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Cool cats and communities: Exploring the challenges and successes of community-based approaches to protecting felids from the illegal wildlife trade

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Implementing community-based approaches to countering illegal wildlife trade is important to not only improve the effectiveness of strategies to protect wildlife, but also to promote equity and justice. We conducted an international exploratory review of interventions that aim to address the illegal trade in wildlife using a variety of community-based approaches. We focused our study on Felidae species in particular, as they factor centrally in the illegal wildlife trade, and have received significant conservation attention due to many being charismatic species. We searched for case studies that have been or are currently being implemented, and that were published between 2012-2022 in scholarly or grey literature databases. We extracted data on 40 case studies across 34 countries, including information on the approaches used, successes, challenges, and recommendations using a Theory of Change framework for community action on illegal wildlife trade. Initiatives to protect Felidae species from illegal trade could consider using multi-pronged approaches, consider historically underrepresented groups within communities - including women - in their design, and should evaluate the social and ecological outcomes to improve future efforts.

KEYWORDS

community-based conservation, wildlife trafficking, Felidae, justice, gender

1 Introduction

The blame for biodiversity loss is often attributed to the extractive practices of impoverished, local, or Indigenous communities, despite increasing demand and wealth in international consumer markets for illegal wildlife products (Duffy et al., 2015; Domínguez and Luoma, 2020). Approximately 15% of the global population depends on

wildlife harvesting to support their livelihoods (Brashares et al., 2014). The harvest of wildlife and wildlife products is an important component of rural and Indigenous people's nutritional (e.g., Kuhnlein et al., 2008; Haq et al., 2022) and cultural (e.g., Ngoufo et al., 2014; Kumera et al., 2022) identities and have proven to be sustainable, even ecologically beneficial (e.g., Bodmer et al., 2020). The persistence of traditional subsistence socio-ecological systems has been jeopardized by conservation-related injustices, such as the criminalization of subsistence hunting, that disproportionately affect Indigenous peoples and local communities (see van Vliet et al., 2015; Vlasova et al., 2017). Subsistence hunting typically is exercised by local hunters, and involves the snaring or trapping of less at-risk animals for the intention of consumption (Witter, 2021). Instances in which subsistence hunting begins to shift into commercial hunting, in which the animals being targeted have an at-risk status and are being targeted for commercial trade, does the hunting become considered a part of the illegal wildlife trade (IWT). The illegal wildlife trade (IWT) refers to the process "from killing and kidnapping of wildlife, through alteration into products if necessary, then smuggling within or between countries, and selling to the final buyer in person or online" (Wyatt, 2022, p. 9).

Socioeconomic drivers of IWT have a significant impact at the local level which is often omitted in legislative intervention strategies (Liew et al., 2021). However, the legality of hunting, particularly at the subsistence level, is deeply connected to colonial histories of displacement and criminalization of Indigenous peoples for the sake of conservation (Bardey, 2020; Snook et al., 2020). For example, Nicaragua's *saneamiento territorial* (territorial cleaning) policy prioritizes the territorialization goals of the state. In doing so, it dispossesses Indigenous peoples of their territories and natural resources (Sylvander, 2021). These injustices can increase the likelihood of a conservation intervention strategy failing, exacerbate unwanted behaviors, and undermine the legitimacy of conservation initiatives to succeed (e.g., Duffy et al., 2019). Efforts to mitigate IWT that uphold local rights and that support a community's assets and livelihoods can create an enabling environment for effective enforcement and prevent unintended consequences (Cooney et al., 2017). Further, Jones and Murphree (2004) suggest that providing for human needs must be tangential to any conservation effort, which involves the lives and livelihoods of local communities. Community-based approaches to addressing IWT are slowly gaining attention and can be effective in preventing wildlife crime and supporting communities (Roe and Booker, 2019). Identifying how measures to protect wildlife from IWT can counter conservation injustices necessitates a deeper investigation into how these strategies translate socially.

It is also important that consideration of communities in efforts to address IWT is not homogenized. In particular, women are increasingly being recognized as critical actors for IWT prevention (Graham, 2022). However, women's roles within this sector are often undermined due to patriarchal power dynamics, which affect women's access to and participation in conservation initiatives (Kahler and Rinkus, 2021). The gendered dimensions of IWT are a critical consideration for species conservation because gender dynamics can influence both IWT operations (Agu and Gore, 2020; Mrosso et al., 2022) and community-based conservation initiatives (Keane et al., 2016; Abebe et al., 2020; Mashapa et al., 2020). IWT relates to distinct gender disparities, which are important to recognize if any IWT response measure is to be successful (Seager, 2021). For example, women generally participate in IWT in different ways than men, receive less economic benefit from IWT than men, and suffer a higher burden of the negative consequences, such as zoonotic disease (Seager, 2021). Women can also play an important role in supporting efforts to mitigate IWT (Agu and Gore, 2020; Anagnostou et al., 2020; Kahler and Rinkus, 2021). Both overlooking women's roles in IWT and failing to integrate women in interventions to address it creates major blind spots for practitioners, deepens existing gender inequalities, and ultimately limits the effectiveness of responses (Seager, 2021). Thus, when grappling with the complexity of illegal trade in species and conservation, it is imperative that we have an understanding of women's role within community-based responses.

Many previous works signal alarm for the conservation status of global carnivores facing uncertainty in their persistence due to the synergistic effects of pressures (e.g. Ingeman et al., 2022; Ripple et al., 2014). These pressures include changes in climate, habitat availability, land use, disease exposure, and invasive species. Prey depletion is arguably amongst the most significant drivers of vulnerability in carnivore populations, where overhunting and habitat loss degrade the prey stock to disrupt predator-prey dynamics (Carter, Levin, and Grimm, 2019; Wolf and Ripple, 2016). In addition, overexploitation by humans is of high concern, and contributes to carnivore declines across scales. According to the International Union for Conservation of Nature (IUCN) Redlist, biological resource use threatens all 38 species of the Felidae family either directly through hunting and trapping or indirectly from habitat degradation and modification (IUCN, 2022). Felids are of high conservation priority and interest, which results in increased conservation efforts, communication campaigns, and research attention (Albert et al., 2018). Therefore, Felidae species present a useful sample for researching efforts to address IWT.

In this paper we present an exploratory study on community-based approaches to mitigating illegal trade in felid species. We do this by conducting a review of case studies of community-based approaches to counter IWT using a Theory of Change (ToC) framework. This study is a review of specific case studies of community-based approaches to counter the illegal trade in wild felids, and provides insight into research gaps that could be addressed. We were looking broadly at the types of community-based approaches used, as well gender and justice oriented conservation solutions. Our study contributes to the literature on the gendered dimensions of IWT, community-based conservation, and justice-oriented conservation.

Objective 1: Identify the types of community-based approaches which are being used to stop the IWT of Felids.

Objective 2: Identify the factors which reportedly contribute to the challenges and success of anti-IWT initiatives.

Objective 3: Identify the means in which gender and justice are integrated within community-based approaches to prevent illegal trade in Felidae species.

Specifically, we outline the ToC for community-based anti-IWT efforts; we detail our methods for an analytical framework to assess

case studies on the challenges and success of measures to protect felid species from illegal trade; we provide a qualitative explanation of gendered and justice-centered approaches to highlight the human dimension of IWT prevention; we discuss the outcomes, both positive and negative, of these community-based practice, as well as state the broader conservation implications; and we conclude by providing suggestions for future research.

2 Theory of change

The communities closest to wildlife should play a central role in deterring IWT. Biggs et al. (2016) developed the first ToC for countering IWT based on feedback garnered from stakeholders, including IWT experts, conservation organizations, funders, and government officials. ToC articulates the activities and inputs needed to achieve a particular outcome in a given context. When properly implemented, a ToC is a participatory stakeholder-driven process that examines assumptions associated with the context in which the outcomes are associated (Biggs et al., 2016). The ToC process can foster organizational reflection and learning, and adaptive management (Archibald et al., 2016). ToCs have been widely used in international development, outreach, agricultural extension systems, and wildlife conservation, and most recently, IWT (e.g., Wallen and Daut, 2018; Balfour et al., 2019; Skinner et al., 2020; Donaldson and Franck, 2021).

Four key pathways for community action on IWT were identified by Biggs et al. (2016): 1) strengthen disincentives for illegal behavior, 2) increase incentives for wildlife stewardship, 3) decrease costs of living with wildlife, and 4) support livelihoods that are not related to wildlife. These pathways all represent key conditions that enable communities to take action, while taking into account the needs for capacity-building and proper governance structures (Biggs et al., 2016). Community contributions to the first pathway, "strengthen disincentives for illegal behavior," include normative sanctions against poachers as well as more formal means such as being hired to aid law enforcement as game guards or scouts (Biggs et al., 2016). More robust formal means of law enforcement are also needed so that violators are penalized and there are staff members to monitor for illegal behavior. The second pathway entails "increasing incentives for stewardship." This is a crucial approach for including the community in IWT solutions since it involves securing the ownership and use rights for wildlife at the local level. As a result, IWT is discouraged and individual and societal capacity for wildlife conservation is built (Biggs et al., 2016). The third pathway for community action on IWT is to "decrease the costs of living with wildlife" as a means to foster improved co-existence. This can be achieved by improved fencing to protect livestock, which can decrease livestock losses and dampen animus by hopefully preventing attacks (Biggs et al., 2016). Local communities are less likely to support wildlife protection when people are harmed by wild animals (Lamichhane et al., 2018). The fourth pathway, "creating alternative sources of income," can reduce IWT by enabling and promoting alternative livelihoods. Supporting diverse sources of income, such as crops, tourism, or artisanship, can reduce livelihood dependence on wildlife resources. Given the utility of ToC for understanding community involvement in the IWT, we apply the four pathways as a framework in our study to understand the socio-ecological dimensions of IWT prevention using felid species as a case study.

3 Materials and methods

3.1 Data collection

We used English-language search terms to identify case studies from publications in academic and grey literature between 2012-2022 to identify community-based anti-illegal felid trade interventions that have been implemented over the past decade or are currently being implemented. We identified 38 felid species from the IUCN Red List (see Table 1). Of the 38 species included in our search, case studies of community-based conservation efforts were available for 25 species and were thus included in our analysis (see Table 1). Of these 25 species, 9 are currently classified as Least Concern, 9 as Vulnerable, 5 as Near Threatened, and 2 as Endangered. The populations of the majority of the species (n=20) reviewed are decreasing globally, while 3 species populations are stable and the trends for 2 species are unknown.

We included case studies described in academic peer-reviewed publications, as well as case studies described in non-academic sources, including the People Not Poaching database (https://www.peoplenotpoaching.org/), non-governmental organization reports, and websites dedicated to the specific initiative, all of which are included in the reference list. We included case studies of IWT at domestic or international levels. Two case studies that emerged from the searches had English-language summaries and additional details in other languages (Spanish and Portuguese), which were included and the additional details were translated as needed using the Google Translate tool. We did not exclude studies based on geographic location, or the research design used (e.g., qualitative, quantitative, descriptive, mixed-methods, etc.). As our study was exploratory, we sought to find at least one, and up to three case studies for each species, in order to have a greater opportunity to identify trends in anti-illegal wildlife trade approaches for the species, as well as to generate a nuanced understanding of the problem and the specifics of the initiatives at the local level.

The databases that were used included Scopus, Google, Google Scholar, and the People Not Poaching database, as these are four comprehensive databases for both scholarly and grey literature sources. Our criteria for inclusion of the identified case studies were that the case study: (1) must cover at least one of the four community-based pathways; and (2) the anti-IWT prevention project must have been already implemented, rather than having been just proposed or suggested. If we were unable to find case studies in scholarly literature first, we would then attempt to find examples from the People Not Poaching database based on our two inclusion criteria. In identifying available literature for case study examples, we used various combinations of search terms such as "anti-poaching strategies'', OR "anti-poaching", OR "local communities", "local community conservation", OR "community-led conservation", OR "community-based conservation," or

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TABLE 1 Felidae species that were included or excluded from our study, along with their most recent IUCN Threat Status.

Species with Included Case Studies	Species with Excluded Case Studies
Cheetah (*Acinonyx jubatus*) Vulnerable	Borneo Bay Cat (*Catopuma badia)* Endangered
African Golden Cat (*Caracal aurata*) Vulnerable	Chinese Mountain Cat (*Felis bieti*) Vulnerable
Caracal (*Caracal caracal*) Least Concern	Black-footed Cat (*Felis nigripes*) Vulnerable
Asiatic Golden Cat (*Catopuma temminckii*) Near Threatened	Jaguarundi (*Herpailurus yagouaroundi*) Least Concern
Jungle Cat (*Felis chaus*) Least Concern	Southern Tiger Cat (*Leopardus guttulus*) Vulnerable
Sand Cat (*Felis margarita*) Least Concern	Northern Tiger Cat (*Leopardus tigrinus*) Vulnerable
Wild Cat (*Felis silvestris*) Least Concern	Canada Lynx (*Lynx canadensis*) Least Concern
Pampas Cat (*Leopardus colocolo*) Near Threatened	Eurasian Lynx (*Lynx lynx*) Least Concern
Geoffroy's Cat (*Leopardus geoffroyi*) Least Concern	Iberian Lynx (*Lynx pardinus*) Endangered
Guiña (*Leopardus guigna*) Vulnerable	Bobcat (*Lynx rufus*) Least Concern
Andean Cat (*Leopardus jacobita*) Endangered	Pallas's Cat (*Otocolobus manul*) Least Concern
Ocelot (*Leopardus pardalis*) Least Concern	Flat-headed Cat (*Prionailurus planiceps*) Endangered
Margay (*Leopardus wiedii*) Near Threatened	Rusty-spotted Cat (*Prionailurus rubiginosus*) Near Threatened
Serval (*Leptailurus serval*) Least Concern	
Sunda Clouded Leopard (*Neofelis diardi*) Vulnerable	
Clouded Leopard (*Neofelis nebulosa*) Vulnerable	
Lion (*Panthera leo*) Vulnerable	
Jaguar (*Panthera onco)* Near Threatened	
Leopard (*Panthera pardus*) Vulnerable	
Tiger (*Panthera tigris*) Endangered	
Snow Leopard (*Panthera uncia*) Vulnerable	
Marbled Cat (*Pardofelis marmorata*) Near Threatened	
Leopard Cat (*Prionailurus bengalensis*) Least Concern	
Fishing Cat (*Prionailurus viverrinus*) Vulnerable	
Puma (*Puma concolor*) Least Concern	

Species were included if we were able to find community-based case studies to mitigate illegal wildlife trade.

"conservation action plan" AND "[family name of Felidae species]", OR "[species common name]", OR "[species scientific name]". We used qualitative content analysis to identify key patterns and concepts within the included texts (Forman and Damschroder, 2008).

Members of the research team met biweekly for six months to categorize and identify the modes of anti-IWT approaches, as well as to establish the criteria for how each case example for each species (n = 25) met at least one of the ToC pathways. Further, we noted when we could not find an implemented community-based anti-IWT example for a given species. These species were not included in our analysis (see Table 1). We then explored the specific social and ecological outcomes that were reported in the case studies. Each case study was categorized by the lead and second authors, with discrepancies discussed, reviewed and resolved.

As our study was exploratory and descriptive, themes were identified inductively. The case studies were read first for familiarization with the context, then re-read to generate themes relating to the approaches used, and then re-read again to identify themes relating to the challenges and effectiveness of each intervention. The themes for the approaches used were centered around the four ToC pathways, and additional themes were added inductively (e.g., "Adaptive management"). The 'lessons learned' data were separated into the broad themes of "Challenges" and "Successes." Specific codes were then assigned to the identified themes (for example, one of our assigned codes was "Challenges: Lack of participation," or "Successes: Positive attitudes toward felids post-intervention"). The results are presented in descriptive terms, which collate the ideas and lessons learned across all the case studies. The results section is organized by themes.

3.2 Data analysis

We populated a database in Microsoft Excel to extract data from each reviewed initiative on the approach used, the successes, and the challenges, if reported. The spreadsheet includes columns for basic information on the species of interest, such as the species' common names, scientific names, family, IUCN Red List status, year of assessment, CITES status, IUCN Red List population trend, and whether it is threatened by IWT (yes/no; and if yes, in which countries). We also included more specific data in the spreadsheet relating to IWT, such as the known drivers of illegal hunting, and cultural significance. In addition, we recorded details on the identified case studies of initiatives to protect that species, such as where it is located, details of their approach, and its categorization within ToC framework. Lastly, we extracted data on whether it was evaluated, and the study/evaluation outcome. Data were analyzed qualitatively using Pivot Tables to measure counts of categorical data (e.g., count of case studies in each country, count of case studies that used each approach, etc.) and visualized using Python in Jupyter Notebook. Citations for the source of case studies supporting each of the themes are noted in the results section.

4 Results

Each included publication (n = 36) could consist of multiple case studies relevant for our analysis. As such, the number of case studies is higher than the number of publications included in this study. Of the publications included, 25 were retrieved from academic literature, 6 were retrieved from the People Not Poaching platform, and 5 were retrieved from grey literature sources. These publications gave us a total of 40 case studies for our investigation. These case studies were based in 34 different countries, in addition to one African-continent wide review study (see Figure 1). Despite searching all included case studies for any type of gender consideration, only 5 described gender dynamics.

According to our review, all 25 included felid species were illegally hunted and traded throughout their geographic range. Frequently reported drivers of illegal hunting of felids included human-wildlife conflict due to poultry or livestock depredation (n = 21), opportunistic/unintentional illegal harvesting (e.g., caught in indiscriminate trap; n = 10), targeted for illegal commercial trade in pets, skins and parts (n = 18), used in traditional cultural practices (n = 8), and unknown/not enough data (n = 9) (Figure 2). These drivers add up to more than the total number of species, as many

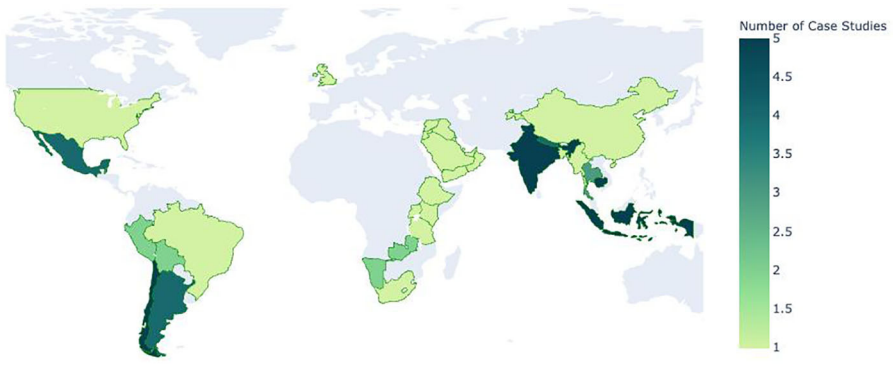

FIGURE 1
Global map of the countries where included case studies were located. Darker coloration indicates a higher number of case studies representing that country.

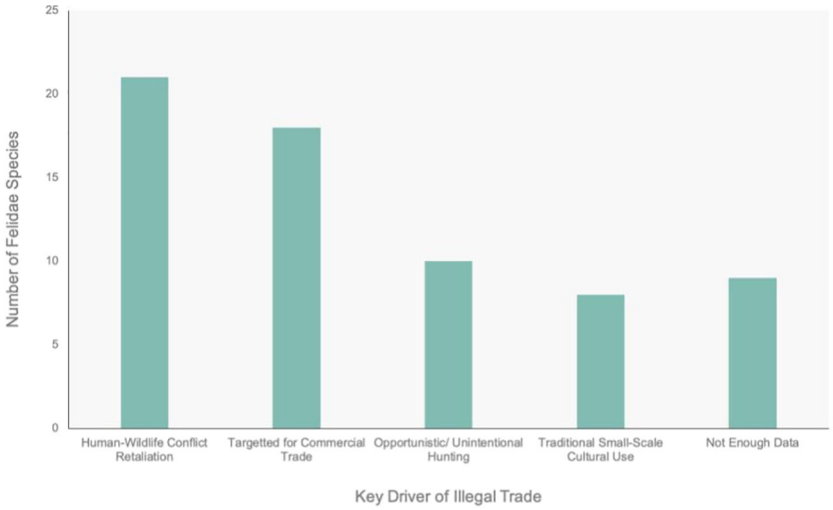

FIGURE 2
Reported key drivers of illegal trade in Felid species (n = 25) across the case studies. Totals exceed the number of included species, as some felid species are illegally traded due to a combination of these factors.

species experienced a combination of drivers of illegal hunting and trade. For the purposes of this investigation, we focused on the species who were targeted specifically for IWT.

4.1 Types of community-based initiatives

We coded case studies using the four pathways in the ToC framework (Biggs et al., 2016) and found that many community-led initiatives to stop the illegal trade in felids focused on increasing incentives for wildlife stewardship (n = 27). This was followed by decreasing the costs of living with wildlife (n = 23), supporting livelihoods that are not related to wildlife (n = 16), and strengthening disincentives for illegal behavior (n = 14) (Figure 3).

4.1.1 Comprehensive approaches

Several felid conservation projects used highly comprehensive approaches to address all four community-based pathways to reduce pressure on wildlife from IWT. For instance, Panthera's project, which aimed to mitigate IWT in the Greater Kafue Ecosystem, Zambia, focused on all four pathways for cheetah (*Acinonyx jubatus*), leopard (*Panthera pardus*), and lion

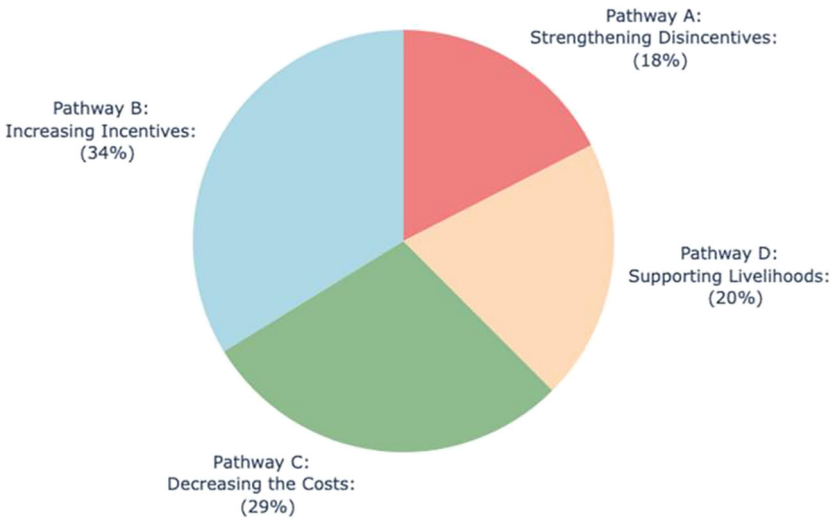

FIGURE 3
Distribution (%) of pathways used to address illegal wildlife trade in felids in our included case studies. The pathways are: **(A)** strengthening disincentives for illegal behavior (e.g., through community scouts and incentivizing patrols); **(B)** increasing incentives for wildlife stewardship (e.g., through tourism, resource access); **(C)** decreasing the costs of living with wildlife (e.g., physical barriers to protect livestock); and **(D)** supporting livelihoods that are not related to wildlife (e.g., enterprise support) (Biggs et al., 2016).

(*Panthera leo*) conservation (People Not Poaching, 2020b). Similarly, community-based projects in Kerala, India, Chitwan district, Nepal, and in Veun Sai-Siem Pang Conservation Area, Cambodia, took a comprehensive approach to protecting felids (i.e. leopards (*Panthera pardus*), clouded leopards (*Neofelis nebulosa*), fishing cat (*Prionailurus viverrinus*), Asiatic golden cat (*Catopuma temminckii*), marbled cat (*Pardofelis marmorata*), leopard cat (*Prionailurus bengalensis*), and tigers (*Panthera tigris*)) from wildlife crime by utilizing at least three ToC pathways in their prevention approach (e.g., People Not Poaching, 2018; Lamichhane et al., 2020; People Not Poaching, 2020a). Notably, many highly comprehensive conservation projects target the conservation of large felids, such as tigers, cheetahs, and leopards. The small felid species included in our review generally appeared to lack the same level of conservation attention. We were unable to find any evidence of community-based conservation projects for thirteen felid species and these were primarily small felids (Table 1).

4.1.2 Strengthening disincentives

Examples of initiatives to strengthen disincentives for illegal felid hunting behavior included programs that offered payment for community scouts and for patrolling and guarding (Foggin, 2012; People Not Poaching, 2018; Lamichhane et al., 2020; People Not Poaching, 2020a; People Not Poaching, 2020b; Embaka, 2022). Some initiatives also offered in-kind incentives for actionable information on wildlife crimes (e.g., People Not Poaching, 2020a). The most commonly reported strategies involved community outreach, workshops, training sessions, and raising community awareness about wildlife conservation concerns, and wildlife crime rules, penalties, and sanctions (McCarthy et al., n.d.; Foggin, 2012; Fishing Cat Conservation Alliance, 2018; People Not Poaching, 2018; Breitenmoser et al., 2019; Fishing Cat Conservation Alliance, 2019; Silva-Rodríguez et al., 2019; Lamichhane et al., 2020; Lavariega et al., 2020; Ramírez-Bravo et al., 2020; People Not Poaching, 2020a; People Not Poaching, 2020b; People Not Poaching, 2020c; People Not Poaching, 2020d; People Not Poaching, 2021; Geoffroy's Cat Working Group, 2022). In addition, a couple of studies that we reviewed focused on the power of social norms in reducing felid hunting practices, the impact of passively received information, and the use of hunting taboos and cultural proscriptions as culture-based tools for reducing unsustainable hunting and IWT (Marchini and Macdonald, 2020; Nijhawan and Mihu, 2020).

4.1.3 Increasing incentives

Examples of initiatives to protect felids from IWT by increasing incentives for wildlife stewardship included facilitating a shift to ethical ecotourism, conservation tourism, and trophy hunting (Mossaz et al., 2015; Thapa et al., 2017; People Not Poaching, 2018; Breitenmoser et al., 2019; People Not Poaching, 2020a; People Not Poaching, 2020b; Geoffroy's Cat Working Group, 2022), often emphasizing the need for transparency and fair sharing of benefits. One study in Tajikistan noted that implementing trophy hunting programs of snow leopard (*Panthera uncia*) prey species has the potential to support conservation efforts of snow leopards (Kachel et al., 2017). However, the researchers noted that these types of programs can be complex and more research is needed (Kachel et al., 2017). Other projects that increased incentives for wildlife stewardship promoted resource access and use for local community subsistence (People Not Poaching, 2020b). In addition, payment for ecosystem services projects were able to reward communities who supported conservation and monitoring initiatives of target felid species (Harvey et al., 2017; People Not Poaching, 2021). Job creation through reformed poacher/"Poacher to Protector" initiatives also emerged in our review to prevent re-offending and provide past offenders with the capacity and opportunity to participate in illegal wildlife trade mitigation and tourism efforts (People Not Poaching, 2020a; Embaka, 2022).

4.1.4 Decreasing the costs

Examples of initiatives to decrease the costs of living with wildlife - and therefore to decrease the likelihood of engaging in IWT - included the introduction of livestock guarding dogs with financial support and training on their care and the provision of veterinary support and vaccinations (González et al., 2012; Kebede et al., 2016; Marker et al., 2021). Similar initiatives under this category to help mitigate human-wildlife conflicts included livestock protection collars (McManus et al., 2015), and predator control lights to mimic human activity and act as a visual repellent for livestock depredation (Verschueren et al., 2019). Other repellents, such as fire, noise and chemicals, and irritating smells were also used in efforts to mitigate conflict with felids (Kebede et al., 2016; Megaze et al., 2017). Several projects aimed to decrease human-felid conflicts through the construction or predator-proofing/reinforcing of different types of physical barriers, such as bomas, chicken coops, and goat pens (McCarthy et al., n.d.; Lichtenfeld et al., 2015; Kebede et al., 2016; Megaze et al., 2017; People Not Poaching, 2020b; Geoffroy's Cat Working Group, 2022). Physical separation of people/livestock and wild felids through improved land use zoning plans is another reported strategy (People Not Poaching, 2020b). Finally, interventions have been implemented which offer financial compensation for property damage, livestock depredation, and human injury or death to facilitate equitable sharing of benefits from wildlife (Bauer et al., 2017; Chouksey et al., 2017; Karanth et al., 2018).

4.1.5 Supporting alternative livelihoods

Examples of initiatives to support livelihoods that are not related to wildlife included promoting alternative sources of income that do not rely on wildlife exploitation and involved the provision of community benefits, such as access to new employment opportunities, farming support, training in new skills (such as tailoring), and improving access to school (Fishing Cat Conservation Alliance, 2019; People Not Poaching, 2020b). A creative approach to supporting livelihoods and community benefits as a strategy is a project that aimed to protect the African golden cat (*Caracal aurata*) from illegal hunting in Uganda. Part of their strategy involved offering free oral health care and treatment to communities living near protected areas through the use of mobile dental units, in exchange for voluntary support with

detecting illegal hunting (Embaka, 2022). The project also supported pig farming to improve household income, dissuade wildlife crime, promote community policing and generate social pressure against IWT (Embaka, 2022).

4.1.6 Additional approaches

Some initiatives were focused at a higher level of governance and management structures for the implementation of policies for sustainable wildlife use, conservation, and management. Many initiatives emphasized the importance of collaborative and adaptive management approaches. These measures included reviewing legislation and law enforcement, engaging with stakeholders, ongoing data collection and monitoring of the species and threats, identifying gaps in knowledge and policy, and using this information to make recommendations to improve legislation, law enforcement, and public education and awareness (e.g., Foggin, 2012; Banfield and al Qahtani, 2014; Fishing Cat Conservation Alliance, 2018; Breitenmoser et al., 2019; Silva-Rodríguez et al., 2019; People Not Poaching, 2021; Gallina et al., 2022; Geoffroy's Cat Working Group, 2022). Lastly, although less aligned with the four key pathways for community-based responses to IWT, some studies described the focus on increasing law enforcement presence, arrests, and prosecutions, to reduce IWT of felids, though noted that this alone cannot stop wildlife crime (e.g., Jenks et al., 2012; Risdianto et al., 2016).

4.2 Effectiveness of community-based initiatives

Many of the initiatives reviewed in our study did not report undertaking formal evaluations of social or ecological outcomes of their community-based programs to address illegal wildlife trade. Nine projects described their approaches, but did not evaluate their effectiveness in benefiting communities or wildlife. The rest of the included initiatives reported on their effectiveness to some degree, which is what we used to glean insights into self-reported challenges and areas of success. The lessons learned from the reviewed initiatives are summarized below.

4.2.1 Challenges to community-based initiatives

4.2.1.1 Low uptake/participation

Some of the most notable challenges to community-based initiatives stem from a lack of enthusiasm, agency, or time by local community members. Despite the known success of livestock guarding dog initiatives in reducing human-wildlife conflict, one study in Argentina found that herders may not be willing or able to provide the ongoing care needed for livestock guarding dogs, and therefore be unwilling to become involved in these initiatives (González et al., 2012). Similarly, community-based anti-poaching units can be effective in raising awareness about wildlife crimes, gathering information, and reducing illegal hunting pressure (Lamichhane et al., 2020). However, local people's participation is central to the success of these programs, and uptake in some cases is low. One case study detailing the use of community-based anti-poaching units in Nepal reported inadequate participation because people felt they did not have time available for conservation activities, received insufficient direct benefits, and importantly, had low security assurances relating to encounters with illegal hunters (Lamichhane et al., 2020). Community-based conservation programs may be improved going forward with the provision of training, field gear and equipment, financial support, incentives, and strengthening security of members (Lamichhane et al., 2020).

4.2.1.2 Ineffective livestock loss compensation schemes

Compensation schemes have proven efficacy in reduced killing of predators, and are also a cost-effective option for conservation organizations to reduce the costs of living with wildlife (Bauer et al., 2017) and therefore reduce incentives for wildlife crime. However, livestock loss compensation schemes have failed in the past due to factors such as poor design, poor implementation, corruption, fraud, lack of transparency, or because of a lack of consideration for cultural values (Mossaz et al., 2015; Karanth et al., 2018). The other challenge for compensation schemes, and wildlife crime interventions more broadly, is ensuring that funding is stable and sustainable (People Not Poaching, 2018). Tourism surcharges, rather than a reliance on charity, is a viable alternative (Bauer et al., 2017). However, the funding for compensation schemes is still dependent on dynamism in tourism markets, broader economic trends, changes in leadership and priorities of conservation groups (Bauer et al., 2017). In addition, people in need of compensation may be unhappy with an overly lengthy and complicated process to submit claims, as well as high transaction costs (e.g., excessive documentation, visits to government offices), and the subsequent delays in payment (Chouksey et al., 2017; Karanth et al., 2018). This suggests that a simple compensation process that facilitates timely payment may improve efforts to mitigate human-wildlife conflict, improve attitudes toward predator conservation, and reduce IWT (Chouksey et al., 2017; Karanth et al., 2018).

4.2.1.3 Barriers to improving attitudes

Interestingly, one case study of a school-based education and communication initiative in the Brazilian Amazon reported that a few participants' negative attitudes towards jaguars were, in fact, reinforced by the project (Marchini and Macdonald, 2020). The researchers posit that this is possibly due to strong preconceived biases toward jaguars (*Panthera onca*) (Marchini and Macdonald, 2020). An alternative explanation is that some of the students involved in the school-based initiative had negative attitudes towards jaguars, which may have been reinforced by having to justify their opinions under peer pressure, since the majority of their classmates had more positive attitudes toward jaguars. Being forced to justify their negative opinions can make the students more convinced that they are right, their classmates are wrong, and that their freedom to choose how to think or feel is being limited (Marchini and Macdonald, 2020). This phenomenon, known as reactance, is an interesting and likely underreported issue in wildlife conservation programs and should be carefully considered in communication interventions to reduce IWT.

4.2.1.4 Gender dimensions and inclusivity

Gender is also important to consider when designing and implementing anti-IWT initiatives. Women may bear a disproportionate amount of the costs of human-felid conflict and illegal felid trade, and therefore barriers to their active participation and opportunities to benefit from initiatives must be eliminated (Harvey et al., 2017; Seager, 2021). However, only a few case studies discussed the importance of gender dimensions. For instance, we found a program in Chile and Argentina within the supporting livelihoods pathway that made special consideration for the gender dimensions of wildlife conservation (People Not Poaching, 2020d). This program focused on empowering women through their engagement as artisans to create handcrafted products to increase incomes, along with educational activities and capacity building (People Not Poaching, 2020d). This project is reportedly resulting in a reduction in carnivore hunting (People Not Poaching, 2020d). The lack of consideration for women and historically underrepresented groups within communities may present a significant challenge to community-based approaches to stopping IWT. In some contexts, gender can influence a person's tolerance towards wild felids, and in turn their intention to kill them (Harvey et al., 2017). By treating communities as a homogenous unit, this type of nuance will be left out of the planning and implementation of anti-IWT initiatives, and opportunities will be missed for targeted engagement that might otherwise maximize success. Much more research is needed to understand how to facilitate women's participation in anti-IWT initiatives (Harvey et al., 2017).

4.2.1.5 Lack of trust and open two-way dialogue

More broadly, one of the reported factors that hinders a project's effectiveness is not making an effort to genuinely and thoroughly consult communities and maintain an open two-way dialogue (People Not Poaching, 2020b). However, this can be challenging even when it is the intention. For example, one of our case studies noted that despite the importance of maintaining community partnerships and despite the success of their community-based collaborative monitoring program on jaguars, the reduction of donor/governmental financial support to continue the program was a setback (Lavariega et al., 2020). When this does not occur and when community participation is limited, it can lead to mistrust and indeed jeopardize the success of the initiative (People Not Poaching, 2020b). Further, ensuring transparency and accountability throughout project implementation is crucial (People Not Poaching, 2018; People Not Poaching, 2020b).

4.2.2 Successes in community-based initiatives

4.2.2.1 Education and awareness

We found that the most common (n = 16) type of anti-IWTproject uses education and awareness raising as a conservation tool. School-based education initiatives can be effective in influencing youth and parent attitudes towards felids, as well as a cost-effective strategy when working in rural communities. To maximize the amount of people reached, case studies used a variety of approaches, including a combination of in-person meetings, workshops, talks in schools, distribution of hard-copies of educational materials, radio broadcasts, and online through various social media platforms (e.g., Breitenmoser et al., 2019; People Not Poaching, 2020c). In many cases, it is important to not only build awareness around conservation initiatives, but to also foster a sense of stewardship and capacity within communities that share spaces with wildlife (People Not Poaching, 2020b).

4.2.2.2 Community partnerships

Many rural communities also suffer from frequent human-felid conflicts that are not responded to in time, or adequately (e.g., in terms of compensation), thus blocking a key pathway of the ToC (decreasing the costs of living with wildlife). Many human-felid conflict interventions are implemented with the main goal of minimizing the negative effects of living with wildlife. However, bottom-up approaches that actually bring benefits to communities are necessary (Kebede et al., 2016). Building strong partnerships of all stakeholders, including communities, conservation non-governmental organizations, academic institutions, government agencies, and park managers and rangers, are an important factor for success as each group can offer support and share their own unique knowledge, skills, and capacities with their partners (Foggin, 2012; People Not Poaching, 2018; People Not Poaching, 2020b). Partnerships should consider economic opportunities for rural communities who are providing conservation services, such as monitoring, anti-poaching patrols, providing information on illegal activities, or changing their land use practices in favor of ecological sustainability (Foggin, 2012; Lavariega et al., 2020). Therefore, it is also important for the establishment of adequate "financing structures at the community level for ensuring the transfer of payments that are equitable, transparent, and practical" (Foggin, 2012).

4.2.2.3 Tourism as a conservation tool

Though there are many ways that tourism can be a useful tool for felid conservation and mitigating IWT, tourism-based approaches can be complex (Mossaz et al., 2015). The proceeds from tourism can support research and wildlife monitoring, and help to mitigate human-wildlife conflicts, offset livestock losses, and shift perceptions toward conflict species (Mossaz et al., 2015). Factors for success generally include community involvement and benefits, for example, through the creation of employment opportunities (various tourism-related jobs), as well as livestock compensation programs (Mossaz et al., 2015). Thapa et al. (2017) echoed that financing from tourism is a critical component to ensure that communities are able to benefit from tiger tourism through long-term sustainable employment, upgraded health and sanitation facilities, improved opportunities for education, and improved infrastructure development. All of these benefits resulted in greater motivation towards conservation and tiger stewardship (Thapa et al., 2017). It is also recommended that project managers have a clear idea of the type of tourism they would like to use in their projects - ecotourism, community tourism, nature-based tourism, etc. (Foggin, 2012). Overall, tourism has the potential to support the ToC pathway that underlines increasing incentives for stewardship of felids, and therefore to possibly reduce pressure from illegal trade.

4.2.2.4 Reformed poacher initiatives

In one of the reformed poacher initiatives that we reviewed, the majority of participants were successful in not reverting back to offending, and able to remain involved in conservation efforts (Shaji, 2020). Although building trust was the initial challenge, these individuals were able to receive a stable income and provide their children with better education. In addition to the social benefits, these groups have now become an important part of participatory forest management, including through the establishment of an intelligence network and have helped dismantle wildlife trafficking networks in the area (Shaji, 2020).

4.2.2.5 Ongoing community engagement

Further, *continual* engagement with partners, namely the affected communities, is essential for long-term success of anti-illegal wildlife trade initiatives (Foggin, 2012; People Not Poaching, 2018; People Not Poaching, 2020b). One of our case studies is a long-term project that has resulted in ongoing community-led monitoring and protection of snow leopards in the Tibetan Plateau (Foggin, 2012). Communities were empowered to create plans for conservation and development, selected community conserved areas which account for their cultural and traditional beliefs, and the community members were in fact the ones promoting education with the wider public on the importance of conservation (Foggin, 2012). The threat of illegal hunting has since been reduced through the introduction of collaborative management with the pastoralist communities (Foggin, 2012). At a higher policy level, strengthening land tenure rights and government support for devolved/decentralized governance of wildlife is also important for the success of community-based conservation, as this reassures local communities of their long-term land 'ownership' (People Not Poaching, 2018; People Not Poaching, 2020b).

5 Discussion

Measures to stop illegal felid trade can involve a variety of community-based strategies. Exploring the types of initiatives that are being used to stop IWT and reviewing the reported effectiveness of these initiatives is critical to inform fair approaches to protecting wildlife in ways that benefit and empower local communities. We reviewed community-based programs that have been implemented to prevent the illegal trade in felid species globally. We have identified key insights into the successes, failures, and recommendations of these programs. Though community-based approaches alone cannot solve the problem of IWT, especially considering the prevalence of sophisticated organized crime groups in some contexts (Anagnostou, 2021), our study further illuminates the need for IWT mitigation strategies to consider local communities and the various social dimensions.

Although we initially sought to review and report on the gender and justice-oriented practices of initiatives, there was often not enough information available. Importantly, case studies frequently emphasized the need for more data collection and analysis on changes in rates of IWT pre- and post-intervention, as well as measuring possible confounding factors, and formally evaluating changes in local peoples' attitudes towards felids, before drawing definitive conclusions on the effectiveness of interventions (e.g., Kachel et al., 2017; Lavariega et al., 2020). In addition, where social norms are the focus of an intervention, it is essential to understand the motivations, origins, and meanings behind culture-based tools, such as taboos, in order to effectively incorporate them into conservation frameworks (Nijhawan and Mihu, 2020). Our results also suggest that determining which initiatives will be successful depends largely on the specific context. For example, a community that does not experience high rates of livestock depredation by felids, may not significantly change their attitudes toward wildlife through compensation schemes (Harvey et al., 2017). Instead, participation in a camera-trapping program (i.e., payment provided to landowners when camera traps record cat presence on their land), may be more likely to positively affect tolerance (Harvey et al., 2017). Overall, the incentives must align with the specific needs of the community (Harvey et al., 2017).

Many of the cases in our study did not report social outcomes, thus suggesting that social benefits were not accounted for or prioritized in the development or implementation of the strategy. This is akin to other studies on IWT prevention strategies (e.g., Wilson-Holt and Roe, 2021). Increasing consideration of social dimensions in the development of anti-IWT initiatives should similarly translate into consideration of social outcomes when evaluating their effectiveness. Ignoring the social dimensions of conservation can contribute to the likelihood of IWT practices to persist if the social inequities are not addressed (Lunstrum and Givá, 2020). Using justice-oriented strategies to protect Felidae species from illegal trade can result in measures which are more socially equitable, as well as more environmentally sustainable. This can also help address the systemic causes of poverty and inequalities that drive people to engage in IWT (Anagnostou et al., 2021). An important, yet still underappreciated, pillar of this is gender equity.

One of the most notable findings, or rather *lack* of findings, was the absence of gendered considerations within the majority of the community-based conservation initiatives. Kahler and Rinkus (2021) conducted a comprehensive analysis of identified literature which analyzed the role of gender in wildlife crime-related activities and studies which incorporated gender in their research implementation. They found that between January 1990-March 2020, less than 1% of wildlife crime-related articles mention gender identity. Therefore, enhancing community-based conservation approaches can simply involve evaluating the ways that gender dynamics influence both the challenges and the successes of the approach in the specific context (Seager, 2021). Community-based anti-IWTstrategies can contribute to the ability of people of all genders to realize their full rights, including having a voice in decision-making, and to not be unfairly negatively impacted by conservation initiatives. Further, the benefits and control over a legal and sustainable wildlife trade should be distributed in a way that counteracts gender imbalances.

Our findings contribute to discussions of the importance of building trust and relationships between conservationists and local communities for IWT mitigation measures to have beneficial social and/or ecological outcomes. A way to strengthen these measures is

by considering the nuanced cultural dimensions of local communities and their relationships with the natural world. For instance, some of the cases in our study were able to leverage their conservation efforts *via* the facilitation of already sustainable and wildlife-friendly conservation practices of the local people. The success of these measures may be enhanced by using context-specific, adaptive, and participatory approaches, including ensuring participation from historically underrepresented groups within communities, such as women. A deeper understanding of the existing and potential roles of Indigenous communities and women in mitigating illegal and unsustainable IWT and conserving Felidae species is needed.

5.1 Limitations

The fact that we were unable to find case studies for certain species (n = 13) does not necessarily mean that targeted conservation action is not being implemented for those animals. This could be due to a lack of reporting, a lack of academic research attention, or reports being published solely in non-English languages. For instance, the flat-headed cat (*Prionailurus planiceps*) is endemic to Sumatra, Borneo and the Malayan Peninsula, where two of the most widely spoken languages are Indonesian and Malay (IUCN, 2015; Britannica, The Editors of Encyclopedia, 2013). Additionally, one of the major inquiries that we could not readily confirm for some of the included case studies is how these reporting mechanisms are accomplished, specifically in studies extracted from the People Not Poaching database. We were not always able to identify who was reporting the success of an initiative; how they were reporting it; whether they were conducting an empirical or non-empirical assessment; and how or if they were measuring the illegal hunting rate for the study area. We also found that community-led monitoring efforts were recommended in the academic studies for some species, particularly small non-charismatic ones, but we were unable to find case studies where community-led monitoring was implemented, suggesting a research-practice disconnect.

6 Conclusion

In this study, we sought to evaluate the successes and challenges of strategies to prevent the illegal trade in Felidae species in the context of their social and gendered dimensions. To accomplish this assessment, we utilized Biggs et al. (2016) Theory of Change (ToC). We found a variety of community-based strategies to address the exploitation of wildlife and human communities, including opportunities for paid community scouts, support with alternative livelihood opportunities, provision of improved livestock protection, community benefits derived from wildlife tourism, payment for ecosystem services, and the use of cultural taboos as a conservation tool, among others. Overall, we found that the most comprehensive community-based conservation approaches often focus on conserving large charismatic felid species, such as lions, tigers, and cheetahs. We collated the lessons learned across all of the initiatives, including the implementation challenges and the critical factors for success. Given the gaps we have identified in the literature, there is a clear need for more research to understand the extent of illegal trade of felid species. Additionally, though an emerging topic for researchers, there is an urgent need for a deeper understanding of the successes and challenges of community-led anti-IWTinterventions. Importantly, systematically evaluating the social and the gendered outcomes of interventions will be useful for empirically informed decision making, and to inform fair and effective conservation programs. More broadly, conservation strategies for Felidae IWT prevention must more adequately account for social and gendered differences that surmount from community based initiatives. As conservation and social justice begin to be more frequently viewed in tandem, it is important for measures to be evaluated for their social and gendered impacts to ensure more equitable and sustainable conservation.

Author contributions

AG, MA, NH, and SA contributed to conception and design of the study. AG and MA organized the database. MA performed the analysis. AG wrote the first draft of the manuscript. AG, MA, NH, and SA wrote sections of the manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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