embedding it directly into the spatial and technical understanding of the island's water system. In a context of fragmented governance and low institutional trust(add which institutions relevant), relationship-building with local communities is not only ethical—it is methodologically essential. Though demanding, this process allows for a deeper, more nuanced understanding of adaptation that validates community expertise and highlights responses invisible to conventional planning approaches. Given the island's ecological sensitivity, remoteness from the mainland and limited carrying capacity, the project advocates for locally grounded, context-responsive infrastructure planning over one-size-fits-all technical fixes. By mapping government institutions and community practices, and centering local agencies and knowledge, the project contributes to more equitable, inclusive, and adaptive models of water resilience and sustainability in small island urban environments.

Planned research output details

Title	DOI	Type	Release date	Access level	Repository(ies)	File size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
GeoSpatial Maps		Interactive resource	Unspecified	Open	None specified		Creative Commons Attribution 4.0 International	None specified	No	No
Community-led Water Resilience in San Cristóbal: P ...		Report	Unspecified	Open	None specified		Creative Commons Attribution 4.0 International	None specified	No	No