

Systematic Map Protocol

Title

Taking stock of knowledge on the causes and solutions for human wildlife conflicts in rural Africa - A systematic map protocol

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Biodiversity, human well-being and security, institutions, technology, participation

Background

The global rate of wildlife species loss has reached unprecedented levels (Richardson et al., 2020). In Africa, human-wildlife conflict (HWC) is one of the drivers of biodiversity loss (Treves et al., 2006). Research shows that communities residing in proximity to wildlife habitats experience the loss of both life and livelihoods due to wildlife incursions (Lamarque et al., 2009). Furthermore, retaliatory killings of wildlife and the degradation of habitats resulting from human activities are increasing and exacerbating the crisis of wildlife loss in Africa (Kansky et al., 2016; Blanc et al., 2016). Despite extensive research efforts and the implementation of mitigative policies, HWC remains a persistent challenge (Hoare et al., 2015). Understanding of the contextual contributing factors, determinants, and causes of HWC is critical for governments in Africa as they strive to formulate policies that promote harmonious coexistence (Graham et al., 2010). This also includes shifting the thinking around biodiversity conservation towards more human- and development-friendly approaches (Büscher, B., & Fletcher, R. 2019; Massarella et al., 2021; Massarella et al., 2022). In light of these critical challenges, this systematic map aims to provide a comprehensive overview of the causes of HWC in Africa and the associated solutions. It will identify knowledge gaps and emerging research questions that warrant further exploration. This systematic map will delve into the drivers of conflicts, factors rendering human communities vulnerable to conflicts, and solutions for conflicts arising from wildlife and wildlife management. Additionally, it will shed light on the prevailing theoretical orientations and frameworks used to examine and address human-wildlife interactions, i.e. human-wildlife conflict (negative framing), co-existence or co-habituation (positive framing) or interaction (neutral framing). This systematic map will not only enhance our understanding of the multifaceted issues related to HWC in Africa but will also serve as a roadmap for future research.

Theory of change or causal model

Human-wildlife conflict (HWC) can be defined as negative interactions between humans and animals. The causes behind it are complex (Figure 1) but can be traced in the simplest terms to competition of resources. Social factors, such as dependency on farming for livelihood, can further exacerbate the situation. Solutions to address HWC range from those targeting individual animals or their populations to those aimed at human communities and co-existence. Although the systematic

map will focus on drivers and solutions to address HWC, we present outcomes here to show the broader context of why finding successful solutions is important.

Stakeholder engagement

The need for this systematic map arose from discussions with various HWC management stakeholders in Uganda in the summer of 2018, including the Minister of Tourism, Wildlife and Antiquities, the Executive Director of Uganda Wildlife Authority and the Chief Executive Officer for African Wildlife Foundation. Discussions with these and other stakeholders responsible for HWC management indicated that HWC issues in Uganda and other parts of Africa are dynamic, complex, and poorly understood. Stakeholders weren't involved in designing of the protocol beyond study questions. The results of the systematic map will be discussed with stakeholders to guide new and more effective HWC management strategies and policy considerations. Results of the systematic map will also be shared with HWC academic stakeholders in Africa (e.g., Makerere University in Uganda, Moi University in Kenya, and University of Dar Es Salaam and Sokoine University of Agriculture in Tanzania) to guide future HWC research.

Objectives and review question

The primary review question is: What scientific knowledge exists on the (root) causes of and policy and management solutions on HWC in Africa, including their underlying dominant assumptions and theoretical perspectives (positive, neutral and negative framing)? The secondary review questions are: 1. What are the common drivers of HWC? 2. What are the dominant types of solutions to address HWC? 3. What are the dominant priorities underlying approaches to address HWC, particularly in relation to biodiversity conservation and community development? 4. How has knowledge on drivers and solutions to address HWC evolved over the years?

Definitions of the question components

We used the PerSPECtiF framework (Booth et al. 2019) to outline the question components:
Perspective: From the perspective of local communities
Setting: In the setting of rural Africa
Phenomenon: Human-wildlife interaction (conflict, co-existence or co-habituation)
Environment: Within different policy environments (i.e. different country settings)
Time: Over time
Findings: Root causes and solutions (both policy and management) to address HWC

Search strategy

As the purpose of the proposed systematic map is to increase knowledge of the various root causes of HWC in Africa and solutions that address them, we selected broad search terms to capture potential literature. The search string includes two substrings comprised of location and phenomenon terms that will be combined in the search with the Boolean operator AND. The final search string is (presented in Web of Science format): #1 TS = Africa* OR "East* Africa*" OR "South* Africa*" OR "North* Africa*" OR "West* Africa*" OR "Central Africa*" OR Uganda* OR Tanzania* OR Kenya* OR Malawi* OR Namibia* OR Zimbabwe* OR Mozambi* OR Botswana* OR Zambia* OR Madagascar* OR Congo* OR Gabon* OR Cameroon* OR Nigeria* OR Benin* OR Ghana* OR Liberia* OR Guinea* OR Senegal* OR Ethiopia* OR Morocco* OR Niger* #2 TS = "human-wildlife conflict*" OR "human-carnivore conflict*" OR "wildlife conflict*" OR "human-wildlife co\$existence" OR "human-wildlife co\$habituation" OR "human-wildlife interaction*" OR "crop raiding" OR "community-based wildlife management" OR "human-monkey conflict*" OR "human-elephant conflict*" OR "human-lion conflict*" OR "human-hippo* conflict*" OR "human-cheetah conflict*" OR "human-leopard conflict*" OR "human-crocodile conflict*" OR "community wildlife management" OR "HWC" OR "damage-causing animal*" #3 #1 AND #2

Bibliographic databases

We will search for evidence in the following bibliographic databases and search platforms using the

full search string: ● Web of Science Core collection (<https://clarivate.com/>); Topic search covering all years within Science Citation Index Expanded (1945-present), Social Sciences Citation Index (1956-present), Arts & Humanities Citation Index (1975-present), Conference Proceedings Citation Index- Science (1990-present), Conference Proceedings Citation Index- Social Science & Humanities (1990-present), Emerging Sources Citation Index (2015-present). ● Scopus: (<https://www.scopus.com/home.uri>); Title, abstract, and keyword search. ● CAB Abstracts (1973-present) through Ovid; All fields ● The Lens: (<https://www.lens.org/>); Title, abstract, keyword or field. Searches will be performed using English language search terms but articles in French will be included if they meet the inclusion criteria. Subscriptions from the University of Helsinki will be used to access Web of Science, Scopus and CAB Abstracts. To complement searches of the bibliographic databases, backward and forward citation chasing will be conducted using the citationchaser (Haddaway et al. 2021). Citation chasing will be conducted after full text screening but before data extraction. All eligible articles will be used as input articles.

Web-based search engines

We will search Google Scholar in English and French using the advanced search structure. We will further specify that words can occur anywhere in the article. No other restrictions will be applied. As Google Scholar limits the results to show to 1000 hits, this will be the maximum number of hits to be screened. Screening will be stopped earlier if no relevant hits appear within a set of 100 consecutive articles. The search string in English is (search function in parentheses): Africa (With all of the words); Human-wildlife conflict (With the exact phrase); Causes, drivers, solutions, responses (With at least one of the words) Same search functions will be used when conducting the search in French. The following words will be searched in French: Afrique; Les conflits entre les hommes et la faune OR Conflits homme-faune; Causes, moteurs, solutions, reponses

Organisational websites

This systematic map is focused on academic literature only. It is part of a broader project aimed to understand responses to HWC in practice (through government and nongovernmental organizations) and work has already been commissioned to look at policy and practice of different organisations from the grey literature. However, stakeholders will be asked for recommendations of any relevant literature to ensure comprehensiveness.

Comprehensiveness of the search

We used a list of 24 a priori chosen articles (additional file 1) in a scoping exercise to assess the comprehensiveness of the search strategy. The list was compiled by ES and IM, who are subject experts and have been working on the topic for over 15 years. When assessing the comprehensiveness of the search, we noticed that six articles were not indexed in the Web of Science and further seven were review articles. This was considered when assessing the number of articles retrieved using different search strings (see details in additional files 1 and 2).

Search update

We will set search alerts for Web of Science, Scopus and CAB Abstracts for the duration of the screening process and data extraction. Before we start the synthesis, we will screen any additional articles retrieved through the search alerts. If they meet the eligibility criteria, we will add them to the final set of articles. The number of articles retrieved through search alerts will be reported in the systematic map.

Screening strategy

Articles will be screened in three stages: at title, abstract and at full text. Articles that are deemed relevant at the abstract stage will be retrieved and read in full. Articles that cannot be located or retrieved will be recorded and reported in the final systematic map.

Eligibility criteria

The following criteria will be applied to assess eligibility of studies at both stages of screening: ● Perspective: Studies focusing either individuals within a community or communities. Studies solely on animal interaction, e.g. impacts of bark stripping on lifespan of trees, are excluded. ● Setting: Studies that take place in rural areas of African countries. Studies focusing solely on cities will be excluded. ● Phenomenon: Any study that focuses on human-wildlife conflict (negative framing or interaction), co-existence or co-habituation (positive framing or interaction) or interaction (neutral framing). ● Time: There are no restrictions on when the study took place. ● Findings: Identified drivers of HWC (not speculative) or solutions to address HWC. ● Study type: primary research and reviews ● Language: English or French

Consistency checking

Articles will be double screened at all stages, except title stage if the searches return more than 1000 articles. Screening decisions will be recorded, and all disagreements will be discussed among the research team. Furthermore, throughout the screening process, authors will meet to discuss any uncertain inclusion/exclusion decisions. If there are more than 1000 articles to screen at title stage, the following procedure will be used: Prior to commencing screening, each author will screen 10% of the articles independently and their screening decisions will be compared to check for consistency. Any discrepancies will be discussed and if necessary, eligibility criteria further defined. If large discrepancies occur (20% or higher disagreement rate), another set of articles will be screened independently until agreement rate of 80% or higher is achieved.

Reporting screening outcomes

We will report screening outcomes using a ROSES diagram (Haddaway et al. 2017). We will also provide a list of articles excluded at title and abstract, and at full text with reasons for exclusion. Finally, we will include a list of all eligible articles in the final systematic map.

Study validity assessment

As we are interested in the extent of the HWC literature and potential knowledge gaps, we will not conduct formal appraisal of study quality for this systematic map. We will, however, extract data on factors that influence study validity, e.g. study design, scale, and potential factors influencing study results, and will report the data in the narrative summary of the results.

Consistency checking

NA

Data coding strategy

We will extract data on elements of HWC (theoretical perspective, type of conflict, risk factors) as well as drivers and solutions to HWC from all eligible studies into an Excel data sheet. Details of data to be extracted are provided in the additional file 3. If a study is missing information, we will contact authors by email to try to fill any information gaps. Any information retrieved directly from authors will be noted in the data extraction sheet.

Meta-data to be coded

The meta-data to be extracted from all eligible studies includes bibliographic information, study context and study design. Details of the meta-data that will be extracted are provided in the additional file 3.

Consistency checking

At the beginning of the data extraction process, a subset of up to 20 studies will be used to train the team on data extraction, discussing disagreements and clarifying coding scheme where needed.

After the initial set, data extraction process will begin. All extracted data will be cross-checked independently by the review team members. To ensure cross-checking is not influenced by previous decisions, the person cross-checking data will first read the article and mark data they would extract, e.g. by highlighting text. Only after they have recorded their decisions, will they check the data extraction sheet and determine the level of agreement. If there is disagreement, those will be discussed among the research team and jointly resolved. Further, during the coding process, any uncertainties will be discussed among the research team members.

Type of mapping

The evidence base identified within this systematic map will be described narratively and will be made available as a searchable database. The database will include both metadata and data on study findings (Additional file 3). Also, an interactive evidence atlas will be created using the EviAtlas tool (Haddaway et al. 2019) to illustrate how evidence is distributed within the African continent and show potential regional knowledge gaps. We will produce heat maps to cross tabulate variables to show the extent of evidence (number of studies) related to the study objectives. Potential combinations of variables used for the heat maps include type of conflict and solutions, dominant priority (e.g. biodiversity conservation) and solutions, and root causes and solutions.

Narrative synthesis methods

We will produce a narrative synthesis of the results describing the evidence base within the systematic map. We will use descriptive plots and tables to describe the meta-data and data on study findings. We will produce a geographic map of the study locations to illustrate the regional distribution of the studies. Where needed, we will use quotes to communicate qualitative aspects of the data, e.g. related to severity of the conflict or theoretical perspectives.

Knowledge gap identification strategy

Knowledge gaps in the overall evidence based will be identified from descriptive plots and the evidence atlas. Heat maps will be the primary method to identify knowledge gaps that exist within a combination of variables, e.g. theoretical perspectives and solutions studied.

Demonstrating procedural independence

The systematic map may include articles published by the review team members. Their inclusion in the map will be jointly determined by other members of the review team in accordance with the eligibility criteria.

Competing interests

Authors have no competing interests.

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Author's contributions

ES, IM and IND conceptualized the study and ES acquired funding. SS and IND wrote the initial draft of the manuscript. ES and IM edited and commented on the manuscript. SS finalised the manuscript. All authors read and approved the final manuscript.

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