

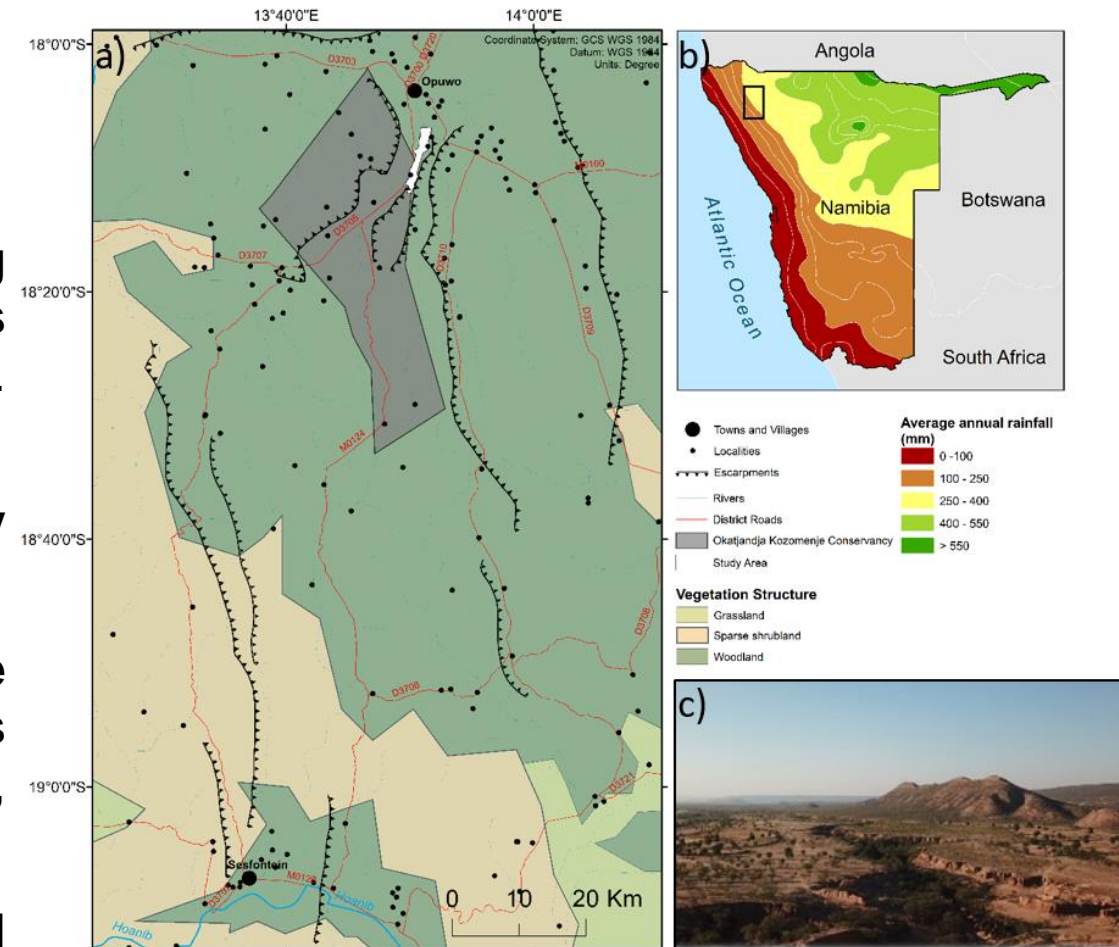
Identifying and describing the impact of gully erosion in the livelihoods and properties of traditional Himba communities in Kaokoland, Namibia

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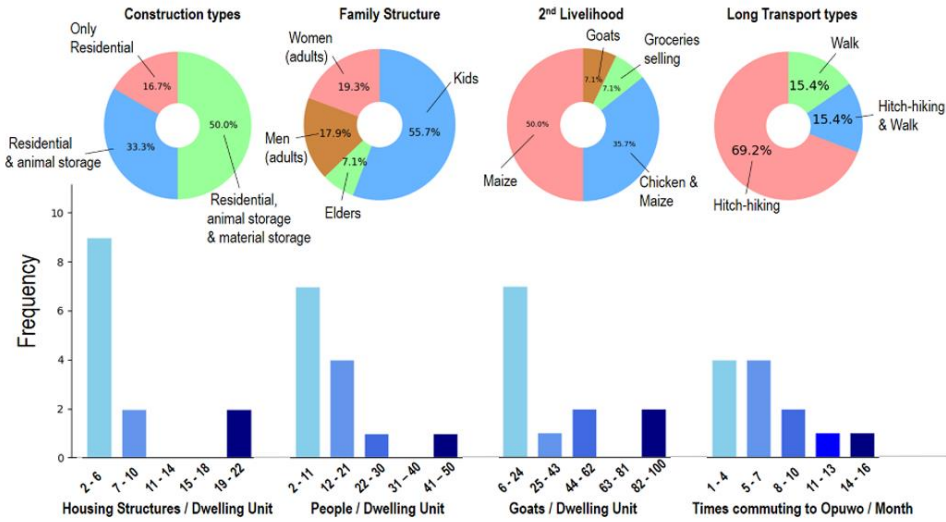
Introduction

- Gully erosion is a **form of soil erosion caused by flowing surface water which consists of open, unstable channels** that have been cut more than 30 cm deep into the ground. (<https://www.environment.nsw.gov.au/>).
- Gullies lead to a **decrease in soil moisture in the inter-gully areas** (Frankl et al., 2013).
- Gully development enhance drainage and **accelerate aridification processes** in the semi-arid zones, which leads to a **loss of crop yields** and available land (Valentin et al., 2005)
- It is possibly the **most critical overlooked environmental problem in Namibia** (Pringle et al., 2011).
- The Himba Land use is based on the joint management of the natural resources pasture and water.
- 1970-80 -> New boreholes system.
- 2004/5→ stability not there anymore in Himba communal management (Bubenzer, Bolten and Darius, (2007))



The Omaipanga valley

a)



b)



c)



d)



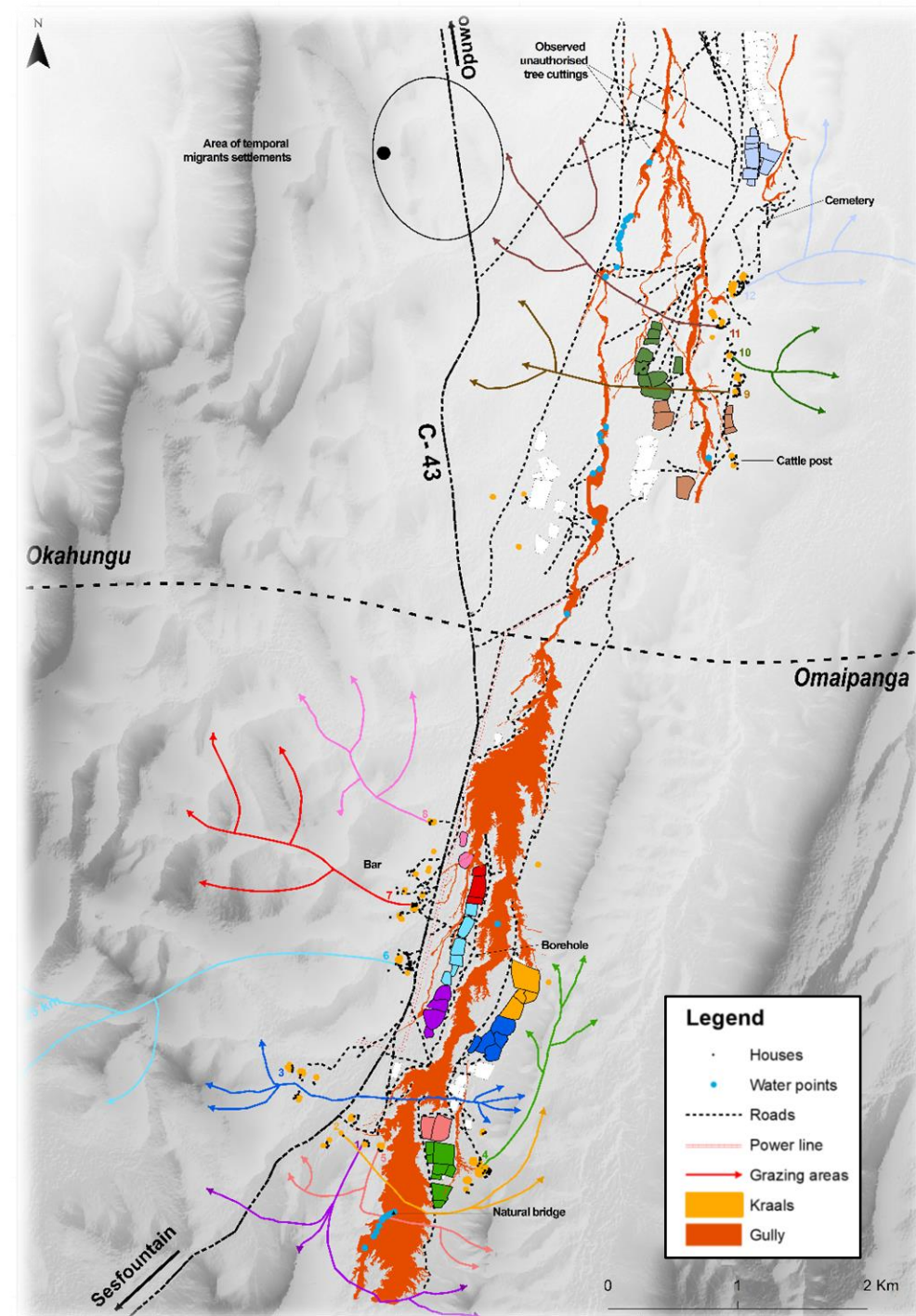
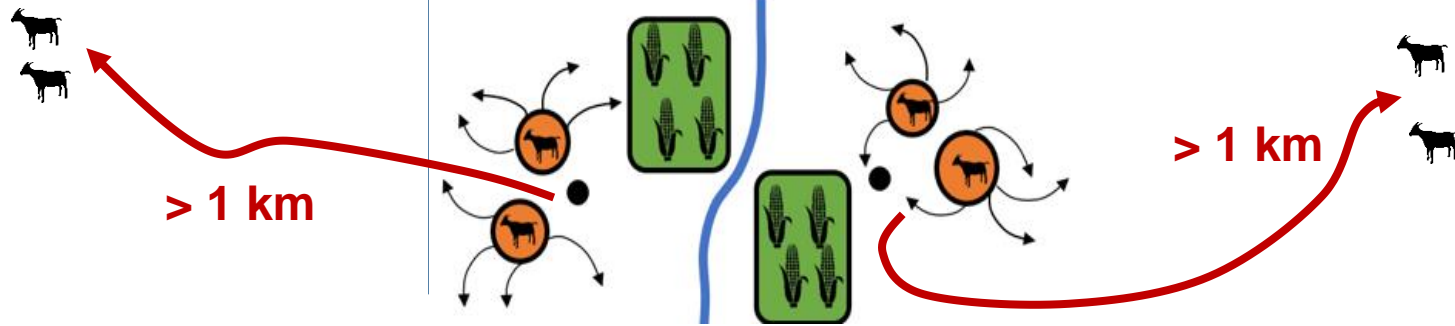
e)



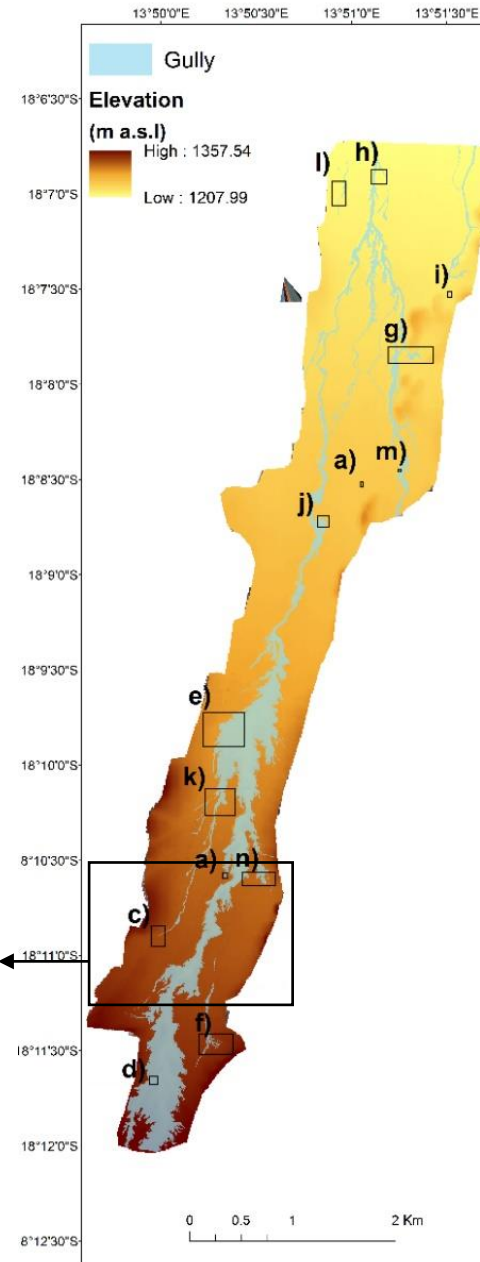
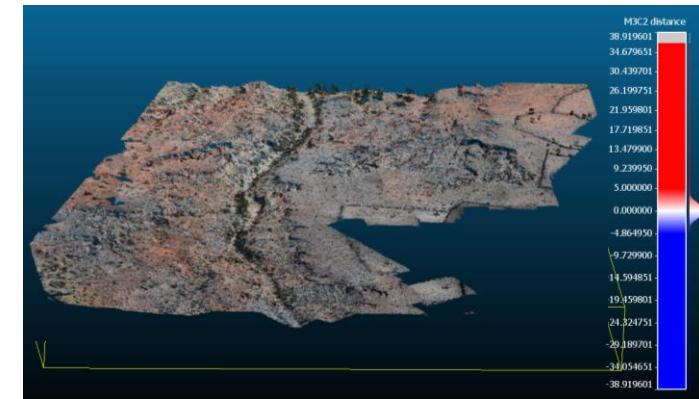
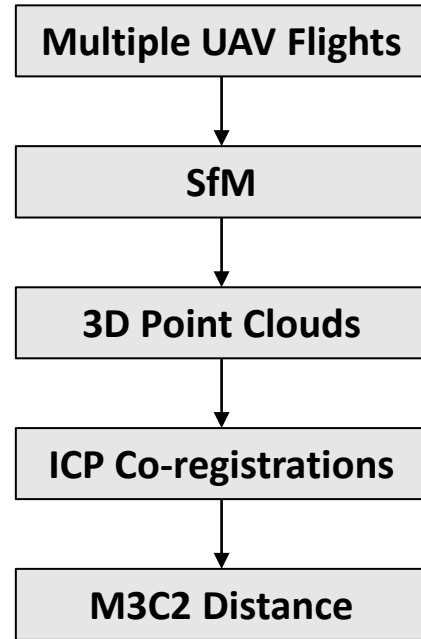
Dry season (April → Nov)

Rainy season (Nov →)

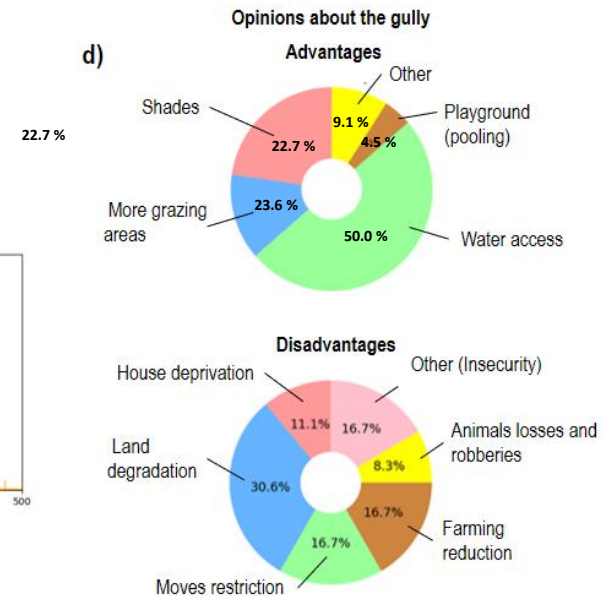
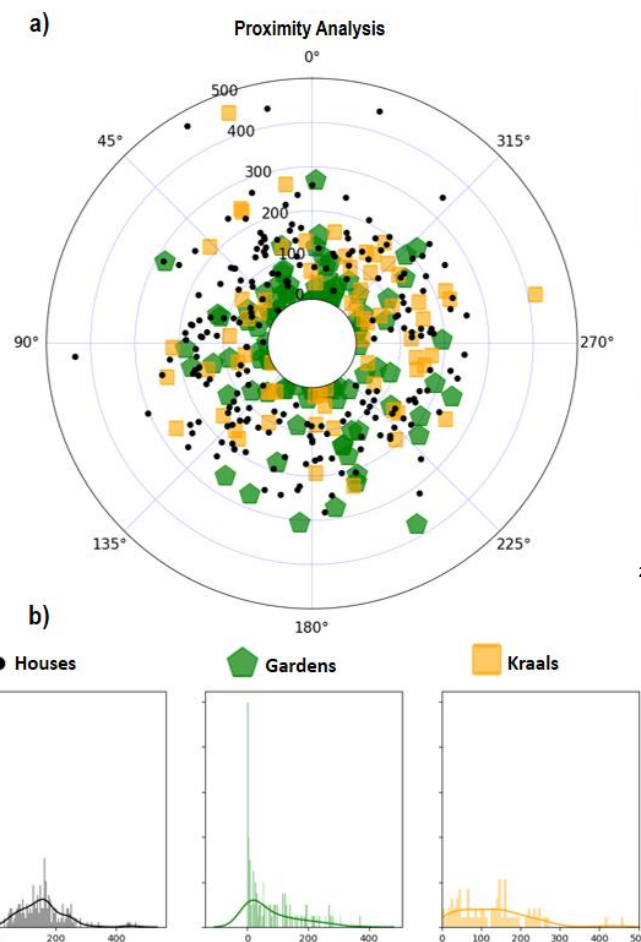
Dry season (April → Nov)



Drone Based 4D Analysis

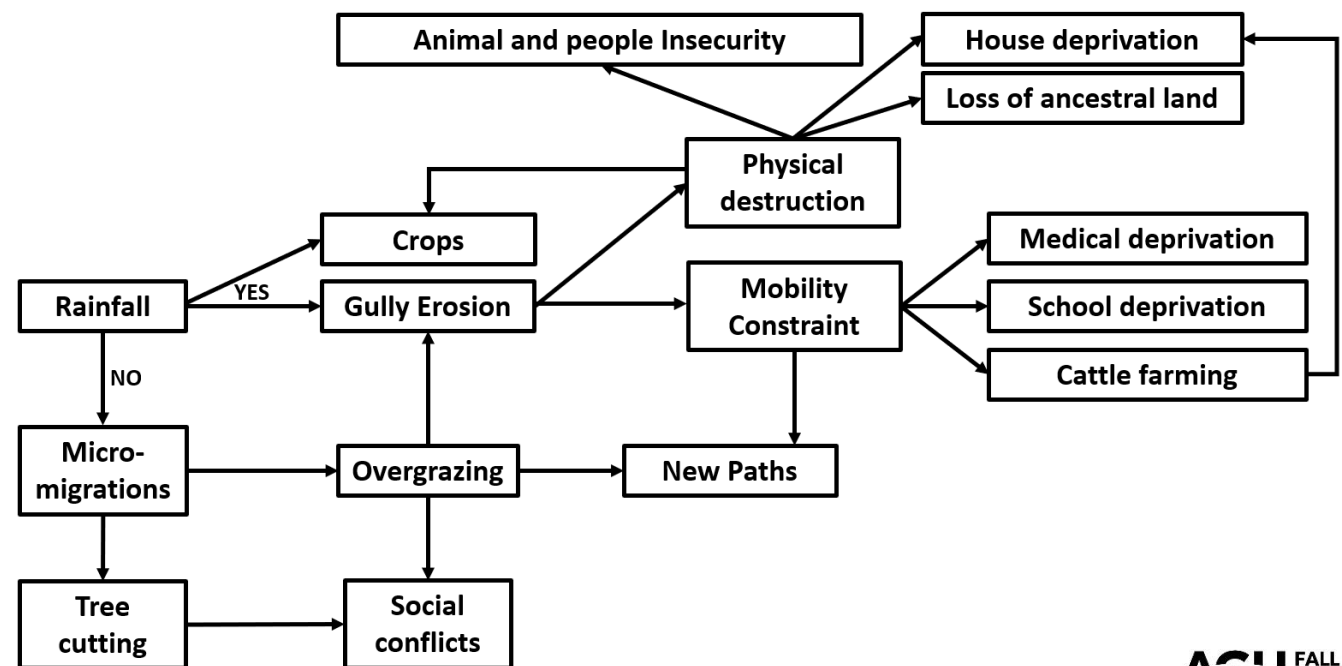


Item	Total	In Danger (<50m)	Description
Gardens	110	57	Reduction of area for crops Abandonments of areas which serve as water and runoff barrier Gully opens for goats Conflicts with new migrants
Kraals	70	17	Economic impact to rebuild them Less protection of domestic animals against predators Temporal migration to safer areas Reduction of number of animals
Houses	60	23	Economic impact as need to rebuild Permanent migration Loss of ancestral identities and accents connections. Family fragmentations
Power Line (sections)	-	15	Isolation of main logistic village with school Public investment
Roads and paths (sections)	-	45	Territorial isolation School deprivation Health deprivation Moves restrictions for animals Cattle farming not possible Development of new roads, increase of degradation.
Bombing station	1	1	Water deprivation



- Most affected elements are the gardens.
- General land degradation and security for animals and humans is reported as the main concern,
- Permanent access to water is reported as the main benefit of the gully.

- The main livelihoods in the study area are **goat herding** and **maize crop farming**.
- **Diversity** of the **family and settlements** spatial arrangements, as well as in the **type of construction structures**.
- The **potential rainy season pasture is disappearing**, and the pressure is transferred to potential dry season pasture.
- As the gully offers continuous resources it is an attractive **migration spot in the rainy season**.
- **Mobility patterns** and **agricultural practices** affect the development of existing gullies and favour the creation of new gullies.
- As the **gully increases in size**, it becomes **more difficult to keep cows**.
- One of the main problems associated with gully is **safety for animals and people**.
- Large scale gully monitoring (Satellite based) is required.



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