Conflict in invasive species management

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As invasive species management becomes more ambitious in scope and scale, projects are increasingly challenged by disputes and conflicts among people, which can produce undesirable environmental and social outcomes. Here, we examine when and how conflicts have arisen from invasive species management, and consider why some management approaches may be more prone to conflict than others. Insufficient appreciation of sociopolitical context, non-existent or perfunctory public and community engagement, and unidirectional communications can all foster "destructive" conflict. We propose that approaches to conflict in invasive species management might be transformed by anticipating disagreements, attending more carefully to the social-ecological contexts of management, adopting more inclusive engagement mechanisms, and fostering more open, responsive communication. Conflicts may be unavoidable, but they can be anticipated and need not be destructive.

Invasive species management (ISM) encompasses a broad range of activities in environmental policy and practice, including preventing introductions of non-native species, containing or eradicating new arrivals, and mitigating the impacts of established populations (Simberloff *et al*. 2013). ISM is an important tool for biodiversity conservation but is also implemented to protect economic interests; ecosystem services; and animal, plant, and human health. The diverse drivers and the methods used in ISM are unified by a common goal: to prevent or mitigate the multifaceted problems that arise from human-mediated introductions of non-native species.

As globalized transport and environmental change increasingly facilitate biological invasions, demands and obligations to manage invasive species grow. Signatories to the Convention on Biological Diversity are expected to make concerted efforts to identify and manage biological invasions by 2020 (Aichi Target 9; SCBD 2014). Concurrently, species introductions are projected to rise (Tittensor *et al*. 2014). ISM therefore remains an important field of environmental and ecological research, policy, and practice. In some regions, management projects are becoming progressively more ambitious, propelled by technological advances and a growing wealth of experience. This momentum is particularly evident on oceanic islands where conservation-oriented eradication projects continue to expand in number and scale (Glen *et al*. 2013); the most ambitious of these aims to eradicate introduced predators from New Zealand (Russell *et al*. 2015).

Despite its growth and successes, ISM can also be controversial, regularly stimulating debates about achievability, efficiency, social fairness, and ethical implications. ISM often involves contentious strategies and methods, including restriction of personal and trade freedoms, extensive use of chemical and biological control agents, and large-scale culling of sentient and/or valued species. More numerous and ambitious management projects inevitably intersect with a wider variety of human communities, interests, and values, and managers are now regularly challenged by social disagreements, some of which intensify into destructive conflicts (Estévez *et al*. 2015).

ISM is therefore also an emerging arena of social conflict. It serves as a focal point for longstanding disagreements, and sometimes ignites new debates. The diverse drivers and outcomes of ISM produce conflicts with unusual configurations and alignments of issues, values, and actors: environmental organizations collaborate with agricultural industries to control invasive pests; hunters and animal-rights activists attempt to protect introduced game species; and conservation organizations find themselves at odds with animal welfare organizations, who might otherwise be their natural allies.

In a nutshell:

- Invasive species management projects often lead to social conflicts; as such projects become more common and ambitious, the frequency of conflicts is likely to increase
- Destructive conflicts are those that produce undesirable environmental, social, and economic outcomes; our review reveals how some management practices can exacerbate conflicts, increasing the likelihood of their becoming destructive
- Conflicts are not always avoidable, but we suggest that their destructive potential can be minimized through careful planning
- Preliminary assessments of socioecological context and feasibility, enhanced public engagement, and open and responsive communication strategies could all help to minimize conflict in invasive species management

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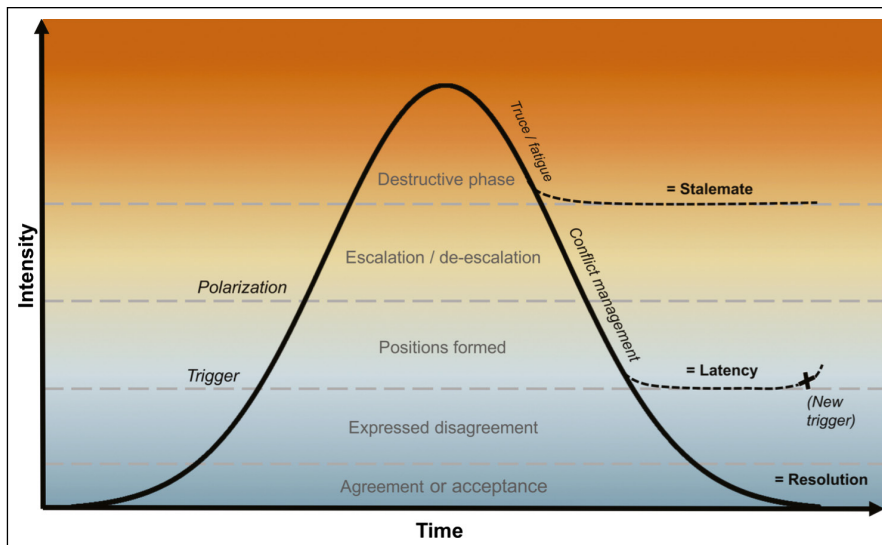
Figure 1. *The conflict curve: visualizing conflict processes and outcomes. This diagram charts the hypothetical course of a dispute or conflict over time. There are three elements: stage of conflict development (central text), key processes (italicized text), and outcomes (bold text). "Conflict management" is indicated here as a de-escalation process but can also be used pre-escalation, as an intervention strategy. Adapted from Svanström and Weissmann (2005).*

Despite their comparative novelty and idiosyncrasies, ISM conflicts can be identified as a sub-category of "environmental conflict", a term that also encompasses social conflicts surrounding natural resources, environmental hazards, and biodiversity conservation. Those interested in understanding and addressing ISM conflicts can therefore learn from existing research on environmental conflicts. Recent work has, for example, explored ways to map and manage existing, often well-established, conservation conflicts (Redpath *et al.* 2013; Madden and McQuinn 2014). However, by examining when and how conflicts have emerged in response to ISM, we should also be able to better anticipate them, and potentially prevent their escalation or entrenchment. In other words, understanding ISM conflicts can be informative for ISM practices, because it enables management projects to be designed and implemented in ways that make them less susceptible to conflict in the first place.

We briefly consider what conflicts are, how they emerge, and what makes them destructive. We review the literature to examine the drivers, events, and outcomes of a range of social conflicts surrounding ISM. We have deliberately studied contested cases to explore patterns of conflict development and escalation and have not sought out the many conflict-free projects. We found that some common ISM strategies were inadequately equipped to recognize or address social disagreement, and in certain cases have actually exacerbated nascent conflicts. We outline some key principles that managers might follow to reconfigure ISM practices, to render them less conflict-prone, and we identify tools and strategies that could help. We are not suggesting wholesale

replacement of current strategies, many of which have achieved success. Rather, we aim to adjust and extend the existing management repertoire.

■ **Conflict: concepts and processes**

Social conflicts are relationships of disagreement that arise between individuals and groups who express seemingly incompatible beliefs, values, or goals. Conflict is inherent in societies and can serve a valuable purpose, for instance by highlighting social injustices (Norgaard 2007) or ethical issues (Lynn 2012). However, when conflicts escalate or endure over long periods they can become destructive (see below).

All conflicts involve unique configurations of actors, issues, and events, but people engaged in conflict often behave in relatively predictable ways. This has enabled researchers to identify patterns in how conflicts change over time: a useful visualization of this is the "conflict curve" (Figure 1). Two key, related processes exacerbate conflicts.

Polarization occurs when disagreements become framed in oppositional, often binary, terms. Reducing complex debates to simple "for or against" positions implies that parties are on opposing sides in a win-or-lose game (Redpath *et al.* 2013), and can mask areas of agreement by assuming that these positions are mutually exclusive (Minteer and Collins 2005). Media attention can contribute to polarization as journalists seek to construct a compelling story and present both "sides" of an issue, even when those sides are unevenly or unclearly drawn (Baumann and Siebert 1993).

Escalation describes an increase in conflict intensity and complexity, where growing numbers of issues and people become entangled in a debate. As people establish and defend their positions, a positive feedback loop of claims and counter-claims accumulates, making it difficult to identify, let alone address, the original or most pertinent issues. In Bellingen, Australia, a dispute developed over a proposal to remove introduced camphor laurel trees (*Cinnamomum camphora*) from the town center (Macleay 2013). Once opposing positions had been established, "justification…end[ed] up as a kind of exercise in distraction" (Macleay 2013), producing a confusing mass of arguments about aesthetics, ecological risk, heritage, tourism, health, environmental ideologies, and political biases. Escalating conflicts can develop their own momentum to the point that winning, or hurting oppo-

Panel 1. Removing European hedgehogs from Scottish islands

European hedgehogs (*Erinaceus europaeus*) were introduced to the Scottish island of South Uist in 1974 to control garden pests. However, research in the 1990s identified hedgehog consumption of eggs as an important factor affecting the decline of wading shorebirds on the Uists (Jackson and Green 2000). In 2003, the statutory nature conservation organization, Scottish Natural Heritage (SNH), launched the "Uist Wader Project": a trapping and euthanasia program aiming to locally eradicate hedgehogs. But hedgehogs are a popular icon of British wildlife, and are believed to be in national decline. The project inspired widespread criticism and opposition, particularly in the news media (Webb and Raffaelli 2008). A consultation was held, but some felt that this was largely perfunctory: one attendee (a respected mammal biologist) said, "the 'discussion' to which

Figure 2. *Protesters demonstrate their opposition to the lethal control of European hedgehogs (*Erinaceus europaeus*) on the islands of Uist, Scotland.*

we had been summoned was actually just an announcement. We were simply informed that the animals would be caught and killed" (Warwick 2012). A coalition of NGOs formed "Uist Hedgehog Rescue" (UHR) and argued that hedgehogs should be captured and translocated to the Scottish mainland, a proposal SNH initially rejected on welfare grounds.

For 5 years, each hedgehog-trapping season inspired renewed protest (Figure 2) and media interest, and UHR ran a capture and translocation operation alongside the SNH project. Pro-hedgehog campaigners objected to the way they were portrayed to and by the media – stereotyped as potentially violent animal rights activists (Warwick 2012). The alleged intimidation of SNH management staff by one activist did nothing to improve relations, and communications between opposing parties broke down. In 2007, UHR researchers asked

a third party to submit new evidence to SNH on their behalf, relating to survival rates of translocated hedgehogs. SNH and UHR began collaborating on a joint translocation effort, but in 2010 there remained no statistically significant evidence that the work was improving wader populations. The project was subsequently reconstituted as "Uist Wader Research", with UHR enrolled as stakeholders. A 2015 report provided further evidence of hedgehog impacts, and recommended a third incarnation of the initiative ("Uist Wader Recovery"), again aiming for local eradication, but this time by translocation. The new strategy focuses on the ultimate conservation aim of wader recovery – rather than number of hedgehogs removed – and is more mindful of the sociocultural context and implications of hedgehog management. This case illustrates the delays, frustrations, and antagonisms that ISM conflicts can incur.

nents, becomes more important than resolution, or even the original problem (Burgess and Burgess 1996).

Escalated conflicts are self-perpetuating; hostile relationships become the norm, tractability and opportunities for constructive dialogue are reduced, and "the opposition" become stereotyped and misrepresented (White *et al.* 2009). These conflicts are destructive because they produce both damaging outcomes (sometimes including direct aggression) and damaged relationships (Putnam and Wondolleck 2002). Such intensity can rarely be sustained, so conflict simmers at low intensity (stagnate), while remaining unresolved, or enters recurring cycles of latency and escalation (Panel 1 and Figure 2). Rather than culminating in clear resolutions or "victories", conflicts often produce ambiguous outcomes

and uneasy compromises. Some conflicts can be successfully settled through mediation or the judicial system. However, when applied to intractable, complex, and/or escalated conflicts, mediation or adjudication can become ineffective, or at best temporary: like placing "a Band-Aid over a gaping wound" (Burgess and Burgess 1996). Indeed, attempting to resolve complex conflicts through simple arbitration can actually exacerbate them (Madden and McQuinn 2014).

Enduring and/or escalated conflicts do not help solve the problems created by biological invasions; they drain resources and damage relationships, producing anxiety, antagonism, and distrust. Our contention here is that although conflicts cannot (and sometimes should not) be avoided, it matters how they are approached and

Figure 3. An Australian wild horse or "brumby". Free-roaming horses have been the focus of multiple management conflicts, including in Australia, New Zealand, and North America. These conflicts often involve disagreements about the ecological impacts of horses, their cultural heritage value, and the welfare implications of various management strategies.

responded to, and their destructive potential might be minimized by better management of the tensions and disagreements that foreshadow escalation. We therefore need to identify why destructive conflicts have arisen from ISM, and whether and how management practices have contributed to this process.

■ Factors affecting conflict development

Management context

ISM does not take place in a sociopolitical or ecological vacuum. Although in academic and policy circles, biological invasions are often discussed in terms of theoretical principles, risks, and calculations, in practice they occur in specific places and ecosystems inhabited by and connected to diverse human and ecological communities. Ecologists and managers regularly assess and include ecological complexity and uncertainty in the design of management projects, but human social complexity, and the sociopolitical and historical contexts in which management is delivered, often receives less explicit examination.

Perceptions of introduced species and the risks they pose vary between communities and cultural groups (Estévez *et al.* 2015). Managers are sometimes required to account for this variation in planning and decision making: in New Zealand, for example, management strategies must pay particular regard to Maori concerns (Kapa 2003), including their *kaitiakitanga* (guardianship responsibilities) to introduced species such as kiore (*Rattus exulans*). However, perceptions and values also vary within communities and cultural groups, and are subject to change (Crowley 2014). Personal, community, and cultural attachments to introduced species can develop relatively quickly: in Chicago, monk parakeets (*Myiopsitta*

monachus) introduced <50 years ago have come to symbolize the resilience and diversity of the city's human inhabitants, and efforts to control these birds have inspired strong opposition (Pruett-Jones *et al.* 2011). These associations often develop in relation to charismatic taxa, but can also be produced through human interactions with insects, plants, and landscapes (Buhs 2002; Dickie *et al.* 2013). However, such attachments may not become evident until the species or landscape in question is perceived to be threatened. Consequently, the depth of feeling and strength of opposition incited by management proposals can come as a surprise to their proponents.

In 1990, the US National Park Service (NPS) planned to remove a population of horses (*Equus ferus caballus*) from the Ozark National Scenic Riverways in Missouri. The proposed management plan was based on general laws and principles about introduced species, but for some citizens the Ozark horses had become closely linked to community identity and history, symbolizing a (romanticized) ranching lifestyle characterized by freedom and self-determination (Figure 3) (Rikoon 2006). The resulting management dispute also developed in the context of relatively recent transfers of land stewardship, as the Ozarks moved from open rangeland to centralized governance (under the NPS). Consequently, the horses also came to symbolize the marginalization felt by residents of an area increasingly protected from human activity. ISM projects justified by simplified environmental ideologies or unqualified first principles (eg introduced species are always undesirable) can therefore be poorly attuned to the complex social landscapes in which they operate (Prévot-Julliard *et al.* 2011).

Conflicts also arise in relation to broader sociopolitical issues that may not initially seem relevant. Case studies from post-colonial nations, for example, highlight the variable access of indigenous communities to meaningful representation in ISM deliberations (Kapa 2003; Norgaard 2007). A second conflict surrounding horse management persists in the Chilcotin region of British Columbia, Canada, and is entangled with ~200 years of political power struggles between First Nation Tsilhqot'in peoples and European settler-descendants, who make competing claims about land and environmental stewardship. Horse management in this region now tends to be initiated for conservation purposes; yet contemporary calls for management resonate uncomfortably with historical attempts, by settlers and governments, to disempower First Nations communities by controlling their valuable wild horse populations (Bhattacharyya and Larson 2014).

Histories of contested or ineffective management also influence how new ISM proposals are received. Socially, economically, and environmentally costly management failures can erode confidence in future projects (Evans *et al.* 2008), instill distrust in managing authorities (Kahn *et al.* 1990), or affect community perceptions of the risks posed

by management (Norgaard 2007). The origin, reputation, and perceived legitimacy of managers are also important, influencing whether they are perceived as biased (Warner and Kinslow 2013) or interloping outsiders.

How people respond to ISM, then, is affected by histories, geographies, politics, knowledge, values, and attachments that are sometimes overlooked when initiatives are planned, and that can trigger bitter disputes. Conflicts arise as manifestations of difference and disagreement; their subsequent course and outcomes are affected by the ways in which these disagreements are approached and managed.

Approaches to management

The public education approach (Callon 1999) to ISM involves top-down decision making, often by centralized authorities. The general pattern is that (ecological or environmental) experts define the problem, evaluate evidence and management options, and advise decision makers, who must then persuade "the public" (ie anyone who is neither expert nor decision maker) to accept their decision, its justification, and its supporting evidence. However, this approach is poorly equipped to recognize and address differences in social values and risk perceptions (Lute and Gore 2014). It can also trigger and rapidly polarize management conflicts. The shooting of >600 horses in an Australian national park, for instance, received immediate and widespread public criticism, and resulted in a reactive ban on aerial culling (Chapple 2005). Deciding, announcing, and defending (Hinchliffe 2007) management plans reinforces them, so that regardless of complexity, uncertainty, or how decisions were reached, interested parties must declare either *for* or *against* the proposal. In continually defending their chosen strategy against opposition, managers can also initiate the positive feedback loop that drives conflict escalation.

Increasingly, and often in an effort to move away from the public education model, ISM incorporates some form of consultation. This normally involves the same first steps as the education model (expert assessment, etc), but decision makers then ask different interest groups for their opinions about possible management options. But if not carefully managed, consultation can produce or exacerbate conflicts, especially if people feel inadequately represented and/or disempowered by the process. For example, a rodent eradication program for Lord Howe Island (Australia) has been repeatedly delayed by technical and social challenges (Wilkinson and Priddel 2011). Island citizens raised concerns about potential ecological and economic impacts of management, but some also opposed the project on principle, because they felt excluded from initial planning and decision-making processes (Lord Howe Island Community Liaison Group 2013).

Consultations can also be counterproductive if interested parties are nominally included but have little genuine power in decision making. Perfunctory consultations, that seek out concerns but do not act on them, can produce this "internal exclusion". Mackenzie and Larson (2010) examined a dispute surrounding the Canadian Food Inspection Agency's efforts to halt emerald ash borer (*Agrilus planipennis*) invasions by cutting down ash trees (*Fraxinus* spp) throughout a buffer zone. Landowners' dissatisfaction with the consultation process, the authors argued, made them less likely to work constructively with managing authorities, and intensified conflict. Although landowners were invited to public meetings, some were unwilling to engage in a consultation they considered unfair and exclusive, because the most important decision – that the trees would be removed – had already been made.

Interested parties who lack, or lose, formal power to affect management decisions may seek alternative means of achieving their goals, which can drive conflict escalation by promoting segregation and antagonistic interactions. In the case described above, aggrieved parties joined forces to increase their collective power (Mackenzie and Larson 2010). Others recruit more powerful allies, or generate publicity for their cause through news and social media. In Hawaii, dedicated activists capitalized on the inherent uncertainties of invasion science, and prevailing distrust in government and scientific authorities, to build a damaging publicity campaign against biocontrol for strawberry guava (*Psidium cattleianum*) (Warner and Kinslow 2013).

Some protesters resort to legal action, as illustrated by two acrimonious ISM disputes: the failed eradication of gray squirrels (*Sciurus carolinensis*) in Italy (Genovesi and Bertolino 2001) and successful eradication of black rats (*Rattus rattus*) from Anacapa Island, California (Howald *et al.* 2005). In both cases, activists identified where eradication projects might conflict with existing environmental and animal protection laws and used judicial systems to delay management. More subtle forms of protest include denying land access to managers and nonreporting of target species, though these resulted in only minor delays for the UK's ruddy duck (*Oxyura jamaicensis*) eradication program (Cranswick and Hall 2010).

Communicating management

The framing and content of communications about invasive species influence perceptions of both biological invasion as a phenomenon and specific management initiatives (Hart and Larson 2014). Although the extent and power of this influence is unclear, the drive to persuade people to accept ISM encourages communication strategies that emphasize positive, or more palatable, project aims (eg "Save the Seabirds!" rather than "Kill the Rats!"). However, where "educational" messages are incomplete – or disingenuous – they are liable to be contested by those concerned about what has been omitted, such as the severe animal welfare implications and potential non-target effects of rodenticides.

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Figure 4. (a) Management strategies for introduced invertebrate pests such as the light brown apple moth (Epiphyas postvittana) that involve aerial distribution of pheromones have met with strong opposition in the US. (b) This placard refers to one such management program targeting this insect in California, in 2008.

Where communication is solely intended to inform, it is harder for managers to respond constructively to concerns. A Californian communications campaign about the control (using aerially distributed pheromones) of light brown apple moth (*Epiphyas postvittana*; Figure 4) was criticized for its unidirectional message: "they keep insisting that the problem…[was] communications…that they didn't get their message across well…They got their message across fine. We just didn't agree" ("health and environment community" participant in Zalom *et al.* [2013]).

■ Anticipating and responding to conflict

Attending to context

In this section, we consider how alternative and/or complementary approaches could, by anticipating and carefully responding to disagreements, help lessen the likelihood of destructive conflict. These alternative approaches, with examples of their use in ISM, are summarized in Table 1.

As escalated or long-standing conflicts can damage both management outcomes and social cohesion, managers need to work in ways that enable cooperation and constructive debate and that do not risk igniting or reigniting destructive conflicts. Biological invasions are by definition novel, diverse in form and effects, and often unexpected. So, although the principles of ISM might be linear and streamlined (ie prevention, containment, eradication, control: Simberloff *et al.* 2013), in practice, managers must work in relation to "messy" and dynamic politics and ecologies (Boonman-Berson *et al.* 2014). Managers therefore need to be attentive to social, as well as ecological, contexts. Clearly, researchers and managers cannot be expected to resolve wider social inequities or historical injustices, but they can make themselves aware of how ISM interacts with, or is fostered by, local, national, and even international histories and politics. Managers could therefore benefit from performing dedicated, pre-project reviews of past initiatives conducted in the same region, or targeting the same species, to identify potential issues. They might also make concerted efforts to understand the specific social contexts within which they are set to operate, through early engagement with interested and affected communities. Explicit integration of social considerations (eg using social feasibility or impact assessments; Table 1), could improve understanding of socioecological settings, allow identification of interested parties and their concerns, and provide opportunities for developing context-appropriate management options (Crowley *et al.* 2016).

Inclusive engagement

Attentiveness to socioecological context is the first step to reducing conflict. The second is being able to work fairly and effectively within that context. If differences in interests, ethics, and values are treated as supplementary to the technical, scientific considerations of management, and are ignored or suppressed as a result, conflicts will continue to emerge. Deliberative models of engagement, as opposed to public education or simple consultation models, generally involve organized collaborations between expert and lay participants to develop and constructively evaluate a range of management options. They could be more flexible and innovative than consultations that rely on appraising a single, pre-defined project (Martin 2012). Liu *et al.* (2011) have tested quantitative, deliberative approaches to decision making, using a "citizens' jury" to evaluate management options for the European house borer (*Hylotrupes bajulus*) in Australia. Other methods are more qualitative or strategy focused, using focus groups or interviews to explore community values and concerns (Table 1). While potentially enabling

Table 1. Principles, tools, and strategies to anticipate and respond to conflicts in invasive species management

	Factors affecting conflict development	*Key management principle*	*Alternative tools and strategies*	*Examples and evidence*
Context	(a) Socio-ecological complexity (b) Variation in values, attitudes, and perceptions	Explicit attention to socio-ecological considerations and contexts	Reviews of previous management initiatives to identify potential opportunities/challenges	Plant eradications in the Galapagos Islands (Gardener *et al.* 2010) Rodent eradications on oceanic islands (Campbell *et al.* 2015) Invasive species management in urban areas (IUCN 2013) Wild horse management in Australia, New Zealand (Nimmo and Miller 2007)
	(c) Existing socio-political issues (d) Legacies of conflict or failure		Conduct preliminary, participatory social assessments focusing on particular management context	Socio-cultural values assessment (Context 2015) Social impact assessment (Estévez *et al.* 2013) Public attitude assessments (Schüttler *et al.* 2011) Community perception and preference evaluations (Vaarzon-Morel and Edwards 2012; Santo *et al.* 2015)
Approach	(a) Public education (b) Perfunctory consultation (c) Internal exclusion	Inclusive public and community engagement	Deliberative or democratic approaches to planning and delivery	Multi-criteria decision analysis (Liu *et al.* 2011) Structured decision making (La Morgia *et al.* 2017) Co-management (Robinson *et al.* 2005)
Communication	(a) Direction (unidirectional/dialogic)	Open and responsive communication	Seek feedback and respond constructively	Unidirectional versus dialogic communication in invertebrate eradication efforts, California (Zalom *et al.* 2013)
	(b) Message and tone		Honest messages	Role of language and framing in communications (Hart and Larson 2014; Ernwein and Fall 2015)

a wider range of views to be expressed, deliberative models must nevertheless pay attention to procedures (eg how participants are selected for inclusion or exclusion). More radically, co-management strategies aim to reorient ISM toward a collective approach to knowledge production, problem definition, and project development (Armitage *et al.* 2009; Moon *et al.* 2015). For instance, Kakadu National Park (Australia) is co-managed through careful negotiation of "Western" and Aboriginal values (Robinson *et al.* 2005). Even where conflict is unlikely to arise, reconfiguring public engagement in ISM could produce more democratic, "socially robust" (Nowotny 2003) management practices that are largely endorsed by citizens – particularly important where public resources are at stake – and facilitate positive relationships between managing authorities and interested publics.

Opening up communications

A direct consequence of the public education approach to management is that communications about ISM can be partisan and unidirectional. The obvious remedy to the latter is to adopt communication strategies that promote dialogue and are able to respond to concerns.

Even relatively simple measures, such as including contact details in press releases or supplying regularly updated "FAQs", can improve managers' capacity to understand and address concerns (Morrison *et al.* 2011). Clearly, there is a need for messages – describing both the problems associated with biological invasions and the potential benefits of ISM – to be shared. However, and perhaps counterintuitively, communications about controversial projects may be better received if they are resolutely open about the less positive aspects of ISM. There are ways of framing management that acknowledge its inherent risks and ethical challenges, while not necessarily rendering it undesirable (Keulartz and van der Weele 2008; Larson 2010). This frank approach risks inviting debate, and possibly objections, that might not otherwise arise. But it also allows challenges to be voiced and potentially addressed, which is arguably preferable to a defensive response, and could in the longer term increase trust in experts and managing authorities (Stirling 2010).

More broadly, we suggest that ISM could benefit from greater openness (Stirling 2008) in relation to wider society. There remains a drive to educate citizens about "the problem" of invasive species. However, unidirectional, sometimes didactic, strategies rely on a singular, simplified

understanding of invasions that does not recognize variations in how different people understand and interpret the problem, or whether they see a problem at all (Selge *et al.* 2011). In practice, the implications of biological invasions are invariably complex and uncertain. Openness means finding better ways to express and manage these ambiguities, rather than simplifying them (Stirling 2010), and explicit recognition that ISM is rarely (if ever) an apolitical enterprise.

■ Conclusions

Disagreements about ISM are inevitable and are likely to become more frequent. Recognizing this allows, and perhaps even requires, managing authorities to adopt an anticipatory rather than reactive approach to conflict. We have identified a selection of established practices, common to many ISM projects, that can engender destructive conflicts. Inattentiveness to the complex socioecological contexts of management can cause important issues to be overlooked or delegitimized, inspiring tension and opposition. Tensions can be exacerbated by management approaches that exclude interested parties from meaningful participation in planning and delivery. Furthermore, the way in which management initiatives are communicated can affect both how they are received and managers' ability to respond to concerns. There are no simple solutions, and we have therefore avoided championing a single approach or tool. Instead, we propose that the incidence and severity of conflicts could be minimized by following three key principles to carefully reconfigure certain practices within ISM: greater, explicit attention to the sociopolitical contexts of management; early, inclusive, public engagement; and open, responsive communication strategies. Disagreements about invasive species may be inevitable, but destructive conflicts about their management are not.

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