



An exploration of system-wide flood protection standards for coastal polders in Bangladesh

Third Submission: RR_BGD_2025_442

Maria Reyes Retana

reproducibility@worldbank.org

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This review verifies the reproducibility of the exhibits included in the paper “*An exploration of system-wide flood protection standards for coastal polders in Bangladesh*”.

Contents in this review:

1. Main findings
2. List of exhibits and reproducibility status
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Main findings

- **Every exhibit has been reproduced accurately.**
- The code was successfully executed on a new computer after:
 1. Recovering the environment and running the Jupyter notebook.
- The output demonstrates consistent stability across multiple runs. Specifically, executing the code two times consecutively yielded identical results.
- The code takes approximately 10 hours to run.
- We conducted our reproducibility analysis based on the paper shared by the authors on October 24th.
- **Verification Process and Data Handling:**
 - The reproducibility package relies on 2 types of data: accessible and restricted data (available only from the authors).
 - Reviewers used accessible and restricted data provided directly by the authors to conduct the reproducibility verification, and this is not included in the public reproducibility package. Restricted data is forthcoming in the Development Data Hub.
 - *data_hash_report.csv* lists the SHA256 hashes of all files in the Data folder to support data integrity checks. Users who acquire the restricted data can use this file to verify that the data has not been altered.
- **Reproducibility Summary:**
 - **Data:** Some data is restricted and it is not included in the reproducibility package.

- **Code:** All code files (from cleaning to analysis) are included in the reproducibility package.
- **Outputs:** All outputs are generated by code included in the reproducibility package.
- **Dependencies environment:** The reviewers created a new environment using the latest versions of dependencies available at the moment of the review.

List of exhibits and reproducibility status

Results in the Main Section of the Paper

- **Figure 1** Does not show analysis results.
- **Figure 2** Does not show analysis results.
- **Figure 3** **Reproduced.** Verified against protection_levels_donothing.png
- **Figure 4** **Reproduced.** Verified against Flood_damage_25_year.png left panel
- **Figure 5** **Reproduced.** Flood_damage_per_area.png left panel
- **Figure 6** **Reproduced, includes manual changes.** The figure is displayed in the Jupyter notebook. By default, the left-hand graph is generated with polder set to 5. The user must manually change the polder value to 32 and adjust the axis accordingly.
- **Figure 7** **Reproduced.** Verified against Optimal_RP_base.png
- **Figure 8: Left panel** **Reproduced.** Left panel verified against Optimal_heightening.png
- **Figure 8: right panel** **Reproduced.** Right panel verified against variable_cost.png
- **Figure 9** **Reproduced.** Verified against Uncertainty_analysis.png.
- **Table 1** Does not show analysis results.
- **Table 2** Does not show analysis results.

Results in the Annex

- **Figure 10** Theoretical example, wasn't considered in the verification.
- **Figure 11** Theoretical example, wasn't considered in the verification.
- **Figure 12** Theoretical example, wasn't considered in the verification.
- **Figure 13** Does not show analysis results.
- **Table 4** Does not show analysis results.
- **Figure 14** Theoretical example, wasn't considered in the verification.
- **Figure 16** **Reproduced.** Verified against dyke_classification.png
- **Figure 17** **Reproduced.** Verified against slope_protection.png

- **Figure 18** Does not show analysis results.
- **Table 5** Does not show analysis results.
- **Table 6** Does not show analysis results.
- **Figure 19, 20, 21, 22, 23** Reproduced with manual changes. The figure was reproduced when setting uncertainty_mode = 'variable' (figure 19); uncertainty_mode = 'slope' (figure 20); uncertainty_mode = 'bathtub' (figure 21); uncertainty_mode = 'wind' (figure 22); uncertainty_mode = 'SLR' (figure 23).
- **Figure 24** Theoretical example, wasn't considered in the verification.

Reproduction Environment

Paper exhibits were reproduced on a computer with the following specifications:

- OS: macOS Sequoia
- Processor: Apple M4 Pro
- Memory available: 24 GB
- Software version: Python 3.9.23