COLLECTION OF STATE-OF-THE-ART PARTICIPATORY APPROACHES FOR CONFLICT REDUCTION / STAKEHOLDER INVOLVEMENT

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Managing wildlife means managing humans. Especially the restoration and maintenance of large carnivore populations can only be successful with the cooperation and integration of people. Large carnivore management is as much a socio-political issue as a biological one, and understanding the public and gaining its acceptance is crucial to the success of conservation and management programmes. Therefore, the human dimension must be an integral part of any scientific programme for carnivore management.

(Urs Breitenmoser 1998)

1. Introduction

Large carnivore conservation, as the efforts for the protection of Eurasian lynx in Bavaria, the Czech Republic, Austria, Italy and Slovenia within the present 3Lynx project, can generate different forms of conflicts with humans. People and large carnivores often live in close proximity to each other, with large carnivores occupying and roaming extensive territories not necessarily staying inside the premises of protected areas. Consequently, direct and severe conflicts with human interests can be the result. Thereby, conflicts occur in a variety of contexts e.g., when species damage property, kill livestock or compete for prey.

If conservation programs prove successful, wildlife populations usually expand in population numbers and in their distribution range. Consequently, human - large carnivore (wildlife) conflicts have the potential to increase. This results in a need for adjusting management schemes to meet the needs of involved and affected stakeholders and secure a transparent wildlife management process of large carnivores. In order to prevent negative attitudes towards the species in question, to maintain and increase acceptance for the species in question as well as for arising conflicts. This process is crucial, to establish, respectively maintain acceptance for coexistence of human – large carnivores in areas, where encounters in any form occur occasionally or on a regular base. Thereby, implementation of interdisciplinary research, which collects and combines scientific and local knowledge about the species in question, assessing distribution and population composition, is crucial. As well as assessing the needs and wants within different stakeholder groups in question to turn human-large carnivore conflicts into opportunities to reduce misconception, negative attitudes and intolerance in order to allow for coexistence with a large carnivore species in question (Linnell et al. 2011).

Humans and wildlife – defining experience of human existence

Thereby, human interactions with wildlife are a defining experience of human existence. As human populations continue to increase, it is becoming more important to mitigate evolving conflicts between humans and large carnivores to improve the state of acceptance and consequently conservation for large carnivores (Van Eeden et al. 2018). Consequently, researcher and policy-makers have concluded that promoting human tolerance is a critical factor to allow for success of large carnivore conservation efforts (Treves and Bruskotter 2014). Thereby, the factors that affect people's tolerance towards wildlife are not well understood. Interactions can be positive or negatively influenced, e.g. hunters as important stakeholder group in Eurasian lynx related conflicts share the impression of competing with the species over prey base (roe deer) as additional, enriching food source and intrinsic hunting trophy, which explains acceptance for the species within this group impaired and rather low (Davis 2008). Consequently, to reduce negative interactions and perceptions of humans towards large carnivores and to decrease human - large carnivore conflicts, a wide range of social, behavioural and technical approaches and instruments are applied.

As conflicts in the past lead to reduction and extinction of Eurasian lynx in Western Europe: nowadays, since the reintroduction, respectively reestablishment of Eurasian lynx populations in numerous western and central European countries, advancing initiatives in regard of campaigning and informing about the species are applied. These information campaigns include aspects about the species´ ecology, dietary needs as well as informing about the implementation of participatory methods in monitoring and management related issues, which subsequently led to an increased acceptance of and understanding for the existence and return of the species. These campaigns assisted in reducing conflict and promoted development in terms of conservation efforts and coexistence outcomes within many parts of the Eurasian lynx distribution range in Western and Central (Bloemsma 2016).

About the present collection

The present collection of state-of-the-art participatory approaches for conflict reduction by stakeholder involvement points out factors, summarizes and synthesize them for the successful reduction of human – large carnivore conflicts. More precisely, which factors contribute to conflict; approaches that mitigate them and encourage acceptance, coexistence and present emerging trends and debates which could help to facilitate participatory approaches more directly towards the existing conflicts, that arise, exist and prevail. The present document explains key concepts of participatory involvement, describes the importance of implementing participatory approaches into wildlife management schemes to mitigate human – large carnivore conflicts. It examines main categories of human – large carnivore conflicts in regard of Eurasian lynx, characterizes factors influencing conflict and responses to conflict, including different types of participatory approaches, applied in different case studies in various scenarios across Europe. It aims at assistance to understand development, nature and generalized patterns of human – large carnivore conflicts, expanding boundaries of what is considered as conflict, different participatory tools and technologies, as well as providing information for collaboration to mitigate and address Eurasian lynx related human - wildlife conflict and promote coexistence (Nyhus 2016).

1.1. Purpose

In the present scheme for the conservation strategy of Eurasian lynx populations within the frame of the 3Lynx project, participatory approaches and instruments for conflict reduction by involving all relevant stakeholders, which are immediately affected by the existence of the species and related conflicts are most important to be included to support a coherent conservation approach for the species within the BBA, East-Alpine and Dinaric population. Implementing participatory instruments represents one of the main instruments in a functioning wildlife management scheme, apart from developing transboundary, population-level based management and monitoring plans, backed by national management plans in order to involve public authorities and private stakeholder in the process, which intends to ensure management decisions be supported and conflicts being mitigated on many shoulders.

The implementation of existing participatory instruments for conflict reduction as well as further development and adaptation of these to meet individual, arising and prevailing situations and issues of conflict (especially with regard to prevailing social, political and geographical conditions) are most crucial to allow for increased acceptance of existence and measures applied to conserve a species and account for arising human – large carnivore conflicts to assure an effective, broadly and publicly accepted and supported conservation management strategy for the species.

The development of participatory and fascilitated approaches, goals, standards and common management, as it is (partially) within the three lynx populations already established, ensure acceptance and function as transmitter for a successful conservation appproach.

1.2. Goals

Participative wildlife management mechanisms are an important tool to motivate and include stakeholders into conservation efforts (in order to allow for them transparent information and the possibility to engage in monitoring and participative management) to meet specific goals and intended outcomes within a project. The main idea behind this approach is not just using “physical capabilities”, but also utilize and concentrate intellectual and emotional capabilities of involved or directly affected stakeholders in the process of reducing human - large carnivore conflicts.

Participation in these type of conflicts: the process of involving people in decision making processes adressing human – large carnivore conflicts ensures that everyone's personal psychological needs are met. In return, it increases acceptance and understanding for wildlife management conservation processes and implemented measures taken for a species such as Eurasian lynx. Motivated and well-informed stakeholders are (partially) directly involved in conservation schemes (e.g. by deploying and checking camera traps for monitoring efforts in the field) being key pillars to support applied conservation methods and measures on a broad base and create acceptance and interest for the conservation of a threatened or vulnerable species in question. This is achieved through the establishment of trust among all affected stakeholder groups, aiming at the reduction of arising conflicts or the mediation of existing ones, as well as decrease misperceptions and negative attitude by the implementation and use of participatory instruments and involvement of all (in-)directly affected stakeholder groups. Consequently, participative management and the implementation of participatory approaches and instruments are an effective strategy to reduce conflicts and allow for increased transparency and acceptance for the presence of the species and its effective conservation.

2. Human – Large Carnivore Conflicts and Coexistence – a definition

Human – large carnivore conflict in regard to the Eurasian lynx are commonly conflicts deriving from competition over prey-base, predation of ungulates (e.g. roe deer, chamois), cases of livestock depredation, which are rather marginal within the lynx populations of Western Europe as well as the general perception of lynx in public (Kaczensky 1999; Lüchtrath and Schraml 2014, 2015). Thereby, the competition over prey base commonly described as one of the main human – large carnivore conflict, occuring within the populations concerned in the 3Lynx project. Thereby, it is widely assumed and acknowledged, that intolerant behavior and negative attitudes toward large carnivores - in the form of illegal killings are largely motivated by retaliation for real and perceived losses (e.g. for the perceived competition over roe deer) (Treves and Bruskotter 2014).

Figure 1: Rational conceptualization of human – large carnivore conflict processes (Dickman 2010)

Therefore, applied wildlife management actions have a direct influence on large carnivore acceptance and perceived risk potential by affected stakeholder groups. Perceived risk potentials and scenarios include threaths to human life, economic security or recreational value diminished by occurrence of the species, as well as the perception of it. The assumption prevails that immediate existence of large carnivores threatens human safety, health, food, and property (Dickman 2009).

Large carnivore conflict and damage management copes besides other actions with diminishing negative attitude and consequences of large carnivore existence, while maintaining or enhancing their positive aspects, often also referred to as human – large carnivore conflict mitigation. According to Nyhus (2016), human-wildlife conflicts are often fueled and supported by underlying tensions from human-human conflicts over conservation issues and resource use. Difficult in this circumstances proved the fact, that human interactions with wildlife are often framed negatively, even if important positive benefits - recreational, educational, psychological and ecosystem services - derive or exist from it. As a result, growing convergence around the phrase human – large carnivore conflicts and coexistence arise to connote the recognition of both problems and solutions of these existing contradicting parties (Dickman 2009).

Out of different social and cultural backgrounds, beliefs, assumption and standpoints, that humans about wildlife possess, coexistence strategies have to be developed and adapted location-specific, incorporating cultural values and environmental conditions. They have to be designed in such a manner, that return on financial investment can be evaluated – these are essential factors to include to allow for an efficient and functioning wildlife management scheme, that supports successful conservation outcome.

2.1. Large carnivores do not recognize borders

Large carnivores use large distribution ranges for dispersal, migration, in order to find prey, to establish territories and to reproduce, consequently human - wildlife conflicts within these groups of species often occur beyond the boundaries of protected areas specially assigned as “allowed” habitat. This poses many challenges for wildlife conservationists and managers because often almost entire research platforms, legislative instruments and the attitudes of affected stakeholder are based around the simple equation where forest = wildlife = protected areas (Linnell et al. 2011). Consequently, in many cases of conflict, local stakeholder share the assumption that large carnivores in human-dominated landscapes are in the wrong place and need to be “assisted” back to their primary habitat – but it is not as simple as that.

With the ecological demands of large carnivores, roaming large distribution areas and the expansion of human development and the increase of natural areas converted into cultivated landscapes, many wildlife species live today partially or entirely in humanly altered or (at least) influenced landscapes. Therefore the development of large carnivore conservation and management frameworks (in regard of legislative and ethical viewpoints) are needed, which accept and allow (co-)existence of large carnivores outside existing protected areas. This requires a management approach that encourages the implementation and inclusion of participatory approaches, that adress arising conflicts efficently and reach for acceptance for the occurrence of the species beyond the border of protected landscapes by including all relevant and affected stakeholders in the process. Consequently, an approach to large carnivore conservation in our surrounding landscape, that jointly considers both - the protected areas and the human-dominated cultivated landscape in which humans and large carnivores are co-existing (Linnell et al. 2011).

Consequently, this poses many challenges for wildlife management in regard of arising conflicts with large carnivores. But despite these challenges for large carnivore conservation in Western Europe, there is no other option, because it is impossible to adopt a sustainable conservation policy, that tries to return large carnivores to entirely “natural areas” which are not already in one way or the other occupied or used by humans or altered to fit human needs.

2.2. How human – large carnivore conflicts arise

Very few public stakeholder understand how human-large carnivore conflicts develop, leave alone the most environmentally and ethically correct way to manage the problems, that arise by them. Increased public awareness and appreciation of the origins of conflict, dynamic nature and ecology of human – large carnivore conflicts also may provide valuable insights into potential solutions. The reason for most, if not all, human – large carnivore conflicts, can be determined and understood with a basic appreciation and understanding of biological and ecological relationships.

To cope with the conflicts that may result in altered environments, the density or numbers of the species in question are often regulated. This type of management aims at a population control, in order to protect the interests of affected stakeholder and reduce the damage to resources and property. It is contradictory, that frequently the species at the source of these conflicts also may be highly valued by the society for its intrinsic value at the same time. Essentially, how wildlife is perceived in human-large carnivore conflict situations depends largely on how stakeholders are personally affected (Messmer 2000).

2.3. Solutions for human – large carnivore conflicts on different scales

Conflicts between humans and large carnivores occur in many different ways - both in terms of the nature of conflict and the way that different stakeholder perceive them. This implies, that solutions also need to be diverse and adapted to the particular, prevalent local ecological, economic, social and cultural conditions and background. At the same time, while adressing human - large carnivore conflicts on a local scale (which is best achieved and supported by the implementation of participatory instruments) there is an increased need to adopt large scale (whole landscape, state or national scale) coordination of large carnivore conservation activities that include both - protected areas and the surrounding landscape. Thereby, the challenge is to maintain the need for local adaptation of measures (to adress the existing local conditions) while keeping a large scale coordination (Linnell et al. 2013).

The emphasis in this issue, rather lies in adapting different scaling of coordination, rather than standardize management tools, which are used to solve and mitigate human – large carnivore conflicts. One scheme that fits in a certain situation of conflict might fail or not fit at all in another with an apparently same initial conflict situation. In this context rather many different, to the situation adapted local efforts, that include participatory approaches including all affected stakeholders need to join together to achieve large scale conservation goals and find solutions for human – large carnivore conflicts on different scales on the way. Achieving such coordination requires conceptualisation, planning of main objectives and a delegation of details. A central component of this effort is the achievement of an effective dialogue base with local people and stakeholder groups to allow them to claim ownership and knowledge of the situation and ensure that their views are respected and communicated, as well as their viewpoints being represented to more centralized decision making processes by implementing participatory instruments for adressing and reducing effectively human – large carnivore conflicts (Linnell et al. 2013).

3. Coexistence

3.1. Concept of Coexistence

The concept of coexistence after Carter and Linnell (2016) is a “dynamic but sustainable state in which humans and large carnivores co-adapt to living in shared landscapes where human interactions with large carnivores are governed by effective institutions that ensure long-term large carnivore population persistence, social legitimacy, and tolerable levels of risk. These concept of coexistence includes both human – large carnivore and human - human interactions, helping to unify different interpretations of coexistence seen from different disciplines and point of views. In fact, coexistence emerges from the interactions within coupled socio-ecological systems, in which human and natural systems are fundamentally and holistically integrated. Specifically, mutual adaptations between humans and large carnivores are key mechanisms facilitating coexistence in space and time. Flexible institutions (i.e. the formal and informal rules that govern human behavior) have an essential role in fostering human adaptation to large carnivores. Although the concept of coexistence laid out by Carter and Linnell (2016) might be difficult to achieve in real scenarios, it can serve as an conceptual framework to develop and implement in conservation projects such as 3Lynx.

3.2. Coexistence and large carnivore protection

Protected areas are crucial to large carnivore conservation, which act as a sink for species conservation, especially if it comes to vulnerable and threatened species (Hansen 2011). Whatsoever, the distribution ranges required by large carnivores such as Eurasian lynx in order to disperse, migrate, mate and prey on roe deer mean that co-existence with humans is and always has been common in landscapes outside protected areas. Given the fact, that shared landscapes often represent a vital part of the remaining geographic distribution range of a species, any kind of population control would threaten efforts for their conservation and survival (not to mention that a fully protected “red list” species occuring in very small population numbers, such as Eurasian lynx it is out of question).

For this reason, the need for conservation of large carnivores in proximity to human populations and cultivated landscapes often generates conflict, with a key point of discussion being how and to which degree negative impacts and conflicts with the species in question can be minimized, regulated and solved. Thus, regulating human – large carnivore coexistence in shared landscapes is essential to successful large carnivore conservation efforts and maintaining human wellbeing at the same time (Carter and Linnell 2016).

Yet, a clear understanding of what coexistence means is lacking, partially because it can be interpreted very differently, depending on the point of view and social background (e.g. affected stakeholder / livestock holder experiencing damages or perceiving the existence as some kind of a risk factor or from the standpoint of a wildlife researcher considering the wellbeing of the species under reducing conflict schemes as foremost important; being not affected at all by the existence, but being in apprecation of the species itself). Thus - unclear, spongy and inconsistent - conceptualization and execution of coexistence frameworks and management plans with inconsistent conflict solving mechanisms hamper the ability of engaging opposing stakeholder groups in dialog and finding solutions and impede the process of developing strong and comparable coexistence strategies, that are an important key, if not the most important factor of establishing a conservation strategy, carried by the majority of affected and involved parties, participating public and private authorities to ensure the inclusion of all affected and concerned stakeholder with their wants and needs in the process.

3.3. Co-existence through co-adapation

Seeing and experiencing the complex and dynamic nature of human – large carnivore interactions and resulting conflicts from it, Carter and Linnell (2016) contended, that mutual adaptations between humans and large carnivores in shared landscapes are crucial to achieve and maintain coexistence.

Adaptation in this context means that humans and carnivores are able to change their behavior, learn from experience, and pursue their own interests with respect to each other (which applies just to a certain extent for wildlife) (Carter and Linnell 2016). In terms of facilitating coexistence, Carter and Linnell (2016) defining mutual adaptation, as resulting in minimal negative impacts of humans to carnivores and vice versa (carnivore impact on human livelihood and safety and human impact on carnivore population persistence).

Although some large carnivore species can adapt (and do so) to human-modified landscapes given sufficient prey and habitat, this capacity can increase the likelihood of negative encounters between humans and large carnivores. Human response to negative encounters with large carnivores has often entailed the reduction of carnivore numbers through lethal methods, such as poisoning or (illegally) shooting. However, during humankind long history of interacting with large carnivores, we also adapted to carnivore presence, minimizing the need to reduce their population sizes lethally. Examples of human adaptation to large carnivores include the use of livestock-guarding dogs and nonlethal repellents and protection methods (e.g., electro and light fencing).

Other examples include avoiding potentially risky situations by understanding carnivore behavior (e.g. not jogging with a dog in cougar territory), reducing the amount of human-produced food accessible to carnivores (e.g., through bear-proof trash bins or by disposing of livestock carcasses away from human settlements), or having adults herd livestock rather than children. But unwillingness (e.g. due to risk intolerance), inability (e.g., due to lack of resources or knowledge) or simply ressentiment of individuals to behaviourally adapt to the presence of large carnivores on shared landscapes are major challenges and hindering coexistence, because not adjusting and adapting is more likely to aggravate conflict (Carter and Linnell 2016).

Therefore, overcoming these disputes might rely heavily on local community leaders serving as multiplicators to endorse behavioural adaptations and changes in attitude as well as conservation organizations to implement education and information campaigns and programs laid out as social marketing campaigns for promoting the coexistence of humans and large carnivores. Moreover, institutions tasked with ensuring that the benefits (tangible and intangible) of large carnivores are available to current and future citizens can incentivize (e.g. financial incentives/performance payments), promote and support towards positive attitude and human adaptations to large carnivores greatly (Carter and Linnell 2016).

4. Human-Large Carnivore Conflict

4.1. Adressing human – large carnivore conflicts

The process of conducting research on evolving and existing human – large carnivore conflicts can be an important and conflict reducing measure, as the results obtained by implementing participatory instruments itself. Working on human - large carnivore conflicts brings wildlife researchers, project managers into dialogue with affected local stakeholder and the general public, which induce that their problems and remarks about large carnivore presence are being taken seriously. Additionally, involving local authorities e.g. from forestry or hunting in the monitoring fieldwork creates participative opportunities for dialogue, where the researcher acts as an informal mediator between the species in question and the opposed party, which might feel threatened by existing (or assumed) conflicts caused in certain ways (e.g. perceived competition over prey base with Eurasian lynx within the group of hunters). Thereby, conducting interdisciplinary research that combines ecological and social sciences is a key factor helping to reinforce conservation strategies and establish and implement efficient participatory measures and account for the fact that the needs of locally, directly affected stakeholders are being considered, respected and taken seriously.

The results of subsequently initiated participative processes are so important as there can often be considerable disagreement about the actual extent of human – large carnivores conflicts impacting, local stakeholders e.g. by the misperception in regard of the species in question (e.g. with Eurasian lynx in the BBA-, East-Alpine and Dinaric population: misperceptions about dietary needs, population numbers and subsequently the impact on local roe deer populations etc.). Objective data collected by monitoring of a species causing conflict, provides a common platform for fact-based discussion, negotiation and allows for transparent information and reduction of misinterpretation and –judgement regarding the impact of a species, e.g. on local prey populations or on livestock. The organization and quantification of different topics, which are of concern to local stakeholder into a systematic conceptualised management framework helps to establish a platform for communication and participation between local people and responsible officials in nature conservation (Linnell et al. 2011).

4.2. Considering social factors for conflict reduction

Identifying the complexity of conflicts and exploring underlying factors, that fuel conflicts require beside ecological also economic investigations, which have to be complimented by social science studies on the persisting matter of conflict. Such studies are crucial to understand the source of human – large carnivore conflicts, to evaluate existing perceptions and view points of local stakeholder groups concerning existing conflicts. Taken these factors into account can be even more important than the actual objective assessment of the topic or the actual economic component of the conflict (Linnell et al. 2011).

Often only technical aspects of conflict reduction are considered, but peoples' attitudes towards large carnivores such as Eurasian lynx are more complex and deep rooted, with social factors shaping conflict intensity and species perception. Moreover, human – large carnivore conflicts are often manifestations of underlying human - human conflicts, such as between authorities and local people, or between foresters/hunters and wildlife manager and researcher etc. The study of Dickman (2010) shows, that social factors can be more important in driving conflicts than the actual damage done by large carnivores, but in studies on human – large carnivore conflicts they are often neglected.

Developing a broader awareness of conflict drivers, that influence the attitude towards large carnivores will advance the understanding of patterns and underlying processes, that are critical to solve human – large carnivore conflicts. Predominantly by establishing and implementing participatory instruments and methods to allow for increased transparency and acceptance among affected stakeholders for the species in doubt (Dickman 2010).

Considering social factors, a study on Brazilian ranchers living near jaguar territories showed that social factors play an influential role in retaliation for jaguar predation on cattle or perceived threats to humans (Marchini and Macdonald 2012).

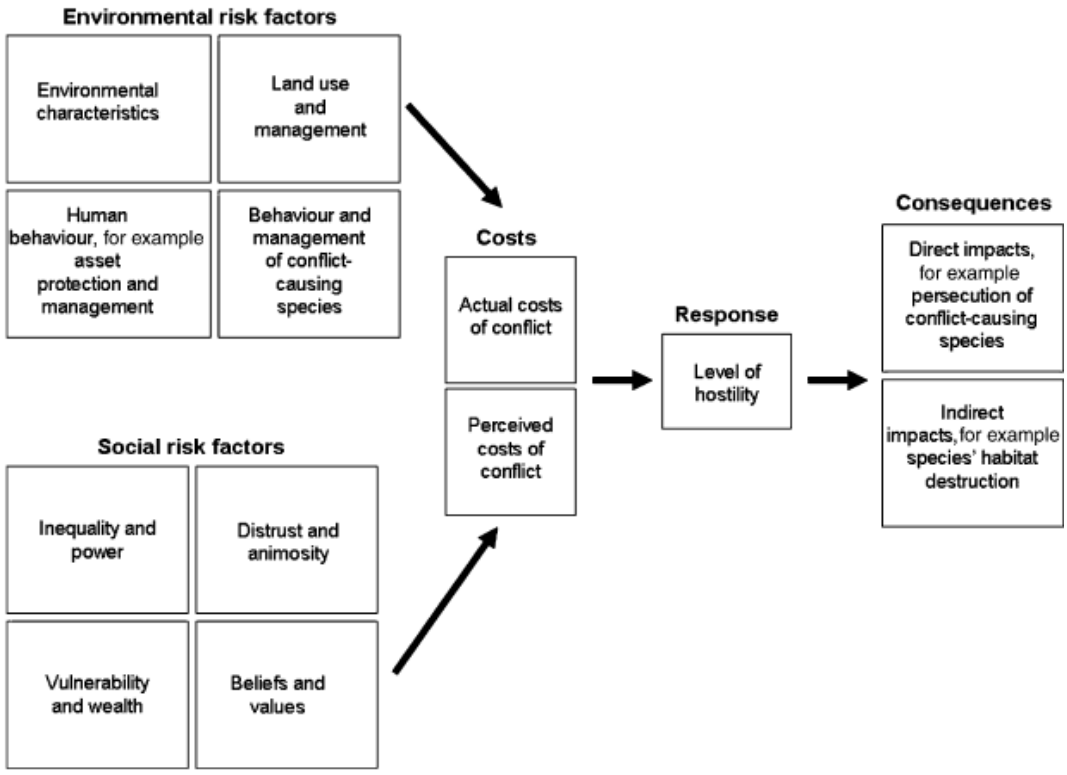

Figure 2: Framework of some factors likely to affect the intensity of human – large carnivore conflict (Dickman 2010).

Although some financial incentives for large carnivore tolerance appear to have been successful in several cases of conflict, illegal killing of large carnivores seems to be influenced more strongly by social factors (as evidenced in the Brazilian case study above). Stakeholder group norms (e.g. within the group of hunters) affect people's intentions to illegally kill large carnivores (Treves and Bruskötter 2014).

Elements of successful human – large carnivore conflict management (taken from Messmer 2000):

1. Identification of clearly defined objectives to be solved in the process
2. Establishment of clearly defined authority levels to prevent false expectations
3. Participant agreement on how group decisions will be made, prior to dealing with the issues
4. Inclusion of team building activities
5. Maintenance of continuity by not allowing substitutes for proposed goals and targets
6. Implementation of guidelines and activities that promote active participation by affected groups
7. Achievement of success on smaller scale (pilot implementation) prior to addressing the present issue of conflict reduction on a larger scale

Although input processes including public participation require more time and resources, they provide stakeholders with an increased opportunity to become more knowledgeable about management options and the chance of participating in the decision making process. Increased participation will ultimately result in more public ownership in the outcome, enhanced conservation program credibility and acceptance / acknowledgement of intended and applied methods towards the realization of long term wildlife conservation goals (Messmer 2000). Thereby is the collection of sound scientific and technical data essential for discussing and developing solutions for existing and emerging field of conflicts during the execution of a conservation program, which lead to successful implementation and acknowledgment of methods for human – large carnivore conflict agreed upon.

4.3. Mitigation of conflicts considering its complexities

Normally, finding solutions for existing conflicts should be a relatively moderate undertaking, with the expectation that once the appropriate strategies and instruments for conflict reduction have been established and implemented to deal with the reported problem, any animosity towards the species concerned should abate. Unfortunately, evidence as from Dickman (2010) laid out, suggest complete, long-term human – large carnivore conflict resolutions are a rare phenomenon, even where such strategies have been implemented.

This suggest, that despite most people citing direct damage caused by large carnivores as the main reason for their antipathy towards wildlife, the causes of conflict are often more complex and deep-rooted and a broader approach for mitigation must be applied in order to adress and solve such a conflict in its entirety (Dickman 2010).

The main objective of reducing human – wildlife conflicts is to identify factors to reduce or prevent conflicts for reaching a level of co-existence between humans and large carnivores. Therefore, understanding the details, mechanisms and nature, that fuels and ignite conflict is a prerequisite for finding efficient answers and solutions (Linnell et al. 2011).

4.4. Types of Human - Large Carnivore Conflict

Conflicts between humans and large carnivores occur predominantly where humans expand into natural habitats and increasingly where large carnivores expand into human-dominated landscapes. People around the world express deep hostility, if it comes to large carnivores because of real and perceived impacts on human well-being, health and livelihoods (Treves and Karanth 2003). Large carnivore species, such as Eurasian lynx are particularly often at risk for conflict with people, because of their ecological needs, occupying large home ranges, their physical appearance and dietary needs (Macdonald and Sillero-Zubiri 2004). Their abundance is often determined by factors such as prey availability (Carbone and Gittleman 2002), consequently, more than 75% of the world's felid species are somehow affected by human – large carnivore conflicts (Inskip and Zimmermann 2009).

Consequently, with the reestablishment of Eurasian lynx populations in many Western European countries, even if often small and vulnerable, these type of conflicts are widespread and often complicated, not only involving economic or material factors, but also often social, cultural or political factors, as well (Linnell et al. 2011). Thereby, human – large carnivore conflicts and coexistence are predominantly of concern with large carnivore species that are rare and protected under EU habitat directive (e.g. Eurasian lynx, Brown bear and wolf). Consequently, much of research and communication work in the context of human – large carnivore conflict have focused on rare and protected carnivorous species of conservation concern. After reintroduction (respectively recurrence) and establishment of large carnivore populations in Western Europe, a major challenge for the conservation sector emerged and become more clear in the last decades on how to balance the protection of an endangered species such as Eurasian lynx with the needs of local communities/stakeholders and institutional bodies (e.g. hunting associations). In order, to find resolutions to arising human – large carnivore conflicts, which are an important element of successful conservation strategies to allow for acceptance and transparency, as well as acknowledgment of the applied conservation measures.

In Eurasian lynx-related cases of conflict, the impact of the perceived competition over prey base populations (e.g. roe deer), the impact on prey in terms of changing behavioral patterns caused by the physical presence of the species, as well as depredation on livestock (which is shown in different publications on the subject, playing a rather marginal role in most distribution ranges of Eurasian lynx in Western Europe) play the biggest role. Another important factor for conflict persists, by the misperception of lynx´dietary needs, assuming the species nutrition claims and feeding behaviour is leading to reduction or complete eradication of prey base populations (in regard to roe deer and chamois), which impairs acceptance and co-existence for and with the species. The assumption on critically decreasing prey base might be allowed in areas with low hunting bag counts, but is often supported by misinterpreted, incomplete or fragmented information about species ecology and impact, including dietary needs and habitat (Lüchtrath and Schraml 2014, 2015).

4.5. Main types of conflict with Eurasian lynx (within the framework of the 3Lynx project):

4.5.1. Predation of ungulates / Competition for prey-base

Perceived or real competition between hunters and Eurasian lynx and resulting opposition of hunters to the species´ presence is believed to be one of the main obstacles to Eurasian lynx conservation within many populations of Western Europe. In order to mitigate the effects of the prevailing conflict it is important to increase knowledge and understanding about lynx ecology in terms of species´ dietary needs and communicate the impact of Eurasian lynx on prey populations supported by the collection of sound scientific data towards the concerned stakeholder group. This allows for reduction of prevailing conflicts, which are often based on misjudgements, -perceptions and/or overestimation of the influence of a large carnivore species like the lynx, occuring in rather low densities preying on roe deer. Thus, a very important aspect in the limelight of this prevailing conflict is the integration of lynx predation into future management plans for ungulates (e.g. adjustement of roe deer hunting quotas).

Consequently, it is very important to study and assess the predation impact of lynx on its main prey base in order to allow for a representative and fact-based result on the extent of “real” vs. “perceived” competition between lynx and hunters for game and allow for exact numbers underlying the base for discussion and finding solutions for the conflict. Consequently, it allows to make recommendations how to consider the predation impact by lynx and integrate into conservation strategy and wildlife management plans for the three populations adressed within the 3Lynx project in the future.

Important participatory approaches and activities in this conflict include:

1. Investigate the attitudes of hunters towards lynx and their view of its predation impact by questionaires and surveys
2. Develop recommendations on how to adapt wildlife management plans and hunting quotas (e.g. for roe deer) to the presence of lynx and its predation impact
3. Inform wildlife managers and hunters and implement the recommendations in the wildlife management and hunting regime / hunting quotas to increase transparency and acceptance for co-existence with the species on long term

A key aspect to improve lynx conservation in the face of this conflict: to mitigate between the group of hunters and conservationists promoting coexistence (e.g. by appeal to habitat enrichment through the presence of a large carnivore like the lynx), adapt wildlife management plans and hunting quotas according to present population numbers of Eurasian lynx and its impact on present prey populations in areas of conflict. This needs constant monitoring and readjustement according to present population numbers and development of prey base and predator.

In principle, responsible for implementation are wildlife manager, researcher and social scientists for the assessment of data (in regard of collecting population data by species monitoring and assessing socio-demographic structures of stakeholder and data by questionnaires and surveys) and interested and knowledgeable stakeholder and person who function as mediator between these groups. Another critical factor is the establishment of working groups, that include stakeholder participation for recommendations of successful conservation efforts being made as well as including national and provincial public and wildlife management authorities for carrying the strategy and successful implementation of measures for conflict reduction agreed upon.

4.5.2. Livestock depredation

Another field of conflict, negatively influencing public attitudes toward Eurasian lynx (and other large carnivores such as Brown Bear and wolf) is perceived by (and actual impact of) depredation on livestock. This is especially the case in Fennoscandinavia, where mostly bear and wolf are responsible for killing of livestock, as underlined by a study by Axelsson-Linkowski et al. (2017). With in Norway, the rates of livestock losses from bears and wolves being among the highest observed in Europe (Swenson and Andren 2005). In other European countries the reintroduction of large carnivores and the reestablishment of large carnviore populations lead to to the arising of similar problems, even in areas where population numbers are low and cases of livestock depredation being killed by lynx are rare. Generally, in Western Europe, Eurasian lynx can be considered the least important large carnivore species causing damage to livestock and property. Opposed by the situation in Fennoscandia, where most attacks seemingly occuring during the night and livestock is the most exposed adjacent to forested areas. The high predation levels in Fennoscandia can be explained by the large number of untended and unfenced sheep that stay day and night in proximity to forested areas exposed to the risk of depredation by large carnivores (Eeden et al. 2018).

In order to reduce livestock depredation, management of carnivore populations has to be an active component of livestock husbandry. In the last century, in some areas, due to a large decline of large carnivore populations forced by habitat conversion of expanding human development and conversion of natural areas in cultivated landscape, large carnivore populations were pushed back, reduced or entirely eradicated. Traditional husbandry techniques were abandoned and livestock in the absence of predatory species were allowed to graze over larger areas unsupervised, this especially applied to livestock held in rugged, mountaineous and alpine pastures. With the return of large carnivores, this (unattended) livestock herding practice involves increasing potential for conflict, especially where large carnivores have reestablished populations, respectively where they were being reintroduced, sometimes without the consent of the local communities. Subsequently, the implementation of nonlethal control methods have been reintroduced and implemented to mitigate conflict between humans and large carnivores. These methods include deployment of livestock guarding dogs, fencing, sterilization and translocation of large carnivores, chemical and physical repellents and financial incentives such as compensation for depredated livestock (a priori - a posterio payments – see chapter: Wildlife and compensation management) (Eeden et al. 2018).

4.5.3. Perception of large carnivores in the public

The predominant positive or neutral attitude towards large carnivores such as Eurasian lynx are most often eroded and result in negative reactions caused by a perceived competition over prey base and damages caused to livestock (see above), by misperception and fear fueled by missing knowledge about large carnivores in question. Consequently, people tend in the face of large carnivore conflict, perceived or real, to call out for retiliatory actions, such as the implementation of population control by lethal means, sometimes lacking entirely knowledge about the “actual damage” or “impact” being caused by the presence of a large carnivore. Often, aspects about dietary needs and perceived ecological and (societal) impact is not based on facts (collected monitoring data, executed studies and reports), but merely on hearsay and assumptions exceeding and disfigure fact-based argumentation and reasonable planning for the implementation of instruments to solve these conflicts.

Therefore, it is most important to provide more precise information on the ecology of large carnivores by collected monitoring data and expand this knowledge and incorporate it into education and information campaigns. This allows, in a participatory scheme for enrichment of knowledge and an increase of acceptance towards a more fact-based orientated perception about the factors, that shape coexistence between humans and large carnivores in the 21st century. Especially in areas, known to be reoccupied by large carnivores, encountering them, to support and promote re-adjustment to live in co-existence with large carnivores after being absent for many decades, respectively where cases of conflict already ignited discussion, upheaval and a negative attitude towards large carnivores such as Eurasian lynx.

Reduce fear and wrong perceptions of the species

Different studies on percepted fear towards large carnivores suggest that education (through information campaigns) and direct experience of the species (by exposure activities e.g in zoos or natural parks to captive individuals) reduce fear and misperceptions towards large carnivores among the public. For example, a study by Prokop et al. (2011) showed, that school children who more frequently watched natural documentaries and experienced nature (e.g. attending excursions etc.) were less fearful of wolves. Johansson et al. (2016) suggested in their study also educational activities, including nature visits for children. In general, outreach projects involving public and local authorities in an effort to increase social trust is proposed as a useful tool in reducing people's fear of large carnivores. Information and exposure to the respective species combined with local participation in livestock loss prevention actions and active participation in developing and implementing compensation schemes were also suggested (see chapter: Wildlife Damage and Compensation Management).

Educational activities and campaigns

Educational activities and campaigns are by far the most commonly proposed interventions to change perceptions towards large carnivores. Such activities include campaigns and outreach projects providing information and training to increase people's knowledge of the species' biology, behaviour, habitat use and potential benefits, as well as behavioural strategies for humans to avoid conflict situations. Educational activities and campaigns are a universal instrument of intervention to prevent human-large carnivore conflict, thereby reducing perceived risk and feelings of fear (Johansson et al. 2016).

Røskaft et al. (2007) suggest that education activities and campaigns, including information about benefits of large carnivore presence and damage prevention, may reduce fear, but also argues that education should be combined with other interventions to prove successful. Some of the cited works in Johansson et al. (2016) propose direct collaboration between authorities and local stakeholder, involving local participation in wildlife management as an important instrument to develop common ground, trust in handling and preventing conflicts between humans and large carnivores.

5. Stakeholder Identification, Analysis and Participation

A major challenge in managing large carnivore conflicts proving more difficult to solve them is the sociodemographic change within communities. Society continues to diversify and make the finding of "general" solutions for occuring human – large carnivore conflicts, supported by a broad majority more difficult (Messmer 2000). The diversity of stakeholders holding different beliefs and values, expecting different proceedings and outcomes of wildlife conservation programs, have created new challenges regarding the use of traditional approaches to manage wildlife. Increased concerns for privacy, property or livestock damage and safety may result in larger areas being closed to the use of traditional population management and monitoring options, thus further fueling existing or igniting new conflicts (Messmer 2000).

However, if human-large carnivore conflicts are seen as a reflection of societal diversity, they may act as important positive forces of change in wildlife conservation schemes, while an improper handling can increase and continue public frustration, further reducing the credibility of the institutions involved and administering the conservation program and detracting from long-term objectives of an project (Messmer 2000).

Although public input and participation processes require more time and resources, they provide involved stakeholders with an increased opportunity to become more knowledgeable and integrated about proposed management actions and options, actively participating in decision making processes. Increased participation will ultimately result in more public ownership and active contribution to an proposed outcome. It will enhance the credibility of a conservation program and can actively support the realization of long term wildlife conservation goals. Thereby, base to consolidate such a process are sound scientific and technical data, essential for implementing successful conservation management.

Successful implementation of conflict management instruments adapted to location-specific circumstances can be used effectively to manage stakeholder disagreements. They function as voluntary processes in which stakeholders seek to achieve a mutually beneficial resolution of their differences raised by an existing human – wildlife conflict (Messmer 2000).

5.1 Preliminary Stakeholder Assessment

The first pre-assessment, sharing a common theoretical basis, helps to understand how a methodological approach of reducing conflicts in a given scenario of wildlife governance are differing in an international context, that involves different countries. Socioeconomic, legal, ecological and geographical conditions are usually very much differing, which makes clear, that in each country a common approach adapted to local needs has to be applied.

Therefore, specialists within each country have to be included. Most of these processes are led by a mediator who serves as a neutral third party in a participatory negotiation process, which helps a group of different stakeholders to establish a framework within negotiations on different viewpoints and perceptions, that help to adequately point out specific problems to be faced in a participatory workshop process on conflict reduction (Calandra 2014).

Application of methodological approaches

The phase of the preliminary stakeholder asssessment is followed by the application of a methodology, which instruments and measures are used to aim at the management of conflicts by negotiation with local stakeholders and participatory planning (Calandra 2014).

5.2 Negotiation meetings

For this purpose, Calandra (2014) conducted in their approach on conflict reduction (conflict scenario: coexistence of livestock and large carnivores (bears and wolves) in Italian National Parks) two sets of negotiation meetings. The first set aimed at identifying urgent topics of conflict and subsequently some concrete priority actions to solve or mitigate them.

The second set of negotiation meetings aimed at verifying the results of the previous agreements and at stipulating new ones. By involving external mediators as facilitators, these meetings will result more often in common agreement on management approaches, which are subsequently followed by concrete interventions.

5.3 Classification of stakeholder

The starting point in a project, that involves participatory approaches for e.g. conflict reduction of human – large carnivore conflicts aims and requires, despite the diversity of different social, political and economic parties engaged, the involvement of all stakeholder to express and understand, that "environmental governance" is composed by the analysis and comprehension of the power dynamics of and between the different affected stakeholder (Calandra 2014).

Calandra (2014) referred in their study on a particular type of governance, related to the coordination methods of local actions, in which a majority of stakeholder operate within an area with each one having decision-making strength in a given context of the given conflict. Thereby, these strengths are not easy to define, but often intertwined with a multitude of factors. They are not solely based on legislation, but also on social and cultural heritage and informal social arrangements (Calandra 2014).

Seen from this perspective, a spatially defined approach being applied gives a significant contribution to human – large carnivore conflict reduction and management since it involves shared planning in a bottom-up management approach involving all stakeholder.

5.4 Stakeholder Assessment/Analysis

Within a international project, a detailed stakeholder analysis based on the consultancy of mediation and conflict management experts under the coordination of an international steering group within the participating partner countries is a key prerequisite for the implementation of a functioning participatory approach for conflict reduction.

One of the possibilities of analysing stakeholder involved in the process, to construct a "Map of Actors" (Calandra 2014). A tool, that helps to identify the persons and bodies, that are at various levels affected in any form (positively and negatively) by the presence of large carnivores.

According to Calandra (2014) they can be divided into the main groups of:

Institutional actors: Public institutions and functional agencies empowered by law, with specific profiles and tasks concerning wildlife/large carnivore-related topics and issues

Stakeholder: Private and public groups or person, who share interests, are directly involved in conflicts as well as in subsequent conflict-solving mechanisms. Their point of view is essential to contribute to large carnivore conservation and the solution of problems in this context by involving their existence in order to create consensus around the planned and undertaken approaches to reduce conflicts. This groups include livestock owners/herders, hunters, veterinarians, foresters, as well as persons involved in local tourism etc. Stakeholders are selected on the basis of their representation (boards and institutions, associations), their effective presence within the area of conflict and the fact, that they are affected, respectively have something to add about the addressed conflict issue.

Stockholders: A special category of stakeholders, who are interested in investing in specific tasks of a project or issue, in order to make a profit (e.g. tourist operators, farmers, construction companies) or for image strategies (green business, interest in investment in conservation programs etc.). They can have direct interests (investors) or indirect ones (sponsors).

After dividing the main actors in these groups a second dimension is included within the "map of actors", where the actors are divided in different "circles" according to the level of their involvement in the targeted issue (Calandra 2014).

According to Calandra (2014) these are:

The first circle (core actors) included all the institutional bodies as well as the stakeholders and stockholders who were closely and directly affected by the presence of large carnivores and evolving conflicts in a certain area.

The second circle included interest groups that are less strongly affected by the presence of large carnivores, benefitting from their presence only to a certain degree.

The third circle included only those stakeholder who are indirectly affected by the presence of large carnivores (e.g. residents, tourists).

In the process, each of the identified stakeholder is characterized by different profiles, issues and strategies. The construction of this map of actors is a first important step in order to identify all stakeholder, single or group of people, that have to be involved more or less intensively in the following steps to mitigate and reduce human – large carnivore conflicts (Calandra 2014).

5.5 Development of interviews/questionnaires

The next step in order to access the topics, that are most important to the involved stakeholder, the development of a questionnaire. Calandra (2014) developed in three steps:

1. production of a preliminary brief version of the questionnaire
2. testing of the questionnaire on a restricted group of persons (testing phase/pilot phase)
3. after evaluation of the testing results (and eventual adjustement), development of the definitive questionnaire

Furthermore, Calandra (2014) applied the "hermeneutical" interview technique, a type of semi-structured qualitative interview, that includes oriented questions and open replies (Dalehite 2008). With the purpose, to allow the interviewees the biggest possible freedom to express their opinions and suggestions. This is a crucial point, in order to most effectively obtain a full-range diagnosis of all factors, which are involved in the conflicts, in terms of: actors, issues, conflict setting and level of conflict.

5.6 Analysis of interviews/questionnaires

Subsequently, the analysis of the interview results leads to a classification of the existing components of a or numerous human – large carnivore conflicts based on a 3-stage methodology. Conflic dynamics are divided into three stages with an upward dynamic (bottom-up), with each stage requiring specific management interventions to mitigate these stages of conflict towards a solution of the entire conflict complex. Consequently in all three stages, interventions and specific behaviour can assist in a decrease of the conflict level or an increase. If the conflict level strongly increases it develops into the next step (Calandra 2014).

1st Stage: Initial disagreement develops into a permanent tension stage. This happens when diverging positions among current actors in the process emerge, regarding more or less well-identified and scrutinized issues or interests, but do not cause open disputes and severe negative attitudes.

2nd Stage: If the causes, effects, dynamics and time frame of tensions and frictions are not properly identified, if they are not appropriately addressed, they can evolve into an open conflict stage. In this stage diverging positions are well defined and are expressed in severe negative feelings and attitudes and in clear and open disputes. This stage requires an accurate diagnosis in order to put in place proper mitigation and management strategies.

3rd Stage: If adequate mitigation measures are not applied, the arising disputes might spread or connect to other previously existing issues of any kind, developing into the conflict network stage. At this stage controversies grow, developing new conflicts, spreading into new areas, involving new actors and dynamics. This event can exacerbate the negative feelings, creating a climate of suspicion and hostility.

5.7 Participatory meetings and workshops

The next step after analysing stakeholder composition in a conflict scenario includes participatory meetings and involves workshops. These meetings and workshops aim to neutralize the upward dynamic of the 3-stage model, to manage the identified conflicts and tensions in order to prevent them from developing into a more severe stage (Calandra 2014).

For the workshops, the “World Café” and one with the “Open Space Technology” method were applied (Brown and Isaacs 2005; Owen 1997).

“World Café” and “Open Space Technology” – method

The World Cafè method involves division of the participants in small subgroups and a series of twenty-minute rounds of conversation for each group. Each round aims at discussing one specific question, designed for the context and desired purpose of the session. After the small group rounds the participants are invited to share insights or other results from their conversations with the rest of the large group.

The Open Space Technology (OST) (Owen 1997) can be used in meetings with variable numbers of people. The approach most distinctive characteristic, its initial lack of structure, in which the group of participants creates the working agenda, as individuals post their issues in bulletin board style. The issues are then organized in sets of topics, which are addressed in dedicated discussion rounds. These resulting notes are compiled into a proceedings document, distributed physically or electronically to all participants. In addition, specific issues emerging from consensus workshops were discussed more in depth with the involved stakeholders, in opportunistically organized and unstructured personal meetings (Calandra 2014).

Calandra (2014) pointed out, that it is not possible to precisely plan the number, timing and structure of such meetings in advance, due to the fact that the topics and techniques involved in each single meeting result from the outcomes of the previous ones.

Each time influenced by many factors such as:

1. Main issues raised in the previous meetings
2. Attitudes of the involved stakeholders
3. Availability of key stakeholders to participate.

Therefore the whole process is subject to a case-by-case evaluation of the single steps by expert mediators and a consequent adaptation of locations, timing and involved techniques for the next meeting.

In the process, interviewees are comprised of institutional actors and stakeholders, in the case of human – large carnivore conflicts: livestock herder and owner, farmer and local communities, hunter, forester, veterinarians, environmental bodies (NGOs etc.).

Feedback meetings

Following stakeholder analysis, a set of feedback meetings are organized, in order to communicate the results of the interviews and questionaires, that were conducted, in order to classify existing components of human – large carnivore conflicts.

In this feedback meetings emerge the main issues, that are important for the interviewed respondents of the stakeholder analysis, which are discussed in subsequent participatory "consensus" workshops (see below).

Consensus workshops method (CWM)

After the feedback meetings, Consensus Workshops (CW) are held; they are used whenever a group of stakeholder need a solid foundation on which to base all future steps and work within a participatory approach to mitigate or solve a conflict. Consensus workshops generate an actual consensus with which the entire group can move forward, but a consensus with a more complex framework than a simple yes or no to a proposal. The CWM has broad application and can be used whenever a consensus is needed but no one has a simple answer to the focus question. It can take from 30 min to 3 hours and can be easily used with any size group up to 100 (Stanfield 2013).

Usually CWM, includes more than one session in order to encourage joint identification of planned and implemented actions in relation to the needs of the stakeholders in the area of conflict, which are based on the principle that, given to restrictions like limited human, material and financial resources, not all measures possible can be implemented. At the same time, these workshops ensure joint identification of the methods and time frames to achieve the identified objectives, based on a fundamental principle of reflexivity: "we try to understand what we do when we do it, and not later, when it may be too late to correct the mistakes" (Calandra 2014).

Other aspects, that are usually folded out within a second consensus workshop event, include: assessment of the feasibility of agreements to reduce or solve conflict, through specific finalize meetings, based on the principle that "agreements agreed upon, have to be respected". If something did not work, parties involved in the process, have to understand, which factors lead to failure (Calandra 2014). And last but not least, the implementation of agreements to boost participatory practice at the end of the project and let these efforts continue in the future.

Thereby, consensus workshops did not work independently of each other; on the contrary, they were closely and explicitly related. In the second round of meetings the facilitators recalled the issues that had emerged in the first workshops, and they publicly explained which goals had been achieved, which had been partially achieved, which were subject to further assessments and which had not been achieved.

Between the first and the second set of workshops, thematic meetings are held, which are aiming at strengthening and preparing the second workshop event, in particular with more active stakeholder groups, which presented an higher conflict level (Calendra 2014).

Results of participatory workshops

Achieved results in the participatory process can be classified in four main outputs (Calandra 2014):

1. Concrete interventions to reduce human – large carnivore conflict in the field. These are agreements between local authorities and stakeholder groups about the implementation of specific methods and/or instruments in order e.g. to decrease depredation on livestock or to improve acceptance for co-existence with large carnivores, by e.g.:

- Veterinary assistance to herders/owners of livestock
- Distribution of material to build permanent collective fences

As well as institutional/legal improvements such as, e.g.:

- adaptation of regulations for the control of problem individuals
- update of compensation schemes

6. Key Concepts and Principles of Stakeholder Involvement to reduce human-large carnivore conflicts

6.1. Concept of participatory approaches in human – large carnivore conflicts

In addition to managing large carnivores, there is a growing recognition, that efforts to change human behavior and raise increased acceptance is more important than simply reducing damage caused by them. Therefore, the concept of implementing participatory approaches for the management of conflicts between humans and large carnivores are used to understand and study the human dimensions of large carnivore wildlife conflicts and coexistence. These studies include surveys and interviews with directly affected stakeholders, direct field observations by monitoring the species in question, ethnographic approaches (about the composition of stakeholders in a large carnivore conflict area), community participation and focus groups (Messmer 2000).

Decision making and planning, by engaging all affected and relevant group of stakeholder gives them the opportunity to speak out on their behalf, protect their rights and interests in a just and safe atmosphere. This ensures a conservation approach carried on a stable fundament, by adressing all stakeholders allowing for increased transparency along the process. To secure, that all those who have something at stake in the process, having their voices heard, participation and the implementation of participatory instruments is a key factor. Consequently, the success of wildlife management schemes designed to resolve human-large carnivore conflicts in this dynamic environment will largely rest on the ability of the decision makers and wildlife managers and researchers to recognize, embrace and incorporate differing stakeholder values, attitudes and beliefs in the policy making process (Messmer 2000).

The idea is to have local people and groups of people be agents and helpers, acting as multiplicators for a change in attitudes towards a species in question. In order to identify positive outcomes and advantages of a species existence rather than focussing on conflict-related issues, that are misunderstood, exaggerated or existing because of wrong assumptions or beliefs of ecological or management questions. Participatory approaches and instruments applied to relevant group of stakeholders in human – large carnivore conflicts, strengthen capacities to exert influence and right to say at a matter over decisions that will affect them directly, which result in increased trust and acceptance of measures taken to conserve a species in question (Messmer 2000).

6.2. Information and education

Information, education activities and campaigns as participatory method used in wildlife conservation programs to reach the public are relatively easy to develop and implement. They are also the universally most frequently suggested and tested intervention to change individual stakeholders' emotions, perception or attitudes towards large carnivores (Decker et al. 2012). Experimental studies in the review of Johansson et al. (2016) suggests, information and education about the biology and the habitat of an animal, as well as strategies to deal with and avoid conflict (e.g. remove food attractants), have been successful in changing peoples' risk perception. These approaches have also increased knowledge and improved conflict avoidance behaviour. Another experiment folded out in the study, stressed the importance of providing information on benefits of large carnivore presence to increase an accepting attitude. Using social identify theory, Lute et al. (2014) suggest that such strategic communiction about perceived large carnivore risk must also be adapted to the concerns of the adressed social group.

There is a large variation in theoretical causes of fear, as well as design and distribution, context, and time frame of interventions. Several information channels are sometimes simultaneously introduced and evaluated, and information/education is often combined with other interventions. This generates many questions with regard to the set-up of the intervention. A tentative conclusion is that information might have a potential to change the attitude towards large carnivores, but it should be considered that information and education might decrease as well as increase positive or negative responses towards large carnivores and must therefore be highly context-specific (Field et al. 2001).

6.3. Species and habitat exposure

Another participatory approach reviewed by Johansson et al. (2016) to raise acceptance and reduce misperception of large carnivores is the use of species or habitat exposure to increase predictability of animal behaviour and reduce fear and allow for conflict reducing human reaction during an encounter.

6.4. Collaboration and participation

The large-carnivore management literature mostly stresses mixed interventions combining education-information and public participation and/or financial compensation or incentive schemes (see chapter: Widllife Damage and Compensation Management). Stimulating public participation (e.g. co-participation) is increasingly acknowledged as important complement to education, specifically in relation to fear. This may be especially relevant in situations where lack of trust in managing authorities is associated with fear responses.

Thus, participation and collaboration in the Scandinavian context is primarily introduced to address conflicts between local residents and authorities or between stakeholder groups (Johansson et al. 2016).

In other parts of the world, educational programmes have integrated collaboration and participation (i.e. authorities/associations and public working together in management/monitoring conservation actions). Including participatory components, e.g. recruitment and training of community members to work as para-biologists to assist in the research.

Another example are community-based conservation approaches (incorporate improvement to local livelihoods while conserving areas through the creation of national parks or protected areas), which showed that people's opinions about wildlife were more positive after the project's implementation for other reasons than conservation itself, mainly economic benefits resulting from the implementation of the project.

6.5. Financial incentives

Financial incentives can be aimed at compensating for direct costs (e.g. damages caused by large carnivores) or overcompensating to provide benefits of large-carnivore presence (financial incentives for coexistence humans – wildlife). Financial incentives (e.g. compensation, incentives) as a short-term measure combined with long-term education-information (e.g. campaigns, information signs) have the ability to overcome people's fear and change negative perceptions of large carnivores.

7. Human – Large carnivore conflict assessment

7.1. Protocols for Assessing the Status of Large Carnivore–Human Conflict using PRA

Definition

Participatory Rural Appraisal (PRA) is a common conservation tool for collecting data on large carnivore-human conflict and economic compensation schemes for those affected negatively by carnivore presence. Thereby, the perceptions of local people on human – wildlife conflicts are measured. Varied implementation approaches, however, affect success and hinder the formulation of effective conflict resolution and conservation management (Maheshwari et al. 2014).

Protocols for Assessing the Status of Large Carnivore–Human Conflict Using PRA:

1. The questions, whether open or closed ended, during the interview should be strictly aligned with the study objectives. For example, if the research question pertains to large carnivore–human conflict only, collecting socioeconomic data may not be necessary. However, if the objective is to assess socioeconomic aspects, questions on conflict should also be addressed.
2. If the survey is focused on only academic objectives, this should be conveyed to the interviewees to avoid expectations among the respondents of a monetary settlement against loss
3. The interviewer should clarify his/her role (e.g., government or nongovernment representative), even if the study is concerned with scientific objectives. Any compensation schemes available from the surveyor's side for possible implementation should be discussed with respondents
4. The area's remoteness should be considered because people from highly accessible areas may respond differently than those from remote locations. Attitude of the locals from areas previously surveyed may also differ from those where a surveys was conducted for the first time
5. Key people (e.g., administrators, forest department officials, conservation, non-governmental organization (NGO) representatives, local authorities) should be included in the sample, along with affected local communities, to learn their role in conflict mitigation
6. Factors that increase chances of depredation should be considered (e.g. guarding, husbandry practices, poorly constructed livestock pens, grazing within high-risk areas, attentiveness of shepherds)
7. The categorization of the level of human – large carnivore conflict should be systematic and based on defined criteria

7.2. Participative Instruments and Tools

Participatory Intervention planning (PIP)

Treves et al. (2009) used a simple method for Participatory Intervention planning (PIP) to assess alternative types of interventions based on PIP workshop participants' evaluations of feasibility. The goals of the workshops were to help participants consider all possible types of interventions for existing human – wildlife conflicts and weigh the relative merits of the alternatives.

During the workshop schemes various methods of conflict reduction were brainstormed and discussed with the participants making educated guesses about the relative feasibility of the intended method to reduce conflict - this process was structured and preceded by a critical first step that defined the cause-and-effect relationships underlying a given human – wildlife conflict (Fig. 3).

This step exposed multiple possible focal points of intervention. The causal chains are similar to those advocated for conservation planning (Salafsky et al. 2008). After brainstorming the participants used three criteria: cost-effective design, effectivity and sociopolitical acceptability to evaluate interventions proposed by the participants.

A cost-effective design, understood broadly, considers the resources, time and expertise needed to install and maintain the intervention in its most effective form. Effectiveness must be evaluated against the intended goal, which is either to reduce the frequency or severity of conflict between humans and wildlife or raise tolerance among people for arising or existing conflicts with wildlife. Effectivity is the effect of the intervention on targeted problematic wildlife and unintended targets. Sociopolitical acceptability is the tolerance for the installation, maintenance, and consequences of the intervention among affected stakeholder, more remote interest groups, and the broader population. Treves et al. (2009) used the PIP method in three multistakeholder planning workshops to improve and refine definitions, criteria, and procedures for eliciting stakeholder deliberations.

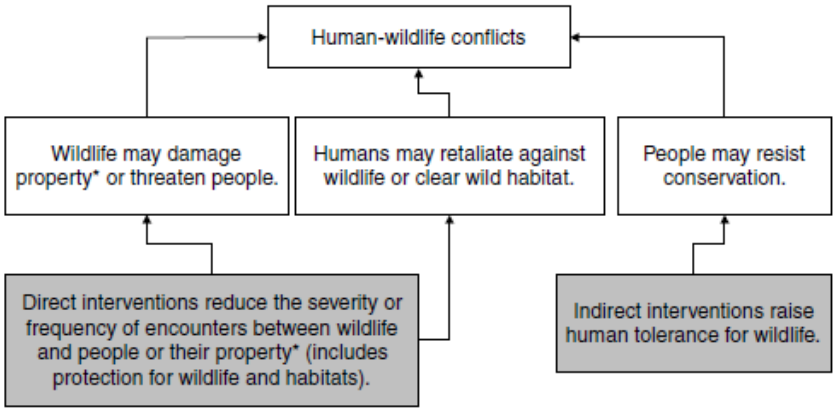

Figure 3: Cause-and-effect relationships underlying human – wildlife conflicts and their associated interventions (*inclusion of fish, game and other natural resources; Treves et al. 2009)

In each workshop, Treves et al. (2009) listed all methods for intervention derived from available literature on human – wildlife conflict reduction and asked the participants to identify additional methods for conflict reduction. The fascilitators of the workshop were wary of prejudicing later decision making and evaluation by providing definitive judgments on the effectiveness of any one method. Instead they briefly summarized the research on conditions under which each type or method of intervention was more or less effective. Thereby, a thorough knowledge of intervention types and methods for reducing human – wildlife conflicts is a valuable prerequisite for effective PIP.

Participants working in groups or in plenary were asked to discuss the entire range of interventions and consider the cause-and-effect relationships underlying human-wildlife conflicts and their associated interventions. As a first cut the participants discarded interventions that were unanimously seen as impossible. For example, ruling out lethal interventions against a legally protected species. Thereafter the participants were asked to consider the feasibility criteria. Subjective assessments of the criteria reflected the participants' knowledge of applicable law, national or local sociocultural norms, economic and material constraints, and biophysical conditions (Treves et al. 2009).

Nevertheless, by designating subgroups randomly or by species expertise, Treves et al. (2009) anticipated the principle of complement within subgroups relating to formal and informal knowledge and experience about conflicts and the species in question. By applying this principle it was expected to promote a more thorough and objective assessment. Once the list of feasible interventions was compiled the workshop participants were asked to consider the potential compatibility of combined interventions. The interventions were considered functionally incompatible if the same individuals, time, materials, or funds would be needed for both interventions but could not be divided adequately between the two. The interventions were considered logically incompatible if one proposed intervention would produce a change that excluded the other (e.g. hunting wildlife is often incompatible with wildlife viewing at the same or nearby sites).

Distinct types of direct intervention human – wildlife conflicts

During the workshops eight distinct types of direct interventions to reduce the severity or frequency of encounters between wildlife and people or their property and five distinct types of indirect interventions intended to raise people's tolerance for wildlife encounters were identified. Within each type there were one to seven methods (i.e., subtypes). Four methods were a combination of the direct and indirect interventions: hunting of problematic wildlife may reduce property damage and raise tolerance for wildlife among hunters and affected communities; wildlife laws or policies that give affected communities ownership or authority of wildlife may raise tolerance and prevent retaliation against the wildlife seen as "property"; incentive schemes that combine payments for surviving wildlife with changes in husbandry or management of wild habitat may combine direct and indirect intervention steps; and voluntary, negotiated household relocation or resettlement projects may reduce threats from wildlife. If outcomes include improved human safety or livelihoods, one may also see higher tolerance for wildlife.

Participants of a PIP workshop reported no problems in conceptualizing the feasibility criteria. Nonetheless, cost-effective design seemed to require the most time and produced the greatest uncertainty. The participants were unanimous that sociopolitical acceptance had to be considered carefully. Although direct interventions seemed the most straightforward and effective way to prevent damage caused by wildlife or avert retaliation, in practice, the participants commonly cited three reasons to prefer indirect interventions. Illicit killing of wildlife and private landowners' conversion of wild habitat were often deemed impossible to prohibit or enforce, so methods to change motivations underlying these behaviors were sought instead. Direct interventions often require the legal authority to interdict, relocate, or confiscate, which few participants imagined themselves holding.

Many participants understood that retaliation or opposition to conservation stemmed from common, contributing factors or indirect threats (e.g. lack of education, poverty, unwise legislation or lack of management capacity). Therefore, direct threats or proximate contributing factors might respond efficiently to a cascade of "upstream" changes triggered by one indirect intervention to solve the conflict (e.g. education, policy reform or training adressing exposure/encounter to particular wildlife species). For example, training farmers and livestock holder to detect and deter transgressing wildlife seemed more efficient than inviting central authorities or an outside team to do so. Likewise changing policy sometimes seemed more feasible than trying to stop every infringement of existing rules (Treves et al. 2009).

8. Wildlife Damage and Compensation Management

One main conflict between human and large carnivores is the depredation on livestock. Coexistence with large carnivores (LC) entails significant indirect and opportunity costs to hinder or prevent LC from attacking livestock entirely. Affected stakeholder invest in livestock herding, guarding and predator control causing substantial economic costs to this group confronted with large carnivores.

Nonetheless, the depredation rates for lynx on livestock compared to losses caused by wolves are rather low within Western Europe (e.g. Stahl et al. 2001).

Compensation is widely used as a way to minimize the impact of large carnivore conflicts on human livelihoods. Thereby, most often exist a common perception, that existing compensation schemes and procedures are too complex, too slow, too bureaucratic (Linnell et al. 2011). This leads in many situations to decreased acceptance of large carnivores, causing conflicts rather by the framework, that is installed to lower conflict potential, increasing it by being not as functional as intended to be. Reform of such existing malfunctioning systems are a most crucial factor, to serve its purpose of assistance in reducing conflict impacts. A malfunctioning, inadequate scheme has the opposite effect with actually increasing the level of conflict and reducing acceptance for a species like Eurasian lynx drastically.

It is often assumed, that intolerant behavior toward large carnivores in the form of illegal killing or other approaches to harm, injure and kill individuals (e.g. by poisoning prey as bait, snaring, shooting etc.) is mainly motivated by retaliation for real and perceived losses. Under this assumption, governments and private organizations aiming to protect large carnivores by implementing economic incentives (prior to occuring damages respectively after damages occurred) to reduce the perceived costs of predator conservation and raise acceptance for co-existence of large carnivores and humans (Bruskotter and Wilson 2014).

8.1. Forms of Wildlife Damage and Compensation Management

If large carnivores are occuring in a certain area, the importance to develop strategies to account for depredation caused by them by establishing compensation schemes, respectively accounting for the high existence value of large carnivores into sufficient, relevant financial incentives for their conservation at local scale is an immanent task within a functioning conflict management scheme adressing large carnivore conservation (Dickman et al. 2011).

There is a wide array of compensation schemes for occuring damages and financial incentives for co-existence of human and large carnivores/predators available, the following chapter provides a review over the different types of compensation schemes and financial mechanisms currently used to promote human-carnivore coexistence. It discuss their potential advantages and disadvantages in terms of large carnivore conservation and points out how these schemes could potentially be combined and improved in the future.

Four common types include compensation, insurance, performance payments and financial incentives (as well as conservation payments) have been developed to account for damages to livestock caused by large carnivores as well as financial incentives to account for the (co)existence of large carnivores and humans, under the term “payment to encourage coexistence (PEC)” (Dickman et al. 2011). Nowadays, these economic incentives are applied to increase tolerance for large carnivores and mitigate evolving conflicts over caused damages.

Some PEC schemes take an ex-post approach, covering individual costs (of damage), if they are actually caused by large carnivores, whereas others provide payments based on the assumption that carnivores will impose some general level of cost during their floruit (e.g. causing damages to livestock).

Very critical is to determine the procedure of payments involved in PEC: payments must be sufficient to outweigh the costs caused by the damage imposed on local stakeholder, but also in proportion to the benefits produced for society. In addition, there are external costs associated with providing incentives for local compliance within the scheme.

Local communities often receive and recognize cultural value from large carnivore presence in their surroundings. Additionally, carnivores may also have some local economic value, for instance through any revenue that already reaches local people from carnivore related tourism. Financial mechanisms can help encourage coexistence if payments being made, that are at least equal to the benefit of living without large carnivores and may be as large as the value of recompensing these costs and providing incentives to maintain compliance to the intended conservation goals (Dickman et al. 2011).

Consequently, Zabel and Engel (2010) suggest, that payments have to be made according to intermediate conservation goals that can be observed locally at a scale relevant to affected stakeholders to allow for increased transparency and understandable processes in a conservation program.

8.2. Compensation and insurance schemes

One approach is to compensate costs as damage occurred by direct compensation payments to affected stakeholders, thereby intending to reduce animosity toward and retaliatory illegal killing of a protected species in question. Numerous compensation schemes have been implemented in countries, which have Eurasian lynx populations in order to address occuring conflicts. The costs associated with livestock depredation are frequently cited as a key reason for people's animosity toward large carnivores (Dickman et al. 2011).

Compensation schemes

Direct compensation of damages caused by large carnivores is an effective strategy for minimizing conflict and encouraging more acceptance and establishing a compatible human – large carnivore coexistence. With the concept being simple: any suspected livestock depredation incident is independently investigated, and if the loss can be attributed to a large carnivore covered by the existing scheme, a payment is made directly to the affected livestock owner (Dickman et al. 2011).

This approach of direct payments for damages is likely to be particularly effective at reducing individual anger and unrest, which is important because carnivore persecution by a hostile, large carnivore opposed group of stakeholders can have significant impacts in terms of decreasing the viability of a protected target carnivore population (Woodroofe & Frank 2005). The conservation aspect of such compensation schemes is sometimes emphasized by forbidding anyone involved to kill any of the carnivores concerned and identified as originator of caused damages, with fines and/or temporary termination of compensation payments applying for any violations (Maclennan et al. 2009).

However, the imposition of financial penalties to avoid moral hazard (e.g. paying only a proportion of market value if the depredation incident was linked to poor husbandry) means that affected livestock owners are rarely fully compensated for the economic cost of depredation even when it has been verified, so large carnivores still impose substantial costs of damage to the respective aggrieved owner, which can lead, even when a compensation scheme exists, to further conflicts and reduced acceptance in the particular area, where the damage occurred. This can be particularly the case and unnerving, as livestock depredation may cost more than the actual market value of the livestock, caused by transaction costs of claiming for compensation or the lost potential value of a pregnant or young animal, which can undermine the acceptance and conservation efforts for a species considerably (Dickman et al. 2011).

Fraudulently claim

Conversely, livestock owners may take advantage of compensation or insurance schemes and fraudulently claim that stock lost as a result of other factors were depredated, increasing the economic burden of such a scheme. Therefore, even if compensation schemes reduce the likelihood of retaliatory killing of a protected predatory species, the form of financial incentives still remain for preemptive killing. Ultimately, although compensation and insurance schemes can undoubtedly reduce the financial impacts of large carnivores, carnivores often still impose more costs than benefits on local people. The schemes usually require significant external funding to be functional with the permanence of financial reserves being often an issue, consequently many compensation schemes have ended in bankruptcy (Morrison et al. 2009).

Implementation of compensation schemes raise expectations among stakeholders, and if they fail (e.g. paying for occurred damages timely or not all), it can intensify negative attitudes towards large carnivores and continue to fuel existing conflicts.

Overall, compensation and insurance schemes may potentially seem to be useful tools for reducing the direct economic impact of large carnivores on the livelihood of livestock owner, but they fail entirely to provide any real incentive for local stakeholder groups to actually contribute to conservation purposes of a species (Dickman et al. 2011).

8.3. Insurance schemes

Insurance schemes are similar to compensation programs but typically require participants to pay a premium. Insurance can promote fair payments by better incorporating the risk into the price of premiums and payments. Insurance schemes are also challenged by the risk of fraudulent claims (as explained for compensation schemes above) and adverse selection (e.g. difficulties differentiating between low-risk and high-risk clients).The challenges of small pools of participants and high premiums have been addressed in some areas by supplementing funds with government or nongovernmental support, community financing (e.g. through ecotourism) or better risk evaluation (Nyhus 2016).

8.4. Performance payments

Performance payments compensate people on the condition of wildlife abundance. These payments establish a direct link between monetary payments and the production of desired conservation objectives but differ from traditional subsidies, which are not typically linked to conservation outcomes. E.g. in Sweden, Sami reindeer herders were paid for wolverine reproductions, resulting in reduced female mortality and an increase in wolverine populations of almost 120% within a decade (Nyhus 2016).

8.5. Revenue-sharing incentives

An alternative is to channel some of the revenue generated by large carnivores or wildlife in general - whether through tourism, trophy hunting or other activities - back to local communities, and provide benefit to help offset costs not covered by compensation or invest in social or public structures.

Foremost, this scheme is in use in African countries using wildlife to earn revenues by e.g. setting hunting quotas on particular species in order to support local livelihoods and nature conservation purposes - e.g. the value of community wages for conservation appeared evident in Kenya: in areas where most of the revenue from ecotourism was retained by the tourism industry and the government. Between 1977 and 1994, in certain areas 29% to 65% of wildlife species were lost, while in areas where revenues were shared among group ranches, wildlife stayed constant. In the same period, on private land where owners received all of the revenue, wildlife increased by 12% (Norton-Griffiths 1998).

8.6. Conservation payments

To strengthen the linkage between financial incentives and conservation - payments for conservation are becoming increasingly common (Nelson 2009). The defining characteristic of this approach, in contrast to other forms of PEC: payments are linked specifically to a desired environmental output or conservation goal (e.g. maintenance of large carnivore population in a certain area) rather than aiming on giving an indirect input, affecting the production of that output, such as aiming at the reduction of human – large carnivore conflicts (Zabel and Roe 2009).

Many of these conservation payment approaches can be categorized as forms of payments for ecosystem services (PES), defined by Wunder (2005) as (i) a voluntary transaction (ii) in which a well defined environmental service or land use likely to secure that service (iii) is bought by at least one buyer (iv) from at least one provider, (v) if and only if the service provider secures service provision (i.e. conditionality).

Conservation payments have several benefits for local stakeholder groups and large carnivores: they are likely to provide economically added value, as they create a direct financial incentive for maintaining large carnivore populations. Thereby, payments are usually independent of levels of depredation, thereby avoiding moral hazard and entail low transaction costs for livestock owner, as they do not have to search for depredated livestock or submit claims for compensation. Furthermore, unlike schemes linked to protected areas, which can impose substantial opportunity costs, these payments actually reduce the costs of maintaining traditional lifestyles in areas where humans and large carnivores coexist, helping people maintain their cultural integrity (Dickman et al. 2011).

Examples

In 1996, the Swedish government opted for initialising a performance payment scheme to obtain and maintain stable populations of wolves, lynx and wolverines. The Sami, of whom 2.500 still being reindeer herders often suffer substantial cases of depredation on reindeer, which can engage in retaliatory killing, a major cause of mortality for adult lynx and wolverines in Sweden (Zabel and Holm-Müller 2008).

Under the performance payment scheme, payments are made to each of the 51 villages contingent on the number of carnivore reproductions certified on village reindeer grazing land, with the amount calculated to offset all future costs imposed by the number of offspring (e.g. in term of damages to livestock and/or property) during their lifetime (Zabel and Holm-Müller 2008). In 2007, the payment for each certified lynx and wolverine reproduction was approximately $29,000, and the villages manage, allocate and disburse the payments after discretion.

There is increasing evidence from studies that conservation payments can be an valuable tool for encouraging human – large carnivore coexistence and for providing an important source of revenue to local communities (Zabel and Holm-Müller 2008). Models have shown that PES schemes in particular can successfully attain conservation efforts. Consequently, they are undoubtedly an important tool for facilitating the ongoing coexistence of humans and large carnivores and for translating global existence value of an protected species like the Eurasian lynx into tangible economic value at a local level if implemented in future conservation scenarios and management plans.

8.6.1. Installing a PEC fund

A PEC fund can be established from all available revenue streams, with the money primarily disbursed as conservation payments, as this approach is the only one that directly incentivizes human - large carnivore coexistence. To avoid issues such as elite capture and payments failing to reach the entire community a subset of the fund can be allocated to community-driven development initiatives (Dickman et al. 2011).

The installation of PEC:

1. Minimize conflict by specifically targeting payments to those most directly affected by carnivores
2. Reduce the direct costs of human–carnivore coexistence
3. Provide local people with additional revenue directly linked to carnivores
4. Avoid moral hazard and perverse incentives
5. Not require significant additional external revenue
6. Specifically link payments to desired conservation outcomes

8.6.2. Economic incentives paid prior to occuring damage on the base on reproductive events

As an example, Sweden´s pioneering program pays Sami to tolerate predators in their range for each successful predator reproduction on their communal reindeer grazing areas, however they refused to accept incentives for protecting gray wolves because these predators are perceived to scare and scatter reindeer widely (Treves and Bruskotter 2014). Studies on herders who received icentives tolerated predators better than those who had not. These outcome suggest that economic incentives can be used to increase tolerance for some large carnivores (such as lynx) and protect them from retaliatory acts of poaching/illegal killing. Still, Treves and Bruskötter (2014) pointed in their paper out, it could not be ruled out, that tolerant livestock owners were more likely to accept subsidies provided by the government, or that intolerant livestock owner rejected subsidies and took care of conflicts with large carnivores independently and illicitly.

Thus, these incentives may change public behaviour regarding illegal killing – Treves and Buskötter (2014) indicate the delivery of the benefits of paying incentives must be supported by social change as well. A correlational study from Kenia on Masaii livestock herders showed, that lion killing diminished when compensation was paid for livestock losses and diminished further when trusted community members got paid to protect livestock, warn villagers of the presence of lions, and monitor lion movements (Hazzah 2014).

Another study on Brazilian ranchers living near jaguar territories showed that social factors were more influential than retaliation for jaguar predation on cattle or perceived threats to humans. The ranchers' intentions to kill jaguars positively correlated with the size of their land holdings and were explained by social norms; ranchers who thought that others kill jaguars or expected such poaching were more intent to kill jaguars themselves. The social facilitation that results in areas where poaching is common and accepted can create large carnivore-free zones as neighbours and associates coordinate their actions explicitly or tacitly (Marchini and Macdonald 2012).

8.6.3. Recommendations for Successful Implementation of Compensation Programs (all information abbreviated from Maheshwari et al. 2014)

Goal of Compensation

A successful compensation scheme requires well-defined goals. Beeland (2008) identified the following: address the economic loss; share the costs of conserving large carnivores equitably; reduce illegal killings of carnivores by locals; increase tolerance toward carnivores; reduce attractants for large carnivores and promote good husbandry. This helps managers and stakeholders to decide on the most effective strategy (Maheshwari et al. 2014).

Sustainable Funding

Compensation schemes, that are used worldwide tend to be underfinanced and are not sustainable, irrespective of the funding source. Long-term funding must be ensured for proper implementation and functionality of the compensation scheme. When compensation programs are inadequately financially equipped or entirely fail, confidence among local stakeholder is impaired and lowered, which may affect achievement of conservation goals.

Time Lag Between Observation and Verification

Many programs report large time lags between observation and verification of damages caused to livestock. Because indirect evidence of large carnivores being held responsible disappear quickly, it reduces the ability of wildlife managers to verify if the mortality was actually caused by a large carnivore. Distinguishing if the damage caused by other animals is often difficult. Just trained personnel should examine killed livestock and identify the carnivore causing depredation and quantify animal-inflicted damage. DNA analyses and camera trapping might be necessary instruments used to identify the animal causing the damage (Maheshwari et al. 2014).

Burden of Proof

Livestock owners are often frustrated at the lengthy procedure of the burden of proof during the verification process (Lee 2011); kills presumably done by large carnivores are typically not fully compensated. Many compensation schemes require the external process of verification because self-reporting of wildlife damage may over-estimate damages or involve fraudulent claims. To avoid abuse, compensation schemes have to adopt a community-based particpatory approach whereby locals are actively engaged in the design and delivery of a functioning compensation scheme.

Low Reporting Rate

Some studies have found a low rate of reporting depredation events. Reasons include confusion with regard to the process, logistical complication, time-consuming processes, and loss of confidence due to burden of proof or corruption. Good communication strategies play an important role in such cases. Other site-specific strategies can also be worked out, such as the establishment of an human – large carnivore conflict hotline (Nugraha & Sugardjito 2009).

Timely Payments

Insufficient and untimely payments of compensation for arisen damages can lead to frustration. The verification process if damages are caused by large carnivores should be separate from the actual payment.

Determining Loss and Compensation Values

Calculating the compensation amount for killed livestock can be challenging because the value may vary with age, size or reproductive status of the individual. Even when compensated monetarily, some livestock owners may perceive they are not receiving fair compensation for the time spent or hardships faced while protecting their assets, or for the emotional loss of losing livestock, which can lead to anger and unrest potentially imperiling conservation goals and acceptance for co-existence for a species.

9. Conclusion

Human – large carnivore conflicts are threatening the survival of large carnivores such as the Eurasian lynx profoundly and require effective and carefully designed, cost-effective solutions to mitigate conflict situations and decrease the potential for a decline in acceptance and changing attitudes towards large carnivores. Most important is to understand the driver and mechanisms that fuel human – large carnivore conflicts and address them effectively, furthermore to establish functioning and well-funded, quick responsive compensation schemes for damages caused by large carnivores and the installation of financial incentives to value acceptance and promote coexistence and the benefit of having large carnivores on private land. While there appear to be general guidelines that can aid wildlife managers and researchers in implementing effective PRAs and compensation schemes, it is important to be sensitive and incorporate site and species-specific issues and experiences from other similar studies on existing human – large carnivore conflicts.

Adressing and involving relevant stakeholder is a key factor, functioning as base for the initiation and implementation of participatory approaches to reduce human – large carnivore conflicts by opening new channels of communication between formal institutions and local communities. At the same time, the bottom-up approach has disrupted the common view, that stakeholders often share: giving "blind" support to local governance policies, which are not adequately discussed and communicated and consequently lacking acceptance by a broad majority of affected groups. The incorporation of stakeholder with the implementation of participatory approaches in exchange ensure a general increase of consensus. Another advantage of such an approach, that local stakeholder groups, participating in the decision making processes will feel more responsible for the developed and implemented tools, activities and regulations, supporting their use and respect also by other involved stakeholder. Additionally, participatory process can assist in the introduction of good practices in the field of stakeholder consultation for supporting large carnivore conservation.

Following participatory meetings there has been a general recognition by stakeholders within a process, started by local authorities, which is on-going and not a "one-shot" initiative (Calandra 2014). This generated in the study by Calandra (2014) a widespread improvement of relationships between stakeholders and the decision-making bodies in a given human – large carnivore conflict. As a consequence, local authorities have recognized the importance and effectiveness of public consultation and participatory management.

The main disadvantage, a participatory process requires very long time. It cannot been applied as a one-shot initiative to quickly solve conflicts but it must rather been seen as an ongoing, never-ending process and investment to establish and ensure co-existence and conflict mitigation of human – large carnivore conflicts on long-term.

Insitutional bodies involved in the process cannot allow interruption, because this would disappoint the expectations of the local communities and generate discouragement and negative attitudes for conservation of large carnivores. The participatory process requires an ongoing commitment by the involved organizations starting the initiative in terms of funds, staff and time.

Another risk of implementing this technique, if the process is not properly managed by specialised staff (in terms of professional external mediators, conservationists, wildife manager etc.) it might generate expectations that are not fulfilled. By bringing together different, diverging groups and positions, it might increase the conflicts instead of mitigating them. Therefore, Calandra (2014) highly recommended the involvement of one or more persons specifically trained in order to adequately manage the difficult situations that always appear during the meetings. Finally, since the assumption of a participatory process is that each party contributes with own expectations and inputs but also with own commitments, the local authorities have to make sure that they will maintain all commitments they take in terms of concrete interventions, law adaptations, financial support to allow for full aceptance and credibility towards the affected and involved stakeholder in existing or arising human – large carnivore conflicts.

The common lesson to be learned is that the future of known approaches and methods cannot be foreseen. However, if carried out with adequate attention to the key factors discussed in the present collection, these approaches can act as powerful tools to mitigate and resolve human – large carnivore conflicts and to achieve long-term goals by accounting with proper conflict management as crucial factor in a fuctioning conservation scheme. In order to ensure acceptance of the public for a protected species of conservation and public concern – by acknowledging and appreciating its presence with all the resulting benefits and costs. Thereby, the prerequisite to success is the empowerment of local communities in decision making processes.

Nonetheless and despite many possibilities to expand ideas and concepts for reducing human – large carnivore conflicts in the near future, big progresses have been made in understanding the importance of adressing and solving these conflicts, by assessment and understanding of biological and social factors influencing conflict and developing strategies towards a solution to promote coexistence of humans and large carnivores.

10. Recommendations and examples of conflict reduction through stakeholder involvement

Conflicts need to be managed effectively for humans and large carnivores to coexist successfully in the long term. Awareness-raising has a vital role to play in this, and protecting livelihoods is vital, especially in areas that are being recolonised by large carnivores after an absence of decades or even centuries. The Eurasian lynx is the large carnivore least likely to attack humans or livestock. Nevertheless, humans are still a major threat to the lynx, particularly to small populations, with low acceptance of its presence, especially by hunters in some areas, which results in persecution and illegal killing (Silva et al. 2013). According to that, involving stakeholders such as the hunting community has been important in reconciling conservation and socio-economic goals.

According to Linnell (2013), massive efforts have also been placed into conducting research into understanding conflicts and in applying a wide range of conflict reduction techniques in the field with biodiversity and natural resource conflicts. The literature on the topic has exploded in recent years. Unfortunately, there has been very little systematic research into evaluating the relative success of different approaches. In other words there is a lot of theory and a lot of practice, but generally there is a disconnect between these two parts. The attempts that have been made to evaluate various approaches have indicated that stakeholder engagement helps in many cases, but not all, and that things are very situation dependent making it impossible to offer an off-the-shelf tool-kit.

Approaches will therefore need to be tailor made to suit each specific set of circumstances, even though there are many common elements that have been identified as contributing to success (Linnell 2013). Despite the diversity of conflicts associated with large carnivores and the diversity of approaches that exist to reducing these conflicts, there is one common feature that appears to be central to a successful approach. And this is the need to engage with a diversity of stakeholders in a targeted, context dependent and meaningful manner (Linnell 2013). Linnell (2013) states, that improving the interaction between stakeholders and institutions and social learning are as desirable outcomes as the conservation status of carnivores, and the ideal process should lead to benefits in both.

As a result, Linnell (2013) offers a combination of basic principles that have consistently been shown to be crucial in successful conflict reduction, some conceptual insights into the specific case of large carnivore conservation, and a list of recommendations from case studies for potential activities that are based on a wide range of experience from the field. These allow the listing of a range of activities that could be potentially deployed under different contexts to address different dimensions of the diverse conflicts associated with large carnivores.

List of recommendations for potential activities for conflict reduction (all information abbreviated from Linnell 2013; extracts):

1. <u>Preventing the development of conflicts:</u>

   Although large carnivores are often associated with a diversity of conflicts, the relative extent to which the different conflicts appear, and the intensity with which they develop, are both highly variable across Europe (Blanco & Cortes 2009; Kaczensky 1999 in Linnell 2013). There are in fact many areas where the species coexist with people with remarkably little conflict, including many of the areas covered by the largest populations of large carnivores in eastern, southeastern and southwestern Europe. Ensuring that conflicts do not grow is an important part of any large carnivore conservation strategy (Linnell 2013).

2. Information:

   There are many conflicts which are genuinely associated with a lack of information and misunderstandings about issues as diverse as large carnivore ecology, legal frameworks, policy, practical methods for conflict mitigation, and the impacts of human activities on carnivores. There is a huge amount of ongoing research in the field leading to a constant production of new knowledge. Access to information is one of the fundaments of the democratic process and is a prerequisite for informed discussion. It is especially important that information is balanced and honest, ideally allowing the perspectives and experiences from multiple interest groups to be expressed to promote a higher degree of mutual insight. However, it is crucial to realize that information has its limits (Brainerd & Bjerke 2003; Heberlein & Ericsson 2008 in Linnell 2013). There are some actors in conflicts who are not interested in information, wide segments of the public are not interested in the issue at all, and there is little evidence that information changes attitudes, let alone fundamental values. Therefore, it is unlikely that information will dramatically change the attitudes of those people who are already strongly opposed to carnivores, but it may change the way the conflicts are played out and conducted.

3. Technical working groups:
   In some areas where knowledge is contested it may be productive to establish a working group composed of scientists and expert stakeholders who use a series of meetings or workshops to review existing knowledge and experience and try and come to a common understanding on specific issues. Areas of agreement can be identified, and if there are areas of disagreement it may be possible to identify approaches to gathering new data to resolve the uncertainty. The output of such processes can be very authoritative with high degrees of legitimacy and can provide the content for information campaigns. The process also fosters a collaborative atmosphere among stakeholders.

4. Outreach educational programs:
   The range of actions also includes employing carnivore advocates, or local contact people, who can function as a contact point for rural people to gain access to information about carnivores, mitigation methods, economic incentives and other issues. Having a predictable and accessible contact person can be very conflict reducing as it provides a local face that can serve as an intermediary with the administrators of a conservation policy that is often determined far away and perceived as being faceless.

5. Economic and practical assistance:
   For the conflicts that have an economic and material nature, such as depredation on livestock for example, there are a number of technical solutions. These include actions like the introduction of electric fences. Practical help both ensures their effective adoption and an opportunity for meaningful face to face contacts and dialogue with individual users.

6. Economic instruments – compensation and incentives:
   Paying a monetary compensation (ex post facto) for livestock killed by predators has become an increasingly common strategy across Europe. The systems vary from country to country, with some paying more than market value, others paying less than market value, some systems paying for all animals lost while others only pay for animals that are documented as being lost, some paying only for direct loss (dead and wounded animals) other for indirect costs too (e.g. less fattening and induced abortion due to repeated attacks to flocks). There is also a huge variation in who pays. In some countries compensation is paid by the government while in others it is paid by the hunters with the lease for a specific area. Despite their widespread adoption the only function of these systems seems to be to protect livestock producers from economic loss. Research has frequently shown that compensation does little to increase acceptance of large carnivores.

There are also many problems associated with the operation of a compensation system. Documentation of the cause of death of livestock requires careful examination and is not always possible, resulting in many conflicts over the basic facts of the events. It is crucial that any compensation system should involve a careful and standardized inspection of killed livestock to protect against fraud and efficient payment.

7. Joint activity:

The idea of engaging in joint activity is gaining ground as a mechanism to bring about constructive engagement between different stakeholders (Skogen 2003 in Linnell 2013). It promotes face to face contact and mutual understanding as well as conveying an admission of shared responsibility to reach common goals. A large part of the conflict around large carnivores concerns uncertainty or disagreement about the size and distribution of the populations. It would be highly desirable to obtain better data about carnivore populations, and to come to a better degree of agreement about these results.

Throughout the Nordic, Baltic and many eastern European countries (e.g. Romania, Slovenia, Poland and Croatia) hunters and / or foresters have long been the main providers of data about all wildlife species. This cooperation between wildlife managers, researchers, foresters and hunters has been most developed in the Nordic / Baltic countries where hunters engage in highly organized data collection that is provided to managers and researchers (Braa et al. 2000; Kindberg et al. 2011; Lindén et al. 1996; Linnell et al. 2010; Solberg & Sæther 1999 in Linnell 2013). The result is a unique access to data for the researchers and managers and a greater degree of buy-in and understanding from the hunters and foresters because they have taken part in the process (e.g. Skogen 2003 in Linnell 2013). It also means that their contribution is much more easily visualized and appreciated. The Alpine countries also use networks of observers to collect data within the frames of the French wolf-lynx network and the international SCALP project (Molinari-Jobin et al. 2012 in Linnell 2013). This model could be easily expanded to many parts of Europe, especially with the present access to camera-traps and DNA methods that permit the quality control of data provided, and it could be expanded beyond hunters and foresters to all those who spend time in the outdoors as well as landowners. Such an approach could be conceptually organized in a way similar to the ever expanding network of citizen science initiatives that are constantly showing their value for monitoring the state of European nature (Roy et al. 2012). The difference in this case is that the desired outputs would be both the data provided and the resultant reduction in conflict resulting from the co-production of knowledge.

Another area concerns the involvement of stakeholders in field research projects. A lot of ecological field data collection is labour intensive and requires a detailed knowledge of the landscape. For this reason, local people, be they hunters, foresters, herders, naturalists or simply outdoorsmen are ideal partners for researchers. Given some basic training, local people can collect valuable data from the field, often more cheaply and more efficiently than researchers. The fact that they live in the study area also reduces travel costs. The co-production of knowledge provides opportunities for scientific and local knowledge to interact and build on their mutual strengths. At its best local knowledge provides detailed and intimate insights into local ecosystems and landscapes, while scientific knowledge can provide modern tools (GPS-telemetry, DNA methods etc) that allow insights that are impossible for local observers. This combination results in the production of an integrated knowledge which has a greater legitimacy than knowledge produced in isolation.

8. Study visits and experience-transfer:
   Trust and legitimacy are key issues in stakeholder engagement. In many cases there is likely to be a high degree of trust within stakeholder groups as they presumably have common values, goals and experiences. There is therefore a lot to be gained by bringing members of a given stakeholder group from different areas together to exchange experience. For example, sheep farmers in eastern and southern Europe have generations of continuous experience at farming sheep in the presence of large carnivores. These farmers are probably the best communicators to discuss the potential for change with their western European counterparts who have to relearn all the old methods. The same potential benefits exist in all directions for almost all stakeholder groups to learn from their peers with contrasting experiences, although each may need to adapt the experience to local situations.

9. Structured decision making:
   In some cases, conflicts are mainly of a technical nature, for example when discussing the impact of hunting quotas or the impact of removing certain numbers of problem animals, or evaluating the most cost-effective way to reach a certain goal. For these cases there are a number of statistical approaches that can be used to model the impact of different strategies. The ability to produce a series of mathematical scenarios allows the exploration of different strategies. Potential areas of application can concern cases where the impact of hunting quotas are controversial or in cases of landuse planning where the impacts of infrastructure routing or placement is being explored.

10. Contact forums:
    A common measure to facilitate the distribution of information and improved dialogue has been the establishment of contact forums. These usually consist of regular (annual or bi-annual) meetings where responsible management agencies, a diversity of stakeholders, and scientists meet to discuss issues related to large carnivores and conflicts. Benefits include providing a structured forum for the presentation of information, such as the latest research results, two-way discussions about management issues and the opportunity for the development of trust between stakeholders. Such forums represent a formal institutionalization of participation and dialogue and have a high degree of symbolic as well as practical value.

11. Institution building:
    The weakness of many public (formal) institutions involved in large carnivore conservation has been identified as both a threat to the survival of large carnivores and a cause of conflict with many stakeholder groups. It is therefore possible to imagine a widespread capacity building program to help institutions build capacity in a diversity of relevant issues including; population monitoring, stakeholder engagement, law enforcement and damage mitigation. One of the clear challenges facing large carnivore conservation is the need for transboundary cooperation. This requires the development of new institutional arrangement at both national (for federal countries) and international levels to facilitate cross-jurisdictional communication.

12. Hunting and lethal control of large carnivores:
    Concerning the possibility to allow limited hunting in smaller populations or in areas with no recent tradition of carnivore hunting: The dynamics of many populations show positive growth and models indicate that low levels of regulated harvest may not prevent even relatively small populations from continuing to grow provided that harvest is limited, well regulated and the population closely monitored (Chapron et al. 2003; Linnell et al. 2010; Nilsen et al. 2012; Sæther et al. 2005, 2010; Tufto et al. 1999 in Linnell 2013). It is claimed by hunters that allowing even a limited harvest will reduce some social conflicts by giving them an opportunity to have some influence over carnivore populations, as well as allowing them to exploit carnivores as a resource for recreational or trophy hunting.

The social and economic effects that this will have on wider rural communities will depend very much on how the hunting system is organized (local hunters versus outside hunters) and the general standing of hunting in the specific communities. Worth noticing is that opening for hunting may however cause environmentalists and segments of the wider public to feel disempowered and lead to an increase in litigation and therefore an escalation of conflict, as illustrated by the Swedish wolf example (Darpö 2011, Michanek 2012 in Linnell 2013). Also the process of slowing population growth may potentially provide more time to adapt to their reappearance. Finally, the claim is made that allowing legal harvest will reduce rates of illegal killing. Many of these claims are often controversial (Treves 2009; Treves & Martin 2011 in Linnell 2013). On the one hand, there is some evidence to support the idea that hunting might in certain contexts increase trust towards authorities and acceptance of large carnivores (Bisi et al. 2007; Ericsson et al. 2004; Liukkonen et al. 2009; Skogen et al. 2003; SjölanderLindqvist et al. 2010 in Linnell 2013), on the other hand, it is not clear if hunting in such situations may not ultimately be detrimental to the recovery of small carnivore populations by reinforcing intolerance towards population growth. It also appears that in some contexts illegal hunting may have been facilitated by poorly organised legal harvest. This is therefore an area that urgently needs more research and where it may be possible to try out certain culling regimes and document their impact on tolerance and the level of illegal killing (Andrén et al. 2006 in Linnell 2013).

13. Delegation of power to local levels:
    At the same time as Europe has undergone a process of building pan-European structures there has been another trend within countries to delegate decision making, or decision implementing, authority to lower, more local levels. This is formally endorsed by the EU under the principle of subsidiarity. The theory behind delegation and decentralization is that local level decisions will enjoy greater legitimacy and be more adapted to local needs. It is especially challenging for large carnivores because their conservation requires large scale (i.e. international) coordination of effort to manage whole populations (Linnell et al. 2008; Linnell & Boitani 2012). Another issue is that so much of their management is constrained by international agreements that there is relatively little decision-making authority that can be delegated.

14. Participatory development of action plans:
    Having detailed action plans or management plans is a key component for conservation. Not only does such a plan ensure that the biological needs of the species are formally taken into account, but it also provides a structured way to provide predictability for stakeholders who may be impacted by this conservation. Issues of concern can be explicitly addressed and firmly anchored within formal policy frameworks. Clear statements of goals and means provide a foundation for adaptation. Traditionally, action plans have been written by experts or bureaucrats and have proven to be sources of conflict in some cases. In recent decades there has been a widespread acceptance of the need to involve stakeholders in the process. This can be achieved in a number of ways.

    Firstly, stakeholders can be consulted at various stages of the process during which an action is developed. This can be done in a range of ways, including allowing for written comments on drafts, to holding public meetings, to constituting formal advisory groups of stakeholders to give input into a process (Andersen et al. 2004; Anonymous 2007; Bisi et al. 2007; Bouwma et al. 2010 a, b; Liukkonen et al. 2004 in Linnell 2013). All these processes serve to allow people with interests in the case to communicate their concerns to the policy makers in structured manners. It is also common to accompany these processes with the commissioning of a diversity of research and technical reports that summarise the state of knowledge on various relevant topics. Original research can also be commissioned to fill knowledge gaps.

If the stakeholder involvement is conducted well and throughout the whole process (especially starting early in the process) it is possible for such consultative processes to influence the contents of action plans and convey a sense of legitimacy to the plans. However, no real power is ever given to the stakeholders. Most existing European action plans for large carnivores have been drawn up using these consultative processes.

A second approach is to convene a group of stakeholders, with expert facilitators, and delegate the formal power of drawing up an action plan to this group. This requires that decision makers have the authority to delegate power, and if so that they agree to abide by whatever the group comes up with at the end of the process, although they will naturally be constrained by national and international legal frameworks. This requires a high degree of trust. It also requires that stakeholders have good internal communication so that their delegates have the mandate to speak for the members of their organisations. Such processes tend to take a long time, especially if there is a desire to achieve full consensus, and require major investments of time. If they succeed, such processes have the potential to have a high degree of legitimacy and greatly reduce conflicts. They have so far only been applied in the less conflictive context of bear management in Bulgaria and Croatia (Bath 2009 in Linnell 2013).

A key challenge for running such processes for large carnivores concerns scale. The need to coordinate manage at the population scale is now well recognized (Linnell et al. 2008; Linnell & Boitani 2012 in Linnell 2013) and almost always requires coordination of management between different jurisdictional units, be they autonomous regions, federal states or countries. While planning on these scales is essential for the long-term survival of large carnivores, and to effectively deal with many to the material and practical conflicts, it poses challenges for widespread participation. There will be a need to experiment with new approaches to integrate stakeholders into these processes.

15. Co-management:

This form of collaborative management has become quite common in natural resource management and wildlife management (Decker et al. 2000; Borrini-Feyerabend et al. 2004; Zachrisson 2004) although it has not yet been formally used within a large carnivore management context. In its classical sense co-management involves making decisions via a committee that consists of representatives of the authorities that hold formal power and representatives of some of the main stakeholders. Scientists or other external experts may also be included as members of the committees or called upon as external advisors. This committee is then delegated the authority to make management decisions. The fact that these committees are small and meet regularly over prolonged periods permits the development of trust, mutual understanding and co-learning, and have shown themselves to be especially valuable in cases involving indigenous peoples and natural resource management. In many ways, co-management represents a formalized perpetuation of participatory action planning, although the frames tend to be set over long time scales, with annual decisions being taken on things like harvest quotas. The model has great potential for wider use.

16. Characteristics of a good process of engagement:
    Based on the experience of many practitioners it is possible to identify a set of criteria that describe a good participatory process (Bouwma et al. 2010b; Webler et al. 2001; Sidaway 2005; Maser & Pollio 2012 in Linnell 2013).

    - Managing expectations so that goals are realistic. A central issue here lies in being very open about how much influence the process can have and about what legal or policy constraints are imposed on the group. It is also often pointed out that the biological and ecological constraints on the species or ecosystems being discussed need to be clearly identified.
    - Ensuring popular legitimacy which requires that stakeholder representatives should be empowered by their constituents to negotiate on their behalf.
    - The process should facilitate a broad and open dialogue which allows ideologies and values to be openly communicated. However, the focus should be very much on exploring common interests rather than divergent positions.
    - The process should be fair, giving all participants an equal chance to speak, and conducted in a manner that allows trust to develop and dignity to be maintained.
    - The process needs clear leadership with trusted and experienced facilitators.

11. Future recommendations

11.1. Increasing stakeholder participation in managing human – large carnivore conflicts

Wildlife managers and researchers work in environments that are continually being reshaped by social, cultural, and political development and influence. Consequently, in this dynamic surroundings, the success of programs designed to resolve human – large carnivore conflicts will largely rest on the ability of decision makers and managers to recognize, embrace, and incorporate differing stakeholder values, attitudes and beliefs in the policy making process. The task of managing these conflicts will prove more difficult as the social demoraphics of our communities continue to diversify (Decker et al. 1996).

Increased diversity and needs of stakeholders has created new dilemmas in management regarding the use of traditional approaches to manage wildlife. In some cases, population management techniques such as hunting, fishing and trapping, which were once widely acknowledged and accepted, are becoming in certain circles increasingly unacceptable. Increased concerns for privacy, property damage and safety may result in larger areas being closed to the use of traditional population management options or the monitoring of species in question, thus further exacerbating conflicts (Messmer et al. 1997a, 1997b). Management decisions regarding large carnivores conflicts by their very nature tend to be often controversial and polemic and unobjective reactions and view points from opposing parties can be the consequence. As stakeholders' values, attitudes, and beliefs differing, conflicts regarding these decisions will exacerbate. However, if human-large carnivore conflicts are viewed as a reflection of societal diversity, they may actually become important positive forces in a conservation process, changing attitudes by adressing and handling them constructively. But when these conflicts are handled improperly, they can be sources of continued public frustration, further reducing the credibility of the agencies and institutions administering the large carnivore management and conservation program, detracting from long-term objectives and reducing acceptance (Messmer 2000).

More agencies and institutions concerned with environmental and conservation issues come to realize, that the implementation of effective conflict management instruments are crucial to address, manage and reduce stakeholder disagreements over large carnivore conflicts effectively (Bingham 1997).

11.2. Optimizing participation

Participation in large carnivore conservation planning schemes and management plans should be optimized. Participation has transaction costs and benefits that are well known from democratic theory and natural resource participation theory (Treves et al. 2009). For PIP methods (see chapter 7.2) potential costs of participation include transaction costs of meeting, communicating and building a shared vision; the risk that opponents consolidate to disrupt planning or implementation processes and the risk that participants are unrepresentative of interest groups that undermine their decisions (opposing stakeholder). Potential benefits include the generation of diverse ideas: participation in decision making may raise tolerance for large carnivore or management even in the absence of measurable reductions in threats; participants may offer help to implement or monitor interventions; and participants may gain skills in negotiation, democracy and coalition building (Treves et al. 2009).

Method for strategic choice of interventions based on feasibility requires local knowledge, scientific judgments, and broader sociopolitical experiences in the context and specific geographic area where participative approaches for the reduction of human – wildlife conflicts are applied. Planners may be limited in the instruments and methods they can use, because some threats or interventions generate strong emotions or economic self-interest. Different institutions, individuals and organizations may demand to be involved in planning interventions, regardless of their capacity to contribute.

But excluding influential or interested stakeholders from planning can itself trigger opposition, resentiment and anger regardless of any positive intentions. Indeed by addressing and embracing all different groups of stakeholder, applied approaches become saddled with broader sociopolitical issues that are of importance to many involved groups. In contrast to disagreements and intractable conflicts of interest that can bog down participatory processes. Treves et al. (2009) believe that blocked processes of reducing human – wildlife conflicts can be avoided, if facilitators articulate goals clearly (top down) or build a shared vision among participants (bottom up) at the outset.

For example, the goal of balancing the needs of Eurasian lynx and hunters needs will generate different views on sets of interventions and measures taken to reduce competition over prey base with the latter would more likely promote lethal control. The appropriate choice of topdown or bottom-up planning of interventions depends in part on whether participants are formulating policy recommendations or implementing interventions.

Then parties who act independently may opt for different goal statements and measures to be applied than would communal and institutional bodies. In the topdown case the goal statement may be general because each participating stakeholder takes away his or her preferred method, whereas in the bottom up case, facilitators allow consensus goals to surface. Treves et al. (2009) expect intervention planning will stand on a firmer footing when the choice of conservation interventions for reducing human – large wildlife conflicts are systematized and made explicit. One step in that direction is to be clear about cause and effect of direct and indirect interventions for reducing these conflicts. Treves et al. (2009) also advocate the use and refinement of the criteria for evaluating alternative interventions, while optimizing the level of participation in planning.

11.3. Increasing human tolerance for large carnivores

An approach, that involves changing the perceptions of people experiencing the damage caused by large carnivores by increasing their willingness to tolerate damage provides possibility for conflict reduction. This can be accomplished by enhancing an individual's appreciation and tolerance for the presence of large carnivores and the non-tangible benefits, that come with it (in the matter of orientation by nature, intrinsic value, mystique, potential role for tourism and operativeness of the surrounding ecosystem). Tolerance for the existence of large carnivores can be further enhanced by providing economic incentives.

Three types of incentives that encourage landowners to allow for co-existence of wildlife/large carnivores seem possible for implementation in the near futur: economic, personal, and social. Economic incentives, such as income derived from leasing the hunting rights increase the monetary value of wildlife for landowners applying not directly for fully protected species such as Eurasian lynx but play an essential role in appreciating and allowing the existence of wildlife in conservation schemes applied e.g. in Africa (Chardonnet et al. 2002). Personal incentives strive and accentuate personal fulfillment, a sense of well-being, or achievement of a personal goal.

Many landowners in Africa, for instance, have a sense of pride that their farm contains abundant wildlife. To deviate this example to Europe, farmers who hunt deer were more likely to improve wildlife habitat, more likely to favor an increase in the deer population and more tolerant of deer damage than those who did not hunt. Social incentives would include managing wildlife habitat to achieve peer-group acceptance, community recognition or leadership status (Tanner and Dimmick 1983).

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