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CHAPTER 20

INEFFECTIVE AND UNSUSTAINABLE POISONING OF NATIVE SMALL MAMMALS IN TEMPERATE ASIA: A CLASSIC CASE OF THE SCIENCE-POLICY DIVIDE

By

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ABSTRACT

Across the grasslands of temperate Asia, native small mammals are frequently considered pests and subjected to massive control (poisoning) programs by policy-makers. Conservation scientists, however, frequently consider these animals to be indicators rather than the cause of rangeland degradation, while also being keystone species for biodiversity – poisoning is followed by a cascading loss of other species dependent upon them and a corresponding loss of many positive ecosystem functions. Why has the conservation science view not prevailed? Why are many poisoning programs receiving huge government subsidies? We contrast the disconnect between policy-makers and managers with the views held by conservation scientists and urge a common ground so that scientific studies can better inform policy and support overarching goals to preserve biodiversity on Asia's grasslands

Key Words: Biodiversity conservation, Control, Mammal, Poisoning, Policy

INTRODUCTION

Policy and science are two engines of a modern civil society, and ideally they are complementary and together contribute to the well-being of people. Policy-makers identify and define significant issues, and ultimately make decisions about them. Along the way they may ask for assistance from scientists to give a neutral analysis of the issue in question. Thus scientific objectivity can inform policy-makers and help them avoid decisions that will be counter-productive or a detriment to society. In the real world, however, this process is flawed (McNeely 1999; Sarawitz 2004). The failure of policy-makers and scientists to collaborate successfully can be traced to the distinct differences in these two ways of thinking. Scientists highlight the uncertainty in their findings, whereas policy-makers must make clear "yes-no" decisions and may be impatient with the reasoned statistical analyses presented to them by scientists. Scientists may be driven exclusively by intellectual curiosity, while policy-makers feel that they are on the front lines and must act in given situations whether they want to or not. Finally, policy makers are influenced by and must answer to a host of stakeholders, including those with long-held if sometimes erroneous opinions related to the issues under consideration, as well as those with economic incentives to maintain the status quo. Ultimately, there is often a communications gap between the

subcultures of the scientific and policy-making communities. Society is the big loser in such conflicts, as it does not benefit from shortsighted or mistaken decisions of policy-makers or the inability of scientists to articulate clearly the parameters surrounding an important issue. When the issue concerns conservation, the long-term sustainability of the land, and the human communities and biodiversity that depend on these lands, may be at risk.

POISONING OF NATIVE SMALL MAMMALS

A classic example of the communication gap between scientists and policy-makers is the widespread poisoning of native small mammals that live on the grasslands of temperate Asia. The targets of poisoning include the plateau pika (*Ochotona curzoniae*), Daurian pika (*O. dauurica*), mole-rats (*Eospalax* and *Myospalax*), Brandt's vole (*Lasiopodomys brandtii*), Przewalski's steppe vole (*Eolagurus prezewalskii*), yellow steppe vole (*E. luteus*), great gerbil (*Rhombomys opimus*), and Mongolian gerbil (*Meriones unguiculatus*)(Zhang *et al.* 2003a). These animals have lived for thousands if not millions of years in the habitats they now occupy, and they are part of a complex, closely adapted and interwoven natural community. In many cases they have coexisted with human pastoralist communities for over 4,000 years (Miller 1998). However, in the past few decades these animals have been labeled as "pests" and poisoned under the assumption that recent land degradation is caused by overgrazing from these small mammals. These poisoning campaigns are far-reaching and expensive. The plateau pika has been cumulatively poisoned over 208,000 km^2 in Qinghai province alone (Fan *et al.* 1999), and the Brandt's vole has been poisoned across its entire range in Mongolia (WWF 2005). Control of Brandt's vole has involved expenditures of about US$100 million in some years in China (Laurie 2005), and US$300,000 to 800,000 per year in Mongolia (Zahler *et al.* 2004). The Chinese government has recently allocated US$934 million for management of the newly formed Sanjiangyuan National Nature Reserve (SNNR) in Qinghai province, and a substantial portion of these funds are earmarked to find more effective poisons and to control plateau pikas in the reserve (Qinghai News 2005; Ma 2006).

The justification for the widespread poisoning of small mammals in temperate Asian grasslands is that these animals are pests. For example, in a recent comprehensive review of sustainable management on the alpine meadows of the Tibetan plateau, plateau pikas and plateau zokors (*Eospalax fontanierii*) are labeled "pests" at their first mention (Wang & Fu 2004). The summary document of the recent European Union Qinghai Livestock Development Project (van Wageningen & Sa 2001) repeatedly refers to pikas as pests. One of the primary activities undertaken by the SNNR management authority is "control of the rat threat" (Qinghai News 2005). A comprehensive review of small mammals on the grasslands of China similarly begins by referring to native species as "pests" that "infest" the grasslands (Zhang *et al.* 2003a).

In these discussions the term "pest" is undefined. Managers and policy-makers observe high densities of pikas, mole rats or voles and immediately draw a connection between these animals and the grassland that they perceive as damaged. Faced with making a management decision to improve the grasslands, the recommendation is often the widespread poisoning of small mammals over huge swaths of land. Intermediate steps that would be considered in a thorough scientific analysis of this situation, such as research to determine the accuracy of these assumptions, are bypassed. The scientific community has been involved primarily in exercises on how best to control these species, rather than to determine the causes of the degraded grassland or the effect on the grassland ecosystem of widespread poisoning. Thus, a management activity that has never been subject to appropriate scientific scrutiny or testing has been applied, at enormous expense, to thousands of hectares of grassland in temperate Asia. This is an example of management that has circumvented the ideal of informed decision-making based on communication between policy-makers and scientists.

NATIVE SMALL MAMMALS AS KEYSTONE SPECIES

On the other hand, scientific analyses of the roles played by native small mammals on the grasslands have approached this issue from a completely different perspective. Plateau pikas (*O. curzoniae*; Smith & Foggin 1999; Lai & Smith 2003; Bagchi *et al.* 2006), Chinese zokor (*Eospalax fontanierii*; Zhang *et al.* 2003), and Brandt's vole (*Lasiopodomys brandtii*; Samjaa *et al.* 2000) have been shown to be either keystone species or ecosystem engineers in their respective ecosystems – that is, they contribute significantly to the preservation of native biodiversity of plants and animals as well as preserve important ecosystem functions. Some of the critical benefits these native small mammals offer are cover in the form of their burrows for other small mammals, toads, lizards, insects and other invertebrates and even breeding habitats for burrow-nesting birds (Lai & Smith 2003); a disturbance mosaic that acts to increase plant species richness in unpoisoned meadows (Samjaa *et al.* 2000; Bagchi *et al.* 2006); the provision of food for most of the native predators on the grassland (ranging from important commercial furbearers such as foxes, weasels, and small cats to various birds such as hawks, falcons, eagles, and owls, -- Schaller 1998; Smith & Foggin 1999; Samjaa *et al.* 2000); the recycling of nutrients and aeration of the soil (Tsendzhav 1980; Zhang *et al.* 2004); and reduced erosion potential (investigations underway).

At the same time, some of these species are short-grass specialists that are found at their highest densities only on land that has already been seriously degraded or overgrazed (Shi 1983; Cincotta *et al.* 1992; Zhang *et al.* 2003; Zhang *et al.* 2003 a, b). Thus, high densities of these native small mammals may indicate that rangelands are in poor condition, rather than their being the actual cause of the degradation (Holzner & Kriechbaum 2001).

THE POLICY-SCIENCE DISCONNECT

There is a general consensus among zoologists that the abundant native small mammals that occupy the grasslands of temperate Asia are usually beneficial to the habitat in which they evolved. This is in stark contrast to the prevailing opinion among managers that they are pests and should be poisoned. An example of this disconnect can be seen in the management plans for the newly established Sanjiangyuan Natural Nature Reserve. The web pages for this reserve promote the idea that these lands will be managed to promote biodiversity -- to become "a natural shelter for wild living creatures" and a "gene bank of biological species" (Qinghai News 2005). Yet at the same time the reserve's specific actions include spending an astounding amount to poison native mammals such as pikas and zokors, despite the scientific consensus that such management actions are contrary to stated management goals – i.e., once an area has been poisoned, native predators essentially disappear (Schaller 1998; Smith & Foggin 1999; Samjaa *et al.* 2000).

In Qinghai, China, now that pikas in the Guinan valley were poisoned in early winter 2005, one must drive several hundred kilometers south of Xining before encountering the first pika (about 328 km on the road to Yushu; about 307 km on the road to Guolou). Along these routes the normally common upland buzzards (*Buteo hemilasias*) are now absent. In the meadows closest to Xining the pikas have been absent for decades. If eradicating pikas leads to more productive meadows, then these areas that have been devoid of pikas for so long could be compared to those farther south, for example in the Maqen area, where pikas can still be found – but these tests have not been conducted. Instead, we learn that after four decades of directed pika control, rangeland degradation has increased (Lang *et al.* 1997; van Wageningen & Sa 2001; Qinghai News 2005). Control has not yielded the desired result, in spite of the huge effort and expense generated to poison these native small mammals.

In Mongolia the wholesale application of the rodenticide bromodiolone (an anticoagulant) has directly caused widespread mortality among many non-target species of wildlife, including economically important furbearers, cranes, and has even killed young children (WWF 2005). At the same time, there is little evidence that these "control" measures have had any real effect on their target – the number and severity of population outbreaks of Brandt's voles has actually increased in many areas where these measures have been undertaken (Zhang *et al.* 2003b). Yet research has shown that Brandt's vole populations are suppressed with increased height of vegetation (Zhong *et al.* 1999). This suggests that one simple, cost-effective solution to control small mammals is to avoid overstocking rangelands with livestock.

As a final example, across the ocean in the United States the ecological equivalent of the plateau pika, the black-tailed prairie dog (*Cynomys ludovicianus*) has been similarly poisoned across nearly 95% of its former range. Decades of focused research has shown that prairie dogs are extremely important to grassland biodiversity, and in many locations prairie dogs actually improve forage for wildlife and livestock (Fichter 1953; Kotliar *et al.* 1999; Miller *et al.* 2000). Yet prairie dog poisoning continues to be an important and strongly supported policy. For example, despite significant national and international issues to discuss, the 2004 US Senatorial race in South Dakota became a sparing match between Democrat Thomas Daschle and Republican John Thune over who hated prairie dogs the most and who would most effectively oversee their poisoning (Harden 2004). We mention this situation to show that neither the desire to eliminate native small mammals, nor the disconnect between science and policy, is confined to Asia.

In China the momentum for poisoning native small mammals has only increased, despite strong evidence that this activity is harmful in the short-term and ineffective in the long-term. Interestingly, many scientists in China – from the Institute of Zoology, Chinese Academy of Sciences to the student-run Darwin Association in Lanzhou, to research institutes in Lhasa – feel strongly that poisoning pikas is incorrect policy. So why does it persist?

In comparison, Mongolia has apparently eliminated widespread poisoning. In 2004 a consensus-building workshop was held in Ulaanbaatar hosted by the Wildlife Conservation Society (WCS), USAID, WWF, and various international grassland sustainability initiatives. International and Mongolian zoologists, agency personnel, NGO workers, and government officials mixed together and charted a path that could best address the issue of poisoning Brandt's vole with bromodiolone (Zahler *et al.* 2004; WWF 2005). Costs and benefits of poisoning, as well as alternative measures for managing the Mongolian pastures sustainably, were discussed, and in the end the decision was made to eliminate the use of aerial spreading of bromodiolone on native pasturelands by the end of 2005. As far as we know, this recommendation is being enforced (Amanda Fine, personal communication).

CROSSING THE DIVIDE

We have written this essay to illuminate the huge disconnect between the scientific community and the management community in creating a practical and efficient policy for rangeland management throughout much of temperate Asia. Millions of dollars have been spent on management of small mammals across Asia through the distribution of poison despite evidence that: 1) poisoning regimes have done little to control many target species; 2) they have caused widespread non-target poisoning, including threatening human health; 3) poisoning may directly contradict explicitly stated policy goals (i.e., biodiversity conservation); 4) other, more cost-effective management interventions may exist; and 5) in some cases small mammals are indicators of grassland degradation rather than the cause, and therefore may not qualify as "pests" in need of control.

Should native small mammals be controlled in an attempt to restore grasslands and their biodiversity? Clearly biodiversity suffers with the poisoning of these species, and in most instances it can be shown that they greatly benefit rather than detract from the grassland ecosystem in which they evolved. Also, no studies indicate that the control efforts are cost effective, and examples of the negative effects of widespread poisoning are mounting. Yet the poisoning continues in most areas, and is even promoted in Chinese national nature areas in the name of biodiversity conservation.

Why does the poisoning persist? Why have there not been more critical tests of the importance of these native small mammals that are subject to control? We suspect the reasons are many, ranging from long-held cultural beliefs about the role of "pests" in rangeland degradation to the political pressure for immediate action (Smith & Foggin 1999), whether it is scientifically justifiable or not. If this is the case, what can be done to cross this divide between science and policy? Again there are no clear-cut or simple answers. However, the Mongolia example may offer one solution – if conservation scientists wish for their research to inform policy, they must actively work to reach out to policy makers. Peer-reviewed publications justify the accuracy of studies, but do little to reach busy officials. Scientists must then take the next step of reaching out to policy makers through workshops, conferences, reports, and even community outreach and education to create a well-informed public (e.g. Smith & Harris 2004) who will encourage and support changes to public policy. If science is to become an important player in this as well as other issues, scientists must learn how to communicate in a positive manner with policy makers. If we cannot learn to do this, then the value of our work for society will continue to be ignored.

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