Hunting for Sustainability

Rendicontazione

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HUNT

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Final Report Summary - HUNT (Hunting for sustainability)

Project context and objectives:

Biodiversity underpins human existence on earth through the provision of goods and services for livelihoods and cultural, spiritual and aesthetic benefits. Despite these important functions, biodiversity is under increasing pressure from human activities throughout the world. Current rates of biodiversity loss are unparalleled in historical time despite widespread agreement across governments, non-governmental organisations and a variety of stakeholders over the importance of this issue. To date, the main strategy has been the creation of legally protected areas where biodiversity conservation is prioritised and human impacts are minimised. However, this approach requires large areas of people-free land and the political resources to protect them. Such large areas are increasingly rare globally due to the expansion of human activities. We therefore need to develop approaches to biodiversity conservation that work alongside activities such as farming, forestry and recreation. In other words, conservation objectives need to be integrated with the social, economic and cultural objectives of local people. In recognition of this, Common Agricultural Policy (CAP) reforms could provide renewed opportunities for conservation in multiple-use landscapes. In addition, demographic and social changes are leading to increasing polarisation between urban and rural viewpoints about the role and use of biodiversity.

In this project we investigate the potential for sustainable use of biodiversity by focussing on an assessment of the social, cultural, economic and ecological values and impacts of hunting. Hunting provides a particularly valuable case study in the sustainable use of biodiversity because globally, it involves millions of people, millions of hectares of land, generates millions of Euros income and occurs across a broad range of ecosystems. Locally, it operates on multiple-use landscapes, cuts across ownership boundaries and involves many stakeholders with diverse management objectives. Hunting has important consequences directly for the harvested species and indirectly for non-target species due to hunting-related management activities. Hunting is an age-old relationship between humans and nature and can therefore act as a conduit for building effective policies for conservation. We use hunting as a lens though which to examine the wider issue of how people interact with biodiversity and seek ways to reconcile conflicts between people over hunting practices.

In the European context, hunting in some form is undertaken across virtually the entire continent, including

both member and non-member states and thus encompasses a wide range of socioeconomic, cultural and environmental contexts. Hunting for subsistence - both legally and illegally - and trophy hunting as a form of ecotourism are widely undertaken in the developing world and here we will focus on two African countries as a contrast to Europe. Comparative studies of societies and environments that are very different from one another are useful to identify social and ecological mechanisms of a general nature as well as to develop mitigation strategies that are adapted to different conditions. The overall goal of the project is to assess the social, cultural, economic and ecological functions and impacts of hunting across a broad range of contexts in Europe and Africa. We interpret our findings in relation to current and future European Union (EU) policy on hunting and biodiversity conservation and, more broadly, for the sustainable use of biodiversity. HUNT is structured into seven WPs across six case study regions in Europe and Africa.

The cultural meaning of hunting, work package one (WP1). Hunting is an extremely important mode of human-nature interaction and is therefore closely linked to cultural patterns and value systems. The objective of this WPis to investigate the meanings attributed to hunting by different social groups in different localities. Research on the wider meaning of hunting for hunters and non-hunters will yield knowledge that is useful for developing effective policy and practical management strategies. Our research has addressed the multiple meanings of hunting in different localities and social groups; hunting as a driver of social relationships, lifestyles and culture in rural communities; the discourse over why hunting is meaningful, ethical, necessary for management, intrinsic to human nature and what this tells us about general perceptions of human relations to other species; why are there different 'rules' for the killing of animals in different contexts and what does this tell us about the meanings, perceptions and values linked to the wider human-nature relationship and why are certain hunting related practices valued as 'indigenous knowledge' by some groups but regarded as cruel by others.

Our approach is to use a comparative methodology to identify the social and symbolic functions of hunting in order to better understand how this influences sustainable biodiversity practices. Hunters, landowners, farmers, agencies, conservationists and other stakeholder groups as well as those not involved in, or opposed to, hunting were selected. We will conduct document analysis of texts that deal with hunting from hunters' organisations, environmental organisations, anti-hunting and animal rights groups, as well as from selected media. The insights gained from a better understanding of the cultural basis of hunting attitudes and values will allow us to offer advice on how different actors will respond to environmental and social change.

Institutions and hunting (WP2). HUNT will contribute to a better understanding of how the environment can be governed in an age of globalisation and decentralised decision-making. The objective of this WP is to analyse how institutional arrangements and institutional change influence hunting. Institutions are the set of rules (formal and informal) and decision-making procedures that, in our case, define the practice of hunting, the role of hunters and guide interactions among the hunters in relation to biodiversity conservation. If poorly managed, hunting can lead to biodiversity loss (tragedy of the commons). Our objective is to investigate the barriers to developing effective institutions that can make hunting part of the solution to, rather than part of the cause of, biodiversity loss. International conventions on biodiversity have instigated increasing amounts of conservation policy at both EU and national level which can conflict with anthropocentric values such as hunting. We will investigate how legislation is transformed down the levels

(the vertical dimension) and identify the important processes of institutional change that influence hunting. For example, how are European and global conventions translated into national and local regulations and to what extent do they clash with hunting institutions? By understanding this, we can make recommendations for appropriate policies at higher levels. Within an institutional level, for example at the local level (the horizontal dimension), we investigate how hunting is regulated (formally and informally) and how existing institutions foster or hinder hunting. We identify how managers recognise and deal with competing interests and polarised viewpoints and how this affects land management. For example, how does land ownership relate to owners' choices about management for hunting in our case studies? We have developed a joint framework for data collection and analysis, applied to a range of case studies in Europe and Africa. Through this approach, stakeholders in the different systems have been involved in identifying the potential to improve the management of hunting and biodiversity by changing institutional arrangements and developing more integrated policies. This allows us to comment on the likely effectiveness of current and proposed institutional structures at the EU level. At all stages the role of institutions is examined in their cultural, economic and environmental contexts.

Economics and hunting (WP3). Hunting is an economically important activity. The objective of this WP is to assess the economic importance of hunting and alternative forms of land use at a range of spatial scales. The value of hunting comprises not just the market values (such as the value of bushmeat in Tanzania or the value of grouse shooting lets in Scotland), but also the non-market value of hunting in relation to the habitats and biodiversity that land managed for hunting produces. Non-market values can be estimated using both stated and revealed preference methods. Preferences are typically informed by more fundamental value-based arguments that capture the importance that individuals assign to procedural aspects of hunting or attributes of the species involved (rarity, endangeredness, or nativeness). Estimates of the values assigned to hunting allow us to compare the social benefits and costs of alternative land management options in a way which includes the implications for biodiversity conservation. It is important to recognise that alternative land management regimes, such as protected areas, often impose opportunity costs on local people by restricting options. Finding ways to accurately estimate these costs of conservation is a challenge, particularly in developing countries. This approach has increased our understanding of the economic value of hunting and wildlife and should help to inform the design and implementation of policy that takes into account the opportunity costs of those suffering losses from changes in land use and will help guide policy makers in terms of the net social benefits of alternative land uses. A comparison of different disciplinary approaches to the question of the value that people hold for hunting and its alternatives is highly original and will lead to increased understanding between research disciplines that commonly work in isolation.

Biodiversity and Hunting (WP4). Game species are part of the underlying biodiversity. The extent to which games are managed for hunting varies considerably, from intensively managed private estates to unmanaged, subsistence hunting. First, we will consider what harvesting strategies are employed and build models to quantify the sustainability of these strategies. We develop a modelling approach that is far more powerful for decision-making than standard harvesting models because it addresses the major gap linking individual incentives to hunt in particular ways with manager values. These techniques have been adapted from fisheries to integrate management and biological dynamics into a single modelling framework. These 'operating models' are based on biological processes, the monitoring process, the management rules (e.g. a harvest quota), their implementation by the manager (see also WP2) and the

degree of compliance by the harvesters themselves (see also WP1 and WP3). In HUNT we have developed a generic operating model for use in hunting applications and trial it in a range of the case studies to test the robustness of this framework as a tool for sustainable harvest management more broadly. Second, we will examine how game management influences various aspects of wider biodiversity. An argument used in defence of hunting practices has been that hunting supports the conservation of habitats which are beneficial to biodiversity. Whilst there is supporting evidence for this argument, uncontrolled hunting may lead to over harvesting, a change in land use and the loss of associated biodiversity. It may also involve management techniques that negatively affect biodiversity such as the illegal control of some predators or the introduction of non-native species and supplementary feeding in order to increase densities of game. We review current, global literature on the costs and benefits to biodiversity of different game management practices. We then compare biodiversity measures across a range of sites varying in hunting intensity - from conservation areas to areas where hunting is intensively managed. This work allows us to explore the impact of hunting on harvested species and also the cascading impacts of hunting on wider biodiversity, which is crucial for exploring ways in which policies can be developed to effectively conserve biodiversity outside protected areas.

Integration (WP5). The role of hunting management as a conservation tool is increasingly recognised because of its social, cultural and economic and ecological importance and all of these values therefore need to be understood in order to integrate it into policy development. The objectives of this WP are to integrate the findings from the previous four WPs into the European policy context and its broader global application. Conflicts between hunting and conservation are partly due to different perceptions about the relationship between hunting activities and wildlife conservation and partly due to conflicts surrounding hunting practices. We will develop conflict reconciliation tools to include novel information from social sciences, economics and ecology (WPs one to four). We use a decision modelling framework to identify how perceptions and perceived barriers to reconciliation vary among stakeholders. By including an understanding of people's motivations and perception of hunting we are developing an understanding of how they will respond to alternative management options and can explore how effective legislation is at producing the desired outcome for biodiversity conservation. In addition, a qualitative cost-benefit analysis framework has been developed to understand who gains and loses, by how much and the overall impact of alternative management strategies. More specifically, we interpret our findings in relation to the following issues:

1. the management of legally protected predators in game areas;
2. the role of hunting in maintaining wilderness areas and associated biodiversity;
3. the impact of trophy hunting on endangered species and
4. the economic benefits of hunting in comparison to alternative forms of land use.

This process will highlight perceptions, barriers and alternative management solutions that can influence trust and understanding within and between key stakeholders and policy makers. We develop a template for best-practice in the use of decision modelling techniques to aid the reconciliation of conflicts over the conservation of biodiversity.

Dissemination (WP6). The objective of this WP is to establish effective communication of the results with key stakeholders, policy makers and the wider public. HUNT has engaged with a broad selection of social

groups and their governmental and non-governmental representatives. In particular we have focussed throughout the project on engaging with local actors and national level organisations. It is only in the final stages that we are able to synthesise our insights, recommendations and vision for policy makers at the EU level. The controversy surrounding hunting reflects the many interest groups with divergent views and entrenched positions and makes dissemination even more challenging. Target audiences include the scientific community, conservation professionals, interest groups and the wider public. An important conduit for dissemination and discussion about the relevance of our work is the hunting for sustainability conference (March 2012, Spain) attended by practitioners, policy makers and academics. As a legacy, we are providing readily accessible information such as policy briefs and popular articles which are all downloadable from our website. Through the website there are also links to the academic outputs with summaries and links to journal articles, summaries of the results from each cases study in a format accessible to practitioners, mangers and policy makers and a series of best practice documents to share with future interdisciplinary researchers. Also we are publishing a popular book on hunting which will be available as a download chapter by chapter.

HUNT case study regions

Scotland: Focuses on gamebirds and deer management on private and public sector estates in the uplands in relation to hunting related habitat and predator management.

Norway/Sweden: Focus is on moose, wild reindeer, grouse and large carnivores (bears and lynx) on private and state owned non-agricultural wildlands, boreal forest and alpine tundra.

Spain: Focus is on game-birds and impacts on non-game species on private and state owned land in relation to hunting management such as predator control and supplementary feeding.

Croatia/Slovenia: Focuses on trans-boundary brown bear management in forested landscapes.

Ethiopia and Tanzania: Focuses on motivations for bushmeat and sustainability of trophy hunting in and around protected areas.

In each case study we established a National Consultative Group which has been engaged in some of our research activities as well as providing a forum for knowledge exchange.

Project results:

Moralities of hunting

Talking about hunting often seems to mean talking about morality: Much of the public debate over hunting revolves around perceptions of moral acceptability of different types of and approaches to hunting. But what exactly is seen as moral, what is seen as a legitimate (or illegitimate) way of hunting? Technically, hunting can be understood as the shooting or killing of wild animals. There are however numerous examples of forms of hunting in which the act of killing itself does not seem to be the key motive for the hunt. If hunting is not primarily represented as the killing or shooting of wild animals, what then

characterises the hunters' ideas of 'true' hunting and 'real' hunters?

Based on interview material from five European and two African countries, we identified what may be termed a moral hierarchy, where motivations such as recreation and excitement are accepted by hunters and non-hunters, but only if the moral imperatives of meat consumption or responsible population control are fulfilled. Differences in evaluations of hunting practices were often not due to fundamental disagreements on moral values, but lay in the question to which degree these were observed in real life.

Norwegian and Scottish data shows that authentic hunters are supposed to show modesty while interacting with their hunting companions, prefer forms of hunting in which the prey has a fair chance to escape and should act like 'Indians'; described as outstanding trackers, one with nature, noiseless and with a profound knowledge of nature. The ideal of holding back the shot is probably one element in the construction of some hunting communities' identity from the inside. It contributes to demarcate their community from the other not-so-authentic hunters.

For many hunters the idea the idea of caring for the wildlife and the land is crucial to their understanding of what hunting is about. The basic thought is that since humans have already interfered with nature; nature also needs to be managed - not only for people's sake, but for nature's own sake. This engagement with wild animals is thought of as part of a deeper unity with nature, which means being part of nature in physical sense. Hunters claim that if humans are to be part of nature, we must also engage with it, e.g. as predators, but also as caretakers, stewards.

The idea of hunters as stewards contributes to the moral justification of hunting and, importantly, underpins a symbolic appropriation of the land where hunting takes place. Despite differences, hunters and conservationists share many thoughts and values. The idea of stewardship that many hunters nourish, points to a potential platform for increased cooperation between the two groups. This could potentially provide a platform for building a consensus that might prove valuable also from a management viewpoint and help break down conflict.

Access to hunting and emerging commercialisation of hunting that may affect cost and access, are crucial issues in a Scandinavian context, where hunting in principle has been open to everybody at a very low cost. Norwegian hunters who are not landowners often think of themselves as being morally in possession of the land where they hunt. Their attachment to the land is often strong and their knowledge about their hunting grounds extensive. Moral appropriation of the land, regardless of legal property rights, is a strong factor in collective identity constructions in rural areas. This notion of possession is tied to an emotional belonging that is both widespread and deep. It may create barriers towards outsiders, but at the same time it appears to yield a commitment to stewardship and conservation that could rival that of the legal landowners. However, it may also lead to opposition against the emerging commercialisation of hunting that an increasing number of landowners now engage in and which is currently encouraged by the authorities.

Young hunters and reproduction of working-class culture

We know that hunting is a practice that carries significant cultural meanings. What is the role of the cultural

dimension when young people first encounter the world of hunting? Participant observation and interviews with young hunters in two semi-urban areas demonstrated that for some youngsters with a working-class background and working-class occupational prospects, hunting may be an arena for the reproduction of typical working-class culture elements.

The hunting culture these boys meet is typically informal, collective, comprises a certain element of physical masculinity and - not least - it represents a 'productivist' perspective on human relations to nature and entails the mastery of 'tools'. These cultural traits correspond to core elements in a typical male working-class culture. However, economic and social change has eroded its material basis and reproduction of significant culture elements increasingly takes place in the sphere of leisure. This includes a certain element of 'cultural resistance' against norms and regulations seen as imposed from above and embedded in a dominant middle-class culture, without respect for the practical knowledge of 'ordinary people'. The young hunters contested the ban on lead shot and the protection of raptors, to some extent by taking the law into their own hands.

The finding goes against popular notions of class-less, free-floating identity projects in the so-called post-industrial era. It also shows us that understanding opposition to hunting regulations and dominant norms related to hunting cannot be understood outside a wider cultural context: They are not simply disagreements about technical issues.

Bushmeat hunting in western Serengeti (Tanzania) and the Omo valley (Ethiopia)

Illegal hunting is often addressed by increased law enforcement and the creation of monetary or material incentives. However, informal rules could help to reduce illegal hunting and were explored here. In the recent past, clan-specific social norms worked as taboos and prohibited the hunting of certain species. Also the use of certain techniques was seen to inflict misfortune on the hunter. However, these rules have been eroding for a number of reasons: People need more cash as they move from subsistence to market economy and cultural and ethnic groups are mixing due to local migration, education, increased intermarriage. Traditional religious beliefs are replaced by modern religion, e.g. Christianity and traditional authorities, such as elders, are not respected anymore.

Informal institutions can be powerful tools to constrain bushmeat hunting, but are vulnerable to social change. As previously active norms might be impossible (or not desirable) to restore, alternative social norms that fit with a modern society should be considered. Conservation interventions should pay attention to those areas where hunting is currently limited due to social norms that are still in place, as these will likely change in the near future.

Bushmeat hunting around Serengeti is usually described as an activity carried out by men, in order to obtain meat and cash. However, interventions that offer alternative means of cash income or protein have often not yet had the expected success. We learnt that women play an important role in bushmeat hunting. While they actively hunt only occasionally, women play a strong indirect role by actively encouraging men to go hunting through a variety of mechanisms. Interventions that aim to address bushmeat hunting should not only focus on men, but also take the role of women into account.

In Ethiopia, women also played an important role in male hunting activities by actively encouraging hunting through a variety of (often ritualised) verbal and non-verbal means. However, the stark decline in wildlife meant that such rituals would nowadays only rarely be carried out. Second, whilst hunting was important to establish relationships between people, it did not seem relevant for developing relationships with nature or wildlife, or developing knowledge about the natural environment. Ironically, this strong focus on social relations might contribute to the disappearance of hunting and its social functions.

Our study raises the question of whether a greater awareness of the social importance of hunting and its likely future demise, partly due to overhunting, might help local people to develop more sustainable hunting practices - for example, to abandon the use of automatic rifles. In any case, the social importance of resource use practices (such as hunting), human-nature relationships and the ways knowledge about the environment is developed, need to be understood to create a meaningful basis for conservation and development interventions.

Large scale policy changes and their impacts on sporting and game management discourses

A large part of the Scottish countryside is traditionally managed for shooting and stalking. However, recent policy changes at both national and European levels reflect an increasing diversity of both public and private land management objectives. This has resulted in the creation of new formal institutions governing land and game management and the inclusion of actors from both the public sector and non-governmental organisations (NGOs) who have previously not had much say in countryside matters.

New institutions governing wildlife management, such as the Convention of Biodiversity (CBD), EU directives and their translation into national policy, seem to have developed in parallel to the formal and informal institutions that have previously governed game management in Scotland. They appear poorly reconciled with existing institutions, such as property rights to the land and are thus not necessarily effective. Game managers and their organisations consider public interests to be increasingly influential. Some of them feel 'under siege' and see their activities threatened and their rights compromised by growing public claims to the countryside and its wildlife. Game managers argue that recent policies for game management are generated by international, non-local or urban actors who lack ?true' knowledge of the way the countryside works. They contend that they, as game managers, hold the appropriate knowledge - a knowledge that cannot be acquired, e.g. through college studies. However, this line of thinking has an exclusive and irrefutable character: Because appropriate knowledge cannot be obtained by outsiders, they are by definition not (and will never be) entitled to have a say in countryside matters.

The lack of reconciliation between traditional and more recent institutions combined with a strong discourse that asserts knowledge-based claims of game managers could explain why recent conservation policies have so far had a comparatively limited influence on Scottish land management. Both factors need to be addressed if tensions between sporting and institutionalised conservation are to be resolved.

The multifunctionality of hunting

In many contemporary societies, multiple functions are connected to hunting. Here, we use the concept of multifunctionality to analyse the interactions between these functions and the interplay between the

institutions governing these. Through a comparative analysis in eight study sites in Europe and Africa our study provides insights into the tensions emerging from the multifunctionality of hunting. We investigated differences and similarities between all study cases to assess the complex patterns of institutional interplay.

We found that, increasingly, complex institutional arrangements have developed to reconcile tensions between the multiple functions of hunting that manifest themselves as perceptions of over-hunting (or over-management) or under-hunting. These include, for example, committees, area designations for multifunctionality and certification schemes. However, these have so far, not necessarily succeeded in addressing multifunctionality.

Managing large ungulates in Europe - the need to address institutional challenges of wildlife management

The management of large ungulates in Europe has received a lot of attention recently, due to the large numbers (more than 15m) and rapid increases in many of the 20 species that live in European countries. A number of management alternatives have been suggested to tackle this issue, such as the landscape approach via the European Landscape Convention (ELC) or ecosystem management through the CBD are suggested as solutions. The study builds on an institutional analysis of the standards and the operational guidelines of the ELC and the CBD.

The two approaches show many similarities, but differ in their focus on either contextual factors affecting landscapes (ELC) or maintenance of ecosystem processes, functions and services (CBD). The two approaches could be regarded as complementary rather than competing. Although some of the management problems will be solved through the implementation of these approaches, they do not give any guidance on how to coordinate across scales and levels to generate collective action. Furthermore, complex property rights systems often constrain the required collaboration and coordination among actors involved in the management of wildlife. However, the robustness of the governance arrangements is strongly dependent on voluntary efforts - and thus also to the various incentives of different actors - to establish collective action for the conservation and sustainable use of natural resources.

In conclusion, the implementation of landscape management or ecosystem-based management, as suggested by the ELC and the CBD, will require new institutional solutions to deal with coordination across management units and management levels.

Revenue sharing from wildlife tourism and hunting in Ethiopia

Local people often bear the cost of protected area designations, including controlled hunting areas, as they forego income from alternative land uses. In many places across the world, revenue sharing schemes have thus been developed based on the assumption that people will support wildlife conservation if they receive tangible benefits from it. We analyse here the governance processes of a scheme that aims to share revenues from trophy hunting and wildlife tourism in Ethiopia.

The revenue sharing scheme was established in 2007 and it was thus too early to assess its impacts on conservation-related attitudes and behaviour. All study participants welcomed the scheme and saw it as

work in progress. Four areas of the current legislation and implementation practice were seen to require improvement:

1. information on the detail of the scheme was lacking among many actors;
2. roles and responsibilities of the actors were imbalanced - district governments were very influential whereas local communities tended to be passive;
3. accountability was compromised, as limited provisions had been made for monitoring and evaluation and
4. disbursement of the shares was usually not associated to hunting or tourism and overall revenue was too limited to have an impact.

The areas identified for improvement reflected the evaluation criteria for co-management, as presented in the literature. However, one fundamental difference lay in the connection between resource and revenue: while in co-management arrangements, this connection is usually at the centre of community and government activities, a revenue sharing scheme such as the one examined here does not establish a close link between resource use and the amount of revenue disbursed to the different actors. This disconnect constrains the potential positive effect of revenue sharing on resource users' behaviour.

Our analysis of governance processes now informs the government's current revision of legislation and implementation practice. It seems unlikely that the scheme will lead to attitude and behaviour change among the local population in the future, given the missing connection between conservation-relevant behaviours and the amount of revenue distributed. This might be addressed by a turn towards co-management of the protected areas, where responsibility for wildlife is shared between government and local communities. However, at a political level, formalised revenue sharing as in this scheme might help to make the monetary value of wildlife conservation visible, thus providing arguments against land conversion

Challenges associated with introduction of an ecosystem-based management system: A diagnostic analysis of moose management in Sweden.

Swedish moose (Alces alces) management has over the years gone from a situation where open access and unrestricted demands lead to over-exploitation, into a situation characterised by an abundance of moose. Whilst high numbers of moose are preferred by hunters, they damage forests through browsing, causing conflicts between the hunters and forest owners. In attempts to resolve the disputes, the Swedish government is introducing a new local ecosystem-based management system. In this study we focus on how this shifts from managing a single resource to the broader perspective of ecosystem management and discuss to what extent it will contribute to conflict resolution. We used a diagnostic approach to analyse a specific critical case of moose management.

Four key findings emerged:

1. the diagnostic approach has helped us to understand the complex interrelationships between social and biophysical factors at different levels of analysis. This has provided insights into the strengths and weaknesses of the current and new moose management systems in Sweden;
2. the new management system, introducing a new management level covering the ecosystem of a moose

population, clearly has the potential to solve problems related to the current mismatch of ecological and social scales arising from the moose being a migratory species and the institutional and organisational patchwork of property units;
3. some problems that are not dealt with appropriately will probably be transferred from the current system to the future one. These problems relate to complex property rights system, representation of hunters and land owners across the whole management system and the fact that the new management system is a mix between formally regulated management levels (national, regional and ecosystem-based) and voluntary based management (local) and
4. without the establishment of cross-scale linkages based on trust and reciprocity, the new management system will experience the same difficulties as the current system and will not contribute to resolving conflicts.

In conclusion, the introduction of ecosystem management will possibly remedy some of the problems related to the current management of moose in Sweden. However, the fragmented management structure, where diverse owners (private and public, large- and small-scale) have different and potentially conflicting objectives, is a challenge to the introduction of more holistic and overarching management principles such as the ecosystem approach.

The socioeconomics of hunting

Economics of hunting in Scotland. The overall focus of the economics research has been the implications of different ways of managing heather moorland on shooting estates, in terms of the intensity of management. Intensity can be thought of as an index of the effort (inputs) applied to a piece of land or in terms of expected outputs of grouse. Two choice experiments were undertaken with members of the Scottish general public, focusing on the conflict between management of red grouse and conservation of hen harriers. We found out that Scottish citizens are willing to pay for increases in both hen harrier and golden eagle populations on moorland by changes to current management. The majority of respondents wanted a change away from the current means of managing conflicts. In a choice experiment on non-hunting recreational users of one moorland area - the Cairngorms national park - we explored the preferences of visitors for changes in landscape appearance, bird populations and employment on sporting estates. Trade-off rates were calculated for each pair of attributes and these showed that recreational visitors would be willing to trade off a reduction in employment on sporting estates for a large enough increase in moorland bird populations. However, other things equal, visitors preferred options which maintained or increased employment.

We then undertook a choice experiment on hunters. We found that the average hunter prefers driven grouse shooting, as opposed to walked-up shooting, more waders rather than a decrease, fewer raptors and lower prices, but is indifferent to the variations in landscape quality in the experimental design. Using a latent class model to allow for different groups of hunters by preference, we found evidence of 4 such groups in the data. This shows that there exists a significant subset of hunters (43% of the sample) who would prefer (and thus be willing to pay for) a less intensive shooting experience with higher wader numbers. Almost all hunters, however, prefer scenarios with fewer raptors, an indication of concern over competition for grouse.

From a policy perspective, the results are of interest as they quantify the general public's willingness to pay for changes in birds associated with moorland and also indicate that public support would likely follow proposals to reduce negative impacts of land management on biodiversity (and thus would support positive impacts). If payment for ecosystem services (PES) schemes were introduced on moorlands aimed at increasing biodiversity, this study provides some evidence for the likely economic benefits from such a policy.

Economics of hunting in Tanzania. In Tanzania, we focused on illegal bushmeat hunting in the Western Serengeti. Two stated preference exercises were undertaken. In the first, we surveyed households to investigate their willingness to exchange different livelihood options, including bushmeat hunting, employment and cattle ownership. We also included measures of the risks of illegal hunting. We were able to quantify the rates at which the average household would be willing to exchange a reduction in the time spent hunting per year for increases in cattle, wages from outside employment and access to micro-credit schemes. However, we also found important variation in the attitudes to risk and in the value of a week's hunting across households. One factor explaining this variation was household wealth. The policy implication is that a range of factors need to be taken into account in designing interventions to reduce illegal hunting, including the need for reliable alternative sources of income. Interventions will also need to be differentiated across households for maximum effectiveness.

A second stated preference exercise modelled households as buyers of illegally-hunted bushmeat and investigated the likely effects on their buying behaviour of increases in the price of bushmeat and reductions in the price of two protein substitutes, namely chicken and fish. Our results quantify the likely reductions in household bushmeat demand through changes in either the own price of bushmeat or in the price of substitutes. For example, we found that a 1% change in bushmeat price leads to a decrease in the quantity of bushmeat demanded roughly equal to 0.7-0.9%. A 1% decrease in fish price is associated with 0.4% decline in the quantity demanded for bushmeat, while a 1% decrease in chicken is related to a decrease of bushmeat demanded of about 0.3%. This suggests that either alternative protein source could be promoted as an alternative to bushmeat.

Economics of hunting in Spain. In Spain, a hedonic price exercise looked at the determinants of market prices for a day of red-legged partridge hunting experience. It was found that there is no significant difference between the price for a hunting day of farm-bred partridge and a hunting day of wild partridge, thus reflecting some equilibrium in the market. Since the average number of partridge hunted in a typical day tends to be higher when the birds are farm-bred, results are according to expectations and to the focus groups conducted, i.e. that hunters value a wild partridge more than farm-bred one.

A second study was conducted in Spain, involving a choice experiment survey among hunters, to explore the implicit value of some characteristics of the partridge hunting estates. Results suggest that the average maximum willingness to pay (WTP) for hunting an additional farm-reared partridge was of near 10 euro in 2012 values (9.95 euro). However, the marginal WTP for hunting a wild-stock partridge rose to circa four times more (38.72 euro). The difference in WTP for a walked-up shooting day with or without the opportunity of hunting other game, like rabbit or hare, for example, is estimated in 177 euro. Hunters would like to pay relatively more for a day in a hunting estate of central Spain that contains Mediterranean scrub (ca. 140 euro for a day). In contrast, the WTP for a site that contains important non-game fauna is near

three times less: 55 euro. Results are potentially useful to estate managers and policy makers with an especial interest on nature conservation.

Economics of hunting in Croatia. A Croatian application, consisting of a hedonic price exercise for bear hunting trophies, was conducted in 2011. Among other things, results show that, on average, hunters from outside Croatia spend 135 euro extra per bear hunted than the Croatian nationals. Also, hunters are more likely to spend more money if the hunting unit is strong in complying with legality aspects and facilitates the documentation for exporting the trophy, which tend to increase the WTP of the hunters in some 60 euro per bear.

Gamebird management and biodiversity.

We reviewed the literature to assess the impact of gamebird management on biodiversity and conducted research to explore these relationships across gradients of management intensity in Scotland and Spain. The literature review revealed that many management practices that are implemented to benefit game bird yields are positive or benign for non-game biodiversity, but there are clear exceptions including illegal predator control and release of exotic species for hunting and more data are required to fully understand the trade-offs.

Our research in the Scottish uplands showed that overall bird species richness nor diversity was strongly influenced by upland management objectives (red grouse shooting, deer stalking, sheep production, or conservation), management activities (prescribed burning, predator control), nor estate habitat diversity. However, bird community structure was significantly affected by management for red grouse shooting and prescribed burning. Ground nesting birds tended to be associated with estates managed for red grouse shooting and on those estates that carried out more prescribed burning, whereas, for example, Corvid spp tended to tended to be associated with non-grouse estates. The implications of these results is that there is no one type of managment that maximises biodiveristy but differnt managmetn objectives are associated with differnt speices. Therfore, a diversity of managment approaches can lead to maximising biodiversity at a landscape scale.

Estates dedicated to small game (mainly red-legged partridges) in the Iberian Peninsula are mainly farmland areas mixed with varying degree of natural vegetation areas. Management carried out to benefit partridges includes provision of supplementary food and water, predator control, the provision of game crops, or the release of farm-reared partridges. Our studies have shown that:

1. in central Spain the commercialisation of hunts is associated with more intensive management and to estates with a higher proportion of natural vegetation, thought to be associated with higher nature value in farmland areas;
2. in Portugal, areas managed for hunting contained higher densities of birds of conservation concern, higher densities of steppe birds and other ground-nesting species than areas not managed for hunting of similar habitats. They also contained higher densities of partridges and rabbits, which in turn was reflected in higher raptor densities, although raptor abundance was proportionally lower than expected in those estates with higher gamekeeper densities, which suggested that illegal control could be occurring;
3. in central Spain, supplementary food benefited granivorous steppe birds like sandgrouse and fox control

benefitted non-granivourous steppe birds like little bustards. Management, notably of habitat and supplementary food were reflected in higher partridge densities, which in turn were associated with higher raptor richness, but not densities.

Small-scale partridge releases were apparently inefficient at increasing partridge abundance or bags, but large-scale partridge releases, such as those carried out in intensive estates, although having a direct positive impact on harvest and thus estate economics, were negatively associated with steppe bird abundance or raptor diversity, suggesting lower biodiversity value of that type of management.

Broadly, our results suggest that, in Iberian farmland, game management activities (in particular, habitat management, predator control or food enhancement) directed at wild red-legged partridges have positive effects on other farmland birds of conservation concern. However, these benefits disappear when management is intensive and based on large-scale releases of farm-reared partridges. Thus in commercial red-legged partridge estates there is a tension between the need to balance economic sustainability with environmental sustainability.

Social-ecological modelling for improved sustainability of hunting across divergent systems

Making conservation decisions to benefit species, habitats and people is challenging due to the complexity and the limited knowledge that characterises interlinked, social-ecological systems. We developed a new approach for modelling the sustainability of interventions in social-ecological systems that extends an existing framework from fisheries science and makes it more appropriate for situations with multiple interventions, multiple users and compliance challenges. This makes the framework more appropriate for many small-scale terrestrial systems in developing countries, more easily integrated into adaptive management and very flexible.

Bear hunting in Croatia/Slovenia. People respond to changes in the management of wildlife with changes in their attitudes towards these species, especially if they are hunted and cause conflicts; a more centralised bear management led to more support for limiting bear numbers but overall attitudes remained positive due to the bear's cultural importance and associated use and bequest values. Economic analysis of stakeholders for the same case study shows that joining the EU in 2013, which will stop trophy hunting, will result in economic losses for bear managers. This suggests that hunting will not be economically viable and this might lead to lower compliance and thus higher poaching rates. The change from a hunted to a protected bear population might threaten a so far socially and ecologically sustainable hunting system.

We revisited the habitat selection of brown bears in Slovenia and Croatia in relation to natural and human dominated features in the landscape. Proximity to supplemental feeding stations and availability of large forest patches (more than 5000 hectares) were the best predictors of brown bear habitat selection. Feeding stations are shared with red deer, another important species for hunting, but the future of these feeding stations is uncertain without income from brown bear trophy hunting. Without feeding stations, brown bear might roam more widely which might increase levels of conflicts with local people.

Mountain nyala hunting in Ethiopia. The quality and quantity of information (e.g. monitoring) determines the ability to make informed decisions. Our case study on mountain nyala, an ungulate endemic to Ethiopia,

showed that the 10 years of monitoring data currently available is sufficient to make informed decisions, but that the system is currently hampered by large uncertainties in the precision of monitoring and the unknown rate of population loss (e.g. poaching or habitat loss).

Bushmeat hunting in Tanzania. In the case study on monitoring impala and wildebeest in the Serengeti, the spatial distribution and the monitoring effort have been shown to interact to determine the bias and precision of the monitoring data. This approach is crucial when developing long term monitoring plans to manage wildlife. The extent of bushmeat hunting in Tanzania is largely uncertain. We used indirect techniques to estimate that the percentage of households engaged in bushmeat hunting was around 19% in the dry season and 13% in the wet season.

Lion hunting in Africa. African lions have decreased over the last decade across Africa despite theory predicting that age limited trophy hunting could be sustainable. We developed a new model for sustainable trophy hunting that includes harvest rule that sets the maximum searching time until a kill and that is robust to a large range of uncertainties. This model that uses data that would be readily available for a range of trophy hunted species (time spent before an animal is killed) to develop simple yet robust rules for sustainable harvesting. Thus, this approach should be widely applicable.

In conclusion, this modelling approach, incorporating human decision making in the dynamics of harvested systems allows us to consider transparently the tradeoffs of different conservation actions for different stakeholders and based on different performance metrics. Moreover, more transparency has been shown to contribute to conflict resolution and builds trust between stakeholders who may have very different objectives.

Potential impact:

The results from HUNT have clear implications for policy development. Broadly, they have identified motivations and agendas of the various relevant actors. Following on from this, the benefits of hunting activities have been identified and the costs of not hunting recognised. Furthermore we have identified the ecological and biodiversity consequences of different forms of hunting and hunting governance. As such HUNT results can now be used to structure debate and provide a common platform of objective knowledge on which decisions can be made.

European policy

The HUNT project is based on the premise that although many of the controversies are fronted as a debate about ecological facts, the ultimate source of controversy may be more deep-rooted and embedded in more general cultural and societal tensions, for example, landowners rights in relation to public objectives for supporting and regulating ecosystem services, or the increasing conflict due to the urban - rural divide. The findings from the HUNT project have a clear relevance to policy at a European and national levels because the multi-faceted approach can inform these controversies by investigating the cultural, economic and ecological components of the conflicts. The impacts of our work are broad ranging. For example, we have specific examples relating to the sustainability of hunting on population size such as our work on harvest models which has provided concrete tools for guiding sustainable quota setting taking

into account regulations and hunter behaviour. On the other hand we have a range of fundamental insights into the wider human-nature relationships that provide an understanding of the role hunting can play in social relations and therefore the motivations for hunting which should be taken into account when devising policies designed to change or reinforce behaviour.

Thus the insights from HUNT can help management authorities respond to these conflicts in a more constructive way and will also help NGOs and other actors to navigate this complicated terrain without creating unnecessary conflict. The results are made more valuable because they are derived from a comparative approach based on very different countries both within and outside the EU frameworks which have allowed us to explore the effects of institutional structures, governance and policy on hunters of very different socio-cultural backgrounds. In particular we have produced valuable new knowledge on the limitations of current vertical or top-down regulatory arrangements in achieving biodiversity conservation because of the conflicts with local objectives and cultural practices. This can be compared with horizontal issues resulting from conflicts between local actors with diverging objectives for the same land holding. This is of direct use in future planning of environmental policy within the EU. For example, the results from HUNT will be directly useful for management planning on Natura 2000 sites as they make decision on what activities, such as hunting, should be permitted. Furthermore, the EU biodiversity strategy to 2020 aims to manage biodiversity outside of protected areas. Much of this land is influenced by hunting or subject to hunting objectives. Thus HUNT insights into the consequences of hunting for biodiversity and the role hunting plays in social structures are important if support of sustainable hunting practices is to be targeted correctly in order to work with hunters in achieving these goals.

African policy

African conservation policy is also influenced by national and international regulations and pressures. Internationally it is mainly the CITES agreements on trade that influences use, although most countries have signed the CBD. Nationally, laws vary widely from country to country. Africa differs in at least two ways from the European situation. Firstly, the large, mainly rural based, human populations are putting enormous pressure on natural resources, which in turn is leading to a very urgent and polarised debate about how to balance the conservation of biodiversity against the human needs for natural resources and about how to distribute the costs and benefits from protecting biodiversity. The resulting debate has focused on the dichotomy between protected area versus sustainable use paradigms and even within the sustainable use paradigm there are heated debates about who should have control (Community based conservation versus central control) and which resource uses are most acceptable and relevant to an area (ecotourism, subsistence use or trophy hunting). Secondly, African conservation policy is greatly influenced by countries and interest groups outside Africa who put pressure on nations through funding and the CITES system. The international debates around ivory trading are a classic case. Other lesser known examples are debates about the export of leopard and lion trophies from Tanzania. The implication is that even when a given country has a healthy resource that can potentially be exploited, it may be hindered from doing so by external groups who do not feel the costs or forego the benefits. The result is that African conservation policy is very controversial, with the African savannah becoming a battle ground for a wide range of global and local interest groups with a wide range of values.

A current controversy that is raging within African hunting and conservation circles is how best to ensure

that trophy hunting is sustainable, both in terms of the target species and wider biodiversity. Calls for a hunting certification scheme are intensifying and there are potentially useful lessons to be learnt from the European experience that we could add to this debate. As Europeans are among the primary consumers of trophy hunting in Africa, our understanding of the meaning of hunting to them and particularly to people in emerging nations like Croatia and Slovenia, who are likely to be future consumers of African hunting, will be extremely valuable. The IUCN - World Conservation Union - has developed Best Practice in Sustainable Hunting and has an on-going interest in hunting tourism because of a premise of 'use it or lose it' which argues that by allowing a species to be hunted according to best practice, this gives value to the species and it is therefore likely to be managed sustainably by those who realise its value. HUNT results provide insights on the sustainability of protected populations versus those that are harvested. In particular, the brown bear populations of Croatia and Slovenia provide useful evidence for policy makers.

Our work on developing robust models for harvesting strategies that allow the consequences of regulations (for quotas) as well as hunter behaviour to be explored will be of use to wildlife managers in Africa as well as in the EU when devising management plans. However, much of the hunting in Africa is associated with subsistence livelihoods. In relation to this, European aid policy is more and more tied to poverty reduction strategy plans (PRSPs) drawn up by recipient governments. In countries such as Tanzania, subsistence and local commercial hunting are key parts of the informal economy and as such do not enter into government financial planning. This means that the contribution of hunting to these economies is systematically undervalued and hence that PRSPs do not recognise its importance in the rural economy. We have investigated subsistence and bushmeat hunting to understand the motivations for it in order to understand better the type of interventions that could be tried in order to improve the livelihoods of these people by reducing their impact on the quarry species which are often of poor conservation status. This work has direct implications for international development policy such as the European Strategy for Sustainable Development (Dec 2005) which sets out the EU policy for Sustainable Management of Natural and Environmental Resources and the EU Development Policy: an Agenda for Change (Oct 2011) which promotes economic development provided it does not damage the environment, biodiversity and natural resources. Thus an understanding of how to influence people to adopt more sustainable hunting whilst alleviating them from poverty fits with the EU development policy of promoting a ?green economy' to generate well-being by investing in natural capital and reducing unsustainable use of natural resources.

Impact on society

The process that leads to a given issue being discussed within the technical context of legislation or ending up in court often stems from an underlying social discourse about the legitimacy or extent of a given activity. Although evidence from scientific research cannot determine the rights and wrongs of a given activity, it should aspire to inform and structure public debates. In the context of HUNT we have aspired to inform public discourse about hunting through:

1. contributing to a shared knowledge base concerning specific issues, such as the state of the resource, the sustainability of its exploitation, the impact on wider biodiversity, the economic costs and benefits of the activity and the consequences of potential alternative land uses;
2. generating a wider perspective on specific hunting related issues and reduce the degree of polarisation

by presenting results from a diverse set of case studies representative of the diversity of hunting;
3. structuring the discourse into its ecological, economic, social and cultural components;
4. creating a forum in each case study where stakeholders and management agencies can interact to discuss policy and private objectives in order to foster understanding, reduce tensions and recognise complementarities where win-win situations can be developed and
5. directly influencing policy at national and international levels.

We have developed a web based portal for accessing the results of HUNT. The overall message from HUNT: that hunting, if carried out appropriately can be a force for conservation will be supported by summaries and links to the results based on either the WP topics; the country case-study summaries; or the best practice documents allowing access to policy makers and practitioners interested in different issues, scales and approaches to easily find the results of relevant research within HUNT.

Relationship with other research activities, going beyond the state of the art

One particular area where we have attempted to go beyond the state of the art is to bring together fisheries harvesting models with the knowledge on the cultural and institutional drivers of hunting behaviour to develop management strategy evaluation models of quarry species populations. Integrating the human dimensions into ecological models is a major development of wildlife models aimed at ensuring sustainability. The success of this work depends on the quality of the insights from the social scientific research on hunting culture and governance and HUNT has benefitted from a suite of novel insights provided in WP1 and WP2. This is an example of where HUNT has simultaneously focussed the insights of a range of disciplines on the same case studies so as to generate a multi-dimensional view of these cases, highlighting the complexities inherent in real-world hunting management and informing the discourse over conflicting (often local versus policy level) objectives.

Wider conceptual impacts

Overall, during the immediate post project period, the findings from HUNT will be synthesised to address two main concepts. Firstly, we will draw on the results to analyse what we can say in relation to the debate about the sustainability of hunting in relation to the balance between consumption versus conservation. This will be of direct relevance to the CBD and the principles of the Ecosystem Approach which essentially promote the consideration of the functions of biodiversity in an ecosystem, the benefits it provides and the people which depend on it. Second we will assess lessons from our interdisciplinary approach and engagement with stakeholders in order to inform the design of future interdisciplinary projects.

Project website: http://fp7hunt.net

Documenti correlati

Final Report - HUNT (Hunting for sustainability)

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