Human–wildlife interactions

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The nature of wildlife management throughout the world is changing. The increase in the world's human population has been accompanied by a rapid expansion of agricultural and urban areas and infrastructures, especially road and railway networks. Worldwide, wildlife habitats are being transformed and fragmented by human activities, and the behavior of several species has changed as a result of human activities. Some species have adapted easily to urban or peri–urban habitats and take advantage of the new resources available. These data provide the context for why human–wildlife interactions are increasing.

At the 30th International Union of Game Biologists Congress held in Barcelona in early September 2011, in addition to two plenary presentations, 52 authors from 12 different countries and three continents presented 15 papers in the Interactions of Humans and Wildlife Session, three of which are included in this volume. To some extent, all the papers reflected the inherent difficulty in solving the complex problems caused either by rapidly increasing species that begin to inhabit urban and agricultural areas in numbers not seen previously (*e.g.* coyotes, *Canis latrans*, inhabiting big cities; wild boar, *Sus scrofa*, across western Europe; wood pigeons, *Columba palumbus*, in France), or species whose populations are threatened by human activities (*e.g.*, Eurasian Lynx, *Lynx lynx,* in the Czech Republic). Some papers addressed the contentious issue of predator control (*e.g.*, gamebirds in Great Britain), while others presented data regarding how human activities influenced animal behavior (*e.g.*, pink footed geese, *Anser brachyrhynchus*; and red deer, *Cervus elaphus,* in Germany).

The papers presented at the congress show how human activities affect the distributions and dynamics of wildlife populations and also change the behavior of some species. Wildlife causes social and economic conflicts by damaging agricultural and forest resources, bringing about traffic collisions, and creating problems for residents in urban areas; while many are increasingly distant from nature and may not accept the presence of wildlife others may actively encourage the presence of wild animals.

The first paper in this volume, by Cahill et al. (2012), analyzes the management challenges of the increasing abundance of wild boar in the peri–urban area of Barcelona. This conflict has arisen in other large cities in Europe and elsewhere. The presence of the species causes problems for many residents, to such an extent that it is considered a pest in these areas. Wild boar habituation has not only been facilitated by population expansion, but also by the attitudes of some citizens who encourage their presence by direct feeding. This leads to wild boar behavior modification and also promotes an increase in the fertility rate of habituated females, which are significantly heavier than non–habituated females. Public attitudes regarding the species and harvesting methods (at present most specimens are removed by live capture and subsequently sacrificed) are highlighted as one of the key factors in the management of the conflict.

The second paper provides an example of how the distribution of irrigated croplands influences wild boar roadkills in NW Spain (Colino–Rabanal et al., 2012). By modeling the spatial distribution of wild boar collisions with vehicles and using generalized additive models based on GIS, the authors show that the number of roadkills is higher in maize croplands than in forested areas. This factor is the main explanatory variable in the model. The paper provides an excellent example of how the synergies of diverse human elements in the landscape (maize croplands and roads in this case) affect the location and dimensions of these types of conflicts.

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The third and final paper, by Belotti et al. (2012), addresses the effects of tourism on Eurasian lynx movements and prey usage at Šumava National Park in the Czech Republic. The monitoring of 5 GPS–collared lynxes and analyses of data regarding habitat features suggests that human disturbance (proximity of roads and tourist trails) can modify the presence of lynxes during the day close to the site where they have hidden a prey item, such as an ungulate, that can provide them with food for several days. In such cases, adequate management of tourism development must involve a commitment to species conservation.

The analyses and understanding of all these phenomena and the design of successful wildlife management strategies and techniques used to mitigate the conflicts require a good knowledge base that considers information both about wildlife and human attitudes. The papers presented stress the importance of spatial analyses of the interactions and their relationship with landscape features and the location of human activities. Species distribution and abundance are related to important habitat variables such as provision of shelter, food, comfortable spaces, and an appropriate climate. Therefore, it is essential to analyze these data adequately to predict where conflicts are most likely to arise and to design successful mitigation strategies. The second key factor for adequate management of human–wildlife interactions is to monitor system change. An analysis of the variety of data on population dynamics, hunting, wildlife collisions, and wildlife presence in urban areas would provide a basis for adaptive management. In this respect, in the plenary session, Steve Redpath mentioned the importance of the wildlife biologist's attitude when interpreting and drawing conclusions from recorded data and stressed the importance of conducting clear, relevant, and transparent science for participants involved in the management decision process, which often involves a high number of stakeholders.

All of the papers addressing the problems associated with human wildlife interactions were characterized by a common theme. Regardless of the specific nature of the problem, the public was generally divided on how the problem should be addressed. A particularly sensitive theme was that of population control methods, especially when conflicts are located in peri–urban areas. Several presenters acknowledged that public participation was necessary if a solution was to be reached. Some suggested, as have other authors (Heydon et al., 2010), that a legislative framework may be needed to reconcile human and wildlife interests. However, each problem that was presented appeared to involve multiple stakeholders with different opinions. Solving these kinds of problems is not trivial. Social factors strongly influence perceptions of human–wildlife conflicts but the methods used to mitigate these conflicts often take into account technical aspects but not people's attitudes. A new, more innovative and interdisciplinary approach to mitigation is needed to allow us 'to move from conflict towards coexistence' (Dickman, 2010). Other authors also mentioned the importance of planning interventions that optimize the participation of experts, policy makers, and affected communities and include the explicit, systematic, and participatory evaluation of the costs and benefits of alternative interventions (Treves et al., 2009).

One technique that has been used to solve problems like these is termed Structured Decision Making (SDM). This technique was developed by the U.S. Geological Survey and the U.S. Fish and Wildlife Service. As described by Runge et al. (2009), the process is 'a formal application of common sense for situations too complex for the informal use of common sense', and provides a rational framework and techniques to aid in prescriptive decision making. Fundamentally, the process entails defining a problem, deciding upon the objectives, considering the alternative actions and the consequences for each, using the available science to develop a model (the plan), and then making the decision how to implement (Runge et al., 2009). Although complex, SDM uses a facilitator to guide stakeholders through the process to reach a mutually agreed–upon plan of action.

It is clear that human–wildlife interactions are inherently complex because many stakeholders are usually involved. A rational approach that incorporates all interested parties would seem to be a productive way of solving these kinds of problems.

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