



Towards a societal discourse on invasive species management: A case study of public perceptions of mink and beavers in Cape Horn

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ABSTRACT

The management of biological invasions is a complex and often controversial issue reflecting a diversity of values. Research and public policy on invasive species have concentrated on their ecological and economic impact, most frequently overlooking the social component. In this paper we examined the public perceptions of invasive species of high conservation concern in the Cape Horn Biosphere Reserve, Chile, for which management plans are forming: the American mink (*Neovison vison*); and, the North American beaver (*Castor canadensis*). Two native species served as counter-examples, the guanaco (*Lama guanicoe*) and the upland goose (*Chloephaga picta*). Qualitative semi-structured interviews covered three areas: conceptualisation and knowledge of invasive species; values associated with invasive and native species; and acceptance of control measures. We found differentiated knowledge and high awareness of invasive species among the public. Interviewees attributed utilitarian, aesthetic, and humanistic values to all four species; however, negativistic values were attributed only to invasive species, and moralistic values only to native species. Our results further revealed key issues explaining tolerance towards invasive species, and different positions of acceptance for management. To include a broader public participation in the design and management of responses to biological invasions we suggest: (1) considering local knowledge as a source of information, and vice versa, providing the public with scientific information; (2) evaluating the tolerance level towards invasive species and negotiating conflicting values; (3) clarifying the perspectives of economic income through invasive species management; and, (4) employing compromises on the basis of suggestions from the public.

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1. Introduction

There is widespread concern among nature conservationists and policy institutions about invasive species “progressively replacing biodiversity with biosimilarity” (Warren 2007, p. 428). Biological invasions are not only considered as one of the major threats to the Earth’s biota (Sala et al. 2000), but some are also detrimental to human health and wealth (McMichael & Bouma 2000; Pimentel, Lach, Zuniga, & Morrison 2000). As a consequence of such well-documented impacts, “native only” policies (Kendle & Rose 2000, p. 19) have widely been promoted and implemented (e.g., Krajik 2005; McNeely et al. 2001). Yet, the construction of native species as more ‘natural’ elements of ecosystems – as compared to invasive species – implies a specific set of underlying values (Foster

& Sandberg 2004). Those values change according to the different stakeholders involved in the debate: scientists; policy makers; the commercial sector; journalists; and, different groups of the general public (e.g., Lodge & Shrader-Frechette 2003). Indeed, invasive species can be viewed from different perspectives, and responses to them will depend on the lens through which we are looking. In this paper we argue that a better understanding of the public’s perceptions of invasive species and their participation in a discourse on their management is needed.

Generally, decision-making through societal discourse is widely urged in the environmental management agenda (UNEP/CBD 2000). Today, scientists are also promoting the consideration of different perspectives, values and relationships with nature as a critical step for reducing conflicts in biodiversity policy (e.g., Berghöfer et al. 2010; Fischer & Young 2007; Jax & Rozzi 2004). However, with respect to invasive species, to date, the literature has focused predominantly on their ecological impacts (e.g., Parker et al. 1999). While there are some influential studies on their economic costs (see especially Pimentel et al. 2000, updated Pimentel, Zuniga, & Morrison 2005), comparatively little attention has been

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given to the social relevance of invasive species and their management.

The social components of invasion biology represent an emerging and diverse field of investigation; an increasing number of studies address criticisms to invasion biology, including, for example, the dubiety of the conceptual foundations of the native/non-native framework (e.g., Warren 2007; Woods & Moriarty 2001) or the use of a fear-based, e.g., “threat”, “crisis”, “disaster” (cited in Gobster 2005, p. 263) and war-like, e.g., “enemy release”, “battling invaders”, “novel weapons” (cited in Larson 2005, p. 495) language in communications about invasive species. Other authors have focused on ethical perspectives of control and eradication (Haider & Jax 2007; Lockwood & Latchininsky 2008; Meech 2005) or on the beneficial traits of invasive species. For example, Shackleton et al. (2007) have shown that rural communities in southern Africa would even prefer higher densities of an invasive cactus species whose fruits they used. Other studies, in turn, emphasised the importance of values in the formation of attitudes towards biodiversity management (e.g., Fischer & van der Wal 2007). Thereafter a variety of studies were concerned with the positions of institutional stakeholders towards invasive species (e.g., Binimelis, Monterroso, & Rodríguez-Labajos 2007; Stokes et al. 2006) and those of stakeholders not formally associated with interest groups (e.g., Evans, Wilkie, & Burkhardt 2008; Robinson, Smyth, & Whitehead 2004). Often quantitative questionnaires are used for these assessments (e.g., Andreu, Vila, & Hulme 2009; Bremner & Park 2007; García-Llorente, Martín-López, González, Alcorlo, & Montes 2008).

Before explaining how our case study provides an example of a qualitative approach to gather in-depth information on such perceptions, it is necessary to first define some important terms. The fact that concepts about invasive species are diverse and lack common agreement among invasion ecologists (Coulatti & MacIsaac 2004) reflects the challenge this complex issue poses even to experts. Among the proposed classification schemes, authors often distinguish between the range of spread and impacts (e.g., Davis & Thompson 2000; Heger 2004). Here we use a definition that minimizes value judgement by referring to an ‘invasive’ species as a non-native species spreading in a new area outside of its area of origin, no matter whether it exerts any negative effects on native ecosystems or not (adapted from Heger 2004).

This study aims to improve our understanding of public perceptions on invasive mammals on a continent where little research of this kind has been carried out before, South America. It is based on the analysis of two cases which allow the comparison of distinct invasion processes and their implications on people’s attitudes: the recently arrived (a decade ago) carnivorous American mink (*Neovison vison* Schreber, 1777) and the long established (more than five decades ago) herbivorous North American beaver (*Castor canadensis* Kuhl, 1820). Having invaded one of the most remote and pristine areas remaining on the planet, the UNESCO Cape Horn Biosphere Reserve (CHBR) in southern Chile (Rozzi et al. 2006), these species are considered of high conservation concern. Yet, so far, management plans in the past (Soto & Cabello 2007) and a planned eradication campaign (“the beavers must die”, Choi 2008, p. 968; see also Menvielle et al. 2010) have given little attention to attitudes of the local community. As examples of terrestrial native species to be used as counterparts in the analysis, we chose two conspicuous species of which we expected people had personal experiences and different types of relationships the upland goose (*Chloephaga picta* Gmelin, 1789), a representative of the rich avifauna of the region, and an abundant and culturally important bird species in coastal and frequented habitats, and the guanaco (*Lama guanicoe* Müller, 1776), the only striking terrestrial mammal on Navarino Island, an island where the other mammals include two species of bats and

two species of mice that were considered as rather inconspicuous and therefore not suitable for the study.

We present results from 37 qualitative face-to-face interviews on the four selected species with members of different socio-cultural groups residing in the CHBR, exploring (1) the conceptualisation and knowledge of invasive species, as well as their perceived impacts, (2) the range of values regarding native and invasive species, and (3) the attitudes towards controlling invasive species. This case study will provide information useful to conservation managers in the Cape Horn Biosphere Reserve, and beyond, by providing a basis for management decisions that consider the diversity of perspectives among those whose environments and lives are affected by those decisions.

2. The local setting

The study focused on a significant conservation problem taking place in the CHBR: the alteration of natural ecosystems by an ensemble of invasive mammal species in one of the Earth’s 24 most pristine wilderness ecoregions (Mittermeier et al. 2003). American mink and North American beavers are the two invasive species of highest conservation concern (Anderson, Rozzi, et al. 2006). As a consequence, a regional control program residing with the Ministry of Agriculture, specifically the Agriculture and Livestock Service (SAG), has promoted the hunting of beavers and mink in the Magallanes and Chilean Antarctic Region from 2004 to 2007, resulting in 234 dead mink and 11,700 dead beavers (Soto & Cabello 2007).

The mink is a North American semi-aquatic mustelid, which was introduced to Argentine Tierra del Fuego Island for fur farming in the 1940s and 1950s (Jaksic, Iriarte, Jiménez, & Martínez 2002). Recently, in 2001, escaped farm animals had reached Navarino Island (55°S), part of the CHBR (Rozzi & Sherriffs 2003), where our study was conducted (Fig. 1). Here the mink represents a new guild of terrestrial mammalian predators with negative impacts on ground-nesting waterbirds, such as ducks and geese endemic to Patagonia (Ibarra, Fasola, MacDonald, Rozzi, & Bonacic 2009; Schüttler, Klenke, McGehee, Rozzi, & Jax 2009), and on poultry farming (Soto & Cabello 2007). Impacts of wild populations of mink are well known in Europe, where they have been shown to reduce populations of waterbirds, rodents, amphibians, and mustelids (reviews in Bonesi & Palazon 2007; Macdonald & Harrington 2003).

Already in 1962 beavers had reached Navarino Island after having been released as furbearers into Argentine Tierra del Fuego Island in 1946 (Sielfeld & Venegas 1980). Today, beavers have colonised the archipelago of Tierra del Fuego, parts of the CHBR and of the Chilean mainland (e.g., Anderson et al. 2009; Wallem, Jones, Marquet, & Jaksic 2007). As ecosystem engineers, beavers have caused the largest alteration to the sub-Antarctic forests since the recession of the last ice age (Anderson et al. 2009). The main ecological consequences are the removal of over storey trees and the alteration of the riparian community structure (Anderson, Griffith, et al. 2006). Social and economic effects include impacts on forestry and livestock management, and damage to the infrastructure (Skewes & Olave 1999).

As a basis for the nomenclature of taxa we used the Integrated Taxonomic Information System.

3. Methods

3.1. Data collection

We used a qualitative approach to explore the spectrum of perceptions on invasive and native species. By sampling representative information-rich cases, qualitative research allows for description of the perspective of the social actors themselves,

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