

Opinion

Conflictive management of small mammals considered as pests: A long way to evidence-based policy making

Catarina FERREIRA^{1,2*}, Miguel DELIBES-MATEOS¹

¹ Instituto de Investigación en Recursos Cinegéticos, IREC (CSIC-UCLM-JCCM), Ronda de Toledo s/n, E-13071, Ciudad Real, SPAIN

² CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Campus Agrário de Vairão, 4485-661, Vairão, PORTUGAL

Abstract This paper discusses the controversial management decisions made by policy-makers worldwide regarding poisoning campaigns aimed to control small mammal populations, often considered harmful economic pests. Aside from considerations regarding the biological consequences of these campaigns, we argue that when society rejects all values of science and expertise then only badly supported and negligent decisions will be made about conservation and management issues. The extermination of small mammal species, some of which play crucial ecological roles in several regions of the world, is just an example of such discredit and misinformation. Without a strong commitment towards evidence-based policy-making, economic investments in research and development could be entirely compromised [*Current Zoology* 58 (2): 353–357, 2012].

Keywords Evidence-based policy, Pest management, Poisoning campaigns, Small mammals

1 Introduction

“With great power comes great responsibility” is a famous quote from the wise elderly to the young hero. Although still a long way for scientific evidence on the existence of Spiderman, the statement brings us to an earthly question: can power and responsibility actually coexist outside comics? Ideally policy and science should be complementary and a progressive society should be settled on rational decision making rather than ideologically-driven politics. Nowadays efforts to bridge the gap between these two fields are considerable, namely through the increasing attempts to consolidate conservation evidence in formats rapidly perceptible and available to the general public (www.conservationevidence.com, www.environmentalevidence.org). Despite this laborious task, science is still too often the easy target of public discredit as a way to sustain controversial political decisions (McNeely, 1999), a common reality scientists need to face and learn to overcome, through efforts beyond the mere translation of scientific evidence to politicians. In this sense, the management process of some species remains unsupported by scientific evidence. This can be a consequence of perceived popular demands, driven by social factors

that strongly influence perceptions of human–wildlife conflict (Dickman, 2010). Additionally, some species are not considered “charismatic” by society and hence benefit from little research funding (Martín-López et al., 2009). Furthermore, many of these species are – or are believed to be – responsible for strong economic impacts, and therefore their management is driven by economic motivations (Singleton et al., 1999, 2003). Clearly, social perceptions (and pressures), as well as economic interests, can too often serve as the main catalyst for poor political decision making (e.g. García-Llorente et al., 2008). In this paper, we give examples of political management decisions directed at eradicating species of small mammals that have been based on social pressures and/or economic interests rather than on sound scientific evidence, jeopardizing biodiversity conservation in several ecosystems worldwide.

2 Examples of Conflictive Management of Small Mammals Considered as Pests

In agricultural areas of north-western Spain the regional government officially declared the existence of a common vole *Microtus arvalis* plague in early 2007 and,

Received June 08, 2011; accepted Aug. 08, 2011.

* Corresponding author. E-mail: catferreira@gmail.com

© 2012 *Current Zoology*

with the support of a self-assembled *ad-hoc* “Plague Scientific Committee” (PSC), promoted three extensive poisoning campaigns aimed at its control (Olea et al., 2009). By the end of 2007 and € 24 million later, the plague was declared effectively controlled as crop damage had ceased. However, another group of scientists who were working in the region during that same year, published a study suggesting that 2/3 of the animals found dead in the area had perished due to these poisoning campaigns supporting the belief that they had been negligent, aside from ineffective, and highly lethal to non-target species, some of conservation concern (Olea et al., 2009). Moreover, this rodenticide treatment could have acted synergistically to increase the spread of pathogens, such as *Francisella tularensis*, which could have been the responsible for a human tularaemia outbreak that occurred in the same region in 2007 (Vidal et al., 2009). The ineffectiveness of these poisoning campaigns was attested by the fact that most vole populations had already collapsed prior to the last poisoning campaign, which corroborated the perception that these campaigns were more politically driven than clearly evidence-based (Olea et al., 2009). Despite the transparency of these results, normally assured by journal peer-reviewing, regional environmental authorities claimed that the findings of Olea et al. (2009) were false, and questioned their scientific grounds through direct comparison with a technical report developed by the PSC which stated that none of the animals they found dead in the field had been affected by the toxic rodenticides¹. Divergent views of the problem aside, the scientific method exists to promote objectivity and reliability, whilst measures of error are used to account for its inaccuracy, which is why despite its flaws, science is considered a discipline that grows on open debate among those with experience, providing a better grounding for society precisely, and only, because its findings are provisional (Collins, 2009). This was not recognized by the PSC and hence its view prevailed.

The common vole plague in Spain is not a unique situation because the use of poisoning campaigns to control small mammal populations, independently of the ecological damages inflicted, is widespread in the world (Berny, 2007). Another flagrant example occurs in Asia, where for decades many native small mammals that coexist in grassland ecosystems have been the target of

far-reaching and expensive poisoning campaigns because of their declared pest status (Singleton et al., 1999; 2003; Smith et al., 2006). In particular, the control of Brandt's vole *Lasiopodomys brandtii* has involved expenditures of about US\$ 100 million in some years in China (Laurie, 2005) and US\$ 300,000 to US\$ 800,000 per year in Mongolia (Zahler et al., 2004). Similarly, bolstered by a huge input of funding (7.5 billion Yuan, equivalent to US\$ 966 million at the time of funding; Ma et al., 2000), plateau pikas *Ochotona curzoniae* have been poisoned over an estimated 320,000 km² in Qinghai, China (Smith et al., 2006). Again, the application of these poisoning campaigns has been usually driven by social and economic interests rather than by scientific evidence. In fact, the studies performed on the roles played by native small mammals on the grasslands have shown that, instead of plain pests, these species actually represent major keystone species and/or ecosystem engineers (Smith et al., 2006), hence bearing high conservation value.

The persecution of small mammals in Asia closely resembles the situation of prairie dogs (*Cynomys* spp.) in North America. Historically, prairie dogs have been eradicated by landowners, farmers and managers, who usually believe that they have a negative impact on agriculture, damage natural habitats, and compete for forage that could otherwise be utilized by livestock. The management of prairie dogs as pests is very conflictive because it has caused a significant reduction in their distribution and abundance (e.g. a 85% reduction in prairie dog numbers was achieved in Montana after a treatment with zinc phosphide; Knowles, 1986), despite playing a major ecological role in prairie grassland ecosystems in North America (Kotliar et al., 1999). Surprisingly, economic damages caused by prairie dogs have been rarely documented in the scientific literature (Delibes-Mateos et al., 2011); even in such cases where damages were reported these were not extremely high (Derner et al., 2006). This is often one of the main drawbacks of economically supported political decisions: the lack of scientific evidence about economical losses due to wildlife damage. For example, in the case of the plateau pikas in China this information was inexistent and poisoning campaigns were implemented without the true knowledge of the extent of economical losses (Delibes-Mateos et al., 2011).

¹ <http://www.jcyl.es/scsiau/Satellite/up/es/Institucional/Page/PlantillaDetalleContenido/1132645327945/Comunicacion/1237541531410/1132645327945?asm=jcyl>

3 General Considerations

Aside from considerations such as the adequacy of small mammal poisoning campaigns or the consequences of its misuse, other important general questions rising from this controversy should be depicted. Can policy makers simply reject scientific data, as with the common vole plague in Spain? Can they neglect scientific evidence as it is recurrent in Asia and North America where keystone species are persecuted as pests? Is the peer-review system of scientific journals not enough safeguard anymore of rigorous and high-quality data on which to base management decisions? In the regions of the world where these human-wildlife conflicts are so negatively perceived and people are so eager for actions, what can be done to mitigate the effects of bad political decisions despite the existence of opposed scientific evidence? The potential for the existence of complementary relationships between research and policy outcomes in all the cases presented here is unquestionable, since this is the kind of “hard” evidence that provides the basis to objective and neutral policy making beyond political ideology (Marston and Watts, 2003). The question we are raising is where should the scientific community stand when policy decisions are not based on neutral science, when they are instead based on unsubstantiated empirical knowledge and neglect peer-reviewed science? Our intention is not to argue for a value-free science, because this seldom occurs as confirmed by several examples worldwide; e.g. the wild and farmed salmon conflict in Norway (Liu et al., 2011) or invasive species management in Cape Horn, Chile (Schuttler et al., 2011). Instead, we do wish to reinforce that pluralism and diversity in science will always be at least as valuable as scientific freedom (*sensus* Wilholt, 2010), as long as it follows the same standards. In our opinion any reluctance on evidence-based science should be grounded on equally rigorous scientific criteria, independently of the social acceptance level of a species or its economic interest. In this sense, in the case of the common vole plague in Spain, the PSC’s obligation, as a scientific consultant, was to have prepared a reply to Olea et al. (2009) in a scientific journal, presenting their gathered data to refute these findings, in-

stead of merely denying them in technical reports or local newspapers (e.g. http://www.nortecastilla.es/2009/03/26/castilla_leon/iniciativas-junta-contra-roedores-20090326.html). In our view, public deliberation and debate on science should be conducted on the basis of exemption and equality of criteria, provided by evidence presented under the same standards and certainly not based on rhetorical arguments (Boertje et al. 2010).

The intricate web of power and responsibility must involve scientists whose role is to teach fallibility and not to demonstrate absolute truth (Collins, 2009). The different time scales on which researchers and policy makers are working is a balance between long-term societal gains and short-term need to fulfill public demands (Mulgan, 2003²), which must be stabilized by a higher investment in research and the rethinking of policy processes (Nutley, 2003³). It is unreasonable that a demand for urgent scientific knowledge rises when a species is coming to a dead end (especially if the causes are anthropogenic), but in contrast we are ready to overlook the basic ecology of a species (e.g. population cycles in rodents) and to abdicate of a deeper understanding of population dynamics when species are still (thought to be) abundant. Ultimately, society is the big loser in such conflicts, as it does not benefit from either short-sighted decisions of policy-makers or the inability of scientists to clearly translate scientific findings (Smith et al., 2006).

Nowadays, Mongolia seems to have refrained widespread poisoning after thoroughly assessing costs and benefits of this practice, as well as alternative measures for managing the Mongolian pastures sustainably (Smith et al., 2006). Spain also showed a clear intention of fighting this problem since the latest Spanish government at the beginning of its mandate had launched a multifaceted program to increase research funding in 2004 from 1.1% of its GDP to 2% by 2010, exceeding the European Union average of 1.8% (see the editorial in *Nature* 446:7134). The way small mammal cycles have been dealt with over the past years reveals how such an economic investment in research and development could be entirely compromised when society rejects all values of science and expertise.

In conclusion, we would like to call to attention the

² Mulgan G, 2003. Facing the future. Paper presented at the Facing the Future Conference, Canberra, Australia 23–24 April (<http://209.197.113.29/pdf/MulganBackgroundpaperFacingFutureConference.pdf>) Accessed 15 Dec 2010.

³ Nutley S, 2003. Bridging the policy/research divide: reflections and lessons from the UK. Paper presented at the National Institute of Governance Conference; “Facing the Future: Engaging stakeholders and citizens in developing public policy”, Canberra, Australia 23–24 April (<http://www.treasury.govt.nz/academiclinkages/nutley/tgls-nutley.pdf>) Accessed 15 Dec 2010.

importance of combining ecological studies with social and economical sciences (Robinson, 2006) since solving conflicts relies on the junction of these disciplines (Dickman, 2010). In the case of keystone species of recognized conservation value both local social and economic interests should be safeguarded (Delibes-Mateos et al., 2011). However, in most cases win-win solutions are difficult to find, and trade-offs and hard choices need to be made (McShane et al., 2011). As conservation biologists, we feel that although economic and social sciences are crucial to support management decisions, in the case of small mammals' management, their sustainable conservation should certainly prevail and not rely solely on economical issues.

Acknowledgments C. Ferreira is supported by a PhD grant (Ref. SFRH/BD/22084/2005) funded by the Fundação para a Ciência e Tecnologia of the Ministério da Ciência, Tecnologia e Ensino Superior, Portuguese government and M. Delibes-Mateos was supported by a Juan de la Cierva research contract, awarded by the Spanish Ministry of Science and Innovation and the European Social Fund. Special thanks go to Dr. Zhi-Yun Jia, Dr. N. Polunin and two anonymous reviewers for helpful comments on previous versions of this manuscript, and to Dr. Adriana Ford-Thompson for reviewing the English.

References

- Berny P, 2007. Pesticides and the intoxication of wild animals. *Journal of Veterinary Pharmacology Therapy* 30:93–100.
- Boertje RD, Keech MA, Paragi TF, 2010. Science and values influencing predator control for Alaska Moose management. *Journal of Wildlife Management* 74(5): 917–928.
- Collins H, 2009. We cannot live by scepticism alone. *Nature* 458: 30–31.
- Delibes-Mateos M, Smith AT, Slobodchikoff C, Swenson JE, 2011. The paradox of keystone species persecuted as pests: A call for the conservation of abundant small mammals in their native range. *Biological Conservation* 144:1335–1346.
- Derner JD, Detling JK, Antolin MF, 2006. Are livestock weight gains affected by prairie dogs? *Frontiers in Ecology and Environment* 4:459–464.
- Dickman AJ, 2010. Complexities of conflict: The importance of considering social factors for effectively resolving human-wildlife conflict. *Animal Conservation* 13:458–466.
- García-Llorente M, Martín-López B, González JA, Alcorlo P, Montes C, 2008. Social perceptions of the impacts and benefits of invasive alien species: Implications for management. *Biological Conservation* 141:2969–2983.
- Knowles CJ, 1986. Population recovery of black-tailed prairie dogs following control with zinc phosphide. *Journal of Rangeland Management* 39:249–251.
- Kotliar N, Baker W, Whicker AD, Plum AD, 1999. A critical review of assumptions about the prairie dog as a keystone species. *Environmental Management* 24:177–192.
- Laurie A 2005. Brandt's vole management in China. In: WWF Mongolia ed. *Proceedings of the International Seminar on Brandt's Vole Management*. Ulaanbaatar, Mongolia: WWF-Mongolia, 78–87.
- Liu Y, Olausson JO, Skonhott A, 2011. Wild and farmed salmon in Norway: A review. *Marine Policy* 35: 413–418.
- Ma Y, Lang B, Shi D, Wang Q, 2000. Establishing pratacultural system: A strategy for rehabilitation of "black soil type" deteriorated grassland on the Qinghai-Tibetan Plateau. In: Zheng D ed. *Formation and Evolution, Environmental Changes and Sustainable Development on the Tibetan Plateau*. Beijing: Academy Press, 339–344.
- Marston G, Watts R, 2003. Tampering with the evidence: A critical appraisal of evidence-based policy making. *The Drawing Board: An Australian Review of Public Affairs* 3:143–163.
- Martín-López B, Montes C, Ramirez L, Benayas J, 2009. What drives policy decision-making related to species conservation? *Biological Conservation* 142:1370–1380
- McNeely JA, 1999. Strange bedfellows: Why science and policy don't mesh and what can be done about it. In: Cracraft J, Grifo FT ed. *The Living Planet in Crisis*. New York: Columbia University Press, 275–286.
- McShane TO, Hirsch PD, Trung TC, Songorwa AN, Kinzig A et al., 2011. Hard choices: Making tradeoffs between biodiversity conservation and human well-being. *Biological Conservation* 144: 966–972.
- Olea PP, Sánchez-Barbudo IS, Viñuela J, Barja I, Mateos-Tomás P et al., 2009. Lack of scientific evidence and precautionary principle in massive release of rodenticides threatens biodiversity: Old lessons need new reflections. *Environmental Conservation* 36: 1–4.
- Robinson JG, 2006. Conservation biology and real-world conservation. *Conservation Biology* 20:658–669.
- Singleton GR, Hinds LA, Leirs H, Zhang Z, 1999. *Ecologically-based Rodent Management*. Canberra, Australia: Australian Centre for International Agricultural Research.
- Singleton GR, Hinds LA, Krebs CJ, Spratt KM, 2003. *Rats, Mice, and People: Rodent Biology and Management*. Canberra, Australia: Australian Centre for International Agricultural Research.
- Smith AT, Zahler P, Hinds LA, 2006. Ineffective and unsustainable poisoning of native small mammals in temperate Asia: A classic case of the science-policy divide. In: McNeely JA, McCarthy TM, Smith A, Olsvig-Whittaker L, Wikramanayake ED ed. *Conservation Biology in Asia*. Himalaya, Kathmandu, Nepal: Society for Conservation Biology Asia Section and Resources, 285–293.
- Vidal D, Alzaga V, Luque-Larena JJ, Mateo R, Arroyo R et al., 2009. Possible interaction between a rodenticide treatment and

- a pathogen in common vole *Microtus arvalis* during a population peak. *Science of the Total Environment* 408:267–271.
- Wilholt T, 2010. Scientific freedom: Its grounds and their limitations. *Studies in History and Philosophy of Science* 41:174–181.
- Zahler P, Dolgormaa L, Hinds LA, Smith AT, 2004. The management of Brandt's vole in Mongolia: Towards an ecologically-based means of control. *Mongolian Journal of Biological Sciences* 2(2):51–55.