

Landscape permeability for elephant movement

Assessing the cumulative impact of game-proof fences and land management by applying least-cost corridor analyses

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Research context

Study area

- South-west of Etosha National Park (ENP), Kunene Region, Namibia
- habitat to elephants that are bulkfeeders moving over long distances
- communal and commercial farmers engaged in livestock farming, tourism and hunting practices
- human activities incl. game-proof fences restrict elephants to move in search for water, forage grounds and potential mating partners.

Research goals

1. Contributing to a better understanding of the interactions between humans and elephants in the study area
2. Assessing the cumulative impact of game-proof fences and land management on the landscape permeability for elephant movement



Methods

The study applied an interdisciplinary approach by combining social science perspectives with a geospatial data analysis:

1 Socio-empirical survey

respondents selected by snowball sampling, consultation of 9 experts and 11 local stakeholders, semi-structured questionnaires

2 Participatory mapping

manually on a DIN A1 map, provision of a comprehensive overview on the land use activities and the location of game-proof fences

3 Geospatial analyses

impact assessment of slope, NDVI, fences, management on location of GPS records of 7 collared elephants (provided by MET); suitability analyses to identify suitable habitats as core areas based on home range estimations (Calenge 2019); least-cost corridor analyses (Linkage Mapper by McRae & Kavanagh 2017) for different landscapes to assess the connectivity between core area pairs

Results

1 Contextualization of variables influencing human-elephant interactions

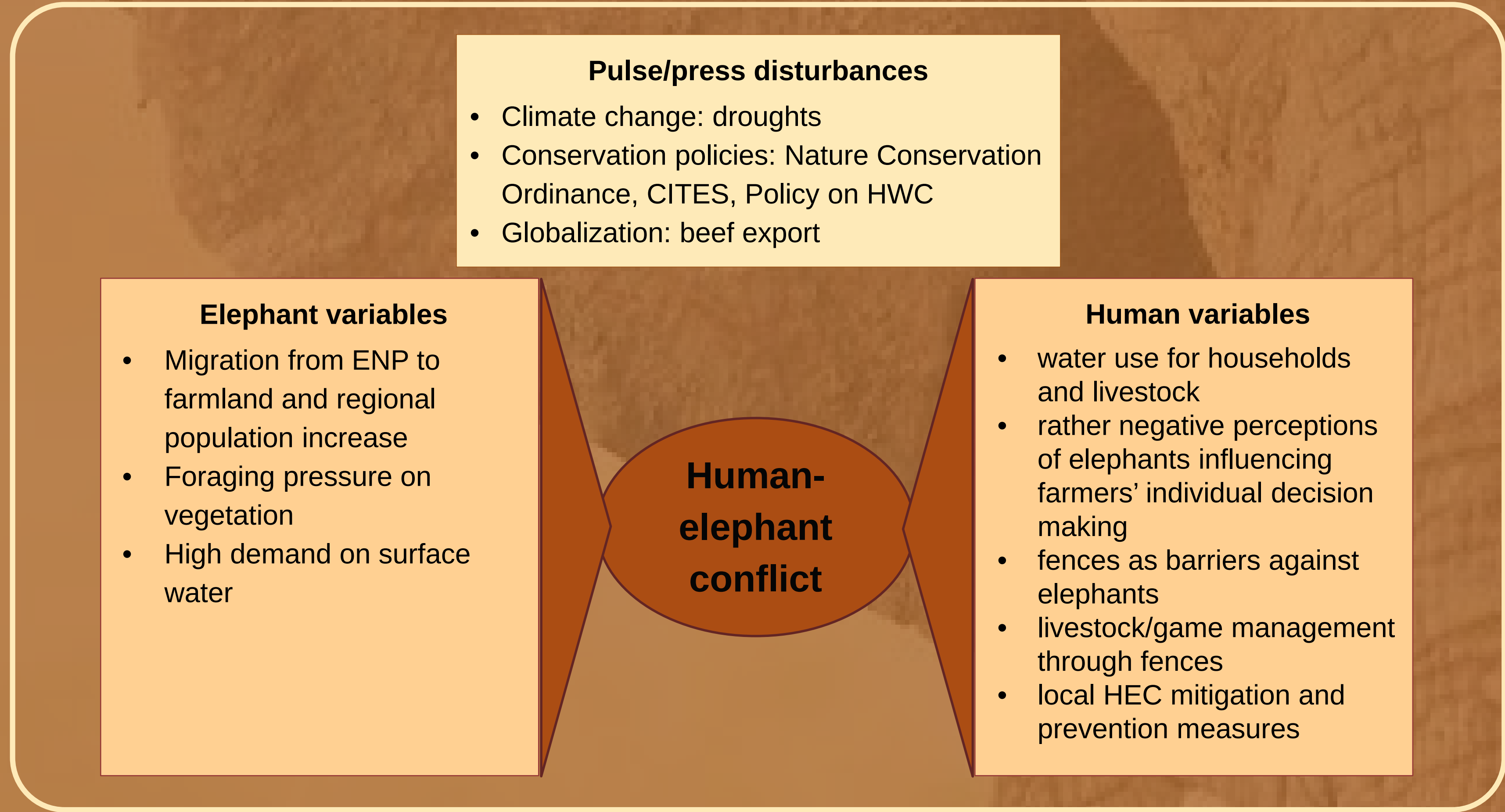


Fig. 1: Contextualization of the in interview findings, modified after Shaffer et al. 2019

2 Management patterns and fence locations

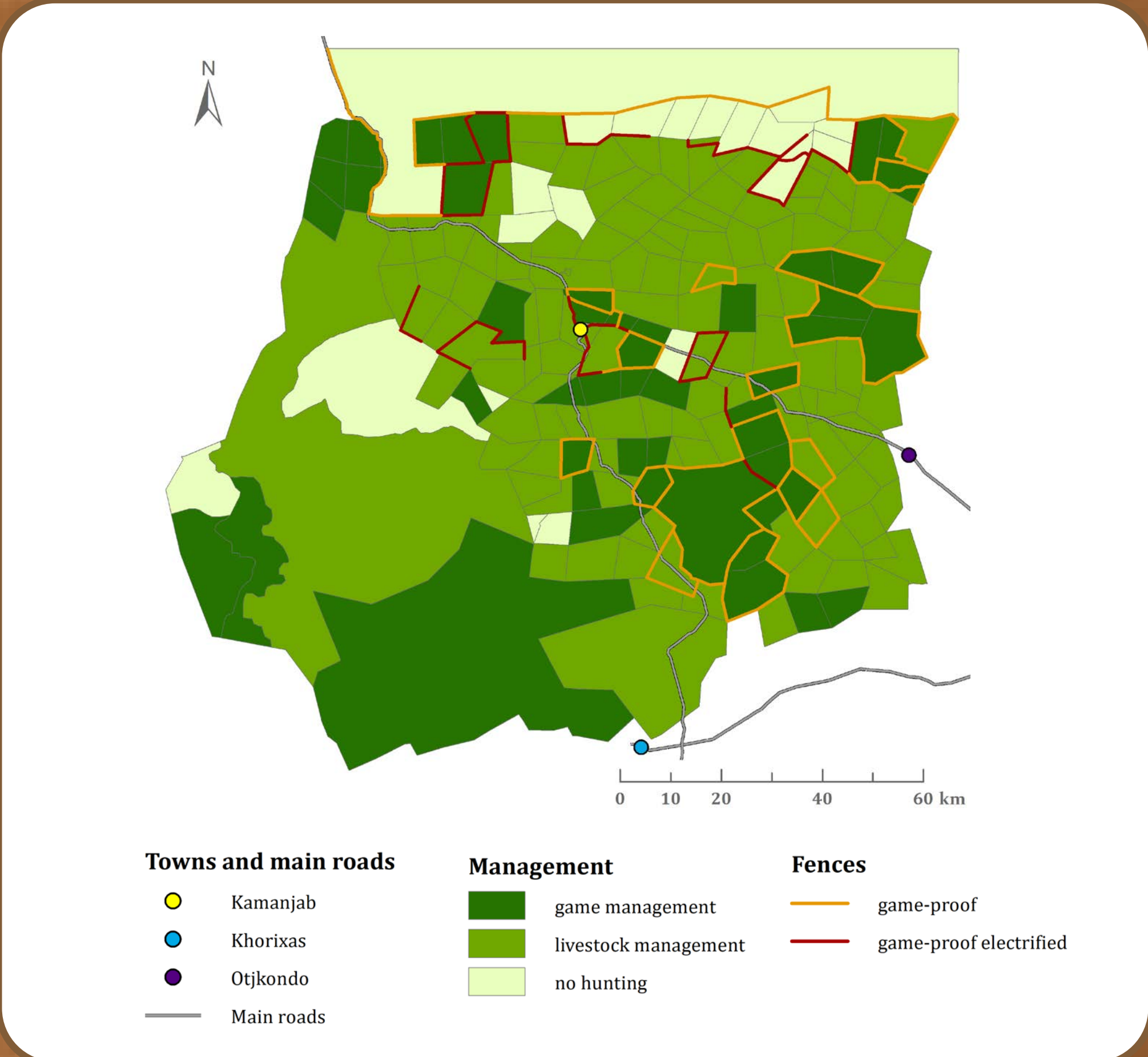
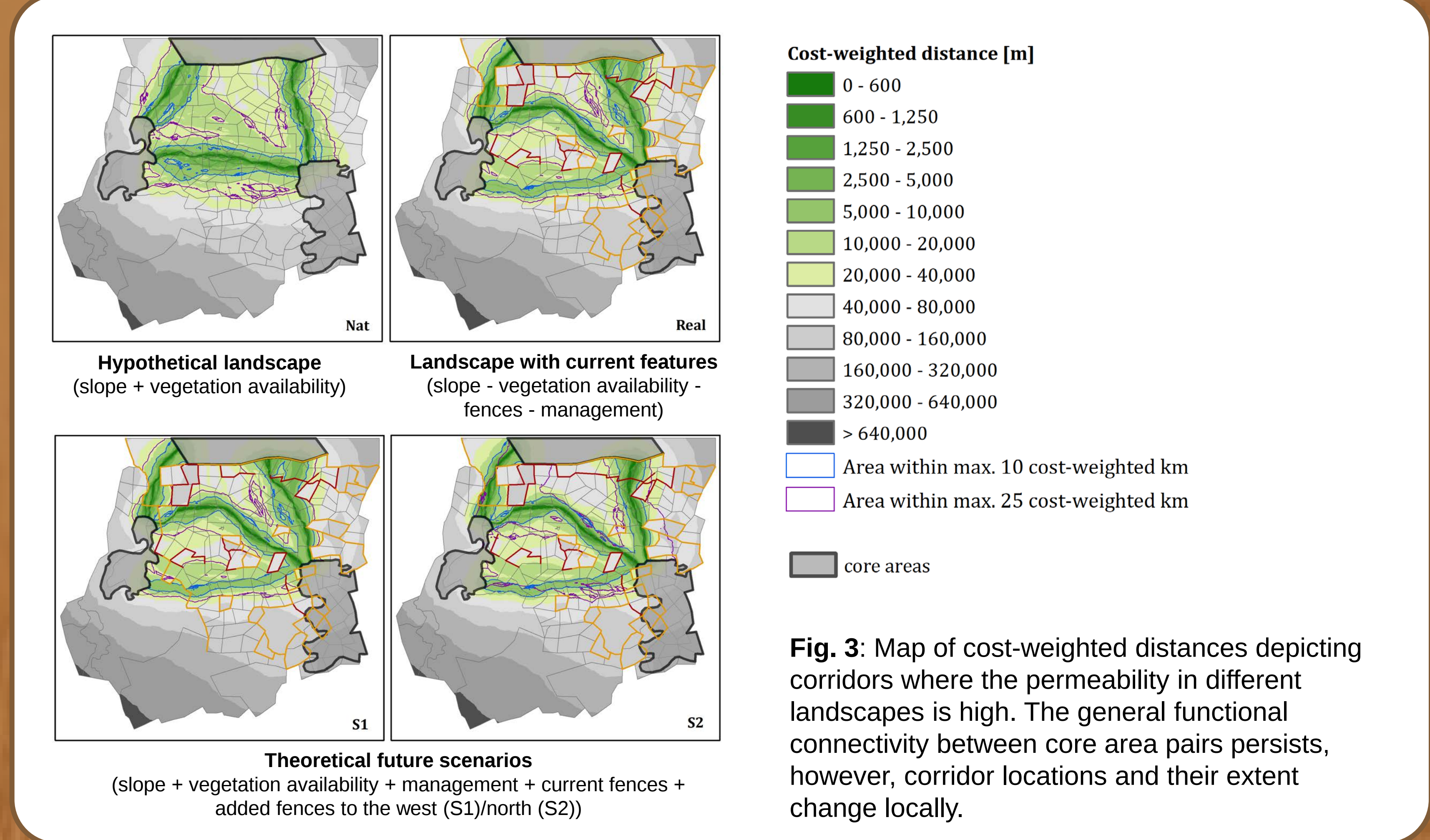


Fig. 2: Participatory mapping results for study area

3 Shift of least-cost corridors connecting core areas in different landscapes



Research conclusions

1. Human-elephant interactions are **complex** and based on the **shared use** of natural resources.
2. On a **landscape level**, locally applied measures and activities may have a significant **cumulative and far-reaching impact on the permeability** for elephant movement and on corridor characteristics.
3. **Overarching strategies** are necessary in order to avoid that isolated measures only lead to a shift or intensification of conflicts rather than to improved **conflict regulation**.