



# A COMPARATIVE ASSESSMENT OF FLOOD MAPPING METHODS FOR URBAN RISK MANAGEMENT IN DATA-POOR ENVIRONMENTS

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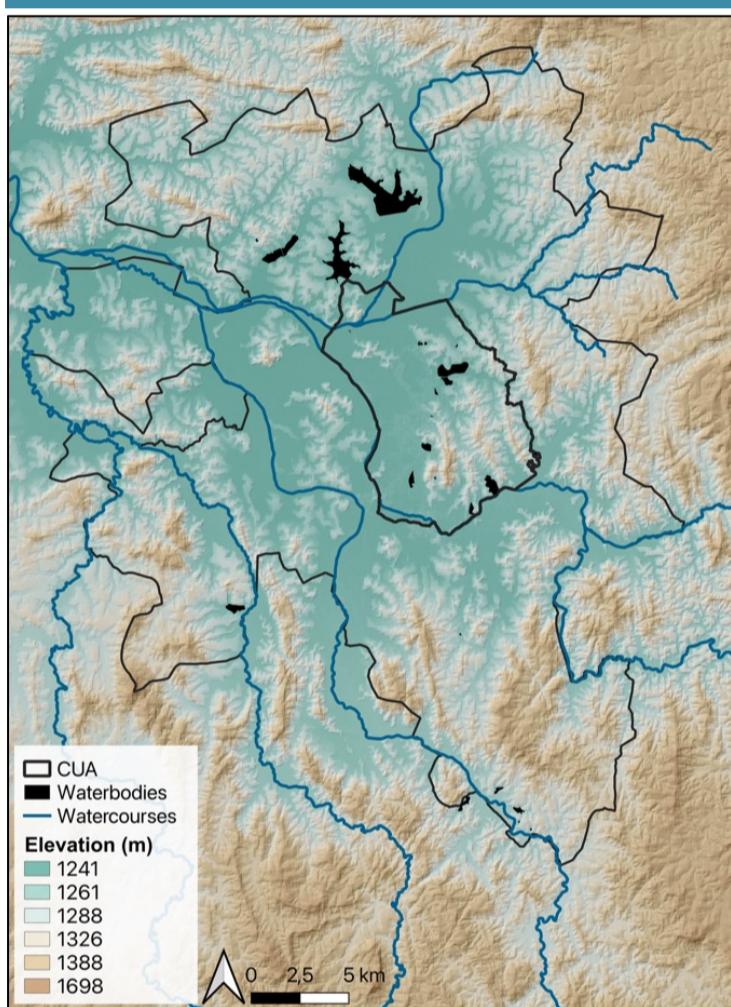
## BACKGROUND

- Flood mapping is essential for urban resilience, yet conventional hydrological models often perform poorly in **data-scarce** contexts.
- Alternative approaches include **optical/SAR remote sensing**, **simplified flood modeling**, and **multi-criteria analysis**.
- Limited objective evidence on their **complementarity** calls for benchmarking (data needs, performance, decision relevance).

## OBJECTIVES

- 1 Compare flood maps derived from remote sensing, Fast Flood Simulation, and multi-criteria analysis.
- 2 Assess their strengths, limitations, and operational usefulness across response, recovery, and long-term planning

## STUDY AREA



Antananarivo (Madagascar) is emblematic of **flooding challenges** in data-scarce, **resource-limited** urban environments.

Representative of many rapidly growing cities.

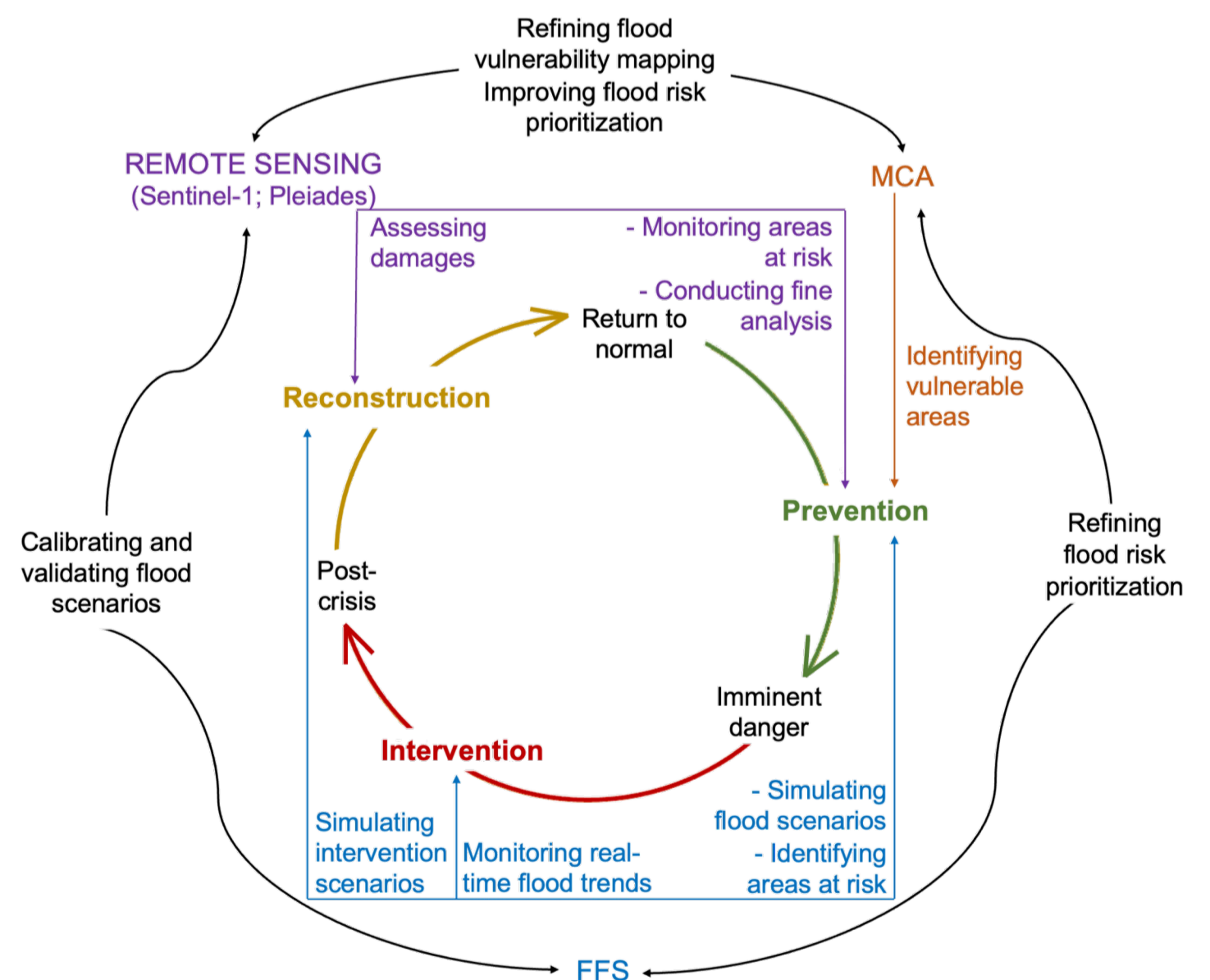
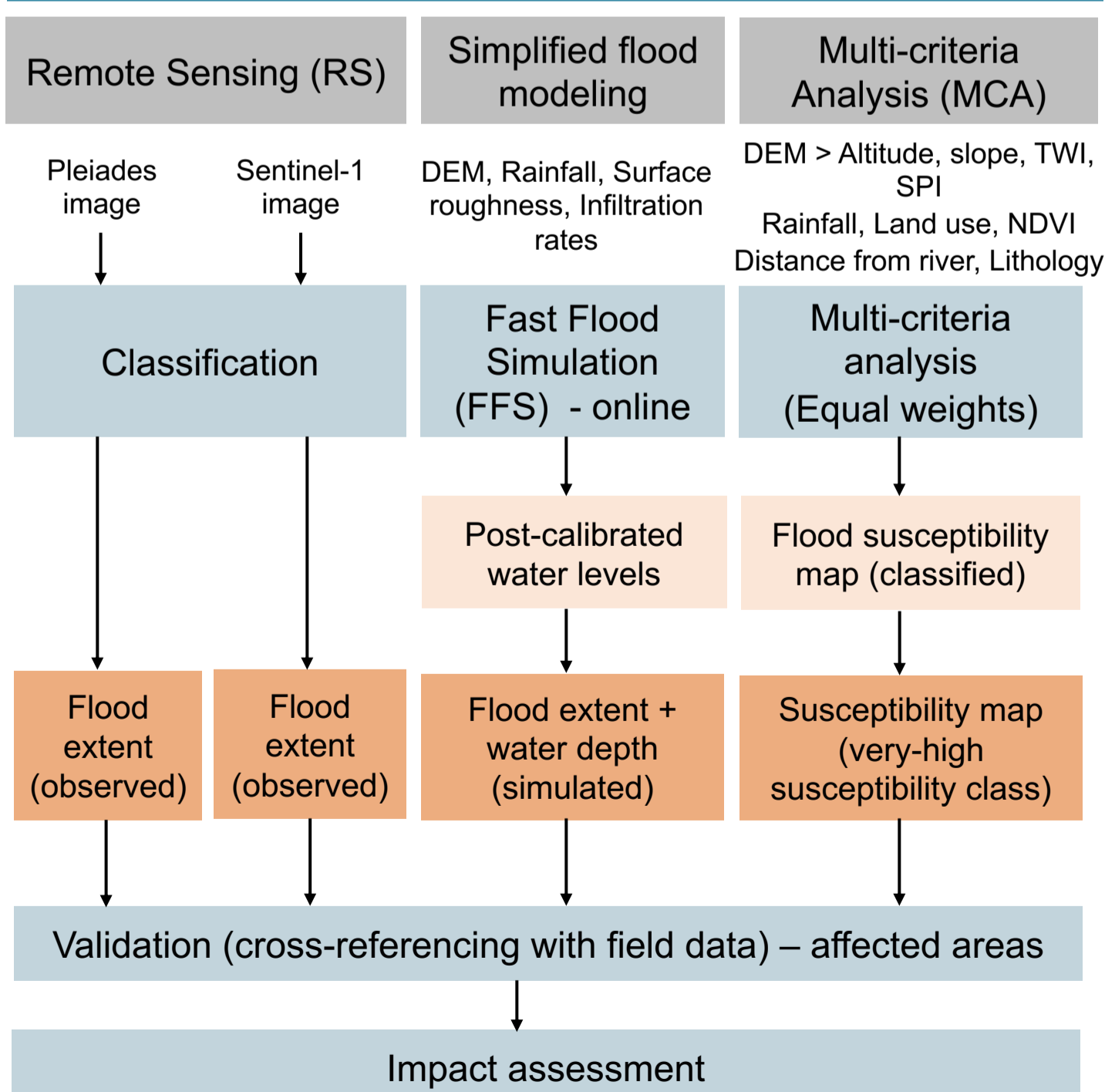
The case study was selected **based on relevance and data availability** (intense rainfall event, Jan 2022).

## KEY FINDINGS and OPERATIONAL TAKEAWAYS

Method	Detect floods Sensitivity (%)	Avoid false alarms Specificity (%)	Overall accuracy (%)
Pleiades	15.12	<b>97.67</b>	92.51
Sentinel-1	0.32	<b>99.78</b>	93.56
FFS	<b>79.53</b>	92.71	91.89
MCA	<b>68.15</b>	94.41	92.78

- **FFS** is most suitable for **event support** (flood extent + water depth) and achieves the highest flood detection in the validation.
- **MCA** supports **risk prioritization and long-term planning**, providing a robust compromise between detection and false alarms.
- **Remote sensing** is best used for **post-event mapping and validation** in this case study, and methods are best applied in **combination** across prevention–response–recovery.

## MATERIALS AND METHODS



RS–FFS–MCA complementarity across risk-management phases

Ramiamanana, F. N., Munyi, J. M., Archambeau, P., & Teller, J. (2025). A comparative assessment of flood mapping methods for urban risk management in data-poor environments. *Natural Hazards*. <https://doi.org/10.1007/s11069-025-07590-9>