

Conference on
Management of Conflicts between Wildlife and Human Resource Use
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Abstracts of parallel sessions

Order of sessions and abstracts follows the official programme
(Abstracts and addresses have been left "as they were", no editing)

1-1 Species abundance, resource distribution, and resource use

(Chair: Niels Jepsen, Room 1a/b)

Balčiauskas, L.: Large carnivore numbers and distribution in Lithuania: conflict between protection requirements and admissibility

Kaschner, K.; Watson, R.; Trites, A.W.; Christensen, V.; Pauly, D.: Modelling and mapping resource overlap between marine mammals and fisheries on a global scale

Klenke, R.; Bregnballe, T.; Jepsen, N.; Sterup, J.: Population development of the cormorant in the South-western Baltic in relation to landscape, colony site specific factors and population density - an example for a large scale approach.

Musina, J.: Coffee or Hinde's Babbler? The pomp and circumstance surrounding the conservation of globally threatened bird found only in Kenya. (**TALK cancelled**)

Large carnivore numbers and distribution in Lithuania: conflict between protection requirements and admissibility

Linas Balčiauskas

Institute of Ecology of Vilnius University, Akademijos 2, Vilnius LT-08412, Lithuania (e-mail: linasbal@ekoi.lt)

Large carnivore protection in Lithuania is assured by European politics – Bern convention (regulation of terms of wolf hunt; in Lithuania convention was ratified with exceptions), requirements of Habitat Directive (Lithuania has achieved exemption for wolf population management) and Natura 2000 (territorial protection of lynx covers ca 80% of population, but no special territories for wolves were established). There are also local measures – existing system of protected territories (many of them inhabited by LC), protection through non-hunting (lynx is not hunted since 1979, currently included into Red data book, wolf hunting period was shortened and in 2005 is planned to shorten again), NGO initiative ("Joint NGO council for protection of wolves") and private initiatives.

Admissibility of LC is influenced by various conflicting options. Natura 2000 territories for lynx protection are established in productive forests; management restrictions were not discussed with forest managers and cause inconveniences to timber production. State-wide survey of LC numbers is stopped; incomplete data in the press made possible for NGO's to argue against wolf population management, pushing decision of including wolves into the national Red data book, thus shaping a future conflict between national and European LC-related policy.

Abstracts of parallel sessions (Status: 29.1.2006)

After joining EU Lithuania accepted requirements for the large carnivore protection (wolves now are hunted with no limits from August till April). In 2004–2005 number of wolves decreased without growth of the hunting bag, and now hunt limitations are being considered. In the same time, wolf damage in Lithuania was not compensated by the state (unless cattle is covered by insurance), thus giving a basis for the conflict between the protection requirements and the species acceptance, raising conflicts with hunters and local administration, as well as hindering LC protection policy. Our data on large carnivore distribution changes in 2002–2005 gives some background for a scientific point of view to above mentioned problems and conflicts.

Modeling and mapping resource overlap between marine mammals and fisheries on a global scale

K. KASCHNER^{*,+}, R. WATSON^{*}, A.W. TRITES⁺, V. CHRISTENSEN^{*} AND D. PAULY^{*}

Contact email: kaschner@zoology.ubc.ca

^{*} *Sea Around Us Project, Fisheries Centre, University of British Columbia, 2259 Lower Mall, Vancouver, BC, Canada, V6T 1Z4*

⁺ *Marine Mammal Research Unit, Fisheries Centre, University of British Columbia, Hut B-3, 6248 Biological Sciences Road, Vancouver BC, Canada, V6T 1Z4*

The impact of fisheries on marine mammals and other megafaunal components of marine ecosystems is a major concern. Fisheries – in addition to causing bycatch mortalities – may affect marine mammals through direct or indirect competition for food. We assessed the potential direct impact of fisheries on mammal populations on a global scale by quantifying the spatial overlap in resource exploitation between both groups using modelling and mapping tools. Within a GIS framework, we developed a generic model to predict the relative probability of occurrence of 115 marine mammal species by relating information about species-specific habitat usage to average oceanographic conditions in a global grid with 0.5 degree latitude by 0.5 degree longitude cell dimensions. For each species annual food consumption estimates (specified by food types) were generated from syntheses of population abundances, sex-specific mean weights, standardized diet compositions, and weight-specific feeding rates, compiled through screening of more than 2000 publications. By linking species-specific probabilities of occurrences with estimated consumption, we obtained spatially-explicit food consumption estimates (expressed as food intake per km² per year). Superimposing geographically disaggregated fisheries catches (generated by a similar model) allowed the calculation of overlap between catches and consumption with respect to both the food types consumed/taken and areas where food/catches were taken. Our model indicates that, in the 1990s, average consumption of all marine mammal species combined was several times higher than total fisheries catches during the same time period. However, effective spatial overlap and exploitation of the same food types was relatively low, indicating that actual competition between fisheries and marine mammals may be much lower than proposed. We predict the highest overlap in the temperate to subpolar shelf regions of both hemispheres, though overlap is more pronounced in the North. Overall, < 15 % of all fisheries catches and < 1% of all estimated marine mammal food consumption stem from areas of high predicted overlap. Nevertheless, overlap between marine mammals and fisheries may be an issue on smaller scales (especially for species with small feeding distributions) that requires more detailed local investigations. The mapping of geographical 'hotspots' of marine mammal-fisheries interactions will help to identify potential areas of highest conflict, which may aid in focusing small-scale research efforts and the development of management approaches on appropriate scales.

Population development of the cormorant in the South-western Baltic in relation to landscape, colony site specific factors and population density - an example for a large scale approach.

Reinhard Klenke*, Thomas Bregnballe, Niels Jepsen & Jacob Sterup

* *Department of Conservation Biology, UFZ Leipzig-Halle GmbH*
Permoserstr. 15, D-04318 Leipzig

We have analysed survival, growth and size of cormorant (*Phalacrocorax carbo sinensis*) breeding colonies in Denmark and Germany in relation to characteristics of colony site and its surroundings. On basis of mostly free available landscape data and specific knowledge about the colony development a statistical analysis were made using multivariate methods. In relation to other investigations in population and landscape analysis a generic methodological approach was developed with the aim to make it applicable on different types of data and scales. We will present results as a "case-example" of (first) how important is it to look not only on population development but also on landscape and spatial interactions and (second) how such analyses can be made along with a broader evaluation of the feasibility of such analyses to provide useful management recommendations.

Coffee or Hinde's Babbler? The Pomp and Circumstance surrounding the conservation of globally threatened bird found only in Kenya.

John Musina

Research Biologist

Ornithology Department

National Museums of Kenya

P.O. Box 40658 00100 GPO

Nairobi

Tel: Office: +254 20 3742131/4

mhornbill@yahoo.com

Hinde's Babbler *Turdoides hindei* is a globally threatened Kenyan endemic, whose range lies predominantly within the catchments of the upper Tana and Athi Rivers, with seemingly isolated populations in Meru, Kitui and Nziu. Over the past century its range has contracted and fragmented, almost certainly as a result of scrub clearance. During 1994-2001, some 70% of its known population was located within intensively cultivated coffee farmland around Kianyaga and Mukurweini, and only 8% was found within two legally protected areas. Its global population has recently been estimated at 1,500-5,600 birds. Hinde's Babbler occur in two contrasting situations: thickets and woodland within semi-arid areas, and moist, fertile land cleared for agriculture and subsequently invaded by the exotic shrub *Lantana camara*. In both situations the species is normally found in close proximity to dense vegetation associated with streams and rivers. As a group-territorial, cooperative breeder, Hinde's Babbler typically occur in groups of 3-4 adults, often accompanied by 1-2 fledglings or immatures. There are concerns that human disturbance may cause low breeding success in some areas. Hitherto, surveys carried out since 1994 have provided a baseline for future monitoring done by the local people themselves.

Ideally, observations are made along a 5 km section of the Tambaya Stream in Mukurweini Valleys IBA. Mukurweini supports the bulk of the species' known population, with a mean density of c. 10 birds km⁻¹ of watercourse (2.5 groups km⁻¹). The proposed study site was surveyed in 2000 and in 2001, when it was found to hold 12 Hinde's Babbler groups, containing 46 birds. It is relatively accessible and, at one end, includes a small, private wildlife sanctuary at which accommodation is available at a reasonable price. Otherwise, the habitat composition, topography and babbler population of the site are broadly representative of the IBA as a whole. In addition, Mukurweini Valleys IBA has an active registered site support group officially recognised by the National Museums and Nature Kenya. The Site Support Group members participate in monitoring twice a year, thereby gaining experience in survey methods. We believe that working together with the local farmers, school teachers and children is the best and most sustainable way of saving Hinde's Babbler from extinction.

1-3 Stakeholder views and discourse analysis

(Chair: Heidi Wittmer, Room 1c/d)

Gebetsroither, B.; Friedl, B.: Visitor attitudes and valuation of species protection – differences across species, measures and visitors

Bruckmeier, K.; **Larsen-Hoj, C.**: Stakeholders in the Swedish seal conflict: an in-depth analysis of interests and views through discourse analysis (**TALK cancelled**)

Marshall, K.: Attitudes, obstacles and options: perceptions of the hen harrier – red grouse debate in Scotland

Visitor attitudes and valuation of species protection – differences across species, measures and visitors

Brigitte Gebetsroither¹⁾ and Birgit Friedl^{1), 2)}

¹⁾ Wegener Center for Climate and Global Change, University of Graz, Leechgasse 25, 8010 Graz, Austria

²⁾ Department of Economics, University of Graz, Universitätsstraße 15, 8010 Graz, Austria
corresponding author: brigitte.gebetsroither@uni-graz.at

Protected Areas have diverse, and sometimes conflicting, purposes and aims. The most important aim of the Hohe Tauern National Park is to serve biodiversity preservation and to assure sustainable development of the alpine ecosystem and its biodiversity. Additionally, since the park is classified as an IUCN category II site, the park management develops programmes for visitor recreation and education. How strong these aims are in conflict or in synergy depends not only on the nature and stringency of conservation measures taken, but also on the communication with and compensation for visitors. Finding a balance between optimal nature conservation and optimal visitor infrastructure provision and avoiding conflicts is the responsible task of the park administration. Following that direction, the knowledge on different attitudes and values for preservation of species held by visitors and the general public is essential. Therefore, we focus on the attitudes towards the protection of two species - one very popular, well-known, but hardly under threat (the alpine ibex, *capra ibex*) and the other one unimpressive but important as an indicator for unimpaired alpine landscapes (rock partridge, *alpestris graeca saxatilis*), both found in the Hohe Tauern National Park. In the survey, different interview spots were chosen: the Grossglockner Franz-Josefs-Height (with one million visitors per year) and the quiet Mallnitz Tauern Valley (visited by some 20,000 hikers per year).

The respondents were asked about (i) the relative importance and appreciation of species, habitat (landscape) and visitor infrastructure (ii) the acceptance of different protection measures and visitor infrastructure improvements (trails, information, picnic sites) and (iii) about their willingness to pay for a change in the species population size as a consequence of different protection measures. For estimating the mean willingness to pay from the double-bounded dichotomous choice question, a non-parametric procedure was applied using the Kaplan-Meier technique and the Turnbull self-consistency algorithm (TSCA). As a policy conclusion, it is highlighted that protection should not be limited to ecological (and legal) concerns but has to take account of the reaction by visitors, both in ecological and economic terms. In the best case, an accepted protection measure could be (at least partly) financed from contributions by preservation-aware visitors.

Stakeholders in the Swedish seal conflict: an in-depth analysis of interests and views through discourse analysis

Karl Bruckmeier* & Christina Høj Larsen

* Göteborg University, Department of Human Ecology
SE-40530 Göteborg, Sweden

The views of stakeholders in the longstanding conflict between seals and coastal fishermen at the Swedish Baltic coast have not been studied in-depth before the present FRAP-project, in spite of the fact that a management plan for mitigation of the conflict is implemented since several years. The discourse analysis made visible controversies and irreconcilable positions that continue also under the present conflict management regime. The management plan itself can be understood as formulating a distinct position of how to mitigate the conflict temporarily. But the plan has no strategy for the long-term development of coastal fishery which is in danger of vanishing. What has become visible through discourse analysis is the often discussed - but in practice neglected - problem of integration of scientific and local ecological knowledge in conflict management. Conflict management has better chances when it is part of overarching strategies for species conservation, development of coastal fishery and of coastal communities.

Attitudes, obstacles and options: perceptions of the hen harrier – red grouse debate in Scotland.

Marshall, Dr. Keith

Macaulay Institute, Socio Economic Research Programme
Craigiebuckler Aberdeen AB15 8QH, UK

Gamekeepers are required to provide high densities of grouse for commercial shooting and can perceive hen-harriers as one of several threats to both their grouse stocks and their livelihoods. Hen-harriers are a species protected at a national level and efforts to conserve them conflict with the objectives of those actively managing the moors for grouse. Debate on this topic is perceived by some to have come to a stalemate, with little progress towards a resolution being made.

Sixty individuals from three different locations in Scotland were questioned in person regarding their perceptions of the hen-harrier and red grouse debate. Interviewees were drawn from a cross section of backgrounds including landowners, grouse managers, conservation agency employees, wildlife crime officers (police), and local raptor specialists.

Three dominant elements of the debate emerged from preliminary semi-structured interviews with a sub-group of the 60. Quantitative tools were then developed in order to explore these elements in more detail with the whole group: attitudes towards the conflict were scored on a weighted Likert scale; factors that prevent the debate moving forward were ranked in terms of their significance and; Potential management solutions are assessed using a semantic differential approach.

The combination of qualitative and quantitative tools provided valuable triangulation and allowed interactions between the three components to be identified and explored. Perceptions of certain elements (e.g. attitudes towards land management) of the conflict varied within and between groups and across the study areas. However there was more consensus across the stakeholder groups on issues relating to improving the resolution process itself.

This work demonstrates how subtleties, and opportunities, within the debate at the grass roots level can be obscured by the positioning of stakeholder representatives in the debate at the national level. This can reduce the likelihood of workable solutions to the problem being found, to the cost of everyone involved.

1-5 European legal framework and national options for action

(Chair: Riku Varjopuro, Room 2)

Bisi, J.; Kurki, S.: Local objectives in relation to supranational legislation in the Finnish wolf management

Lunneryd, S.G.: Legislation to preventing by-catches, could that hinder an efficient strategy of decreasing by-catches?

Suvantola, L.: The golden eagle compensation system as an example of incentive measures as a conflict management tool

Thum, R.: Benefit and legality of cormorant culling in Germany

Local objectives in relation to supranational legislation in the Finnish wolf management.

Jukka Bisi, Metsähallitus, Finland

Sami Kurki, University of Helsinki, Finland

The growth of the Finnish wolf population have highlighted people's contradictory attitudes towards wolves and the different objectives set for managing the wolf population. The supranational conservation objectives, brought on by Finland's membership in the EU, and the regional application of the official policy, have led to various conflicts. This has been the case especially in the eastern Finland where the wolf density is highest.

In this study, we used the qualitative data collected during the nationwide hearing across Finland in 2004, and examined how the people who are co-habiting with wolves see the wolf question and also what is the readiness for consensus among different interest groups at both regional and national level. Overall, our data collection involved over 2000 people.

Numerous demands were placed on legislation and its interpretation, and concessions to these demands would likely promote consensus and increase tolerance for wolves. Furthermore, the concepts of favourable conservation status and social sustainability seemed to increase the confusion because they were interpreted by each party according to its own interests. Conflicting expectations at the regional level are placed especially on the national authority responsible for wolf population management, the Ministry of Agriculture and Forestry, and regional game management districts. The wolf question is currently a bone of contention in the area of environmental policy, the conservation of wolves and the management of wolf populations have become more complicated and therefore the cooperation between various interest groups has been hampered. According to our results, it seems rather difficult to create a wolf policy that would be endorsed by everyone. Therefore, the only possible way to improve the heated situation is create compromises in most important questions. The issues that should be solved are further discussed according to our observations.

Legislation to preventing by-catches, could that hinder an efficient strategy of decreasing by-catches?

Lunneryd, S.G.

Tjärnö Marine Biological Laboratory

TML 45296 Strömstal

Sweden

Bycatches of marine mammals are a negative effect of commercial fishery. There is a genuine effort being made by the fishing community to avoid bycatches; quite apart from any animal welfare issue, as this is also likely to involve damaged gear, lost catches and fishing time wasted. A collaboration between the fishing community and the scientific community, is the only satisfactory way to alleviate the by-catch problem. Such a collaboration is a voluntary log book whereby selected fishermen are

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contracted to keep a detailed daily log of bycatches in the Swedish fishery. The result from the logbook tails much with earlier telephone surveys of by-catches in the Swedish fishery and could be an important indicator of by-catch trends. The total Swedish by-catches are estimated to reach several percent of the seal populations, despite this there has been a fast increase of all seal populations. Unfortunately those studies are the only thoroughly that are done in the Baltic area. This has two important disadvantages, first figures from other countries are necessary for a total estimation of bycatches and second it highlights bycatches one-sided in one country.

The conditions for reliable estimates of by-catches have been radically altered by two recent factors. The first is the EU-regulation 812.2004 to prevent bycatch of harbour porpoises demanding phasing out of drift-netting for salmon in the Baltic and compulsory use of pingers for bottom-set nets by boats over 12m length in an area along the Swedish south coast. To the fishermen affected, it seems clear that the reason they have been singled out in this way is that it was in the Swedish part of the Baltic that the only porpoise bycatch study was ever carried out in the region.

A second political decision which also threatens to disrupt the voluntary collaboration concerns the "Environmental Objective" set by the Swedish government, according to which all marine mammal by-catches must be reduced to at most 1% of their populations annually by the year 2010. It is hardly surprising that many fishermen have come to the conclusion that it is counterproductive to collaborate with scientists.

THE GOLDEN EAGLE COMPENSATION SYSTEM AS AN EXAMPLE OF INCENTIVE MEASURES AS A CONFLICT MANAGEMENT TOOL

Leila Suvantola

Department of Law

University of Joensuu, Finland

leila.suvantola@joensuu.fi

The Convention on Biological Diversity (1992) encourages countries to use incentive measures to promote conservation of biodiversity. Can incentive measures combined with participatory management provide assistance to conflict management in nature conservation?

This presentation will introduce the only nature conservation instrument with dynamic incentive features used in Finland. It is the compensation system for damage caused by the golden eagle to reindeer husbandry. The paper compares the traditional compensation for proved damages and the existing system where compensation is paid on the basis of nesting and reproduction of the golden eagle. The aim of the new system is to promote the conservation status of the species by discouraging disturbance of the species during nesting and encouraging the creation of nesting sites rather than their destruction. Some participation is allowed as information on nesting sites is shared with reindeer co-operatives. This feature may increase trust between the authorities and the reindeer co-operatives.

The research framework of the paper is legal, yet the purpose is to widen the scope to tackle issues of legitimacy of the compensation system.

Benefit and Legality of cormorant reduction in Germany

Randi Thum

UFZ Centre for Environmental Research

Environmental and Planning Law

Permoserstr.15

D-04318 Leipzig

The presentation analyses the discrepancy between administrative and juridical practice in allowing of cormorant culling as a measure to avoid damages to fish stocks.

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An instrument used to avoid damages by cormorants to fish farms is culling in order to scare them away from the ponds. This exception from the protection status of the cormorant is based on Article 9 of the Birds Directive, which allows exceptions to avoid considerable damages. The German legislator used this authorisation in two ways. Firstly: permissions to shoot cormorants can be granted to single requesters. Secondly: permissions can be granted in general by the government of a Land which is often used by enacting special "cormorant regulations". The conditions for these permissions are the same in both cases. Shooting must be able to avoid serious damages to the whole fisheries sector. If a legal action was taken (possible if the authority refuses to grant permission), all judgements stated, that the culling of cormorants avoids no damages and rejected the claims. The claimants were not able to prove the existence of the requirements – considerable damages and the possible avoidance of these damages through culling. Nevertheless, killing cormorants on basis of "cormorant regulations" or single permits is very common and there is no legal possibility to clarify the differences between authorities and courts. There is neither a way to sue against "cormorant regulations" nor against granted permissions.

The presentation shows that the German instruments for cormorant reduction attach on different scales. Judges demanded from requesters that they prove damages in the whole area, which in fact is not possible. This jurisdiction is consequent and shows that a regional problem can not be solved on local level – so in fact the permissions in a single case make no sense.

Otherwise "cormorant regulations", which generally allow the killing of cormorants, attach on the right scale, but are only lawful if cormorants cause considerable damages to fisheries. Until now, this proof often is missing and there is a lack of legal control of cormorant regulations.

1-1 Species abundance, resource distribution, and resource use (cont.)

(Chair: Bernd Gruber, *Room 1a/b*)

Kammer, A.: Using Geographical Information Systems to investigate the Bushmeat Phenomenon in KwaZulu-Natal

Pandiyan, J.; Nagarajan, R.; Thiyagesan, K.; Asokan, S.: Conflicts between the migratory shorebirds and human activities of the East Coast of Cauvery Deltaic Region of Tamilnadu, southern India

Sales-Luís, T.; Freitas, D.; Marques, C.; Rosalino, L. M.; Santos-Reis, M.: Otters and marine fish farms: Space use patterns and key landscape factors for damages

Using Geographical Information Systems to investigate the Bushmeat Phenomenon in KwaZulu-Natal

Annelene Kammer

Universität Salzburg

Zentrum für Geoinformatik

Schillerstr. 30, Bauteil 15

5020 Salzburg, Österreich

Tel: + 43 662 8044 5277

Fax: + 43 662 8044 5260

E-mail: annelene.kammer@sbg.ac.at

The bushmeat phenomenon is spreading throughout the African continent. Wildlife species are slain and conservation areas are under increasing strain. Although studies have been conducted in east, central and western Africa, limited resources regarding this phenomenon exist. This is the first study to be conducted in the southern African region. Initially the study was intended for the whole of South Africa, but due to a lack of co-operation from other provincial governments and the unavailability of data, the study was focussed on conservation areas within KwaZulu-Natal.

Data regarding bushmeat occurrences were collected from Ezemvelo KZN Wildlife and the South African Police Services. With the help of a Geographical Information System, the data was overlain with other datasets such as the National Census data and a real-world model was created to establish the correlation and relationship between the bushmeat phenomenon in southern Africa compared to other regions of the continent.

The results confirm a steady increase in the number of reported bushmeat occurrences in KwaZulu-Natal from year to year. The increase in the number of bushmeat occurrences in KwaZulu-Natal can be attributed to an increase in population and poverty as well as the lack of a substantial alternative protein source. Bushmeat are primarily targeted by members of impoverished communities in the surrounding rural areas. Bushmeat are sold at local commercial markets as a subsistence protein source for consumption by the local communities. There is no evidence of a significant international commercial trade in bushmeat in the study area. Poachers travel great distances on foot to hunt inside conservation areas where the targeted animal species are still relatively abundant. Snares are utilised as the most preferred method for poaching in all areas. Hunters also utilise traditional weapons and dogs, but the use of firearms are relatively limited. According to the information derived from the analysis, Nyala and Wildebeest were the most targeted species during poaching activities. The highest percentage of bushmeat occurrences in KwaZulu-Natal take place in Mkhuze- and Ndumo Game Reserves.

Conflicts between the migratory shorebirds and human activities of the East Coast of Cauvery Deltaic Region of Tamilnadu, southern India”

Pandiyan, J^{1.}, R. Nagarajan^{2.}, K. Thiyagesan³ and S. Asokan⁴

¹Department of Zoology, Bishop Heber College (Autonomous), Trichy, 17, Tamilnadu, Southern India

²³⁴Department of Zoology and Wildlife Biology, A.V.C. College (Autonomous), Mannampandal, Tamilnadu, southern India

Author Email: dunlinpandiyam@rediffmail.com

The coastal wetland areas are vital for the successful migration of varieties of shorebirds to compete their day to day life processes. Lot of works has been made about the shorebirds migration but very few studies closely investigate the conflicts between the migratory birds and human activities. This study, carried out to evaluate the availability of wetlands types especially tidal flats (mudflats and sandflats), prey availability, evaluation of water quality parameters, soil nutrients and conflicts between the shorebird habitats and human activities (aqua farms, hunting and pouching) in the Cauvery Deltaic region of Tamilnadu, southern India, 2000-2002. The appropriate statistical tool have been applied and obtained positive results between the bird characteristics features such as shorebirds density, diversity, richness and wetlands types. Correlations (r) analyses and step-wise multiple regression analyses showed a causal relationship between the water quality variables and shorebird population characteristics. The prey items are such as polychaetes and molluscan availability differed significantly between the areas used by shore birds in the sandy and muddy tidal flats. Finally very interesting results were obtained between the aquafarm area and non aquafarm area with reference to the bird population, water chemistry and soil sediments. The result of the present study revealed that low bird density and poor water, soil quality conditions in the region of high level aquafarm associated tidal flats and non-aquafarm tidal flats showed that normal distribution pattern of migratory shorebirds, water and soil quality conditions. The present study revealed that the water quality parameters, soil nutrients and the prey availability strongly influence the waterbird community structure and ecological process on exposed sandy and muddy wetlands.

Otters and marine fish farms: Space use patterns and key landscape factors for damages

Sales-Luís, T.; Freitas, D.; Marques, C.; Rosalino, L. M. & Santos-Reis, M.

Centro de Biologia Ambiental, Departamento de Biologia Animal, Edifício C2, Faculdade de Ciências da Universidade de Lisboa, Campo Grande, 1749-016 Lisboa Portugal

tsl@fc.ul.pt

Sado Estuary, a Portuguese coastal Natural Reserve, was chosen as study site for the FRAP project (Development of a procedural framework for action plans to reconcile conflicts between the conservation of large vertebrates and the use of biological resources: fisheries and fish-eating vertebrates as a model case FRAP-EVK2-CT-2002-00142) focusing on otter damages on marine fish farms.

For this study, 14 fisheries were selected, varying in size, stocking levels and harvesting cycle. In order to assess otter visiting rates and to collect scats for otter diet analysis, weekly surveys of the fish farms perimeters were conducted from July 2003 to June 2004. Additionally, bank vegetation, bank structure, hinterland use, alternative prey availability and existence of preventive measures (fences, electric fences, dogs, etc) were recorded as descriptive factors for landscape analyses. Several metric variables (distances, areas in buffers) were also assessed with resource to a GIS data base. Data on otter predation on commercially important fish was evaluated through scat analyses, expressed in terms of numeric frequencies and ingested biomass and used as a surrogate variable for damages. A multivariate approach using Multiple Linear Regression Models (stepwise backward) was used to assess key landscape factors for damages. Space use patterns were inferred from sign distribution and fidelity to marking places.

Surprisingly, visiting rates were not significantly related to damages. Nevertheless they are negatively influenced by preventive measures and the distance to the nearest streams, and positively related to the refuge cover area in a 1km buffer. Damages were best represented by the consumed biomass and were positively influenced by the distance to the nearest streams and by the distance to refuge cover areas.

The overall interpretation is that preventive measures like electric wires are effective and that damages in this study area are higher in fish farms further away from water lines of some importance and with some refuge cover (streams and brooks).

1-4 Stakeholder views and policies

(Chair: Birgit Friedl, Room 1c/d)

Nygren, N.: Margin for planning as a conceptual tool in urban wildlife conflicts

Liukkonen, T.; Kurki, S.; Sakari, M.; Jukka, B.: Lynx management in Finland – conflicts or compromises?

Ratamáki, O.: Societal sustainability and governance in Finnish wolf policy

Jepsen, N.; Olesen, T.: The background of a Danish cormorant-fisheries conflict and its management

Margin for planning as a conceptual tool in urban wildlife conflicts

Nina Nygren

Department of Regional Studies

Pinninkatu 53b, 33014 University of Tampere, Finland

nn62585@uta.fi

The Siberian flying squirrel (*Pteromys volans*) was added to the annex of strictly protected species (Annex IVa) of the Habitat Directive (Council Directive 92/43/EEC) in the accession negotiations of Finland in 1995. According to the Directive, the deterioration or destruction of breeding sites or resting places of the Annex species is prohibited. The Habitat Directive was implemented in Finland by the renewal of the Nature Conservation Act in 1997.

Since then, the protection of the flying squirrel has become an increasingly heated issue not only in forestry but also in urban land use planning. Flying squirrels are small nocturnal rodents, and thus they are difficult to detect. Despite their hiding way of life, they have proven to be quite common in the suburbs of Finnish cities, which has delayed and stalled many plans of new residential areas. Flying squirrel is a mobile species on individual and population level, living in the continuously growing and changing forests, often in urban context, thus protecting the species is inevitably a dynamical challenge.

The flying squirrel problem illuminates new kind of conservation dilemmas. Protecting a species that is abundant in places, nationally declining, and internationally strictly protected, has been quite difficult in a local context of participatory land use planning, as many conflicts all over southern Finland demonstrate. I use *margin for planning* as a conceptual tool to elaborate local conservation policy options. By this concept I refer to the existence of alternative ways of reaching similar conservation goals and, within a longer temporal horizon, of broadening the possibility space of conservation. Scaling between the nature of ecological processes and the extension of decision-making is important in the analysis, as well as participatory practices.

Lynx management in Finland – conflicts or compromises?

Tuija Liukkonen¹, Sami Kurki², Sakari Mykrä³ & Jukka Bisi⁴

¹ University of Helsinki, Ruralia Institute c/o University of Oulu, P.O.Box 3000, Fin-90014 University of Oulu, Finland, tuija.liukkonen@oulu.fi

² University of Helsinki, Ruralia Institute, Kampusranta 8, 60320 Seinäjoki, Finland, sami.p.kurki@helsinki.fi

³ University of Helsinki, Ruralia Institute c/o Satakunnan ympäristöntutkimuslaitos, Konttorikatu 1, 28900 Pori, sakari.mykra@utu.fi

⁴ Forest and Park Service, P.O.Box 81, 90100 Oulu, Finland, jukka.bisi@metsa.fi

A nationwide hearing about public opinions on lynx and on lynx management was carried out in Finland 2004-2005. The conservation objectives resulting from EU membership of Finland together with the rapid growth of the Finnish lynx population have risen contradictory attitudes towards lynx and the management of the lynx population. In those parts of the country, where the lynx population is locally dense, people's attitudes are growing highly negative. Local people believe that they have run out of ways to influence their own lives which is ruled by EU, authorities and conservationists. Even though the damages caused by the lynx are minor, the most negative opinions about the lynx are resulting from the damages it may cause to cattle, sheep or pets, to reindeer or to fur farms. In the areas, where feeding of the small game is common, the lynx rises anger when hunting by the feeding sites. The conservation of the lynx and the management of lynx populations is complicated and including conflicts, and the cooperation between various interest groups is necessary. The qualitative data of the present study pointed out the hotspots in lynx conservation and management and also highlighted the possibilities in solving the problems and conflicts. To increase the tolerance for lynx several demands of concessions were pointed out on both the legislation and on its interpretation. The most important demands included development of the damage compensation system and a national possibility to rule over the lynx population, its management and also the hunting licences. Because of the nature of the lynx and the frustration associated with the species, consensus is needed for the management and also for an adequate conservation/management plan of the lynx population.

Societal sustainability and governance in Finnish wolf policy

Ms. Outi Ratamäki

Department of Social Policy

University of Joensuu

P.O.Box 111

FI-80101 Joensuu

email. outi.ratamaki@joensuu.fi

Tel. +358-13-2514236

I am doing research with a title "Societal sustainability and governance in Finnish wolf policy". It is said that the 1960's was a decade when environmental consciousness increased and attention was directed from ecological and species conservation points of view also towards large carnivores. Up until the 1970's wolf was considered a noxious animal in Finland and the state paid bounties for killing wolves. A reform of hunting legislation was started in the 70's and this reform took twenty years. Joining the European union was also taken into account in this reform. Many changes were made. Large carnivores were now considered as preserved game animals. During this reform the conservation of large carnivores had paid off and large carnivore populations had grown and confrontations increased (losses of domestic animals, reindeer, dogs etc.). However the approach that the state had at this point was very different from what it had been a few decades ago. It no longer supported killing wolves but tried to protect it. Conflicts in Finnish wolf policy originate from these changes and challenges of combining national cultural and legal perceptions of a game animal and the internationally agreed perception of an endangered species.

In my research I have interviewed authorities at different levels, members of different NGO's, researchers and local people. I look at the conflicts from two angles. First I explore the contents of wolf policy through the concept of societal sustainability. With this concept I want to stress that none of the elements presented in the SD framework (economical, political, social, cultural, ecological or ethical) stand alone but are extremely strongly interconnected. Therefore also policies and plans should be based on this kind of pluralism and diversity. I am bonding this exploration of contents with the study of policy processes through the theoretical framework of governance. What kind of processes and instruments honour the complexity of the contents of wolf policy? What kind of processes and instruments could lead to more sustainable policy making? How are contents and processes interconnected?

The background of a Danish cormorant-fisheries conflict and its management

NIELS JEPSEN¹ & THOMAS OLESEN²

1: Danish Institute for Fisheries Research, Vejlsøvej 39, 8600 Silkeborg, +4589213131, nj@dfu.min.dk

2: Institute for Fisheries Management, Hirtshals.

Since the establishment of a cormorant colony in the 300 km² shallow estuary, Ringkøbing Fjord, in 1992, the conflict between bird protection and fisheries interests has grown steadily with the increasing number of birds. This presentation will provide an overview of the conflict as studied through the FRAP work. There will be a brief description of the Ringkøbing Fjord with its fish, birds and stakeholders. We view the decreasing catches and the coinciding colonisation of the area by cormorants as the base for the conflict. Also the status of the salmon in the river and its protected status are discussed. This paper will generally focus on the results from the investigations of the impact of cormorant predation on fish stocks seen in context with the stakeholder opinions and views derived from interviews. A main issue will be how different types of knowledge and documentation are used by stakeholders and managers in very different ways, fuelling the conflict. From the case study in Ringkøbing Fjord, the national management will also be discussed. Finally the question of a "necessary level of documentation" is raised.

1-6 Damage assessment

(Chair: Reinhard Klenke, Room 2)

Freitas, D.; Marques, C.; Sales-Luís, T.; Rosalino, L. M.; Santos-Reis, M.: Commercial fish loss in Sado Estuary fish farms: Is the otter to blame?

Lundström, K.; Hjerne, O.; Alexandersson, A.; Karlsson O.: Diet of grey seals in the Baltic Sea

Hjerne, O.; Lundström, K.; Karlsson, O.; Alexandersson, K.: Potential effects of grey seal (*Halichoerus grypus*) predation on Baltic Sea fish stocks and competition with fisheries

Fjälling, A.; **Wahlberg, M.**; Westerberg, H.: Acoustic Harassment Devices (AHD) for salmon trap nets in the Baltic Sea

COMMERCIAL FISH LOSS IN SADO ESTUARY FISH FARMS: IS THE OTTER TO BLAME?

Freitas, D.; Marques, C.; Sales-Luís, T.; Rosalino, L. M. & Santos-Reis, M.

Centro de Biologia Ambiental, Departamento de Biologia Animal, Edifício C2, Faculdade de Ciências da Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal
difreitas@fc.ul.pt

In the last decade the expansion of fish farms in Portugal, financially encouraged by the EU (Community Structural Policy), arose conflicts between the fish farmers and the otter (*Lutra lutra*), naturally attracted to these type of exploration where fish are stocked at high densities. From July 2003 to June 2004, 14 marine fish farms were investigated in Sado estuary (EU project - FRAP-EVK2-CT-2002-00142). These primarily produce gilthead sea bream *Sparus aurata*, European sea bass *Dicentrarchus labrax*, Senegal sole *Solea senegalensis* and common sole *Solea solea*. On the basis of scats, collected along the pond margins, otter weekly visiting rates were assessed and diet was described. The relative abundance and size range of fish in the estuarine waters and inside ponds (just size range) were evaluated twice (winter and spring) through net fishing. Fish farm owners provided pond stocking densities. The minimum number of otters visiting each fish farm was tentatively estimated on the basis of scats' molecular analysis.

Fish dominated the otter diet, both in terms of numbers (87% of percentage of occurrences) and biomass (96%), but only 31% of the occurrences corresponded to species produced in the fish farms. However, in terms of biomass, produced species represent 61% of the consumed prey, being *Solea* spp and *S. aurata* the two most important species (45% and 14% respectively) These results confirm that fish farms are an important food source for the otter in the Sado estuary, mainly in what concerns *S. aurata*, as the species was almost absent from the estuary.

The impact of otter predation to the fish farms was assessed assuming that all commercial fish was consumed inside the ponds and combining otter numbers in each fish farm (1 to 7 individuals-preliminary results), visiting rates (0,10 to 0,68) and consumption. Damages were significantly different between fish farms corresponding to economic losses that varied from negligible to locally important.

Diet of grey seals in the Baltic Sea

Lundström, K.*, Hjerne, O., Alexandersson, A. and Karlsson O.

* Göteborg University, Tjärnö Marine Biological Laboratory, Marine Ecology
Fiskeriverket, Box 423
40126 Göteborg
Sweden

Food-containing digestive tracts from grey seals (*Halichoerus grypus*), collected in the Baltic Sea between 2001 and 2004, have been examined. We compensated for biases introduced by erosion of otoliths, both by using additional hard-part structures other than otoliths, and species-specific size and numerical correction factors. A total of 24 prey taxa were identified but only a few species contributed substantially to the diet. The diet composition was dependent on the diet estimation models used, but independently of model, herring (*Clupea harengus*) always dominated the diet, both by numbers and biomass. In addition to herring, common whitefish (*Coregonus lavaretus*) and sprat (*Sprattus sprattus*) were important prey, but cyprinids (Cyprinidae), eelpout (*Zoarces viviparus*), flounder (*Platichthys flesus*), salmon (*Salmo salar*) and trout (*Salmo trutta*) also contributed significantly. Our results indicated dietary differences between the Gulf of Bothnia and the Baltic Proper, as well as a change in diet composition compared to the late 1960s.

Potential effects of grey seal (*Halichoerus grypus*) predation on Baltic Sea fish stocks and competition with fisheries

Olle Hjerne*, K. Lundström, O. Karlsson, and K. Alexandersson

* Tjärnö Marine Biological Laboratory

Göteborg University

Dept. of Systems Ecology

10691 Stockholm University

Sweden

In the Baltic Sea there is an increasing conflict between the growing grey seal population and commercial fisheries, mainly because of damages on catch and fishing gear. The competition about the fish resource might also be important, but need to be investigated further. Based on the grey seal diet composition, population size, individual energy requirement and its prey energy content, we estimate the grey seal consumption of fish species in the Baltic Sea. To get a first idea about the potential influence of seal consumption on fish stocks, we compare seal consumption estimates with commercial and recreational catches of highly targeted fish species. In general, seal consumption is small in relation to total fish catches, but for some species (e.g. salmon, *Salmo salar* and whitefish, *Coregonus lavaretus*) consumption could be as large as, or even larger than catches. This indicates a competition between seals and the fishery and a possible effect on these fish stocks of seal predation. However, to quantify and understand the influence by the grey seal, as well as the fishery, we need estimates of fish population size or fish production. Since this information is missing for many Baltic fish species, such analysis is restricted to species that is more studied. We analyse the seal predation on herring (*Clupea harengus*), and find a possible negative effect on the population size. Even if herring is the most common prey in the seal diet, other species (e.g. salmon and whitefish) is probably more preferred and we expect larger effects on those species.

Acoustic Harassment Devices (AHD) for salmon trap nets in the Baltic Sea

Arne Fjälling¹, Magnus Wahlberg^{2,3} and Håkan Westerberg^{3,4}

- 1) Institute of Freshwater Research, National Board of Fisheries, Sweden
- 2) Department of Zoophysiology, Aarhus University, Denmark
- 3) Tjärnö Marine Biological Laboratory, Göteborg University
- 4) National Board of Fisheries, Göteborg, Sweden

Acoustic harassment devices (AHDs) were deployed in the vicinity of salmon traps in the Baltic Sea to reduce gear and catch damage by grey seals (*Halichoerus grypus*). The AHDs emitted pulses of 250-500 ms duration with a frequency around 15 kHz and a source level of 191 dB re 1 μ Pa pp @ 1 m. AHDs were deployed during four fishing seasons. Catches improved significantly using the

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AHDs as compared to controls. The effect was maintained during the whole fishing season and also during tests made in three consecutive years. However, the gear damages increased in traps with AHDs later each season and actually superseded the controls in the end. The reasons for the discrepancy between the effect of AHDs on catch and gear damage is not clear. This study shows that AHDs may be a reliable mitigation tool in the Baltic seal-fishery conflict under some circumstances if it is used with great care.

2-2 Interdisciplinary development of policy instruments

(Chair: Frank Wätzold, Room 1a/b)

Ring, I.; **Ferreira dos Santos, R.**: Integrated evaluation and design of policy instruments for biodiversity conflict reconciliation

Schwerdtner, K.; Gruber, B.: A conceptual framework for damage compensation schemes

Rubeck-Schurtz, N.; Millenbah, K.F.; Whalon, M.; Olsen, L.; Roloff, G.: The reconciliation of the Endangered Species Act and Michigan's agriculture interests

Madrugá, L.; Ferreira dos Santos, R.: Markets and biodiversity conservation: the case of ecotourism in the Autonomous Region of Azores

Integrated evaluation and design of policy instruments for biodiversity conflict reconciliation

Irene Ring and Rui Ferreira dos Santos

Dr. Irene Ring, Department of Economics, UFZ-Centre for Environmental Research, Permoserstr. 15, 04318 Leipzig, Germany, irene.ring@ufz.de

Prof. Rui Ferreira dos Santos, New University of Lisbon, ECOMAN Centre, Dept. of Environmental Sciences and Engineering, Faculty of Sciences and Technology, Quinta da Torre, Caparica, Portugal, rfs@fct.unl.pt

Successful biodiversity policies can be observed for some large vertebrates that were close to extinction. Recovering populations can be accompanied by increasing conflicts with humans especially when species feed on commercially relevant biological resources. What can be the role of policy instruments in reconciling such human-wildlife conflicts and how can policies be evaluated with respect to conflict resolution? This paper presents results of the EU project FRAP that aims 1) to develop a generic framework for reconciliation action plans between the conservation of large vertebrates and the use of biological resources by humans and 2) to illustrate this framework using conflicts between the conservation of fish-eating vertebrates and fisheries as models.

Policy instruments relevant in the conflicts between fisheries and protected species were investigated in Portugal and Germany (otters), Finland and Sweden (grey seals) and Denmark and Italy (cormorants). A number of regulation and economic instruments, and others such as communication and information were studied regarding their actual implementation and potential for improvement. They were evaluated based on criteria such as effectiveness in conflict reconciliation, efficiency, perception by and involvement of stakeholders, thereby considering ecological, economic and sociological concerns.

Policy analysis in biodiversity conflict reconciliation has to be based on sound economic analysis, but it must also include ecological findings on the abundance and feeding behaviour of species as well as sociological analysis on the perception and attitudes of stakeholders. Only such an integrated approach in the design and evaluation of instruments is able to provide socially relevant and locally acceptable conflict resolutions. Comparative analysis of conflicts and policies in different countries provides a basis for mutual learning and improvement of the policy mix in place.

The costs of compensation: a framework to analyse damage compensation schemes

Kathleen Schwerdtner* & Bernd Gruber

** Department of Economics, UFZ Leipzig-Halle GmbH
Permoserstr. 15, D-04318 Leipzig*

kathleen.schwerdtner@ufz.de

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Damage compensation schemes are used in many European countries and elsewhere in the world in order to compensate people for economic losses caused by protected species. Especially predatory species such as the European otter (*Lutra lutra*) may cause significant damages by preying on biological resources. In order to adequately share the costs of damages between those who benefit from conservation and those who face the damages, compensation schemes are applied in two ways: Either as ex-post compensation schemes, where compensation is paid after the damage has occurred, or as compensation in advance which is based on verified damage assumptions.

Such schemes can require considerable amounts of money. Facing the rather limited financial resources that are available for conservation issues in general, it is well worth to take a closer look on all costs that are needed for damage compensation schemes.

We have developed a framework for cost categories in order to compare and evaluate damage compensation schemes. Besides the cost of the damage itself (*damage costs*), we included the transaction costs that arise with the use of compensation schemes, namely *search and information costs* in order to verify damages, *bargaining and decision costs* deriving from the inevitability of imperfect damage measurement and *policing and enforcement costs*. We exemplify our findings by evaluating two compensation schemes for otter damages in the German state of Saxony. Our results show that: (1) transaction costs may differ significantly between ex-post compensation schemes and compensation in advance over the running time of the schemes and (2) the choice of the damage compensation scheme depends on the spatial and temporal distribution of damages.

The Reconciliation of the Endangered Species Act and Michigan's Agriculture Interests

Nichole Rubeck-Schurtz, Department of Fisheries and Wildlife, Michigan State University, 13 Natural Resources Building, East Lansing, MI 48824, USA. (517)353-5135. rubecksc@msu.edu

Kelly F. Millenbah, Department of Fisheries and Wildlife, Michigan State University, 13 Natural Resources Building, East Lansing, MI 48824, USA. (517)353-4802. millenba@msu.edu

Mark Whalon, Department of Entomology, Michigan State University, East Lansing, MI 48824, USA. (517)353-9425. whalon@msu.edu

Larry Olsen, Program Coordinator for IPM MSc, Michigan State University, B18 Food Safety and Toxicology, East Lansing, MI 48824, USA. (517)355-3459. olsenl@msu.edu

Gary Roloff, Department of Fisheries and Wildlife, Michigan State University, 13 Natural Resources Building, East Lansing, MI 48824, USA. rolloff@msu.edu

This project seeks to unite organizations and agencies responsible for and interested in protection of endangered species together with members of the State of Michigan, U.S.A. agricultural community for the purpose of deriving a process for mitigating the effects of an example commodity (cherry) on federally and state listed threatened and endangered species (TES) while allowing for survival of the species and the affected agriculture operation. To our knowledge, this cooperative public/private partnership has never been assembled prior to a crisis. We have developed georeferenced maps that assemble the best information on habitat occurrence for TES as well as georeferenced maps of private cherry orchards. We are applying a pesticide drift model to each orchard location to determine pesticide drift prone areas (PDPA). PDPA's will be integrated with endangered species locations to determine potential impacts of pesticide drift to endangered species habitat. PDPA's will be created for 3 different orchard levels: unit of habitat (1 block within a cherry orchard), individual orchard and group orchard (multiple cherry orchards within 0.3 km of one another). The results of this project will rank habitat by severity of interaction with PDPA and allow us to create a list of TES that have the potential to be impacted when PDPAs intersect their habitat. Local landowners can be targeted to consider various strategies to mitigate their potential agricultural practices on TES habitat including buffer construction, living barriers (hedgerows), orchard removal, and habitat enhancement in adjacent reclaimed areas. The integration of PDPA's with TES habitat information is vital to ensuring well informed policy decision are made allowing for long-term survival of TES and quality commodity production. Initial results of this project will be presented.

Markets and biodiversity conservation: the case of ecotourism in the Autonomous Region of Azores

Madruça, L.; Ferreira dos Santos, R.

New University of Lisboa

Ecological Economics + Environmental Management Centre

Quinta da Torre

2829-516 Caparica

Portugal

It is nowadays acknowledged that economic science has an important contribution to the identification and correction of market failures associated to biodiversity loss. At present, biodiversity components and ecosystem services are seldom recognized or 'captured' in commercial markets and are thus often given too little weight in policy decisions, resulting in unsustainable harvesting practices and discouraging long-term investments in natural resources. This work analyses the potential contribution of the market approach for the conservation and sustainable use of biodiversity, namely in protected areas. The major objective in this context is to present and highlight the challenges and opportunities of market creation for biodiversity resources, to address the long-term financial viability of protected areas and biological diversity conservation.

The concept and importance of biodiversity is presented, as well as the main threats and motives of its loss. The establishment of protected areas, as the cornerstones of most biodiversity conservation strategies, is highlighted. The economic approach to biodiversity conservation is reviewed, namely its value and economic characteristics, the economic causes that lead to its reduction and the potential contribution of economics to its conservation. This work identifies and characterizes several incentive measures, and emphasis is placed on market creation for the conservation and sustainable use of biological resources.

The methodology that has been used consists, first, in analysing the ecotourism market as a financial instrument for protected areas, therefore contributing to the conservation and sustainable use of biodiversity, and second, in testing the ecotourism potential in the Autonomous Region of the Azores, selected as the case-study of this work. The current discussion in this region has been focused on the consolidation of protected areas management, namely on the difficult compatibility of its protection and local socio-economic development, in particular with tourism.

Just like in the rest of the world, the establishment of protected areas in the Azores tends to increase, especially with the implementation of Natura 2000 network. However, these areas, as many other protected areas, are often managed with budgets that are much smaller than needed to ensure that long-term conservation objectives are met. A potential source of additional income may be obtained from tourism, since the archipelago is currently an important tourist destiny, mostly due to its exceptional natural environment, which conservation is crucial for the region's future. Considering the budget limitations that most protected areas face and the important environmental impact that tourism normally has on these areas, we can expect that conflicts in the region between nature conservation and tourism will increase.

Considering, on the one hand that the consolidation of the Azores as a destiny of quality, differentiated and competitive, can be reached if natural resources are preserved, and on the other hand, the need to conciliate the conservation of natural and cultural values with an adequate tourist activity, this study tried to evaluate the potential of ecotourism as a financial source to nature conservation in the region, as well as an instrument to mitigate the conflict between tourism development and nature conservation.

With this purpose, a SWOT analysis, based on interviews to a group of stakeholders involved both in tourism and nature conservation was developed. This analysis allowed to identify a set of potential benefits obtained from ecotourism, as well as the obstacles to its development in the region. A set of recommendations and general considerations was then developed, based on the SWOT analysis, the review of local strategic plans and on the suggested theoretical framework, aiming to reconcile the tourist potential with nature conservation.

The contribution of this study at the methodological level is particularly important due to the suggested framework for problem analysis and policy definition as well as for the application of a SWOT approach based on the qualitative analysis and experience of local stakeholders, which is a first attempt to evaluate ecotourism at the local level.

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The major findings revealed that ecotourism might well be considered as a potential strategy for financing protected areas and conciliate nature conservation and tourism development in the archipelago. In addition, it became apparent that this is only possible if natural resources are preserved, sectoral policies are articulated, investments are made on education of human resources, private initiative and creativity of tourism initiatives are stimulated, and the increase in tourist flows is controlled.

2-5 What makes a conflict a conflict: Facts, interests and values

(Chair: Karl Bruckmeier, *Room 1c/d*)

Wilson, D.C.: The role of science in participatory environmental management

Manfredo, M. J.; **Teel, T.**; Dayer, A.: Understanding the social basis for human-wildlife conflict

Salmi, P.; **Salmi, J.:** Institutional linkages in the conflict between commercial fishing and seal protection – experiences from south-western Finland

Lindley, A.: Animal welfare in conflict resolution

The Role of Science in Participatory Environmental Management

Douglas Clyde Wilson

The Institute for Fisheries Management

Box 104

Hirtshals

Denmark 9850

This paper reports on a study of the attitudes of fisheries scientists involved in fisheries management in Europe. These scientists are experiencing deep frustration in respect to their role within the management system. They experience the management system as changing and misusing the knowledge they produce. What undermines the authority of science in natural resource management is the constant pressure on scientists to produce objectivity out of what they know to be deep uncertainty. When management institutions are understood as a participatory interactive process the central goal of creating a knowledge base for decision making is no longer objective knowledge. The central question shifts to transparent knowledge, because an effective management process requires that participants account to one another about how they know what they say they know. Hence, scientists must still take the lead in developing the knowledge base but must shift the style and approach with which they carry this out.

Understanding the Social Basis for Human-Wildlife Conflict

Michael J. Manfredo, Tara Teel, and Ashley Dayer

Human Dimensions in Natural Resources Unit

Colorado State University

Fort Collins, Colorado, USA

FAX 1-970-491-2255

Phone 1- 970-491-0474

Email manfredo@cnr.colostate.edu

Response to conflict with wildlife is driven largely by human values, and an understanding of these values is a prerequisite to effectively dealing with conflict situations. This presentation will describe a conceptual model, empirical findings, and on-going efforts of a research program directed at understanding people's wildlife value orientations. At the individual level, the model examines enduring value orientations that direct attitudes and norms regarding specific wildlife-related issues and ultimately behaviors related to wildlife and wildlife issues. From the cultural level, values, attitudes and norms are seen to be driven by economic, demographic, and technological factors. Data are presented from a survey conducted in 19 of the United States to illustrate these ideas. The presentation will also describe briefly an international effort underway aimed at developing an approach for describing wildlife value orientations globally.

Institutional linkages in the conflict between commercial fishing and seal protection – experiences from southwestern Finland

Pekka Salmi, Juhani Salmi

Finnish Game and Fisheries Research Institute

pekka.salmi@rktl.fi

Institutions play a central role in the governance of the use of natural resources. It has been suggested that governance institutions rest on three 'pillars': rules, norms, and knowledge. The regulative pillar refers to rules of conduct and enforcement and the normative pillar to the legitimacy of the rules and moral dimensions. The cognitive pillar is connected to how knowledge is assembled and whose knowledge takes precedence, for instance in the fisheries decision-making processes. In my presentation I study the roles of main institutions in a conflict, where increased grey seal population has severely hampered the options for fishing livelihood. Finnish coastal fishers in the Baltic Sea are annoyed, because seals eat fish from the fishing gear, break the gear and scare fish away from the fishing grounds. Fishers call for increased hunting of seals and compensations. The state authorities and fisheries research have participated in the development of seal-proof fishing gear and provided subsidies for investments in the new equipment.

A special attention in my presentation will be given to the linkages between the state and fisher institutions in attempts to mitigate the seal-fisher conflict. Although the fisheries governance is still largely state-driven in Finland, the commercial fisher organizations have strengthened their role in the development projects. Problems have arisen, for instance, in institutional linkages between fishers, scientists and state authorities. Conflict management seems to be hindered by lack of mutual trust and differing values and forms of knowledge. The material of this presentation comprises of personal interviews made with fishers, their representatives and researchers in connection with the problems between fisheries and seal populations in the provinces Varsinais-Suomi and Satakunta, southwestern Finland. This material is supplemented with newspaper articles and other written material.

Animal Welfare in Conflict Resolution

Dr. Arthur Lindley

Royal Society for the Prevention of Cruelty to Animals, science department

Wilberforce Way, Southwater, Horsham, West Sussex RH13 9RS

The FRAP was developed to address conflict between biodiversity conservation and human use of biological resources: but ethical frameworks which govern actions in these areas also overlap, and sometimes conflict, with animal welfare interests. Public interest lies in all three areas, and animal welfare is a matter of growing concern worldwide. Since 1997, the Amsterdam protocol on animal protection and welfare has recognised animals as "sentient beings". Animal welfare interests, as well as human and biodiversity interests, should therefore be considered where conflicts arise.

The resolution of conflicts should, as recommended in the FRAP, be informed by good science. The science of animal welfare, in particular the understanding of sentience across a range of species and the welfare impact of specific management actions, has developed considerably in recent years, and specific evidence, or general principles, are often available to be considered along with evidence relating to the conservation and human benefits of a proposed action. A mechanism for including animal welfare within the FRAP should be considered.

3-1 Case studies of wildlife conflict management

(Chair: Klaus Henle, Room 2)

Ricci, S.; **Salvatori, V.**; Mertens A., Teofili C.: Public opinions and damage prevention in Central Italy

Petrucci-Fonseca, F.; Ribeiro, S.; Espírito-Santo, C.: Improving the coexistence of wolves and man in Portugal

Behrens, V.; Rauschmayer, F.; Wittmer, H.: Managing the cormorant - a case study of failure of a European action plan to minimise the conflicts between Great Cormorants and fisheries

Public opinions and damage prevention in Central Italy

Simone Ricci, Valeria Salvatori, Annette Mertens, Corrado Teofili

LIFE COEX project

Istituto di Ecologia Applicata, Via Cremona 71 – IT 00161 Rome

Damage caused by wolves and bears was assessed in central Italy through data base consultation and direct interviews. The study area includes three National Parks in Abruzzo Region, where the presence of wolves is historical and bears very limited, and the Umbria Region, where wolves are making their come back. Independently but simultaneously, interviews on attitudes of general public were made throughout the study area. A total of 800 interviews were conducted and results show that acceptance of general public for the presence of large predators decreases in areas where they had disappeared in the past. The reason for this might be searched in the fact that the capacities of coexistence are not anymore existing in these areas, especially because in these areas the use of damage prevention methods had been abandoned. As a consequence the amount of damage seems to be higher in areas where the carnivores are expanding, suggesting the local farmers and livestock raisers are not used to the adoption of livestock protection measures. The activities, developed within the frame of the COEX LIFE-Nature project, will be supported in the future with the implementation of damage prevention measures. A potential exists for eco-tourism development, but the way to go seems to be a long one.

Improving the coexistence of wolves and man in Portugal

Francisco Petrucci-Fonseca^{1,2}, Silvia Ribeiro¹ & Clara Espírito-Santo¹

¹ Grupo Lobo, Associação para a Conservação do Lobo e do seu Ecosistema, Faculdade de Ciências da Universidade de Lisboa, Campo Grande, Edifício C2-3º Piso, 1749-016 Lisboa, Portugal

² Centro de Biologia Ambiental / Departamento de Biologia Animal, Faculdade de Ciências da Universidade de Lisboa, Campo Grande, Edifício C2-3º Piso, 1749-016 Lisboa, Portugal

The Portuguese wolf population, originally widely distributed over the country, suffered a significant regression along time, occupying today only 20% of the former area. The wolf population consists of 300 individuals, divided by the river Douro in two subpopulations: the northern one connected with the Spanish population and comprising 90% of the total Portuguese population, and the southern one, isolated from the first one, with just 10% of the wolves. The first sub-population may be considered stable, but that from the south is critically endangered.

The wolf in Portugal is fully protected since 1988, although most of the threats that have caused the decline of the species still are operating: road-kills, poisoning, snaring, habitat destruction and wild prey reduction. Besides the human negative attitude towards wolves, this predator still is illegally persecuted due to damage caused on domestic animals. Portugal has a highly humanized landscape, inadequate agro-forestry practices, and over-hunting, which have caused the regression of the wolves' wild prey (red and roe-deer) with a consequent consumption and damage of domestic prey (horses, cattle, sheep and goats). This has resulted in a long-lasting conflict that is not solved yet.

In the frame of LIFE COEX, a project funded by the European Union, different lines of action are being developed and can be briefly summarized as: (i) monitoring the number of wolves and stray / feral

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dogs; (ii) assessing damage caused by wolves and dogs; (iii) assessing and implementing preventive measures (livestock guarding dogs and electric fences); (iii) analyzing public attitudes towards wolves, and (iv) raising the awareness of the general public and of farmers to the role of the wolf in our rural landscape.

With this presentation we intend to contextualize the actions developed in Portugal in the frame of the overall project, to make an overview of the state-of-art of the man-wolf conflict in Portugal and to describe the results gathered so far and their constraints and possible solutions.

MANAGING THE CORMORANT - A CASE STUDY OF FAILURE OF A EUROPEAN ACTION PLAN TO MINIMISE THE CONFLICTS BETWEEN GREAT CORMORANT AND FISHERIES

Behrens, Vivien*, Felix Rauschmayer and Heidi Wittmer,

UFZ Centre for Environmental Research Leipzig-Halle GmbH, Department of Economics, P.O. Box 500 136, 04301 Leipzig, Germany.

* Vivien.Behrens@ufz.de,

The EU research project FRAP ('Framework for biodiversity Reconciliation Action Plans') deals with conflicts between conservation of large predators and human use of biological resources. Within this project, stakeholder discourses in different European countries were analysed regarding the problem of increasing cormorant numbers and possible solutions to the conflict between fishery and nature protection. Perceptions about the necessity of European-wide management of the Great Cormorant population differed between the countries and the stakeholder groups, and calls for large-scale culling are frequent. This is not astonishing for a fast growing population of a European-wide migrating bird. Another part of the project modelled the European population and the effects of different management scenarios on the population and its viability. The modelling process showed just as well as the outcomes of the REDCAFE project that culling is not an appropriate measure to handle the increase of the population. A mix of summer-culling, controlled by specific monitoring, with the limitation of breeding facilities appears to be the appropriate management scenario. To implement such a policy there is need for an international regulation to be developed. Across the different countries there are several diverging interests in managing the cormorant population: some call for reduction of numbers while others are not willing to take any action if that means culling. Different perceptions of facts, as well as different interests and values make it difficult to define a common protocol on how to handle this issue. Accepting the different cultural, natural and institutional situations seems to be a prerequisite for a common understanding leading to a locally differentiated action plan.

Our presentation will show the efforts that have been undertaken to agree on a European management plan, and give first answers as to why this management plan never has been implemented. It shows why the discussions about establishing a new plan went into a dead-lock, and, based on the modelling, that this non-development might be dangerous for the viability of the cormorant population.

2-1 The role of modelling in conflict resolution

(Chair: Carolyn Fischer, Room 1a/b)

Wätzold, F.; Drechsler, M.; Johst, K.; Bergmann, H.; Settele, J.: A model-based approach for designing cost-effective compensation payments for conservation of endangered species in real landscapes

Behrens, D.A.; **Friedl, B.**; Getzner, M.: Managing a protected area by using the two-edged effect of tourism

Smart, J.C.R.; MacMillan, D.; White, P.C.L.: Using a bio-economic model to develop tradeable culling obligations for red deer management in the Scottish Highlands

A model-based approach for designing cost-effective compensation payments for conservation of endangered species in real landscapes

Frank Wätzold

Department of Economics

UFZ-Centre for Environmental Research Leipzig-Halle GmbH, Germany

Martin Drechsler

Department of Ecological Modelling

UFZ-Centre for Environmental Research Leipzig-Halle GmbH, Germany

Karin Johst

Department of Ecological Modelling

UFZ-Centre for Environmental Research Leipzig-Halle GmbH, Germany

Holger Bergmann

Institute for Agro-Economics

University of Göttingen, Germany

Josef Settele

Department of Community Ecology

UFZ-Centre for Environmental Research Leipzig-Halle GmbH, Germany

An approach is present which integrates an economic and an ecological model for designing cost-effective compensation payments for conservation of endangered species in real landscapes. The approach is used to develop a cost-effective payment scheme for conservation of an endangered butterfly species (*Maculinea teleius*) protected by the EU Habitats Directive in the region of Landau, Germany. Although the results from our case study are specific to the area and species studied, the methodology is general and applicable elsewhere. The results of the case study are used to analyse the effect of metapopulation dynamics on the cost-effectiveness of payment schemes, to compare spatially homogeneous and heterogeneous payments, and to evaluate an existing conservation scheme.

Managing a Protected Area by using the two-edged effect of tourism

Doris A. Behrens^{1,2}, **Birgit Friedl**^{3,*} and **Michael Getzner**²

¹ OR and Dynamical Systems Research Unit (ORDYS), Department of Mathematical Methods in Economics, Vienna University of Technology, Argentinierstrasse 8/105-4, A-1040 Vienna, Austria

² Department of Economics, Alps Adriatic University of Klagenfurt, Universitaetsstrasse 65-67, A-9020 Klagenfurt, Austria
email: {doris.behrens, michael.getzner}@uni-klu.ac.at

³ Department of Economics and Wegener Center for Climate and Global Change, University of Graz, Universitaetsstrasse 15, A-8010 Graz, Austria
email: birgit.friedl@uni-graz.at

* corresponding author

This paper develops a bioeconomic model which frames the interaction of species, their (joint) habitat, and humans in a particular ecosystem. This is accomplished by describing the ecological system by a simple food chain model, augmented by the influence of human activities, i.e. damage and conservation. Visitor demand is modeled as function of the state of the ecosystem. Subsequently, the (additional) conservation budget is endogenously determined by the aggregate willingness to pay to conserve and improve biodiversity and, therefore, depends on the number of visitors, the state of the ecosystem and its change of ecological quality. Thus, a central point of our investigation is the two-edged effect of visitors (stimulating donations to the conservation budget and on the other hand harming the ecosystem). By means of static comparative analysis we determine the effectiveness of different static conservation activities, such as seasonal visitor programs or habitat maintenance measures, for a finite planning horizon.

The bioeconomic model presented here not only allows to evaluate the state of the ecosystem and its real capacity of improvement — it also allows to determine whether or not particular management interventions can be put into reality (in terms of funding). This is the strength of the bioeconomic model as compared, for instance, to a GIS model. Moreover, our bioeconomic model allows to determine “optimal” realistic policies, i.e. policies for which funding is truly available (since it is endogenously determined). The implications of the endogenous budget and its allocation towards endangered species are discussed analytically in a general context, suitable for complex species-habitat-visitor interactions, and underlined by a case study for the rock partridge population in the Mallnitz Tauern Valley (National Park Hohe Tauern, Austria). The parameter values for the spatial conflict (or trade-off) between visitor infrastructure and the habitat of the rock partridge population are based on a GIS model. Visitor demand and conservation budgets are modeled as function of the state of the ecosystem, and are parameterized by data gained from a willingness to pay survey among visitors to the Hohe Tauern National Park.

Using a bio-economic model to develop tradeable culling obligations for red deer management in the Scottish Highlands

James C.R. Smart*, Douglas MacMillan & Piran C. L. White

* University of York,
Environment Department
Heslington,
YO10 5DD York, UK

Successful management of wildlife resources in multiple-user settings requires an understanding of the economic, ecological, environmental and social motivations and constraints underlying resource use. Motivations and constraints typically differ between resource management businesses, giving rise to a broad range of management objectives. Depicting these objectives adequately in interdisciplinary models of resource management can be challenging, but is necessary if such models are to provide a robust mechanism for developing policy instruments to enhance management.

Here we extend a structured bio-economic model of the management of red deer on sporting estates in the Scottish Highlands to encompass the wide range of motivations and constraints elucidated in a recent comprehensive survey of estate management. Businesses depicted range from an estate on which red deer stalking is operated as a profit-maximising commercial business, through estates where commercial stalking is mixed with recreational stalking by the owner and guests, to estates whose reclusive owners show little or no interest in either commercial or recreational stalking.

The extended model is applied to investigate whether red deer management would improve if tradeable culling obligations were introduced among a group of neighbouring estates with diverse management motivations and constraints. Management outcomes are assessed in terms of their ability to enhance economic returns and to increase overall culling levels in order to reduce grazing and trampling damage to fragile habitats.

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Circumstances in which tradeable culling obligations would be likely to effect improvements in management are identified. Our results suggest that the effectiveness of tradeable culling obligations will differ between settings. Particular combinations of management motivations and constraints among businesses managing adjacent land blocks appear problematic.

The modelling techniques developed here could be adapted to investigate the use of other policy instruments for wildlife management in other multi-user, multiple- objective settings.

3-1 Case studies of wildlife conflict management (cont.)

(Chair: Margarida Santos Reis, Room 1c/d)

Polednik, L.; Polednikova, K.; Kranz, A.: The new otter management for Czech Republic in view of findings of FRAP

Kranz, A.; Polednik, L.; Polednikova, K.: Otters versus anglers in Upper Austria: a case study of recent conflict management

Kostkan, V.: Damages and conflicts brought by the beavers in the Czech Republic

The new otter management for Czech Republic in view of findings of FRAP

Polednik, L.*; Polednikova, K.; Kranz, A.

* BOKU Wien

Stodecin 21,

37881 Slaonice

Czech Republic

Otters versus anglers in Upper Austria: a case study of recent conflict management

Kranz, A.; Polednik, L.; Polednikova, K.:

Institut für Wildbiologie – BOKU Wien,

Dep. Of Integrative Biology

Quellengasse 43, 8010 Graz

Damages and conflicts brought by the beavers in the Czech Republic

Vlastimil Kostkan

Department of Ecology and Environmental Sciences, Faculty of Science, Palacký University tř. Svobody 26, 771 46 Olomouc, kost@prfw.upol.cz

European beaver became extinct in the Czech Republic before the first half of the 18th century. The experiments to establish beaver farms in southern Bohemia in the first half of 19th century and subsequent wider re-introductions of beavers, has shown what damage to property beavers can inflict, mostly caused by beaver activity on fishponds.

The development of beaver populations around Europe in the second half of 20th century and new releases in the Czech Republic during the beginning of the nineties has brought about the necessity to prepare a management plan for the fast growing beaver population in the Czech Republic. The management plan recommends:

- the prevention of the spread of the beaver population to areas with a high density of fishponds (Třeboňsko, České Budějovice, Blatná).
- the creation of a technical manual for the protection of dams from beaver activity in other areas.
- the preparation of tools/techniques for the control of the beaver population during the next 10 years.

The first recommendation proposed in the management plan is the prevention of beaver settlement in the main fishpond areas of the Czech Republic due to the high possibility of flooding problems. Also discussed is the possible regulation of an optimal beaver population size and distribution in the Czech Republic.

As the beaver population has increased and expanded in the Czech Republic we have encountered the first problems related to serious beaver damages. There were no serious problems for the first 10-

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15 years after the planned beaver re-introductions. However, since about the year 2000 when the population in specific areas had already covered all the optimal habitats, the beavers started to expand and use new man made habitats.

The first damages related to beaver activity were of a relatively non substantial value. Unfortunately, from around the year 2000 the occurrences and severity of these damages grew dramatically, which provided the impetus to solve this issue over the last 5 years.

In this context, the actual legislation relating to potential settlement of damages caused by beaver activity on constructions like pond dams has proven difficult to implement. There have been proposed changes to the legislation covering the damages, as well as implementing management tools in beaver conservation to reduce beaver damages. These proposed actions will not placate all the possible damages, especially on isolated fishponds and streams, where local floods of land, road and railways could be caused.

The beaver management plan has been prepared for the years 2006 – 2015, and aims to cover the real damages on the basis of existing legislation. The period of the first management plan is a given time for the preparation of real steps and recommendations for beaver population regulation in the Czech Republic, which will hopefully safe-guard the beaver's future.

3-2 From species conservation to conflict management

(Chair: Stefano Moretti, Room 2)

Varjopuro, R.: What to do when conservations is successful? - Attempts to reframe the Finnish seal policy

Bastian, O.: Adopting the precautionary principle in designing and managing Natura 2000 – areas

Rauschmayer, F.; Wittmer, H.; Westerberg, H.: Characterising conflicts caused by successful species conservation

**What to do when conservations is successful?
or Attempts to reframe the Finnish seal policy**

Riku Varjopuro

Finnish Environment Institute, Research Programme for Environmental Policy

riku.varjopuro@ymparisto.fi

A critical state of the grey seals in the Baltic Sea and grim prospects for the population in 1980's lead to stringent conservation with the sole goal of saving the grey seals. Today the population size has exceeded 20 000 and the annual growth rate still is 10% (Helle et al. 2005). Indeed, it seems that the goal set in 1980s will be reached. Recovery of the Baltic Sea grey seals from near extinction shows that nature conservation success stories do exist. This positive development have also had negative consequences, namely on coastal fishing that nowadays suffers from increasing economic losses that seals cause by taking fish from nets and braking fishing gear. The problem has been named as one of the most difficult problems that Finnish coastal fishery has to face (Anon. 2002).

Different mitigation measures have been introduced and tried since late 1990's when the problem escalated. Measures have been initiated by state authorities, but in recent years increasingly also by non-state actors like fishermen's organizations. However, activities have been weakly coordinated and sometimes temporary. In addition, nature conservation legislation and even EU's state aid regulations limit possibilities of full-scale mitigation of the losses. A term 'institutional void' coined by Marten Hajer (e.g. Hajer 2003) captures the present situation very well. Institutional void is a situation in which the 'traditional' state institutions and actors cannot anymore alone manage societal problems. Inability of the state actors stems on one hand from the complexities of problems and on the other hand from an emergence of new powerful and legitimate actors (Hajer 2003). Hajer (2003) argues that this is related to a shift in paradigm of governing the states – a shift from government towards governance. One feature of the institutional void is that such situation is especially susceptible to 'policy reframing', i.e. attempts of defining the policy problems and the respective policy-making in new ways (see e.g. Laws and Rein 2003).

This paper studies various attempts in Finland to reframe 'the Finnish seal policies'. These attempts take place on different governance levels. First, on EU level the Commission restricts possibilities to compensate losses economically. Second, on national level where mitigation measures are introduced, but at the same time seal conservation is actively promoted. Also environmental NGOs have been actively tried to influence policies. Third, on sub-national level there are activities to explicitly reframe the seal policies as one of 'sustainable use of seals as resource' in order to find a balance between conservation and fishing interests. The paper that shows framing of seal policies on different levels work partly on idiosyncratic grounds, but what is more important for finding common grounds, interchanges between all levels take place.

Adopting the precautionary principle in designing and managing Natura 2000 – areas

Olaf Bastian

Saxonian Academy of Science, AG Naturhaushalt
Neustädter Markt 19 (Blockhaus)
01097 Dresden, Germany
Olaf.Bastian@mailbox.tu-dresden.de

More than one decade ago, the EU Member States agreed to establish the coherent European network of protected areas Natura 2000, incl. Special Areas of Conservation (SAC) and Special Protection Areas (SPA), aiming at the maintenance of rare and endangered habitats and species (Regulation 92/43/EWG 21.5.1992). In Natura 2000, the precautionary principle finds expression in the obligation to guarantee favourable conditions for a long-term survival of species and habitats, especially of the priority ones listed in the annexes of this EU-regulation. After describing principles, structure, implementation and procedures of this rather new instrument of nature conservation, on the example of one of the various SAC-areas in Saxony (Germany) chances and problems for biodiversity conservation with particular regard to the situation in an agricultural landscape is outlined. Special attention is paid to the following questions: requirements and actual threats of the target species (the butterfly *Maculinea nausithous*), legal means and economic incentives for suitable measures, the management plan, and the role of different stakeholders.

CHARACTERISING CONFLICTS CAUSED BY SUCCESSFUL SPECIES CONSERVATION

Felix Rauschmayer*, Heidi Wittmer*, and Håkan Westerborg[†]

*: Dept. of Economics; UFZ - Centre for Environmental Research Leipzig-Halle

[†]: Dept. of Marine Ecology; Göteborg University

The re-introduction of large vertebrate species as well as their re-colonisation of ancient habitats can be considered a major success of national and European conservation policy, even if many populations are not yet viable in Western Europe. Such successful species conservation often results in growing conflicts between nature conservation and economically or socially induced uses of natural resources. In order to limit damages to natural resources used by humans, policy goals of reaching and keeping population to a certain limit often are expressed. Therefore, a shift from species conservation to species management is called for. This article will present a frame for assessing examples along the criteria information management, legitimacy, social dynamics and costs, still differentiating each of them. We use this frame for characterising the implications of shifting from species conservation to species management: (1) Information management becomes more demanding, (2) the legal and social frame does usually consider species management only for game species, (3) the continuous and adaptive management requires a high level of interaction between the social groups, and (4) species management is likely to produce higher direct and transaction costs, but also a higher human share in the resource use.

The characterisation of the conflicts in particular considers the actor constellation and the actor interaction in such conflicts as well as the changing requirements towards the institutional set up. As the management of a species requires continuous and adaptive management of the conflict and of the species, participation becomes even more necessary than in species conservation, and participation has to be organised in on-going processes rather than in one-shot participatory events. The developed frame can also be used to select appropriate types of processes, and to clarify institutional requirements on the participating institutions. In many conflicts, it is open which institutional setting can take over the task of arbitrating between interests, monitoring the implementation of decisions, and moderating re-negotiations. The required institutional change implies a changing role of science as well.

2-3 The role of participation in conflict management

(Chair: Anke Fischer, Room 1a/b)

Bruckmeier, K.; Larsen-Hoj, C.: Alternative ways of managing wildlife conflicts – participation, de-centralisation and local management

Samuel, A.: Community development and nature conservation policy in Scotland: Environmental democracy on the Isle of Rum National Nature Reserve (**TALK cancelled**)

Santos, R.; Antunes, P.; Gomes, J.; Madruga, L.; Santos-Reis, M.: Participatory approaches to biodiversity conflict reconciliation: the Sado Estuary Case

Zimmermann, A.; Wilson, S.; Hazarika, N.: Managing human- elephant conflict in Assam: An integrated approach using GIS and community-based mitigation

Alternative ways of managing wildlife conflicts – participation, de-centralisation and local management

Karl Bruckmeier & Christina Høj Larsen (Göteborg University, Human Ecology)

Referring to the Swedish and Finnish case studies of the seal conflict in coastal fishery and its mitigation we discuss several variants of stronger involvement of stakeholders in conflict mitigation for their chances, strengths and weaknesses. All of these approaches differ from centralised, government-dominated and formalised solutions with regard to direct involvement of stakeholders, informal solutions and strengthening of local actors and institutions. Although there is sufficient experience with alternative forms of conflict mitigation in environmental a policy and resource management, the case of the seal-fishery conflict is still one to learn from - for conflicts with limited numbers and small groups of stakeholders. Participation tends to become ineffective when it is not connected with strategies for resource use and species conservation that strengthen local communities, their economy, social system and resource base as a whole and provide better livelihood for the resource user groups.

Community Development and Nature Conservation Policy in Scotland: Environmental Democracy on the Isle of Rum National Nature Reserve

Andrew Samuel

Lecturer in Sociology

University of Abertay Dundee

Dundee DD1 1HG

In Scotland, statutory and voluntary nature conservation agencies manage land for its wilderness qualities and associated biodiversity. Usually this management is ostensibly based on 'impartial' and 'value-free' science. However, the demands that this science-based conservation practice places on the land often conflicts with the more culturally-based management practices of rural communities who live and work on this land.

Under recent post-devolution reforms in Scotland, the reconciliation of conservationists' values and locals' concerns has been given a high priority. Its prioritisation has led to the gradual development of legislation that aims to resolve conflicts, legislation that involves novel participatory mechanisms to enhance public involvement in science-based nature conservation policies. Yet, it remains to be seen whether or not these 'inclusive' and 'co-operative' mechanisms can work in practice.

The aim of this paper is to stimulate debate on the development of new participatory mechanisms like these that are ostensibly orientated towards the practical reconciliation of wild land conservation and community interests. This will be done by describing and analysing these mechanisms and evaluating their success in achieving environmental democracy in Scotland. Illustrating this, the Isle of Rum, a

world-renowned 'wild area' with a community development plan in preparation, will be used as a case study.

Participatory Approaches to Biodiversity Conflict Reconciliation: the Sado Estuary Case

Rui Santos*, Paula Antunes, Jorge Gomes, Luísa Madruga, Margarida Santos-Reis

* New University of Lisboa

DCEA-FCT

Quinta da Torre

2829-516 Caparica

Portugal

In the frame of an EU project that uses fisheries and fish-eating vertebrates to develop a procedural framework for action plans to reconcile conflicts between the conservation of large vertebrates and the use of biological resources (FRAP - EVK-CT-2002-00142), an assessment of the degree of conflict between otter conservation and fish farming, using ecological and socio-economic parameters was initiated in 2003 in the Sado estuary (SW Portugal). This study included a social impact assessment, performed over the relevant stakeholders, an analysis of the legal and institutional basis of the conflict and also an assessment of the existing or potential policy instruments to address the conflict. The results obtained in this assessment are being used to develop a reconciliation action plan, including the proposal of a policy mix to deal with the conflict.

This paper presents a synthesis of the results achieved in the assessment phase, as well as the methodology adopted and the results obtained in a participatory process aiming the development of effective solutions to reconcile this conflict.

The participatory process was based in the organization of several workshops with all relevant stakeholders and meetings with individual or specific groups of stakeholders. A first step of the participatory process consisted in the presentation of the results of the assessment phase, including ecological and socioeconomic relevant data.

The second step consisted in the joint development of report with potential instruments and measures to address the conflict and discussion with the different actors about their applicability in the Sado estuary. After additional work in the development of instruments with higher potential, a third phase took place where meetings with individual stakeholders or groups of stakeholders were used to refine the formulation and assessment of measures and instruments.

The final step consisted in the filtering of the interesting and potentially effective solutions, adopting a multicriteria decision approach and their discussion with the enlarged group of stakeholders.

The most promising approaches identified during the process rely in the promotion of the quality of fish farming production, namely through quality and environment labelling of the fish or environment and/or quality certification of the production and transformation unities. Besides the development of instruments (e.g. certification schemes), also ecological mitigation measures have been discussed with the different actors. Some of these measures will be tested by some fish farmers at their own expenses with the supervision and assessment of the project ecological team.

Managing human- elephant conflict in Assam: An integrated approach using GIS and community-based mitigation

Alexandra ZIMMERMANN^{1*}, Scott WILSON² and Nandita HAZARIKA³

¹ North of England Zoological Society (Chester Zoo) & Wildlife Conservation Research Unit, University of Oxford, UK

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² North of England Zoological Society (Chester Zoo), UK

³ EcoSystems-India, Guwahati, Assam, India

* correspondence to a.zimmermann@chesterzoo.org

The Himalayan foothills of north-eastern India provide one of the last remaining strongholds of the endangered Asian Elephant. In Assam, widespread human-elephant conflict results in the loss of both elephant and human lives, and expert groups have listed this region a top priority for mitigation action. Our paper describes a methodology that combines GIS-based research with community-based conflict management. Patterns and characteristics of crop-raiding are recorded, movements of elephants observed and mapped, and historical habits of elephants reconstructed from local knowledge. In tandem with this, we use a participatory approach of engaging communities to construct and maintain low-cost deterrent methods (e.g. tripwire alarms, chilli, etc). Community members help collect observational data and coordinate the deterrent trials, in the aim that these villages may soon take charge of their elephant problems themselves. Our preliminary results suggest that while elephants appear to follow seasonal routes of migration, their habitual movements are highly sensitive to human interventions. While mitigation of acute conflicts is required to help both elephants and people in the short term, region-wide monitoring is essential for a full understanding of the effects of interventions and to assist local authorities in developing long-term protected area and conflict management policies.

3-1 Case studies of wildlife conflict management, (cont.)

(Chair: Andreas Kranz, Room 1c/d)

Balčiauskas, L.; Balčiauskienė L.: Wolf damage to livestock breeders and humans – historical overview of Lithuania

Szemethy, L.; Markus, M.; Szabo, A.; Gal-Belteki, A.: Role of human conflicts in large carnivore conservation

Odden, J.; Linnell, J.D.C.; Herfidal, I.; Andersen, R.: Lynx depredation on domestic sheep in Norway

Dickman, A.: Assessing conflict between local pastoralists and large carnivores in Rungwa-Ruaha, Tanzania

Wolf damage to livestock breeders and humans – historical overview of Lithuania

Linas Balčiauskas, Laima Balčiauskienė

Institute of Ecology of Vilnius University, Akademijos 2, Vilnius LT-08412, Lithuania (e-mail: linasbal@eko.lt)

Data on the wolf damage in Lithuania are available from 1927–1929 (1500–6000 heads of cattle, 500–2000 dogs, 500 domestic birds), 1956 – approximately 3000 heads of domestic animals, 1958–1959 – less than 400 heads of domestic animals, 1995 – approximately 1000 heads (Bluzma, 1999), 1999–2001 – minimum 400–1000 heads of cattle (Balčiauskas et al, 2002). In 2002–2005 case study in NW Lithuania and 2003–2005 data of the country-wide survey gave ambiguous results. We used data from local administration offices and information from foresters. Damage survey was also targeted to special areas, where the existence of wolf damage was already known. Here we used the help of the county administration. In 1999–2004 we analyzed ca. 200 cases of the wolf damage to the cattle owners. Most attacks on domestic animals occurred in summer and autumn and in places, which were not remote. Cattle were not protected in the daytime and were left in the pasture for a night. Most of the killed animals were cattle, < 1/3 – sheep, < 10% – goats, also dogs. About 40% of kills occurred near villages or in farmsteads. Farmers, who lost their property, are negative to the presence of large carnivores, and they can hinder or ignore EU propagated wolf protection requirements. Though more than 90% of farmers expect direct compensations, most perspective should be compensations toward cattle protection measures or insurance.

Situation is amplified by direct human-wolf contacts. In the 1912–1937 period there were 44 cases of direct human-wolf conflict in Lithuania, some even resulting in human death. In the 1990–2001 period there were 22 cases, all of them related to rabid wolves. Geography of accidents shifted from the east/south Lithuania to the northern/western part of the country – this fact excludes importance of wolf migration from the neighbouring Byelorussian areas.

Role of human conflicts in large carnivore conservation

Szemethy Laszlo, Marta Markus, Adam Szabo, Aniko Gal-Belteki

Saint Stephen University

Wildlife Biology and Game Management

Pater Karoly u. 1

Hungary 2100 Gödöllő

Hungary

During the XXth century number of large carnivores in Europe has decreased their spreading area contains more and more separated patches. Since the last decades the populations seem to be increasing again, but unfortunately their actual territory differs in many respects from the former one.

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Agglomerations have grown highways and motorways have been built, quality and quantity of forests have changed. Increasing populations are forced to adapt the new environment. On the other hand men have to learn how to get on with large carnivores again.

As we managed to make some breeding population in protected areas, we have to provide for them proper space to live. Actually there are areas all over Europe where large carnivores can live in safe, and breed successfully. But everybody knows the problem, when you can not protect the protected animal "outside the fence". Large carnivores use big areas as territories and need more areas as corridors between territories. These corridors are generally not covered by Natura 2000 or any other protection moreover, often cross country-borders, which makes the problem more complicated.

These are the areas where conflicts are the most frequent. In the same time the functioning of these corridors have great influence to the stability and/or the successfulness of a spreading population. There are two basic methods used in Europe to overcome large carnivore-human conflicts: compensation systems, and support systems. The basic difference between the two systems is the message they carry. Compensation system has bad message: the protected animal cause damages to the owner, and the more their losses are the more money he gets. Whereas the support system has good message: it gives a gift to the owner in return for tolerating the existence of the large carnivore.

In our work we compare many respects of these two systems by a mail-questionnaire survey. We wonder if this basic difference has its influence to the effectiveness on long term. By an effective conflict solution, and bit more prudent management the help and agree of local people could be gained, which is really needed to be able to realize long term conservation of the whole European large carnivore population.

LYNX DEPREDATION ON DOMESTIC SHEEP IN NORWAY

JOHN ODDEN, Norwegian Institute for Nature Research, Tungasletta 2, N-7485 Trondheim, Norway

JOHN D. C. LINNELL, Norwegian Institute for Nature Research, Tungasletta 2, N-7485 Trondheim, Norway

IVAR HERFINDAL, Department of Zoology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway

REIDAR ANDERSEN, Department of Zoology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway, and Norwegian Institute for Nature Research, Tungasletta 2, N-7005 Trondheim, Norway

Depredation on sheep is a major obstacle for successful conservation of lynx (*Lynx lynx*) in the multi-use landscapes of Europe, and the conflict is higher in Norway compared to any other European country. Sheep are generally allowed to graze with little supervision from the owner, and the last 10 years up to 10.000 sheep have been compensated as being killed by lynx annually. From 1994 to 1999 we studied depredation rates on sheep, foraging patch selection and diet of radio-collared lynx in southeastern Norway. Density of free-ranging sheep was eight times the density of roe deer, but sheep only constituted about 20% of the digestible biomass in lynx diet during summer. Predation rates on sheep were high (ca. 20 sheep / 100 nights / lynx), all flocks experienced predation annually, surplus killing was widespread, and adult males had consistently higher predation rates on sheep than other classes of lynx. Male lynx move more and therefore encounter more sheep, but also kill more sheep per encounter than do females. We found no evidence for the existence of individuals that killed more sheep per encounter. The probability of a lynx using an area increased with increasing roe deer density. In contrast, lynx avoided sheep grazing areas. This pattern was found both in summer and winter, and for both sexes. Furthermore we tested if roe deer density within grazing areas affected the mortality rates of free-ranging sheep, and we found higher mortality rates of lambs in areas associated with higher roe deer density. This evidence strongly suggests that livestock are mainly killed by lynx incidentally when encountered during other activities rather than being actively selected. Therefore, any management practice, such as concentrating livestock into small patches or less preferred habitats may help to significantly reduce depredation.

Assessing conflict between local pastoralists and large carnivores in Rungwa-Ruaha, Tanzania

Amy J. Dickman

Zoological Society of London

Institute of Zoology

Regents Park

London

NWI 4RY, UK

Human-wildlife conflict is an issue of pressing conservation concern, particularly when it involves threatened species, and accurately identifying the causes of such conflict is fundamental to developing effective resolution strategies. This study investigated attitudes of Maasai and Barabaig pastoralists towards wildlife in central Tanzania, with particular emphasis on five focal carnivore species. Pastoralists reported significant problems with wild animals, particularly carnivores, and results suggested that low levels of retaliatory killing were predominantly due to circumstantial constraints rather than innate tolerance. Number of stock owned and proportion of losses attributed to predators were the most important determinants of conflict examined, with some inter-tribal variation in tolerance. Successful conflict mitigation will depend upon reducing depredation through improved husbandry and improving the cost-benefit ratio of wildlife presence, thereby increasing pastoralist wealth and providing direct, relevant benefits from conservation. Implementing effective conflict resolution schemes should have significant benefits for both human and wildlife populations, and possible schemes are discussed.