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PERSPECTIVE

C2C—conflict to coexistence: A global approach to manage human–wildlife conflict for coexistence

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Abstract

Human–wildlife conflict (HWC) presents a growing challenge to conservation and development worldwide. World Wide Fund for Nature (WWF) and experts on human–wildlife coexistence strategies have responded to this challenge by developing a holistic, globally applicable approach to HWC management that can be tailored to specific local, regional, or national contexts. Its framework addresses the complexity of essential HWC management and long-term coexistence strategies and

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is implemented in a structured yet contextualized step-by-step sequence by a team of facilitators and multiple stakeholders. The C2C: Conflict to Coexistence Approach centers on four principles (tolerance is maintained, responsibility is shared, resilience is built, holism is fundamental), four outcomes (wildlife thrives alongside human presence, habitat sufficient to maintain viable wildlife populations, people able and willing to live alongside wildlife, livelihoods/assets secured against presence of wildlife), and six HWC management elements (policy and governance, understanding interactions, prevention, response, mitigation, monitoring) that are to be implemented in an integrated way. It is currently undergoing testing in diverse pilot sites across three continents and demonstrating positive initial results. Here, we share the framework and methodology of the approach and initial results and experiences from these pilot sites.

KEYWORDS

coexistence, human-wildlife conflict, human-wildlife interaction, management framework, socio-ecological system, social- and environmental safeguards

1 | INTRODUCTION

Addressing the adverse impacts of interactions between wildlife and people is recognized as a rapidly increasing challenge for conservation and development. Human–wildlife conflict (HWC) is defined as the struggles that emerge when the presence or behavior of wildlife poses an actual or perceived, direct, and recurring threat to human interests or needs, leading to disagreements between groups of people and negative impacts on people and/or wildlife (International Union for Conservation of Nature, 2020). In addition to frequently observed negative impacts on wildlife populations, HWC is a humanitarian concern, causing human injury and death, livelihood loss that can be catastrophic, and often impacting the most vulnerable and marginalized communities (Barua et al., 2013; Doubleday & Adams, 2020; Ogra, 2008; Pozo et al., 2020). It is a complex issue, and its dynamics include a non-linear relationship between damages, attitudes, retaliatory, or fear-based actions by people toward the species involved, and institutions and policies that manage such interactions (Ceausu et al., 2019; Kansky 2022; Ostrom, 2009). Effective HWC management must consider these diverse elements (Madden & McQuinn, 2014; Dickman & Hazzah, 2016; Gross et al., 2022), be context specific and adaptable to complex, dynamic, and volatile situations (IUCN, 2023; König et al., 2020; Lamarque et al., 2009; Zimmermann et al., 2021). Emphasizing participatory processes and principles (Pereira et al., 2022; Redpath et al., 2017; Young et al., 2016) to move toward coexistence tailored for context, rather than standardized management actions, allows flexibility for adaptation and innovation. The IUCN Species Survival Commission (SSC) guidelines on HWC and coexistence acknowledge this by explicitly stating that the management of HWC is most effectively pursued through sustained, collaborative, and process-driven efforts (IUCN, 2023). This involves seeking the technical support of interdisciplinary expertise with the goal of developing more integrated and sustainable approaches to addressing this challenge.

Although it has become clear that HWC is a global concern affecting people and biodiversity, current HWC management actions are often not holistic or at scale and are implemented in a piecemeal manner (Gross et al., 2021). The need to think beyond piecemeal management approaches led to the development of the Safe Systems approach for HWC management by the World Wide Fund for Nature (WWF) Tigers Alive Initiative (Brooks, 2015). It is based on the experience of multiple dynamic global sectors such as transport, medicine, construction, and navigation, which demonstrate that overall safety in complex systems is enhanced by making each component of a system safe (Fleisher et al., 2016; Kopacz et al., 2001; Leonard & Frankel, 2010; Saleh et al., 2014). Historical trends in traffic fatality management demonstrated that increased vehicle numbers could be decoupled from numbers of human fatalities through a focus on safety in all components of the system (e.g., vehicle, road, and driver) (Corben et al., 2022; Green et al., 2022). Transferred to HWC, this suggests that an increase in human and wildlife populations should not necessarily result in a commensurate increase in conflict events, provided that all components of the system (e.g., people, their assets, wildlife, and habitat) are managed effectively.

While the Safe Systems approach was generally appreciated (Belecky et al., 2022; National Plant Protection Centre

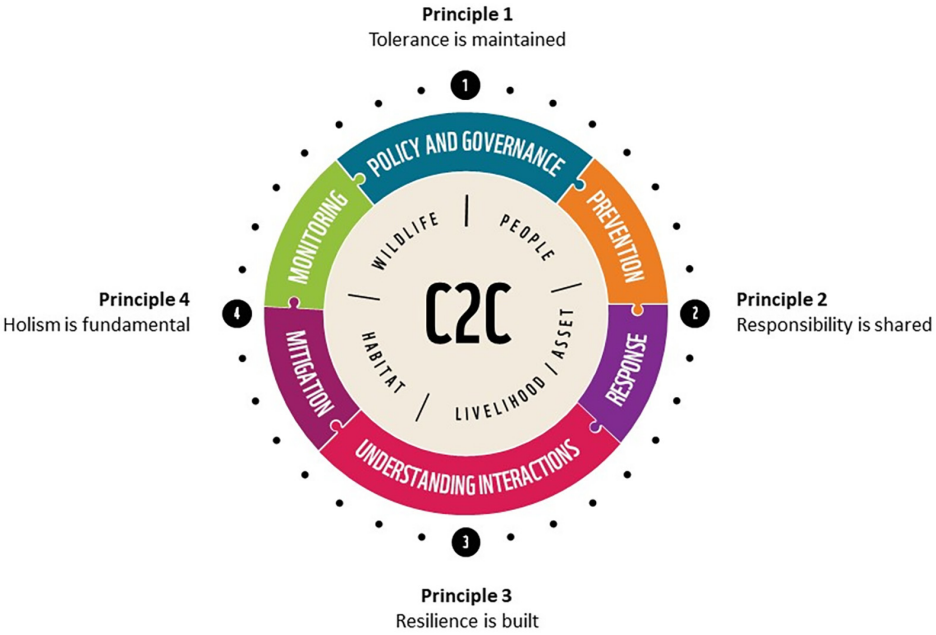

FIGURE 1 Illustration of the C2C: Conflict to Coexistence Framework, its four outcomes (wildlife, habitat, people, and livelihoods/assets), its six HWC management elements (policy and governance, understanding interactions, prevention, response, mitigation, and monitoring), and its four principles for implementation (tolerance is maintained, responsibility is shared, resilience is built, and holism is fundamental).

[NPCC] and WWF-Bhutan, 2016), challenges, gaps, and biases were identified during implementation, including the need for inclusive and meaningful participation of those most affected by HWC, addressing HWC drivers more holistically, and to develop pathways toward coexistence. Consequently, WWF undertook a thorough revision of the approach and identified partners and experts to better align with its intended purpose. The result of this revision process is the C2C: Conflict to Coexistence approach (referred to hereafter as the C2C approach), which considers the complex nature of HWC and the need to promote long-term coexistence through holistic planning, integrated implementation, and inclusive decision-making while keeping the flexibility to adjust to changing social, ecological, and economic contexts. It provides stepwise guidance and tools for implementation, monitoring, and adaptation for managing HWC at a local, regional, or landscape scale and is based on social science and addressing drivers of HWC, while considering social- and environmental safeguards.

2 | FRAMEWORK

The C2C approach is formed on the basis of four principles, four outcomes, and six management elements.

2.1 | Four principles for the C2C approach

All actions within the C2C approach are guided by four fundamental principles (Figure 1, outer circle).

Principle I Tolerance is maintained: Acknowledges that wildlife is inherently wild and may cause negative impacts to people and their assets. In HWC management, it is essential to consider people's ability and willingness to accept direct and indirect costs and risks of sharing a landscape with wildlife (Kansky et al., 2016).

Principle II Responsibility is shared: It is essential for different actors and stakeholders to contribute their knowledge and experience based on their roles, capacities, and skills and that they participate in decision-making in a meaningful and inclusive way.

Principle III Resilience is built: Considering the rights of communities to live resiliently with wildlife and contribute to people's well-being, health, and safety while simultaneously enhancing the resilience of ecosystems is a vital part of HWC management (Rockenbauch & Sakdapolrak, 2017; Wilson et al., 2013).

Principle IV Holism is fundamental: Recognizes that HWC is complex and a consequence of various interconnected factors in a socio-ecological system, and its management must incorporate holistic analysis and planning. It requires systematic and proactive implementation of management measures.

2.2 | Four outcomes of the C2C approach

Effective management of HWC requires taking the local needs and priorities of people and wildlife into consideration. Therefore, the C2C approach defines four outcomes to target simultaneously in landscapes shared by wildlife and people (Figure 1, inner circle).

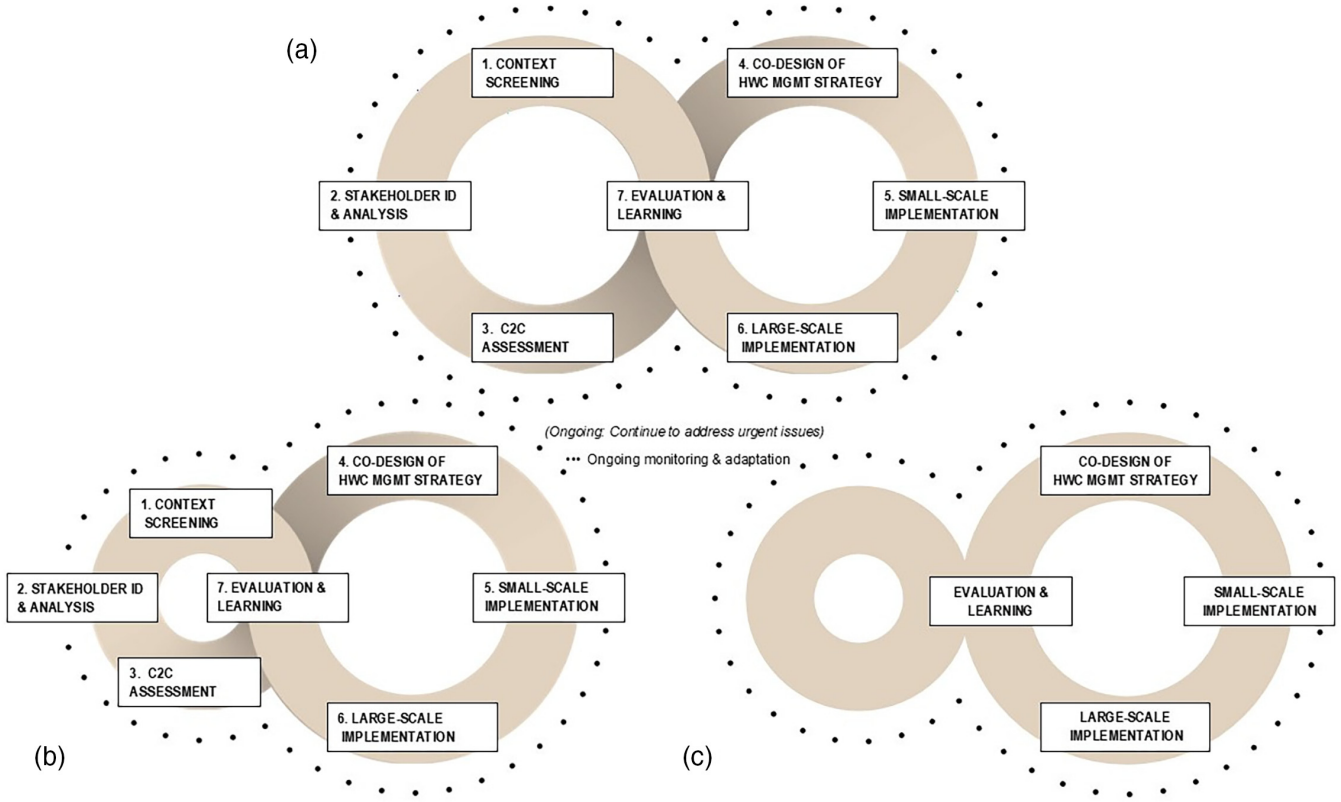

FIGURE 2 Illustration of the seven steps of the iterative C2C: Conflict to Coexistence methodology and its progression over time (a → b → c) with a shift in focus on strategy implementation and an adaptive management cycle.

Wildlife thrives alongside human presence: Negative interactions of wildlife with people are limited; no illegal killing due to HWC takes place; and wildlife is tolerated and supported by local stakeholders. Furthermore, wildlife populations are sustained; legislation for wildlife management is effective; and care of wildlife in danger is provided.

Habitat sufficient to maintain viable wildlife populations: Contiguous habitat with minimal disturbance is available for wildlife; its quality is maintained, improved, and protected by effective enforcement. Spatial plans and policies maintain habitat, and, where feasible, sustainable use and development of habitat and resources is supported.

People able and willing to live alongside wildlife: This involves sustained human well-being; psychological, cultural, social, and economic resilience; tolerance and capacity to live in shared space with wildlife; compliance with policies; and being supported by governmental and non-governmental institutions.

Livelihoods/assets secured against the presence of wildlife: Damage by wildlife to livelihoods and assets is minimized through adequate measures suitable for the ecological, social, and economic context, including the development of wildlife-friendly livelihoods. This also includes land-use plans to define safe areas for people, safe domains for wildlife, and corridors to maintain wildlife connectivity at macro and micro levels.

Detailed characteristics of the four outcomes are provided in Table A1.1, Appendix 1,2.

2.3 | Six HWC management elements of the C2C approach

The four outcomes will be contingent upon implementing actions within the six management elements (Figure 2, middle circle). When applied together, these form an integrated system, and the different actions under each of the six elements create a system of management. Some elements require sequential implementation and others in parallel, with overlaps occurring among a number of them.

2.3.1 | Understanding interactions

The C2C approach starts with "understanding interactions." This involves mapping and identifying negative and positive interactions between wildlife and people,

HWC drivers, impacts, and the broader societal and political context (Zimmermann & Stevens, 2021) in a select site or landscape. This review includes gaining an understanding of social conflict among stakeholder groups and potential knowledge gaps at various layers. Collaborating with an inter- and transdisciplinary team, including social scientists, ecologists, and local culture experts, is crucial for developing an understanding of conflict and exploring management options. "understanding interactions" summarizes a site-specific context, provides baselines for monitoring the effectiveness of HWC management interventions, and considers feedback-loops with regular data collection.

2.3.2 | Policy and governance

This element identifies legislation, structures, institutions, and processes that address HWC drivers and management at the local, national, and international level, and provides the basis and framework for actions within the C2C approach (e.g., customary laws; protocols development plans; coexistence committees/fora; corporate sector initiatives). Policies that affect human–wildlife interactions must be aligned across different legal levels and mainstreamed across various sectors to prevent unintended aversive effects.

2.3.3 | Prevention

"Prevention" refers to measures that are proactively implemented to avoid HWC before it occurs. This encompasses various strategies such as land-use planning, habitat management, wildlife-friendly livestock and crop production, educational initiatives, and sustainable community action to transform behaviors that contribute to or exacerbate HWC. Technical measures to stop, deter, or repel wildlife and early warning systems are also part of prevention efforts. It is crucial for prevention strategies to be informed by the elements "understanding interactions" (especially values, attitudes, and perceptions of HWC) and "monitoring" (sustainability and scalability of strategies).

2.3.4 | Response

"Response" involves measures taken to alleviate a specific HWC incident either while it is ongoing or just after it has occurred (Barlow & Brooks, 2019). Swift responses to ongoing or recent HWC incidents have the potential to reduce the level of threat to both people and wildlife through actions such as safely moving wildlife away from human-inhabited areas, crowd control, first aid, providing psychological or technical support to those affected, and providing rescue and care of wildlife in danger. "Response" also includes confirming and documenting the HWC incident, which can be important when linked to verification for compensation payments (see element mitigation), help identify causes of HWC (see element monitoring), and suggest prevention methods. Adequate HWC response may also help to build trust between affected parties and other stakeholders.

2.3.5 | Mitigation

"Mitigation" measures are implemented to reduce the level of impact caused by HWC incidents after they occur (Leslie et al., 2019). This element encompasses all techniques aimed at lessening the burden of HWC incidents, including financial, psychological, and social impact. The majority of HWC mitigation mechanisms are financially focused and, from a conservation standpoint, can be broadly categorized into three groups: economic incentives to reward living with wildlife; income diversification to buffer or avoid financial cost (alternative livelihoods); and payments tied to incidents (compensation and insurance). The overarching purpose of mitigation mechanisms is to provide a buffer for people when an HWC incident occurs. As a last resort, the removal of animals from a conflict area may be a mitigation measure that must be strictly informed by policy frameworks (element "policy and governance") and influences the "prevention" element.

2.3.6 | Monitoring for adaptive management

"Monitoring" interventions and adaptively managing them is essential for informed and evidence-based decision-making and learning. Consistent monitoring provides continuous feedback on progress and changing factors, as well as effectiveness of HWC management, which facilitates learning to adapt interventions as required. Monitoring HWC incidences, their impact, and the effectiveness of management interventions needs to be ongoing and overlaps with all other HWC management elements.

The effectiveness of any intervention under these six HWC management elements depends on concurrent implementation of components across the system, rather than in isolation. Examples of actions that have been implemented by various agencies worldwide are listed under each element in Table A2.1, Appendix 2 as a

reference for implementing teams to consider. Every conflict situation will require a combination of appropriate, context-specific measures identified under each element in a collaborative and an integrative process. A key recommendation is to assess risks and potential aversive effects of any planned action and to tailor it to the local context. After the implementation of management strategies, they need to be continually revised and adapted based on sound evidence, lessons learned, changing environmental and social factors, innovations, and stakeholder perspectives to ensure that they are appropriate and relevant to a local context.

3 | IMPLEMENTING THE C2C APPROACH

The C2C approach is implemented stepwise by a C2C manager and team by following an iterative process of adaptive management (Figure 2). The implementing team should preferably be a neutral entity (e.g., consultant, mediator, and facilitator) or at least relinquish the role of stakeholder (Bhatia, 2021).

While the process of co-creating the longer-term HWC management strategy with communities and other stakeholders in a participatory and inclusive way takes time, it may be necessary to apply immediate short-term or continued measures to maintain current levels of response or manage current or new urgent HWC situations (Figure 2, background) while taking the time needed to address root causes and underlying issues that are necessary for effective and long-term HWC management.

The C2C approach step-by-step guide and associated tools (Gross et al. 2024, in preparation) provide detailed information on co-designing an integrated and holistic approach to HWC management. In the initial phase (Steps 1–3), priority is given to understanding the interactions between wildlife and people and the dynamics between people in a landscape (left side of methodological process). The second phase (Steps 4–7) focuses on the co-design of HWC management strategies, their small- and large-scale implementation, and assessment of their effectiveness.

Step 1: Context screening—gather all available information on impact, drivers, and social dynamics affecting conflict and coexistence.

Step 2: Stakeholder identification and analysis—inform stakeholder engagement, including identifying forgotten and silent stakeholders and rightsholders, and considering power dynamics among them.

Step 3: C2C assessment—trained enumerators conduct a standardized quantitative study adapted to context targeting two main stakeholder groups (service providers and community members) to assess the status of HWC and its management. "Service providers" are entities or institutions that provide services to people or wildlife, for example, governmental and non-governmental institutions; civil society organizations; local associations; corporate sector, donor agencies, research groups, media, education facilities, tourism operators, etc. "Community members" refers to all people residing in an area or utilizing its natural resources for subsistence. It is a heterogeneous group of rights holders with diverse demographics, including cultures, livelihoods, ages, and gender.

Data is collected through personal interviews and focus group discussions or listening sessions, and directly entered into digital devices and uploaded to a Spatial Monitoring and Reporting Tool (SMART) database for automated analysis. The output of this assessment is the C2C report which, combined with the qualitative information gathered in Step 2, highlights the gaps by elements/outcomes and the differences in perception among stakeholder groups.

Informed by these initial steps, action planning and implementation are conducted through a co-design process with stakeholders (right side of methodological process). The stakeholder analysis and engagement plan determine how, when, and where stakeholders will be engaged, while the C2C assessment identifies priority actions to be considered.

Step 4: Co-designing C2C strategy—develop HWC management actions and the pathway toward coexistence in a stakeholder-led and inclusive process, which involves defining actions, roles, and responsibilities for all stakeholders at their respective institutional levels.

Step 5: Small-scale pilots—implement actions based on the C2C strategy at a small scale in the short term and adapt based on evaluation outcomes.

Step 6: Upscale pilots—in case of positive performance of small-scale pilots, upscale those actions according to the C2C strategy; mid- and long-term measures, including policy, governance, and legislation shifts will be implemented progressively.

Step 7: Evaluation and learning considers the effectiveness of integrated HWC management actions, leading to enhanced learning and increased understanding of the current context.

Ongoing: Monitoring and adaptation—continuously tracks the performance and effectiveness of the C2C process for adaptive management.

With successful implementation of HWC management actions, learning and understanding will increase and eventually be integrated into an extensive monitoring, evaluation, and learning process facilitated by the implementing stakeholders themselves. Thus, the process

TABLE 1 Feedback collected from five C2C: Conflict to Coexistence pilot projects on learnings and challenges during the implementation of the first four steps of the C2C approach and future recommendations.

C2C step	Lessons learned from pilots	Challenges faced	Recommendations
Preparation phase	• This phase was helpful to get a common understanding on the approach before collecting relevant information.	• Elections and other political processes hampered the implementation of the C2C approach or impacted its timeline.	• Spend sufficient time to communicate the project to involved communities and other stakeholders. • Calculate the budget required for all steps of the C2C approach and urgent HWC interventions (context specific). • Make sure the C2C facilitation team is well-informed on the approach before starting Step 1.
Step 1. Context screening	• The Step 1 guidance supported the comprehensive collection of any relevant information. This also triggered good discussions among stakeholders and highlighted information gaps.	• Information was sometimes scattered, incomplete, or came from unreliable sources.	• Make sure stakeholders, especially community members, that are familiar with the landscape are involved in the collection of information.
Step 2. Stakeholder identification and analysis	• The context analysis helped to identify the stakeholders, analyze the diversity of community groups impacted by wildlife and understand the power dynamics in the landscape.	• When stakeholders had different roles in relation to HWC management (e.g., when they are both impacted by HWC and impacting its management), it was difficult to map them in the stakeholder matrix.	• Be as detailed as possible in identifying stakeholder groups. Do not lump them together. • Involve experts in environmental and social safeguards to get insight into the vulnerable groups in the landscape. • Work with key informants from the community to validate the selected list of stakeholders.
Step 3. C2C assessment	• It was helpful to plan the assessment process carefully to avoid overlap with other community activities and increase the chances for good participation. • Rehearsal of the questionnaire by the enumerators and practicing the art of active listening enabled the capture of crucial information.	• Weather conditions and other factors impacted access to some areas. • Some specific target groups were absent during specific periods, such as farming- or fishing seasons. • In some cases, it was not possible to conduct the assessment, like when an individual was killed as a result of HWC in one of the target villages and emotions around the incident were high among the community. Engagement was postponed in response to the situation.	• Organize a 3-day training of enumerators to explain the background of the project and familiarize them with the assessment. • Conduct the assessment on-site and in person. Facilitate the participation of interviewees, especially if it means meeting them in convenient locations to avoid interrupting their normal working hours. • Provide one hand-held device to each enumerator for data collection. • Translate questionnaires into local languages. • Ensure involvement of local government leaders from district level to village level to ensure cooperation at all levels.
Step 4. Co-design of HWC management strategy	• Effective communication of the findings from the assessments helped align community expectations and outcomes. • Involving diverse community groups in focus group discussion	• Limited understanding of the co-design process by some implementing teams delayed the process. • In some instances, incomplete stakeholder assessments led to	• Ensure thorough planning of the co-design process. • If there is limited understanding of co-design by implementing teams, engage an external consultant to support the process.

(Continues)

TABLE 1 (Continued)

C2C step	Lessons learned from pilots	Challenges faced	Recommendations
	helped create better plans and more relevant strategies for HWC management and livelihood improvement. • Conducting side discussions with specific groups like women, youth, and elderly people helped to come up with more inclusive strategies focusing on these groups.	some stakeholders being left out of the co-design process.	• Engage an external, neutral moderator or mediator when conflict among stakeholders is heated.

Abbreviation: HWC, human–wildlife conflict.

will place a stronger emphasis on adaptive management and ownership by the stakeholders (right side of methodological process), eventually decreasing the focus on assessments (Figure 2b,c).

4 | LESSONS LEARNED FROM INITIAL IMPLEMENTATION

The C2C approach has been piloted from late 2023 to mid-2024 in Trong Gewog, Bhutan; Ruvuma Landscape, Tanzania and Mozambique; Parque National Ntokou Pikounda, Rep. Congo, and in ThapLan National Park, Thailand. Table 1 provides preliminary lessons learned, challenges faced, and recommendations on the C2C process until Step 4 of the process, which is the step they are currently in since commencing these pilots.

5 | OUTLOOK

C2C has the potential to be an effective tool for long-term management of HWC because it involves all stakeholders addressing HWC to develop an integrated and holistic approach toward coexistence. It builds on existing structures, institutions, and processes in place and involves current engagement strategies, such as platforms, fora, or committees.

Organizations or agencies applying the C2C approach should acknowledge the inherent complexity of HWC and recognize that effective management requires skilled experts across numerous disciplines. The careful development of adequate structures for long-lasting relationships and resilient networks, crucial capacities, and meaningful processes requires intensive time investment. This investment is crucial to achieve the buy-in and ownership of all stakeholders and forms the basis for long-lasting solutions (Cranston et al., 2022). Given the often-limited availability of financial resources, strategic and efficient investment is imperative. The C2C approach aims to assist in identifying the most pressing gaps in HWC management that require immediate and/or long-term financial capacity. However, unforeseen challenges and unintended consequences can arise as a result of an intervention or changing factors, which is why it is important to create well-communicating networks and to remain in regular dialog with them, as well as a good monitoring and evaluation system.

The C2C approach embraces adaptive management, which requires collaboration and shared responsibility for long-term sustainability and is crucial for effectively addressing constantly changing and complex HWC and will remain open for updates as learnings are collected over time.

AUTHOR CONTRIBUTIONS

Eva M. Gross facilitated the process of the revision of the Safe Systems Approach, wrote the original draft manuscript, and coordinated contributions of co-authors. Nilanga Jayasinghe, Smriti Dahal, Sither Tenzin, Sybille Klenzendorf, Kate Vannelli, Elke van Gils, and Femke Hilderink-Koopmans provided substantial input to the revision of the Safe Systems Approach. Kayla Cranston and Jennifer F. Moore developed the main parts of the methodology. Drew McVey, Natalia Basniak, Valeria Boron, Diana Frances, Sandra Petrone, Wendy Elliott, Kate Clemens, Jenny A. Glikman, Ruth Kansky, Silvio Marchini, Saloni Bhatia, and Margaret Kinnaird provided further input into the draft C2C: Conflict to Coexistence approach step-by-step guide. All authors reviewed, provided edits and revisions to thefinal manuscript of this publication.

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CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

This is a submission as perspectives/notes without data-based evidence, no data available.

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APPENDIX 1: FOUR OUTCOMES OF THE C2C APPROACH AND THEIR CHARACTERISTICS

TABLE A1.1 The four outcomes of the C2C approach are characterized by key parameters, which are mutually beneficial and are linked to six elements of human–wildlife conflict (HWC) management.

Characteristic	Description/context
Wildlife thrives alongside human presence	
No illegal killing of wildlife resulting from HWC	Wildlife is not killed due to negative interaction with or perceptions by people, either in response to damage, in retaliation, or due to fear, low tolerance, or misbeliefs.
Sustainable wildlife populations supported	Sustainable wildlife populations have an intact social structure and are physically capable of performing their regular daily activities (hunting, foraging, reproducing, and protecting themselves) to increase the likelihood of their species surviving over time. Wildlife has the ability to maintain genetic diversity within species. Populations that are substantially reduced through HWC are restored to a size that ensures their survival, at the very least, in suitable areas.
Limited negative interaction with people	Wildlife has limited interaction with humans or their assets. It is not positively conditioned to human presence, food sources, and shelter. Where feasible, water sources of people and wildlife are separated. Wildlife is protected from spillover of livestock and human diseases.
Effective legislation for wildlife management	Wildlife is protected by law with strict associated penalties for any violation. The laws protecting species will also ensure equal protection for its habitat and prey. Wildlife has dedicated personnel (e.g., rangers, police, patrol units, citizen scientists, military, and guardians) devoted to its protection through consistent enforcement of the law. Such personnel have a legal mandate to implement the law, remove threats, prosecute any violations, and continue to monitor and support the safety of wildlife over the long term.
Care of wildlife in danger	Wildlife is supported by professionals who can guide it back to its habitat, aid it when injured, and remove it from danger.
Tolerated and supported by local stakeholders	Wildlife is tolerated because it adds value to the social, cultural, or economic system and is carefully managed by the people sharing space with it. Ways in which wildlife can benefit people and the environment through various mechanisms whereby local people benefit from wildlife conservation.
Habitat sufficient to maintain viable wildlife populations	
Contiguous habitat with minimal disturbance	Contiguous habitat is a large, stable, connected space where wildlife lives, interacts, and breeds, and provides a significant buffer between human areas and wildlife. It offers large range space for species to roam, breed, and maintain genetic diversity, and provides natural cover. The habitat is protected in the long term from fragmentation, encroachment, clearing, selective logging, linear infrastructure, industries, and new settlements, and includes designated areas for wildlife and natural processes.
Habitat quality maintained and improved	The quality of habitat is continuously maintained, and in areas of degradation due to HWC or otherwise, it is supported with regeneration actions and habitat enrichment activities for wildlife.
Spatial plans and policies to maintain habitat	Habitat is secured and managed through spatial plans, which allows enough undisturbed space to foster ecosystem health and continuation of ecological processes and policies that prevent habitat loss, fragmentation, disturbance, and degradation.
Effective enforcement protects habitat	The habitat is protected by law with strict associated penalties for any violation and has dedicated personnel (e.g., rangers, police, patrol units, citizen scientists, military, etc.) devoted to its protection through consistent enforcement of the law. Personnel have a legal mandate to deliver the law, remove threats, prosecute any violations, and continue to monitor and support the safety of the habitat over the long term.
Sustainable use and development of habitat and resources	Depending on the spatial and functional plans, safe habitat may to some extent be used by people living with wildlife. The use of natural resources is adequately regulated and monitored to ensure long-term sustainability.

(Continues)

TABLE A1.1 (Continued)

Characteristic	Description/context
People able and willing to live alongside wildlife	
Sustained human well-being	Human well-being as defined by the United Nations' Sustainable Development Goals encompasses mental and physical health as well as personal safety. Well-being in regards to HWC includes a limited risk of being injured or killed by wild animals when following certain context-specific rules of conduct. People are living without fear toward wildlife and without anger, fear, and mistrust toward wildlife advocates.
Tolerance and capacity to live in shared space with wildlife	People capable and willing to live with wildlife are well-informed about risks and opportunities and have access to resources, skills, and techniques to implement prevention, response, and mitigation strategies. They use local/Indigenous knowledge and lessons from measures taken in other places to improve HWC management. They strive to have limited negative interaction with wildlife through adequate prevention measures. If interaction takes place, they have the capacity to respond in a way that reduces risk to themselves, other people, their assets, and wildlife. They know whom to contact in case of HWC emergencies and actively use local reporting systems when damage by wildlife is observed. If damage happens despite prevention and response in place, negative impact is mitigated.
Compliance and acceptance of laws	Compliant people agree with spatial plans regulating land use for their area and follow laws relating to wildlife and habitat protection, which integrate social and traditional norms and rules into the management of protected area systems and habitats. Community members actively participate in education and awareness-raising on biodiversity conservation and HWC management. Responsible people maintain personal autonomy and control over their actions, and are self-governed, considering that living with wildlife requires some behavioral adjustments. Responsible companies operating in wildlife areas have guidelines and regulations, which are implemented for staff on avoiding interactions with wildlife to prevent personal injury to both people and wildlife.
Resilience	Resilient people derive social and economic benefits despite or because of wildlife's presence. They have the capacity and means to build psychological, cultural, social, and economic resilience and produce sufficient income to live a life without hunger and adequately educate their children, including diverse income streams suitable for their environment to be financially buffered from negative impact by wildlife.
Communities supported	Communities living alongside wildlife and experiencing negative impacts are assisted by governmental and non-governmental institutions and feel supported and secure.
Livelihoods/assets secured against the presence of wildlife	
Well-managed and secured livelihoods and assets	Damage by wildlife to livelihoods and assets is minimized through adequate measures suitable for the ecological, social, and economic context. This could be through selection of livelihoods that are unattractive to wildlife, through the involvement of structures supported by early warning systems or barriers to wildlife entry. Attractants are safely stored out of reach of wildlife and disposed of in secure places.
Wildlife-friendly livelihoods	Livelihoods that are suitable to the ecological, social, and economic context but do not drive HWC or harm wildlife are identified, monitored, and adapted to increase people's well-being. These livelihoods are productive, well maintained, and marketed through reliable market infrastructure. By a diversification of suitable livelihoods, negative impact through loss is reduced.
Land-use planning	Livelihoods and assets are secured and managed through land-use plans, which define safe areas for people to undertake their lives and define wild spaces and habitats as the safe domain of wildlife and corridors to maintain connectivity. Micro-level land-use plans define, for example, designated grazing areas, areas for livestock corrals, farming areas for specific crop types, dump sites, specific risk zones, wildlife movement areas, and required preventive measures.

APPENDIX 2: ACTIONS UNDER THE SIX MANAGEMENT ELEMENTS OF THE C2C APPROACH

TABLE A2.1 Potential actions under each of the six management elements of the Conflict to Coexistence (C2C) approach and their relation to the four outcomes of the C2C approach; actions that suit various elements, are listed under all suitable elements and are marked with an asterisk (*).

Understanding interactions		
Activity	**Details**	**Relation to the four C2C outcomes**
Understanding the site	• Demographics • Stakeholders • Geography • Threats to people and wildlife	Wildlife Habitat People Livelihoods/assets
Understanding damage related to human–wildlife conflict (HWC)	• Capturing type, severity, frequency, and magnitude of damage by wildlife species, including spatial and temporal characteristics* • Capturing monetary value of damage* • Qualitative analysis of damage (understanding which "assets" are threatened by conflict and what the threats are) • Capturing severity, frequency, magnitude, and type of damage to wildlife* • Understanding intangible costs of living with wildlife (e.g., psychological and social impact) • HWC hotspot mapping on fine spatial scale (mapping of damage by wildlife, mapping of retaliation activities and other types of reaction/response)	Wildlife People Livelihoods/assets
Understanding drivers of conflict	• Anthropogenic drivers, such as land-use change, human population trends, farming practices, settlements and development, economic status and well-being parameters, natural resource use, illegal activities, social, cultural, and economic aspects • Natural drivers, such as impact of climate change, topography, weather conditions, food/water availability, population trends of species, other natural impacts • Mapping of ecological trends* • Capturing spatial and temporal characteristics of drivers* • Understanding local practices and behaviors and how they drive HWC • Adverse effects of HWC management (e.g., shifting/displacement of HWC)	Wildlife Habitat People Livelihoods/assets
Understanding social dynamics	• Community heterogeneity, including stakeholder analysis • Knowledge, perceptions, and behavior toward wildlife (understanding of human behavior and psychology related to HWC, including fear toward wildlife)* • Traditions, culture, beliefs • Analyzing social characteristics of HWC > human–human conflict; power dynamics (multidisciplinary/interdisciplinary/transdisciplinary approaches) • Social carrying capacity • Human behavior in response to conflict • Mapping of social landscape and trends	People
Understanding wildlife in conflict	• Population trends of species—conflict species and their prey, and changes in population • Wildlife movement in the area • Wildlife behavior (understanding wildlife movement, dispersal, and general and individual behavior, especially in relation to humans, their assets, and areas of use); this also includes understanding potential	Wildlife

(Continues)

TABLE A2.1 (Continued)

Understanding interactions		
Activity	**Details**	**Relation to the four C2C outcomes**
	changes over time and with changing biotic and abiotic factors and factors that drive wildlife behavior and aggression • Characteristics of conflict animal (age, sex, condition, behavior, and hierarchy)*	
Understanding policies	• Legal instruments related to HWC • Management mechanisms related to HWC • Policies and legislation affecting HWC drivers and their management • Analysis of governance and institutional fit and misfit (gaps and weaknesses) regarding HWC management; this involves analysis of frameworks/design, policies, institutions, processes, etc. (e.g., by using SAGE, GAPA, METT) • Understanding how policies and processes are implemented effectively	People
Understanding effects of HWC management measures	• List of measures implemented (type of measure, purpose, criteria for selection) • Analysis of effectiveness of measures • Exploration of alternative livelihoods • Lessons learned on measures • Success stories and scaling in other places • Identification of best practices for the given context • Integration of Indigenous knowledge (understanding values and the relationships between people and wildlife, as well as traditional HWC management/coexistence strategies)	Wildlife Habitat People Livelihoods/assets
Policy and governance		
Activity	**Details**	**Relation to the four C2C outcomes**
International policies	• Convention on Biological Diversity (CBD), Convention on Migratory Species (CMS), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), African Elephant Action Plan (AEAP), etc.	Wildlife Habitat People Livelihoods/assets
National policies and laws	• National laws, policies, and benefit- and revenue-sharing schemes related to wildlife, conservation, and development	Wildlife Habitat People Livelihoods/assets
National strategy	• HWC management strategies and species management plans	Wildlife Habitat People Livelihoods/assets
Protected area (PA) management plans	• HWC management strategies and species management plans at PA level; HWC management support for communities and areas in PA's sphere of influence	Wildlife Habitat People Livelihoods/assets
Land-use plans, zoning plans	• Definition of protection and use status, for example, full protection zones, corridors, multiple-use zones, agricultural areas, commercially used areas • Overlaps with prevention	Wildlife Habitat People Livelihoods/assets
		Wildlife

TABLE A2.1 (Continued)

Policy and governance		
Activity	**Details**	**Relation to the four C2C outcomes**
Informal policies such as traditions, cultural laws/beliefs/norms	• Related to use of species, times of use, and use of resources and areas generally, etc.	Habitat People Livelihoods/assets
Policies and procedures for law enforcement	• Standard operating procedures for law enforcement • Overlaps with prevention	Wildlife People
Regulations on problem animal control	• For example, national regulations on problem animal control (PAC), which regard PAC as a last resort and meet animal welfare and conservation standards* • Overlaps with prevention and mitigation	Wildlife
Regulations affecting other sectors which impact HWC	• For example, agriculture, water management, infrastructure development, health, and education	Wildlife Habitat People Livelihoods/assets
Guidelines for translocation	• Species-specific guidelines	Wildlife
Guidelines for HWC response	• Safety guidelines for people regarding corporate and other management situations where conflict may occur	Wildlife People
Insurance and compensation regulations	• Governmental and private regulations; specific policy on insurance and compensation depending on the context of each country* • Overlaps with mitigation	People Livelihoods/assets
Transboundary agreements	• Memorandum of Understanding (MoU) to jointly address transboundary nature of HWC	Wildlife Habitat People Livelihoods/assets
Policies of Environmental and Social Safeguards (ESS)	• Guidance on Environmental and Social Safeguards (ESS) • Overlaps with HWC management; definition of "accountability" and "responsibility" for risk reduction	People Livelihoods/assets
Standards on corporate social responsibility	• Social and environmental standards of organizations/institutions	Wildlife Habitat People Livelihoods/assets
Certification schemes	• Private/volunteer regulations of certification entities	Wildlife Habitat People Livelihoods/assets
Prevention		
Activity	**Details**	**Relation to the four C2C outcomes**
Education targeting behavior change	• Raising awareness and creating knowledge on how to live in shared space with wildlife, the four outcomes and HWC management actions, and wildlife behavior	Wildlife Habitat People Livelihoods/assets
Knowledge sharing	• Building capacity and exchange to increase effectiveness/appropriateness of HWC management* • Overlaps with understanding interactions	Wildlife Habitat People Livelihoods/assets

(Continues)

TABLE A2.1 (Continued)

Prevention		
Activity	**Details**	**Relation to the four C2C outcomes**
Stakeholder communication and involvement	• Facilitation of exchange, transparency, and meaningful participation	Wildlife Habitat People Livelihoods/assets
Livestock management	• For example, selection of adapted breeds, considering carrying capacity of landscape, health/vaccination	People Livelihoods/assets
Protecting wild prey for carnivores	• Protection of prey species to serve as natural prey for carnivores, to reduce need/risk of livestock predation	Wildlife Livelihoods/assets
Early warning systems	• For example, geo-fences, tripwire	People Livelihoods/assets
Deterrents and negative conditioning	• For example, sound, lights	People Livelihoods/assets
Safe working environments	• Guidelines, equipment, training	People Livelihoods/assets
Habitat management	• For example, clearing of border zones and maintaining food and water availability within PA • Provision of food sources to wildlife to prevent approaching villages in search of food	Wildlife Habitat
Implementing land-use plans	• For example, water management (especially in arid areas), linear infrastructure planning (which may drive or displace conflict)	Wildlife Habitat People Livelihoods/assets
Voluntary relocation of people	• Voluntary relocation following due diligence and Free, Prior, and Informed Consent (FPIC) process with communities	People Assets
Barriers	• Fences, trenches, kraals, livestock enclosures, etc., suitable for ecological and social/cultural context	People Assets
Guarding	• Active and strategic guarding	People Assets
Corridors	• Development, maintenance, and restoration of corridors for dispersal and movement	Wildlife Habitat
Culling certain species	• Where relevant and only if other methods have been exhausted, and in accordance with international and national legislation	People Assets
Alternative, sustainable livelihood practices and income sources	• Adapting livelihood practices to prevent and reduce conflict • Creating benefits through ecosystem services, ecotourism, certification, wildlife credits, wildlife premiums, green bonds, natural capital valuation and payments for ecosystem services (PES), biodiversity safeguards in REDD+, associated climate mitigation financing, or any other mechanism whereby local people's livelihoods are benefiting from wildlife conservation	People Wildlife Assets
Response		
Activity	**Details**	**Relation to the four C2C outcomes**
Response teams	• Response team(s) established on agency and/or community level; functionality of response teams; effectiveness of response teams • Crowd management, allaying fear, providing advice, monitoring, and reporting	Wildlife Habitat People Livelihoods/assets

TABLE A2.1 (Continued)

Response		
Activity	**Details**	**Relation to the four C2C outcomes**
First aid/health response	• Capacity of first aid response by response teams, plans for emergency response in place, adequate medical treatment available	People
Removal of problem animals	• PAC by government agency and according to national policies* • Overlaps with prevention	People Livelihoods/assets
Translocation	• Translocation once other management methods have been exhausted, by government agency and according to national policies* • Overlaps with prevention	People Livelihoods/assets
Investigation and verification of the incident	• May involve response team support for filing claim forms	People Livelihoods/assets
Response to retaliation	• Criminal prosecution of retaliation targeting wildlife and its habitat, by government agency and according to national and international policies	Wildlife Habitat
Rescue and care of wildlife	• Professionals who are taking care of wildlife in danger, wildlife rescue centers	Wildlife
Mitigation		
Activity	**Details**	**Relation to the four outcomes**
Compensation programs	• Mostly governmental but can also be mixed (private-governmental)	People Livelihoods/assets
Population restoration	• Wildlife populations that have been substantially reduced through HWC are restored at least to a minimum viable population size in appropriate areas	Wildlife
Habitat quality maintained and improved	• In areas of degradation due to HWC, a safe habitat is supported with regeneration actions and habitat enrichment activities for wildlife	Habitat
Insurance schemes	• Mostly private or community-owned	People Livelihoods/assets
Livelihood diversification	• Reduction of negative impact through losses, risk reduction through reduced dependency, and increased resilience	People Livelihoods/assets
Monitoring		
Activity	**Details**	**Relation to the four outcomes**
Maintaining a systematic database for HWC-related information	• Continuous collection of HWC-related monitoring data, which is fed into a database for regular analysis	Wildlife Habitat People Livelihoods/assets
Mapping of ecological trends and threats	• Wildlife population trends* • Threats* • Habitat and land-use change* • Overlaps with understanding interactions	Wildlife
Capturing details of HWC-related damage*	• Maintaining records of HWC incidents and observations to analyze patterns and trends • Spatial and temporal characteristics by species and type of damage (including land-use and habitat factors on fine spatial scale)* • Severity, frequency, and magnitude of damage by wildlife* • Monetary value of damage* • Overlaps with understanding interactions	People Wildlife Livelihoods/assets

(Continues)

TABLE A2.1 (Continued)

Monitoring		
Activity	**Details**	**Relation to the four outcomes**
Assessment of knowledge, perceptions, and behavior toward wildlife	• Understanding of human behavior and psychology related to HWC, including fear toward wildlife* • Overlaps with understanding interactions	People
Monitoring of process/progress	• Keeping track of HWC measures implementation • Monitoring of implementation process, considering environmental and social safeguards	Wildlife Habitat People Livelihoods/ assets
Monitoring of impact	• Evaluating the effectiveness of interventions—what has worked and not worked* • Short-term and long-term effects of measures • Effects of single and combined solutions and ongoing measures • Impact of pilot livelihood alternatives • Overlaps with understanding interactions	Wildlife Habitat People Livelihoods/ assets
Feedback	• Providing input to HWC management based on regular monitoring and periodic assessment of effectiveness of interventions for informed decision-making	Wildlife Habitat People Livelihoods/ assets

Abbreviations: GAPA, Assessing governance at protected and conserved areas; HWC, human–wildlife conflict; METT, Management Effectiveness Tracking Tool; REDD, reducing emissions from deforestation and forest degradation in developing countries; SAGE, site-level assessment of governance and equity.