Viability of an Irrigation Development Intervention in Tigray: an Application of Stochastic Impact Evaluation

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Introduction

- Assessing the feasibility of an irrigation dam investment and optimizing expected returns require detailed *ex-ante* appraisal.
- Due to the inherently complex and uncertain consequences of irrigation dam investments and often severe data scarcity, traditional cost-benefit assessment methods face limitations.
- Stochastic Impact Evaluation (SIE; Luedeling and Shepherd 2016) attempts to overcome the particular challenges of evaluating investments in such contexts.

Research questions

- What are the costs, benefits and risks of an irrigation dam in the study area?
- What uncertain variables affect the intervention decisions of the dam?
- How will the dam affect local stakeholders and the environment?

Methodology

- Expert knowledge from 10 subject matter experts was elicited and used to develop a causal impact model.
- We applied the SIE approach, which allows assessing complex decision problems and considering uncertainty and variability in input variables (Luedeling et al. 2015).
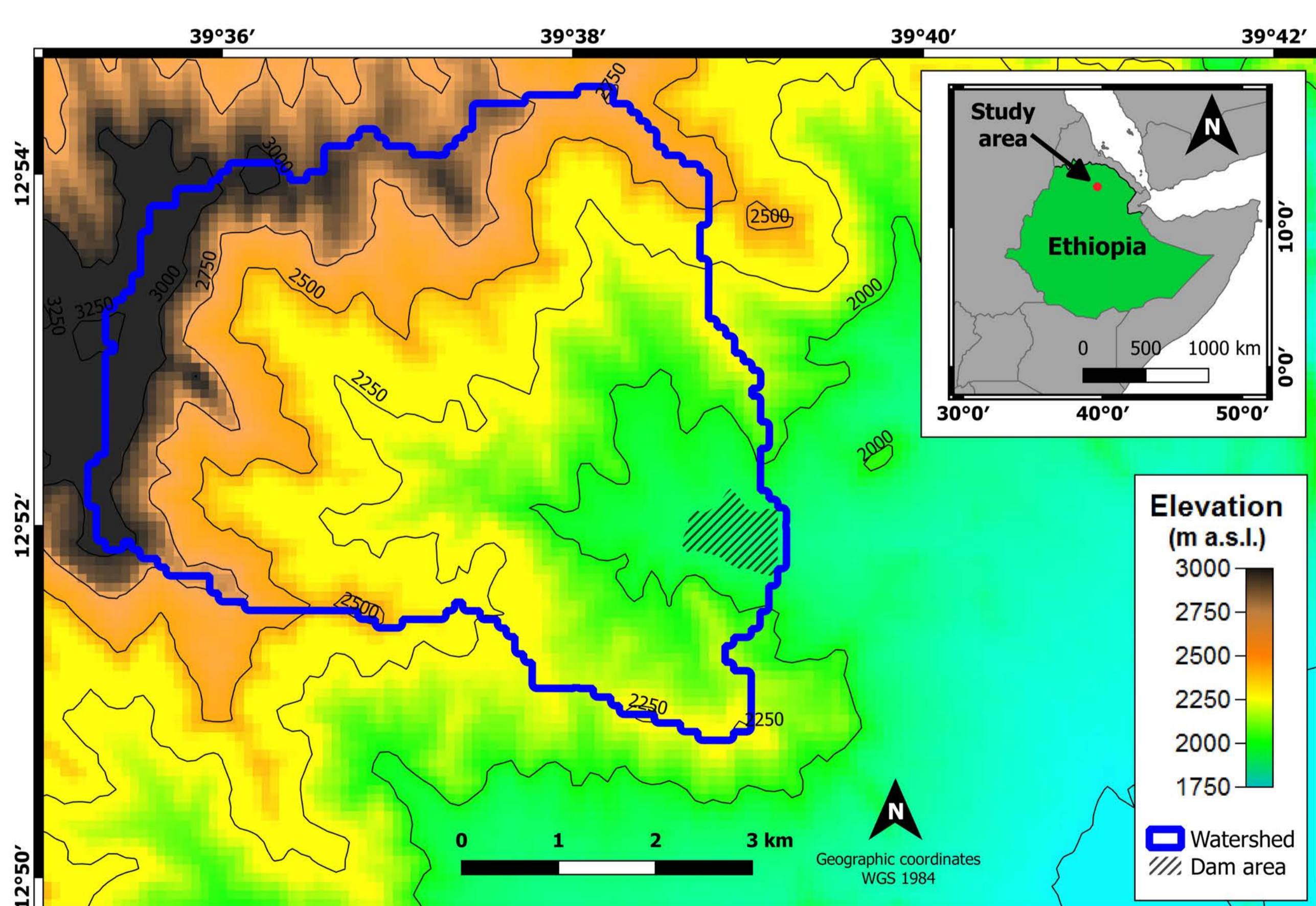
Dam construction area, Ebo, Tigray, Ethiopia.

Impressions from the study area

Proposed dam construction site

Site visit with subject matter experts

Potential irrigation area close to dam site

Potential irrigation area, further downstream

Results

- Several interest groups were identified:

Stakeholders:	
• Upstream villagers	• Farmers further downstream
• People displaced	• Implementers
• Downstream irrigators	

- These groups' net benefits are determined by:

Costs:	
• Production	• Watershed management
• Dam construction	• Health impacts
• Compensation	• Socio-cultural
• Repair and maintenance	• Environmental impact

Benefits:	
• Irrigation (also to support rainfed prod.)	• Compensation
• Employment	• Reduced flooding effect
• Time saving	• Erosion control
	• Other environ. benefits

- Several risk factors were identified:

Risks:	
• Weather risk	• Water diversion
• Dam failure	• Increase in cost
• Use of dam water for urban supply	• Decrease in output price
	• Delay in construction

Outlook

- Modeling of plausible ranges of decision outcomes for various stakeholders is in progress.
- Critical uncertainties will be identified by Value of Information analysis.

References

Luedeling E, Shepherd K, 2016. Solutions 7(5), 46-54.

Luedeling E Oord AL, Kiteme B, Ogalleh S, Malesu M, Shepherd KD and De Leeuw J, 2015. Frontiers in Environmental Science 3, article 16, 1-18.

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DAAD Deutscher Akademischer Austausch Dienst German Academic Exchange Service

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