Climate change and wildlife crime in social-ecological systems: A conceptual framework and examples from the Global South

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Climate change & wildlife crime are priority threats to global biodiversity & sustainable development

Climate change

Wildlife crime

Left: Mozambique's devastating 2015 floods (Photo credit Africa Trade Magazine); **Right:** Homemade firearms confiscated in Mondulkiri Province, Cambodia (Photo: Jessica Kahler)

Climate change & wildlife crime are priority threats, but **few studies investigate their interaction**

These two threats are interrelated to one another in complex ways with implications for human & wildlife security

- Immerging criminology of climate change within the last decade (1,2)
- Documented illicit coping strategies in the development sector as a response to climate variability (3)
- Empirical evidence of climate change perception & general strain on illegal fishing in Iran (4)

1 White, R. (Ed.) (2012). Climate Change from a Criminological Perspective. Springer: New York, NY.

2 Agnew (2012). Dire forecast: A theoretical model of the impact of climate change on crime. Theoretical Criminology 16(1), 21-42.

3 Mosberg & Eriksen (2015). Responding to climate variability and change in dryland Kenya: The role of illicit coping strategies in the politics of adaptation. Global Environmental Change 35, 545-557.

4 Tabar et al. (2020). Climate change, general strain and illegal fishing: an empirical test of Agnew's criminology of climate change theory in Iran. The Social Science Journal DOI: 10.1080/03623319.2020.1750843

Connections between climate change, conflict & crime are complex….

"Overall, there is more consistent evidence that **climate variability has influenced low-intensity organised violence** than major civil wars ….. Likewise, there is more consistent evidence that climate variability has **affected dynamics of conflict**, such as continuation, severity and frequency of violent conflict events, than the likelihood of initial conflict outbreak. Moreover, research suggests with medium confidence (medium evidence, medium agreement) that weather effects on armed conflict have been **most prominent in contexts marked by a large population, low socioeconomic development, high political marginalisation and high agricultural dependence (p. 2428)**"

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

IPCC (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability. https://www.ipcc.ch/report/ar6/wg2/

Why is it important to understand the interactions between climate change & wildlife crime?

Climate change may increase insecurity, serving as a catalyst for wildlife crime[1]

Wildlife crime may serve as an accelerant for further climate change [2]

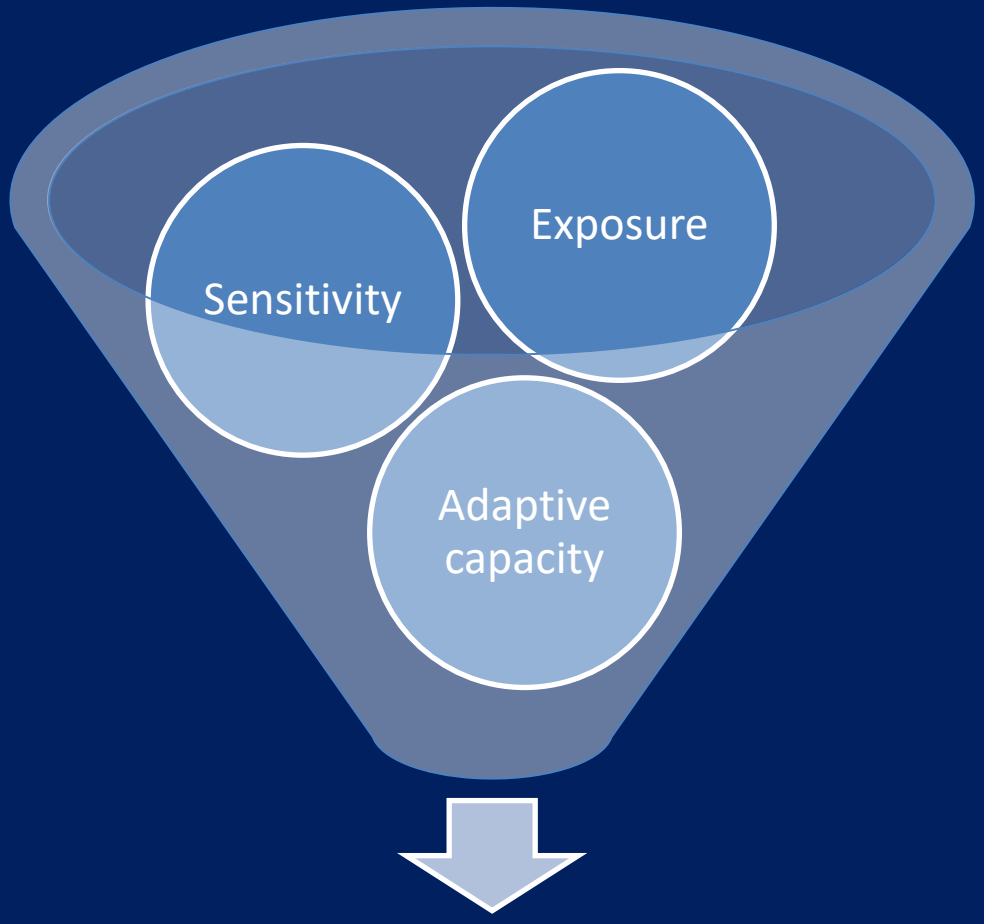
Understanding these interactions will facilitate more effective & socially just policy interventions [2, 3]

[1] African Center for Strategic Studies (21 April 2021). Climate Change Amplifies Instability in Africa: https://africacenter.org/spotlight/climate-change-amplifies-instability-in-africa/

[2] Jones et al. (2020). Improving rural health care reduces illegal logging and conserves carbon in a tropical forest. *PNAS, 117*(45), 28515-28524.

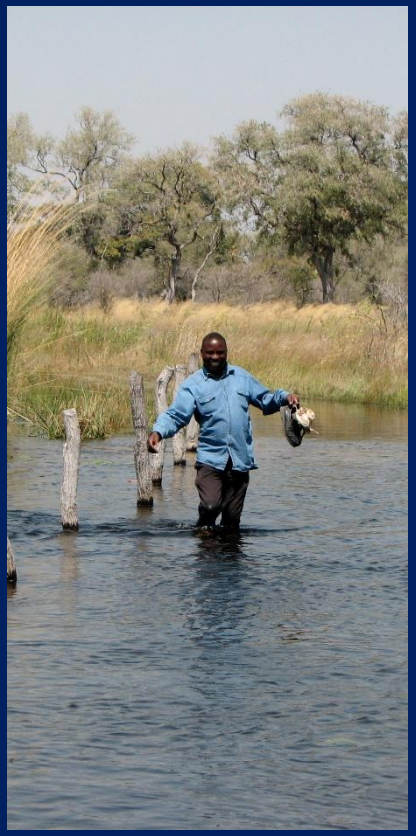
[3] Kahler et al. (2013). Poaching risks in community-based natural resource management. *Conservation Biology 27*(1), 177-186.

Understanding vulnerability, adaptive capacity & behavioral responses of people & wildlife to climate change



Mechanisms driving these complex interactions are not well understood because relevant bodies of research are largely disparate

Conservation & Green Criminology



Climate & Geospatial Sciences

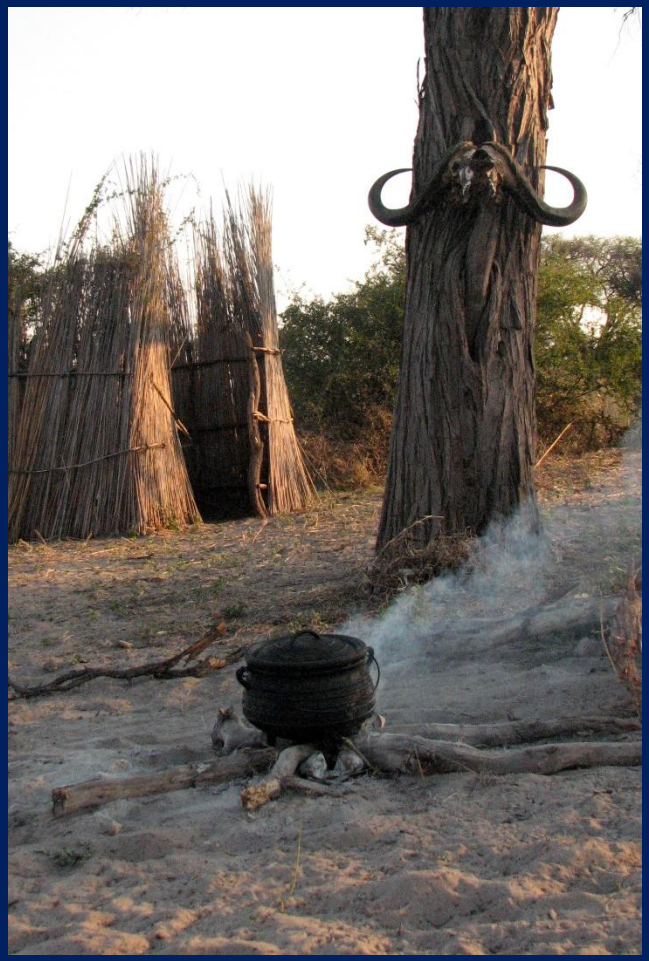
Human Development & Sociology

Wildlife ecology & conservation

Understanding behavioral responses of people to climate change: illicit coping mechanisms

Reactive adaptation strategies, e.g.: increase of water usage, poaching, illegal logging, illegal fishing, etc.

Our overarching objective is to develop an interdisciplinary conceptual framework for understanding these complex interactions



Our conceptual framework should aid researchers to:

- better understand the risk conditions **in different slow and rapid-onset contexts**, including hazard, exposure, vulnerability and their connection to illicit coping strategies (wildlife crime)
- assess the scale and impact of poaching and other likely criminal activities related to climate change
- identify policies, investments and practices that offer forward-looking and sustainable approaches to reduce wildlife crime and aid pro-community coping strategies to climate change

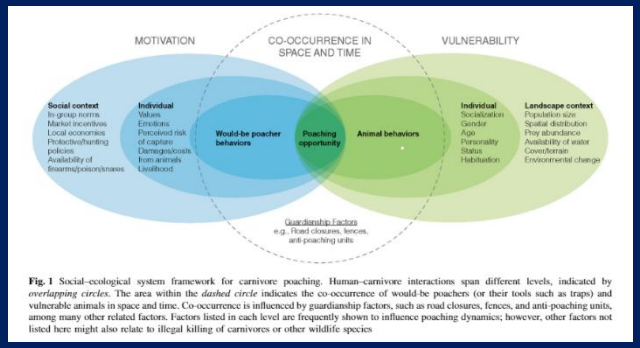
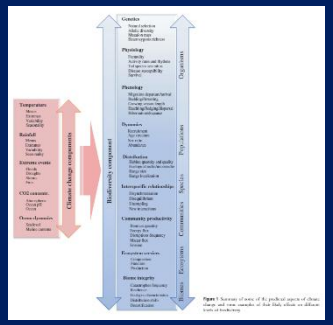
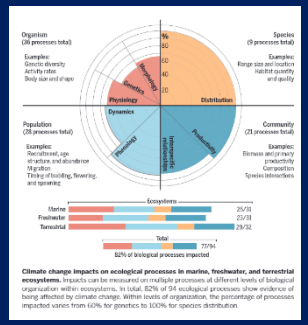
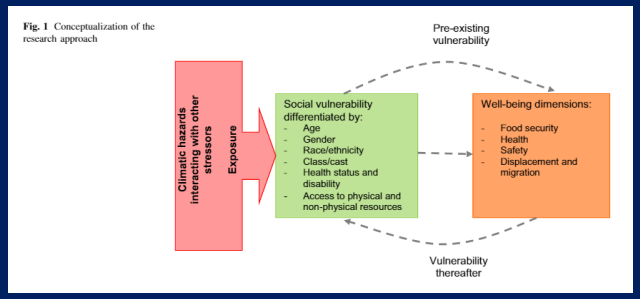


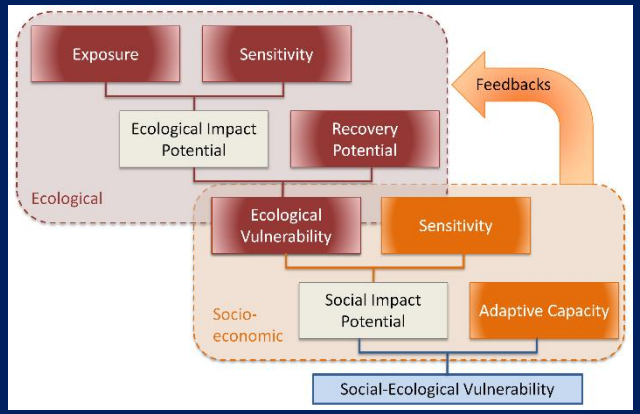
Fig. 1 Social–ecological system framework for carnivore poaching. Human–carnivore interactions span different levels, indicated by *overlapping circles*. The area within the *dashed circle* indicates the co-occurrence of would-be poachers (or their tools such as traps) and vulnerable animals in space and time. Co-occurrence is influenced by guardianship factors, such as road closures, fences, and anti-poaching units, among many other related factors. Factors listed in each level are frequently shown to influence poaching dynamics; however, other factors not listed here might also relate to illegal killing of carnivores or other wildlife species





Climate change impacts on ecological processes in marine, freshwater, and terrestrial ecosystems. Impacts can be measured on multiple processes at different levels of biological organization within ecosystems. In total, 82% of 94 ecological processes show evidence of being affected by climate change. Within levels of organization, the percentage of processes impacted varies from 63% for genetics to 100% for species distribution





We reviewed a wide variety of climate change and wildlife crime-relevant frameworks, while anchoring our efforts around Agnew's (2011) theoretical model of the impact on climate change on crime

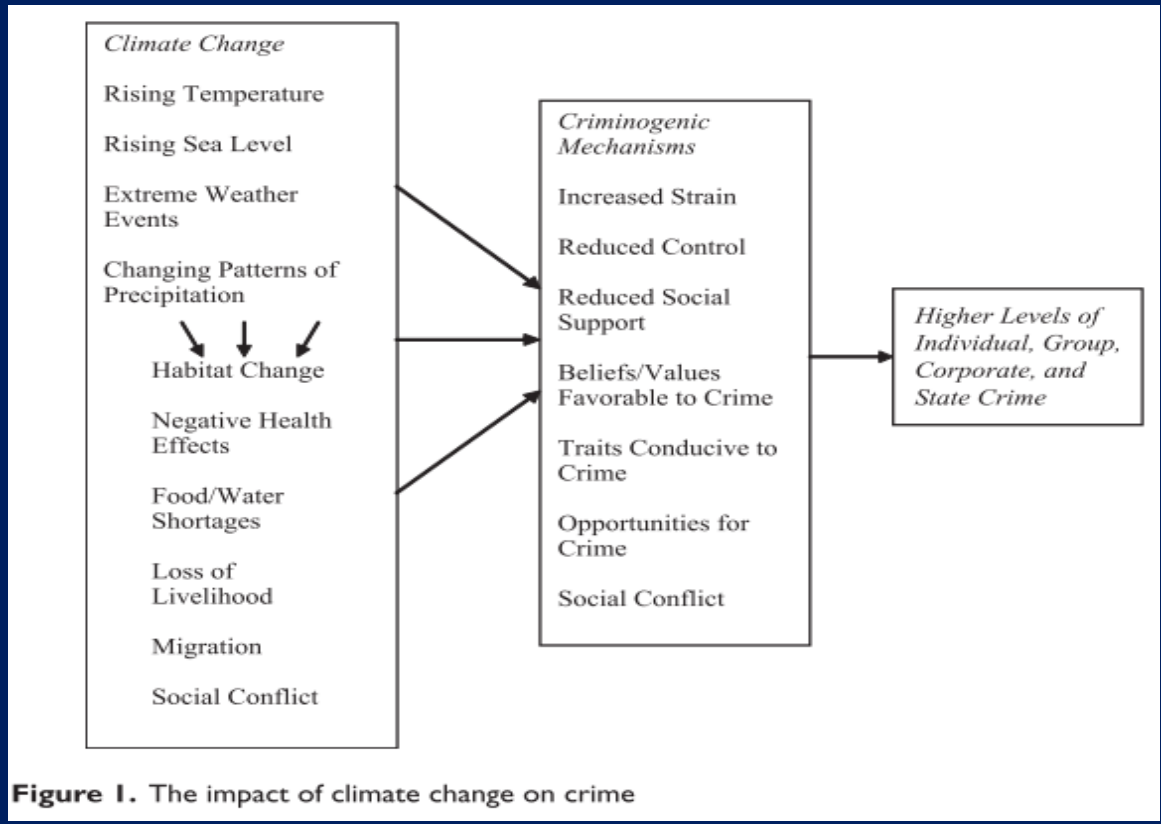


Figure 1. The impact of climate change on crime

Our starting point was Agnew's (2011) theoretical model of the impact of climate change on crime, with specific interest in wildlife crime

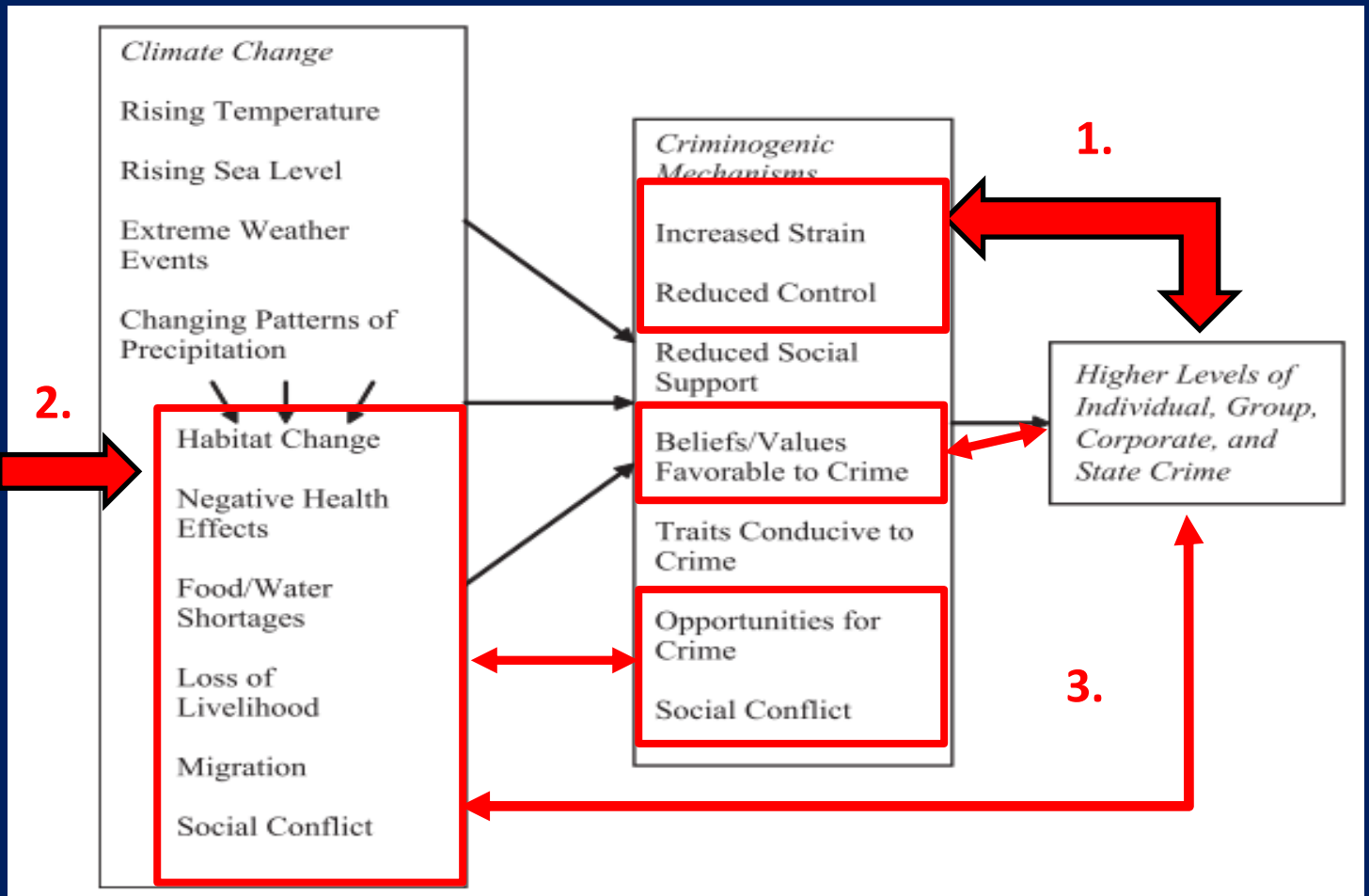
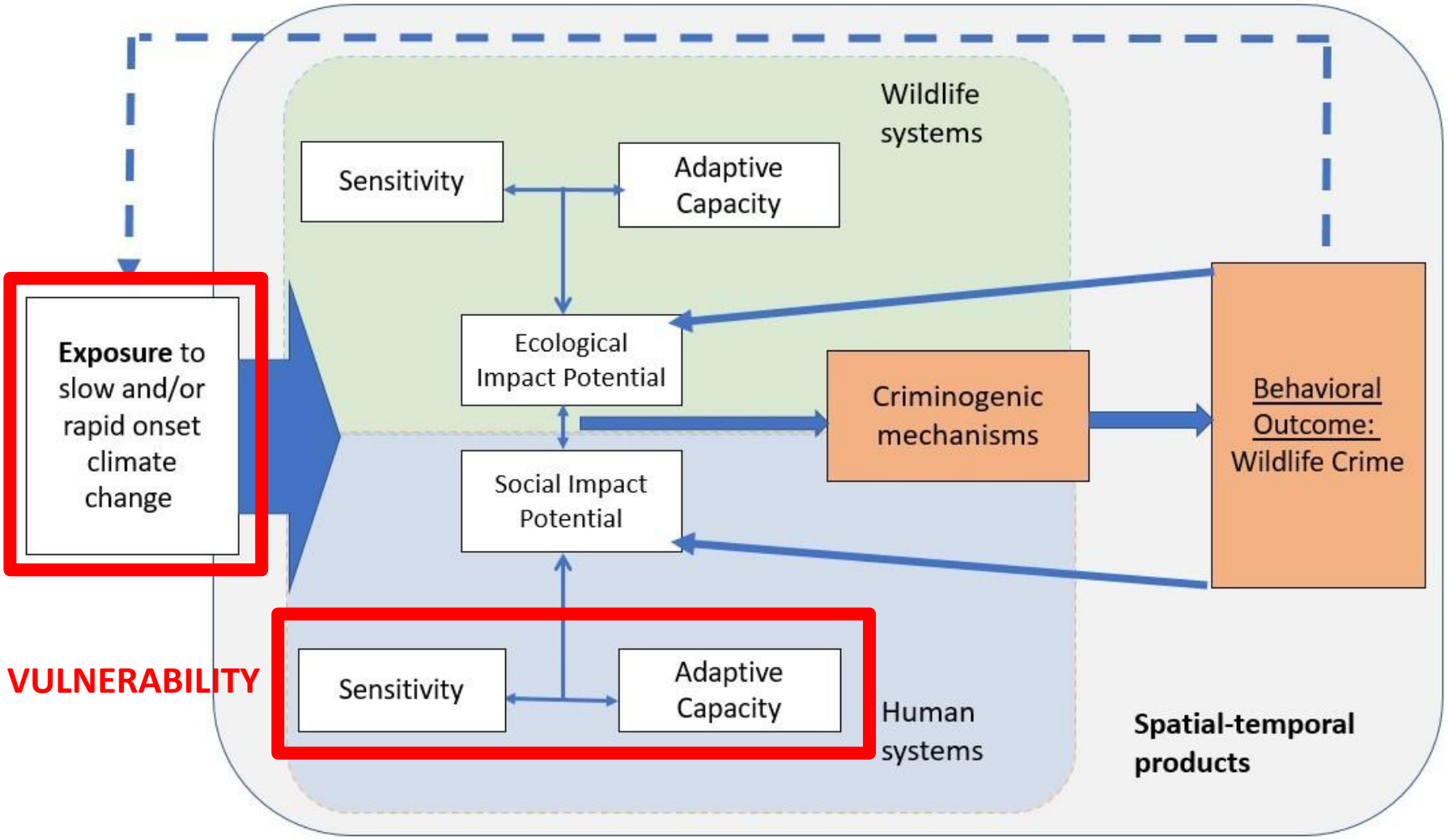


Figure 1. The impact of climate change on crime

A generalized theoretical model of the impacts of climate change on wildlife crime (*Adaptation from Agnew (2011) and Cinner et al. 2013*)



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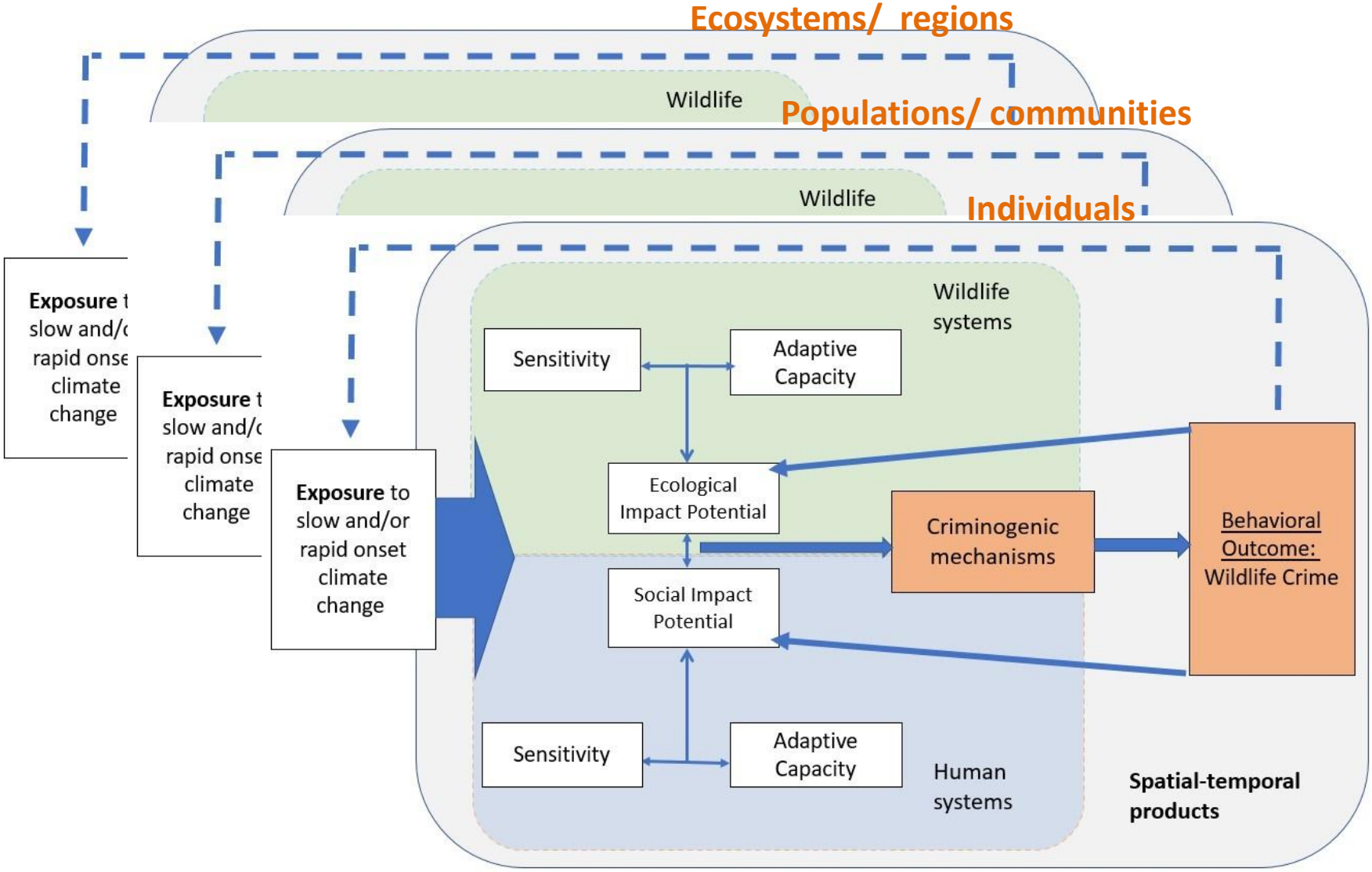
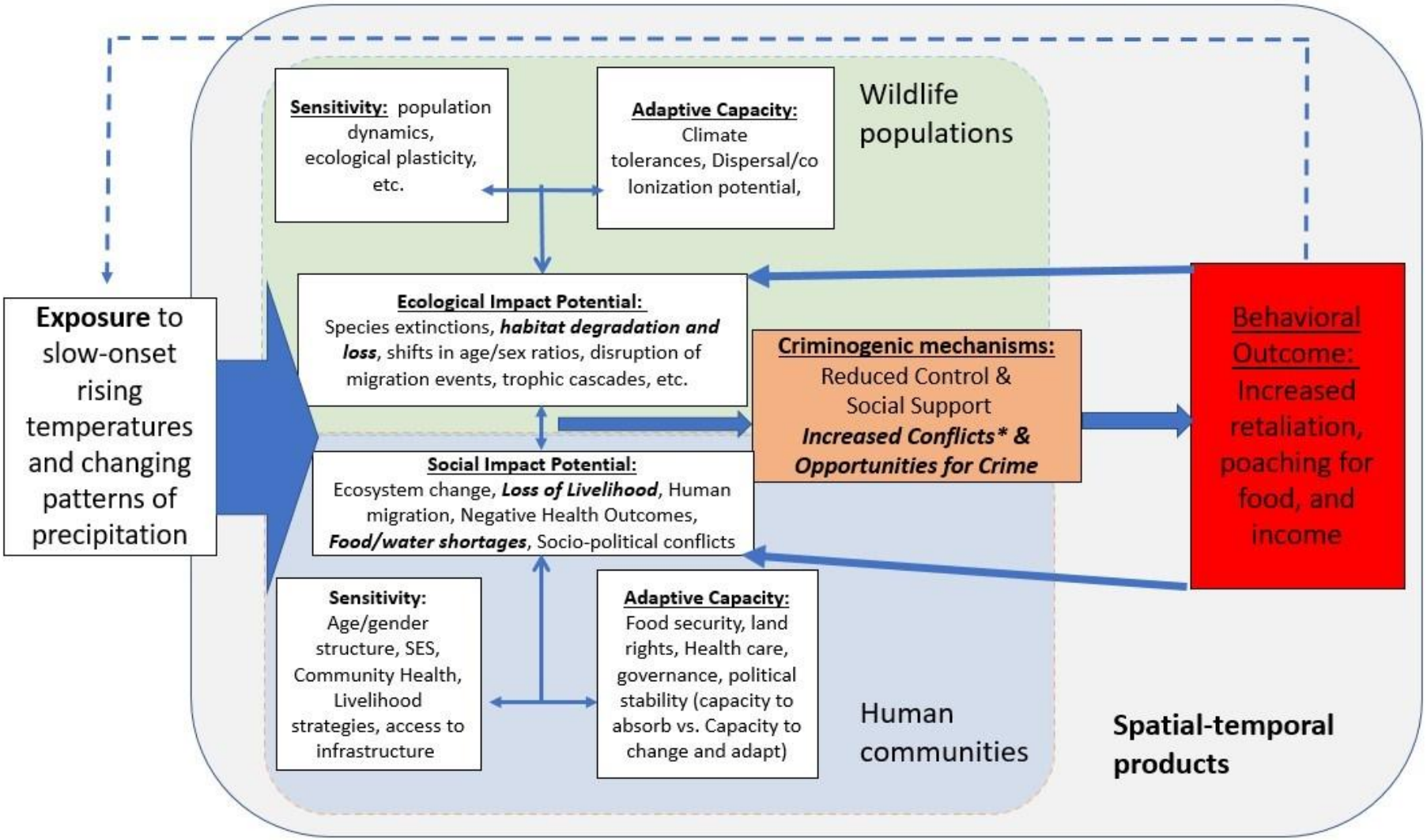
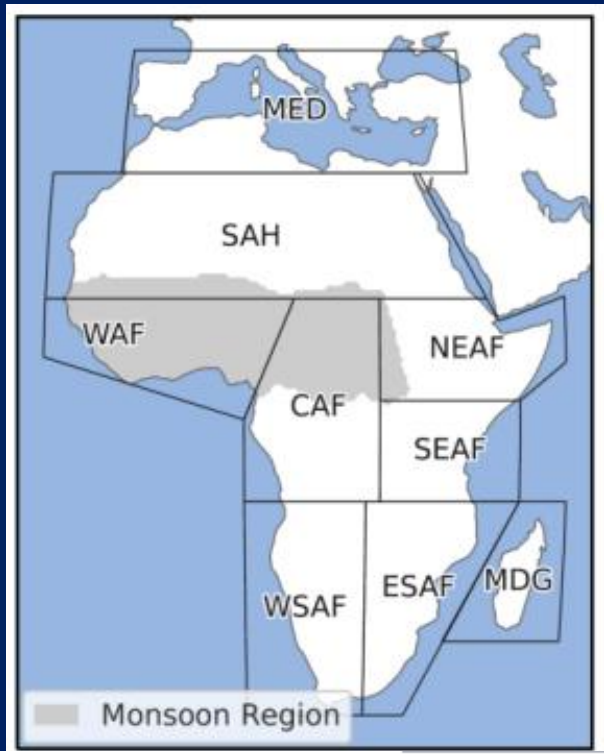


A theoretical model of the impacts of climate change on wildlife crime at the community level for slow-onset climatic change (*Adapted from Agnew (2011) and Cinner et al. 2013*)



Next steps:
Complex interactions between climate change & wildlife crime in Southern Africa



West Southern Africa (WSAF)

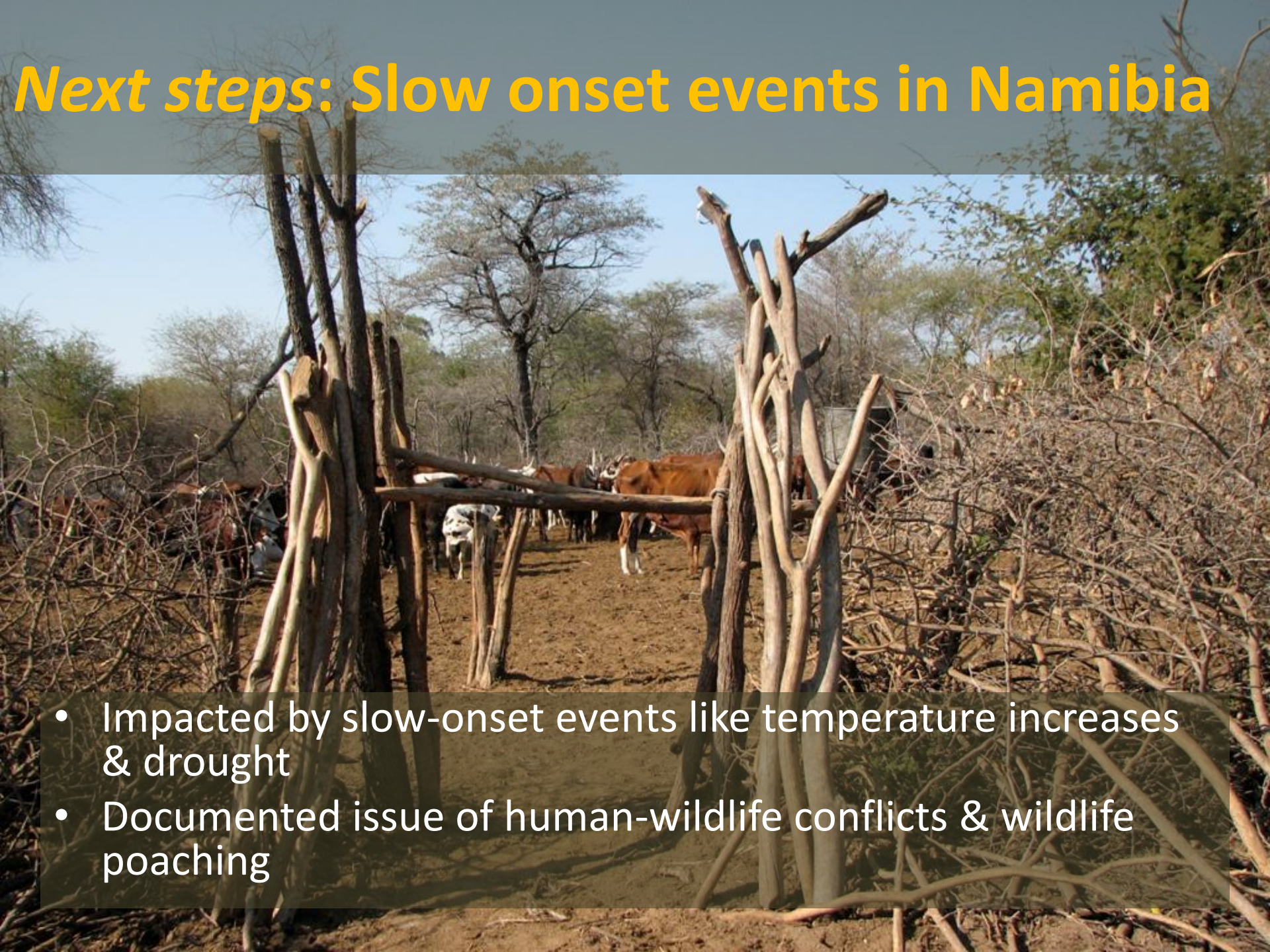
- Observed decrease in mean precipitation;
- Observed increase in heavy precipitation and pluvial flooding;
- Observed and projected increase in aridity, agricultural and ecological droughts;
- Projected increase in dryness from 1.5°C, higher confidence with increasing global warming;
- Projected increases in mean wind speed; increases in fire weather conditions.

East Southern Africa (ESAF)

- Observed decreases in mean precipitation;
- Observed and projected increases in heavy precipitation and pluvial flooding;
- Observed and projected increase in aridity, agricultural and ecological droughts;
- Observed increase in meteorological drought, projected increase in meteorological droughts from 1.5°C, higher confidence at higher GWLs;
- Projected increases in fire weather conditions; increases in mean wind speed; increase of average tropical cyclone wind speeds and associated heavy precipitation and of the proportion of category 4-5 tropical cyclones.

Source: IPCC Africa Factsheet 2021

Next steps: Slow onset events in Namibia



- Impacted by slow-onset events like temperature increases & drought
- Documented issue of human-wildlife conflicts & wildlife poaching

Previous work in Namibia has shown the spatial congruence of HWC and poaching in communal conservancies (Kahler et al. 2013)

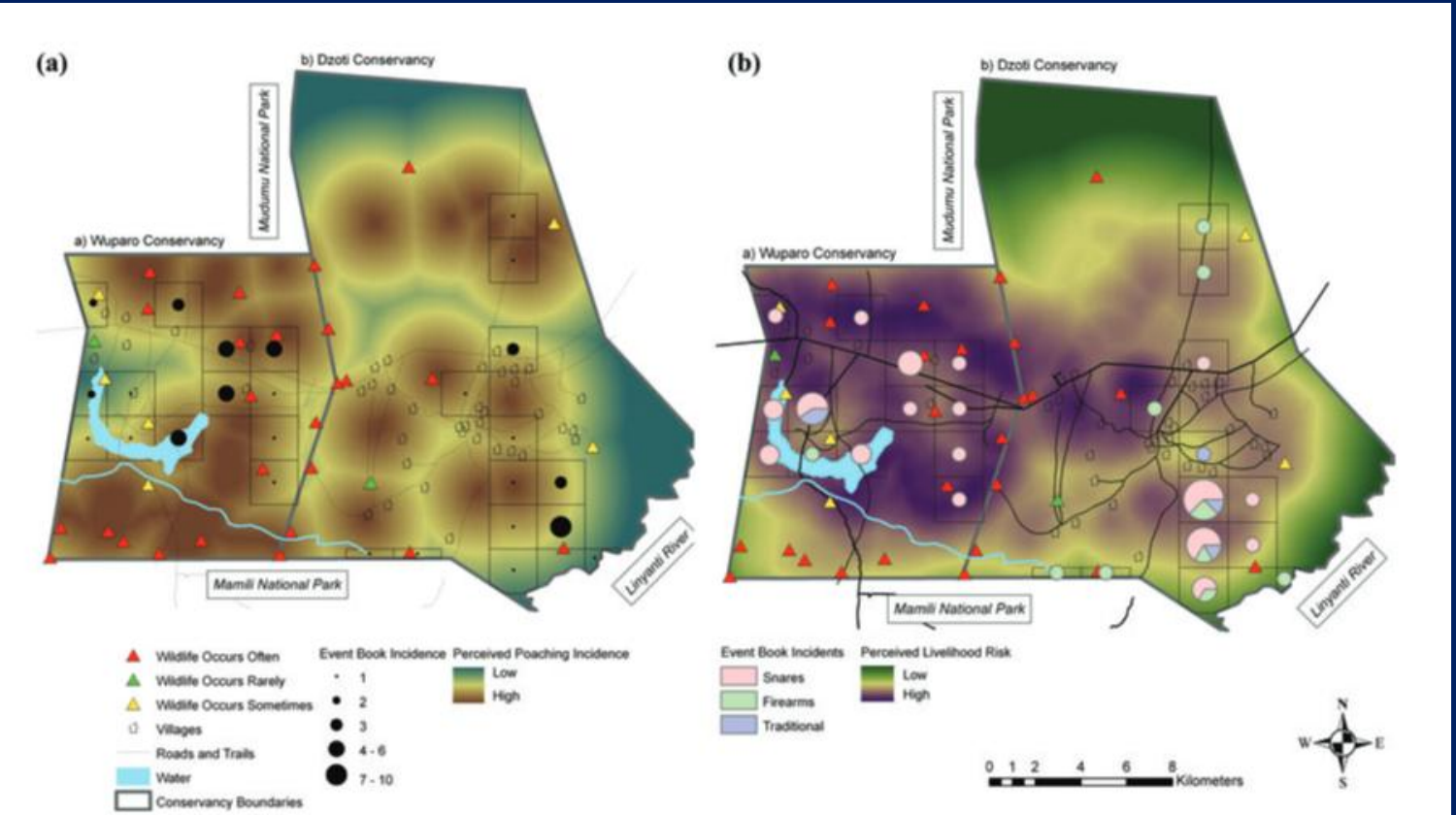


Figure 2. Perceived geographic incidents of poaching and livelihood damage (focus group 2009) and event-book data (2001–2008) on poaching incidents in 2 Mudumu South Complex conservancies, Caprivi, Namibia: (a) perceived incidents of poaching and event-book data for poaching incidents and (b) perceived incidence of livelihood damage and event-book data for poaching incidence by incident type.

Kahler, Roloff & Gore (2013). Poaching risks in community-based natural resource management. *Conservation Biology 27* (1), 177-186.

Additional research has demonstrated a spatial pattern in the use of poison by Namibia's farmers

Probability of the use of poison by Namibian farmers (commercial and communal areas)

There may be opportunities to explore connections between these data and climate change

- NDVI, Persistence data, Human vulnerability data

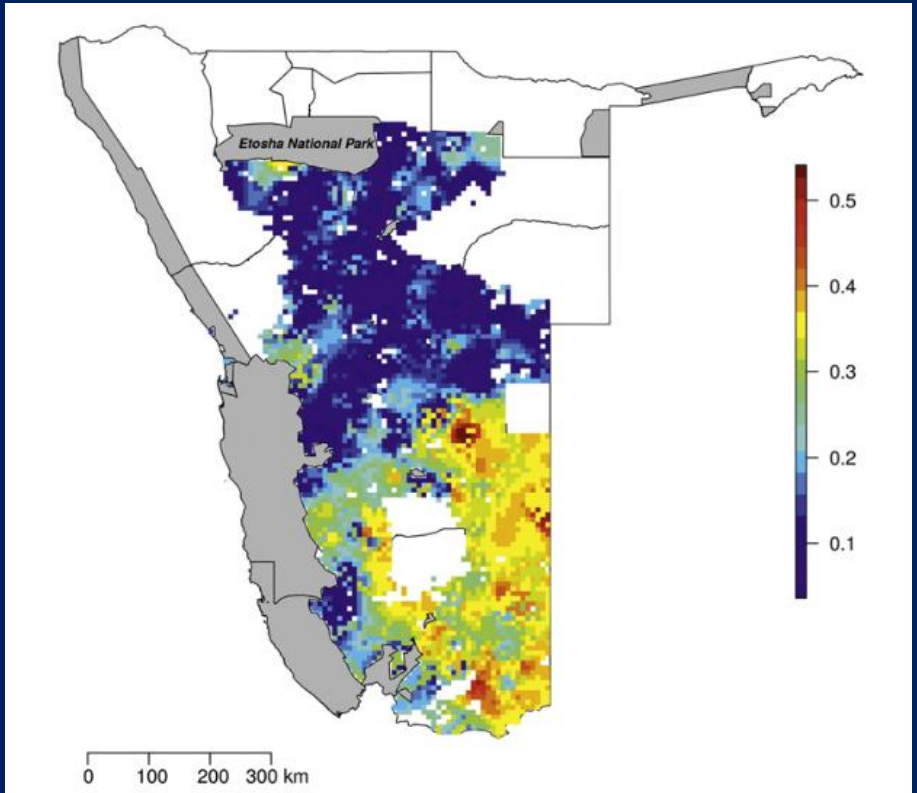


Fig. 4. Probability of poison use across commercial farms in Namibia. The map was derived using inverse distance weighting interpolation of model-averaged predictions from 95% confidence set (see methods and Table 1) relating poison use (estimated using the Randomized Response Technique) and socio-ecological factors. White areas in the map are not owned by commercial farmers (e.g. communal farming areas). Grey areas represent National Parks.

Santangeli et al. (2016). Understanding, quantifying and mapping the use of poison by commercial farmers in Namibia- Implications for scavengers' conservation and ecosystem health. *Biological Conservation 204*, 205-211.

Future research: Slow onset (chronic) + rapid onset (shocks) in Mozambique

Photo credit Africa Trade Magazine

- From IPCC 2021: "Climate change is increasingly **exacerbating extreme events** and causing multiple hazards, often with compound or sequential characteristics. In turn, these elements are **interacting with vulnerability and exposure to trigger multi-risk and cascading impacts** *(high confidence)."*
- *"***Emergent and sustained cooperation among organizations and institutions for adaptation proves necessary, as climate change can accelerate and deepen extremes and abrupt changes."**

Implications

- Understanding landscapes of risk & vulnerability to identify future areas of concern or hotspots to aid socio-environmental adaptation & threat reduction
- Contextualizing the securitization of the environment & militarization of conservation as policy responses

Questions?

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