Invasive species management will benefit from social impact assessment

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1 Figure

58 References
Summary

1. Invasive species management aims to prevent or mitigate the impacts of introduced species but management interventions can themselves generate social impacts that must be understood and addressed.

2. Established approaches for addressing the social implications of invasive species management can be limited in effectiveness and democratic legitimacy. More deliberative, participatory approaches are emerging that allow integration of a broader range of socio-political considerations. Nevertheless, there is a need to ensure that these are rigorous applications of social science.

3. Social Impact Assessment offers a structured process of identifying, evaluating and addressing social costs and benefits. We highlight its potential value for enabling meaningful public participation in planning, and as a key component of integrated assessments of management options.

4. Policy Implications: As invasive species management expands, social impact assessment provides a rigorous process for recognising and responding to social concerns. It could therefore produce more democratic, less conflict-prone and more effective interventions.

Keywords

Environmental impact assessment, interdisciplinary sciences, non-native species, social feasibility, wildlife management
Introduction

The management of invasive species is extending in scale and complexity in response to the growing impacts of introduced species (Hulme 2006) and as technical advances enable increasingly ambitious projects that tackle multiple species and use more sophisticated methods (Glen et al. 2013; Campbell et al. 2015). Many such initiatives successfully achieve their targets (Simberloff 2008, 2013) but as ambitions grow, attempts to eradicate or control invasive species continue to generate controversy and conflict (Estévez et al. 2015). Even on uninhabited islands, the ‘social dimensions’ of invasive species management (ISM) can significantly affect outcomes. Opposition, conflict, political and legal struggles, or simple non-compliance, can incur expenditure, delays and failures.

Social impacts can arise from all issues associated with a policy, plan or project that directly or indirectly affects humans and human communities (Vanclay et al. 2015). International guidance for invasive species management states that interventions should be “socially, culturally and ethically acceptable…” (IUCN & Species Survival Commission 2000) and practitioners, many of whom are ecologically trained, are now commonly encouraged to attend to ‘social’, or ‘human’ dimensions of biological invasions (White et al. 2008). While this can often be with a view to preventing or circumventing opposition to management (Blackburn et al. 2010; Estévez et al. 2015), there are important reasons for assessing social impacts that go beyond their potential to complicate project logistics. Proactive assessment of social impacts has the potential to make management more democratic (increasing public engagement and scientific citizenship), more socially legitimate and, ideally, more effective. Currently, there are few tools with which to make such social assessments
(Campbell et al. 2015), leading to their frequent omission from planning (Dawson et al. 2014) and so here we discuss established and emerging approaches to social issues associated with ISM. First, we highlight some drawbacks of established, often top-down, approaches to management. We identify the emergence of more deliberative, democratic models of public engagement, and some of the challenges associated with them. Finally, we propose that Social Impact Assessment could make a valuable contribution to ISM and identify how it might complement and be integrated into wider management planning processes.

**Social impacts of invasive species management**

Invasive species management aims to prevent introductions, eradicate or contain populations, or mitigate their negative environmental, economic and social impacts (Simberloff et al. 2013). Interventions include legislation, trade regulation, border controls, eradication, population controls and restoration. Clearly such interventions will generate positive and negative impacts of their own; some human communities may benefit from damage reduction or increases in native biodiversity while others might be negatively affected by trade restrictions or the loss of valued animals or plants. Such impacts are rarely evenly distributed and can result in inequity where certain groups are disproportionately affected by action (Norgaard 2007; Marshall et al. 2011) or inaction (Binimelis, Monterroso & Rodríguez-Labajos 2007). The governance and processes of management can themselves create social impacts. Excluding stakeholders from meaningful participation in deliberation and decision-making can produce distrust and animosity, as well as anxiety if affected communities feel they lack control over decisions that affect them (Kahn et al. 1990; Zalom et al. 2013). Reliance on experts and contractors to plan and conduct projects
can generate similar resentment amongst stakeholders who feel excluded (Parkes, Macdonald & Leaman 2002; Rikoon 2006).

**Established approaches**

Concerns about invasive species management are often attributed to deficits in understanding or insufficient awareness of ‘the problem’. The response to this apparent knowledge deficit has often been attempts to better inform or educate stakeholders. *Educational campaigns* can increase awareness of problems and might increase support for management, at least in the abstract (García-Llorente et al. 2011), and amongst ‘naïve’ publics (Hindman & Tjaden 2014). However, this strategic ‘public education’ or ‘information deficit’ model has been repeatedly criticised as ineffective, and for disempowering lay publics (Callon 1999; Owens 2000). This is not to suggest that ecological knowledge is unimportant, but rather that its top-down promulgation may be inadequate for gaining acceptance and support. Educational campaigns are also limited in their ability to respond to opposition and, if dissenting views are characterised as poorly informed or invalid, could exacerbate conflicts (McEntee 2007). These risks can be amplified where campaigns use hyperbole, emotive language and selective evidence, which can incite distrust of a project and its proponents.

The Global Invasive Species Programme (GISP; Wittenberg & Cock 2001) has previously advocated *social marketing* as a means of increasing public engagement in invasive species management. This and related frameworks focus directly on eliciting behaviour changes in individuals and/or communities (Michie, van Stralen & West 2011), rather than assuming that shifts in knowledge and attitude will
automatically produce these changes. Behaviour change models could play a role in some areas of invasive species management, for example, implementing biosecurity practices and encouraging reporting of recent arrivals. However, in their will to achieve pre-set goals through manipulation of social desires, and in the absence of a political or deliberative process, they may well be as paternalistic or anti-political as the top-down policy models they purport to replace. Furthermore, management activities targeting established species or recent introductions, which are often the focus of social disputes, infrequently require specific behaviours or behavioural change on the part of affected communities: rather, they require communities to engage with, support, or at least accept, management interventions (often delivered by others).

Social feasibility assessments can be used to predict how likely stakeholders are to accept interventions and to evaluate whether a project is deliverable, risky or untenable. Judgments about socio-political acceptability are commonplace but often occur as a tacit component of policy and management planning. Managers and policy-makers may avoid bringing forward projects on the basis of anticipated opposition. Whilst preventing investment in unworkable ideas, this might also preclude opportunities for deliberation and innovation. Internal judgements of feasibility may therefore lack transparency and wider participation. This means that not only can powerful interests dominate ‘behind the scenes’, but also that when ‘feasible’ projects are implemented, those excluded may seek to make their voices heard in other ways, such as legal action, generating negative publicity, protesting or active disruption. Consequently, where social feasibility judgements are internal, powerful or vocal minorities can disproportionately influence outcomes. Social
feasibility assessments are becoming more explicit, systematic and evidence-based and Gobster (2013) has proposed a model to help predict human responses to management projects. However, even explicit social feasibility assessments are limited because they incorporate no means of addressing the challenges they reveal: a feasibility assessment might find, for instance, that 80% of pre-defined stakeholders support a proposal, and indicate why 20% oppose, but offers no means of addressing that opposition or understanding the ways that the opposing voices may be mobilized in future.

Emerging approaches

Established, technocratic approaches to environmental management draw heavily on ecological and technical expertise but can risk excluding those people most affected. In recognition of this, environmental governance models have increasingly turned towards more deliberative and participatory processes (Owens 2000). Whilst no panacea, these approaches are arguably more in keeping with democratic principles than are technocratic strategies (Stirling 2008; Hinchliffe, Levidow & Oreszczyn 2014). Democratically produced projects may also carry greater societal legitimacy than those proposed by technicians or politicians (Pellizzoni 2001), and can grant a ‘social licence to operate’ (Vanclay et al. 2015).

This broader movement towards more deliberative and/or democratic models of public engagement is becoming evident in invasive species management, and promising examples of effective community involvement in the design and delivery of management projects are emerging (Saunders et al. 2007; Bryce et al. 2011). Management that engages citizens in deliberation and planning could also enhance
However, a review of public participation in Australian invasive vertebrate management projects found that educational and top-down approaches to participation were still more prevalent than deliberative and democratic models (Ford-Thompson et al. 2012).

An example of a democratic approach to ISM is co-management (or adaptive co-management; Armitage et al. 2009). This is a collaborative governance model in which power and responsibility for decision-making and implementation are shared between interested parties, including governments, organisations and affected communities (Moon, Blackman & Brewer 2015). Whilst some examples of co-management are emerging in relation to established invasive species (Robinson & Wallington 2012), this approach may be less suitable for rapid response control, or projects encompassing large regions or wider publics.

Structured decision making (SDM) sits between technocratic (analytic) and fully deliberative decision-making – it is therefore referred to as an analytic-deliberative approach (Burgess et al. 2007). SDM assumes that a decision needs to be made and that a single body, or a group of open-minded decision-makers, is willing to critically assess a range of alternatives (Runge, Grand & Mitchell 2013). The analytic side involves collection and processing of technical and ecological data, which is fed into iterative, participatory processes. SDM utilises a range of tools, often incorporating multi-criteria decision analyses (MCDA; Estévez, Walshe & Burgman 2013), but also citizen juries, workshops, and deliberative mapping. SDM could have extensive application for invasive species management (Estévez et al. 2015), but is
not without challenges. First, analytic-deliberative tools normally require an understanding and prediction of potential social, environmental and economic impacts of management alternatives before they can be evaluated and compared. Social impacts can be difficult to measure, and may be poorly represented in the MCDA process (Estévez, Walshe & Burgman 2013). Second, some social impacts arise in response to procedural issues (rather than as consequences of an intervention). SDM can therefore run the risk of creating unintentional social impacts through its implementation, especially where there are histories of distrust or tension among stakeholders and authorities.

Social Impact Assessment

Social Impact Assessment (SIA) was developed alongside Environmental Impact Assessment (EIA) (Esteves, Franks & Vanclay 2012). While both assess the potential impacts of development projects, and are used to inform planners, they differ in philosophy and procedure. SIA focuses on human and community impacts of interventions rather than ‘environmental’ impacts, although close interconnections between humans and their environments mean that social and environmental impacts can rarely be cleanly differentiated. SIAs are also initiated earlier than EIAs, as it is assumed that environmental impacts won’t occur until projects start, whereas it is recognised that social impacts can arise simply in response to rumour and discussion (Vanclay 2012). Most substantially, EIA is largely completed before a project begins, so the assessment is a product that informs decision-makers. SIA can be conducted in this manner but is better implemented as a multi-stage social process comprising prospective assessment, mitigation during delivery and retrospective appraisal of outcomes (Vanclay et al. 2015). SIA therefore now
comprises “the processes of analysing, monitoring and managing the intended and
unintended social consequences, both positive and negative, of planned
interventions” (Vanclay 2012). ‘Planned interventions’ have elsewhere comprised
large-scale development projects, urban planning and nature reserve designation,
and we suggest that invasive species management might be subject to the same
due diligence as would be expected of other such civic and private initiatives.

A key advantage of SIA is its flexible structure. SIA promotes a deliberative approach
to management, recommending community engagement from the start. As such, it
has features in common with SDM, and we suggest that SIA could be integrated with
relative ease into governance structures based on an SDM model. Indeed, SIA could
facilitate effective SDM: contemporary SIA is highly reflective, and scoping
procedures include consideration of how management planning processes, and the
SIA itself, might affect and be received by concerned publics. SIA can also be
adapted to risk-based governance structures, where it could be used to augment
existing risk assessment/management procedures.

SIA also widens the definition of ‘success’ in management. Rather than focusing on
whether proximate goals are achieved, e.g. eradication completed, SIA aims to
increase the shared value of projects and to build trust between parties (Esteves,
Franks & Vanclay 2012). This could help produce more collaborative projects that
work towards wider social and environmental goals. Whilst risk-based and
deliberative tools end at decision-making, SIA processes continue throughout project
implementation, enabling management to adapt to changing conditions.
Next, we present an adapted framework for SIA of invasive species management, in five stages: scoping, assessment, decision-making, implementation and appraisal (Figure 1). We are not suggesting that SIA should replace existing strategies, but wish to highlight its value as (a) a complementary tool for identifying and evaluating social impacts of management alternatives, which can inform decision-making, and (b) a broader process through which management planning can be made more democratic, adaptive, and reflective.

1. Scoping

Scoping is an early-stage activity that identifies the social risks and opportunities of management. It assumes that a management problem or issue has been broadly identified, but does not require it to be tightly defined. Scoping can be conducted as a general and/or context-specific exercise. General scoping might include a desk-based review of past approaches to the problem, can identify a range of management alternatives and potential impacts. For example, Gardener, Atkinson & Rentería (2010) reviewed plant eradication efforts on the Galapagos and identified important socioeconomic constraints, including inadequate permissions to access property, personal attachments to plant species and inadequate funding. Nimmo and Miller (2007) reviewed four historical cases of feral horse management and found that contemporary controversy surrounding culling followed the pattern of previous cases so closely that it could readily have been foreseen from a literature review alone. Scoping can be restricted by a paucity of accessible accounts of failures and successes (Simberloff 2008), compounded by the routine omission of social issues from natural science literature. Case studies can be found in interdisciplinary, social science, and humanities journals and some post-project appraisals can be found in
the ‘grey’ literature of management and policy publications (e.g. IUCN 2013; Zalom et al. 2013).

Context-specific scoping should include identification of concerned publics and an initial assessment of the ‘social area of influence’ of the problem. This early engagement enables a deeper and more contextual understanding of risks and opportunities, and is a key step in building trust. This stage is also important for identifying any cultural differences or existing tensions that may make subsequent SIA processes more challenging, and provides opportunities to adapt the process to local conditions. Scoping studies need to actively explore socio-political contexts and the local as well as broader implications of interventions. Existing inequities and tensions, or historical events and relationships (including historical management efforts), can affect the emergence, distribution and intensity of social impacts. For example, discussions about invasive species are frequently entangled with wider histories and debates surrounding nativeness, immigration, and colonialism (Lien 2005; Trigger 2008; Coates 2013). Insensitivity to these issues risks inadvertently creating social impacts, such as unintentional replication of imperialist narratives (Bhattacharyya & Larson 2014).

2. Assessment

The assessment stage likely involves the greatest investment of resources, particularly where numerous or significant social impacts have been identified by scoping. Frameworks have been developed to assess the social impacts of invasive species (Binimelis, Monterroso & Rodríguez-Labajos 2007; Marshall et al. 2011) and a similar approach can be taken to assess their management. Indeed, both
assessments could be made in tandem to compare active management alternatives with ‘do nothing’ options. Assessments should start with a ‘stakeholder’ or public analysis (see Reed et al. 2009), ideally using a participatory method, that identifies the interests, needs, aspirations and concerns of affected communities. Analyses should take into account the composition and geographies of communities, the relationships between them and their varying degrees of vulnerability and power. The assessment should then aim to map and forecast positive and negative social impacts of management alternatives, including how these would be distributed across various groups (Maguire 2004). Whilst there is no single ‘checklist’, broad areas for assessment might include impacts on health and wellbeing (e.g. actual or perceived health threats of control agents, distress), ‘liveability’ (e.g. environmental quality), economic circumstances (e.g. income, property value), culture (e.g. heritage, sacred spaces), and community (e.g. tension, identity) (Vanclay 2002). Potential impacts can be explored using a wide range of methods, including surveys, focus groups, interviews, participatory mapping and scenario-building.

3. Decision-making

This is the stage at which SIA feeds into existing governance structures, and may fit particularly with analytic-deliberative models. Management alternatives might be evaluated against one another in an integrated manner, drawing on multiple analyses or assessments (as in structured decision making) of economic, environmental and social impacts, and technical feasibility. Multi-criteria decision analyses, for example, are useful where problems have complex, multiple or competing objectives (Estévez, Walshe & Burgman 2013), and have been trialed in relation to invasive species management, with promising results (Liu et al. 2011). A
well-designed SIA could increase the likelihood that social impacts are successfully
captured and translated into MCDA processes. Whilst SIA is well-suited to exploring
and elucidating social considerations, it may reveal significant socio-political
challenges that reach beyond the management problem and cannot be easily or
immediately addressed. Equally, however, extensive or intensive deliberation may
not be necessary: consensus, or at least strong preference, towards a particular
option could emerge during the preceding engagement procedures, rendering the
decision-making step straightforward.

4. Implementation

The SIA process does not end with decision-making. Responding to unexpected
social impacts throughout project lifetimes can be more valuable than predicting
them (Vanclay 2012) and given that invasive species managers are often required to
respond to dynamic scenarios, a capacity to adapt is all the more valuable (Prévot-
Julliard et al. 2011). Key functions of SIA in the implementation stage are to ensure
that interventions remain adaptive and responsive to emerging issues, and to
maintain active engagement between managers, affected communities and
interested publics. The creation of diverse, inclusive project management and
delivery groups could help achieve this. Managers should also ensure that feedback
mechanisms are in place throughout delivery. Simple measures to maintain open
communication include establishing project helplines, interactive websites and social
media presence.
5. Appraisal

Regardless of their perceived success or failure, upon completion (or cessation) management projects should be subject to an appraisal evaluating outcomes against aims and predictions. This should incorporate expected, observed and managed social impacts, as well as technical challenges and environmental outcomes. This enables project managers to reflect and report on their experiences, and SIA tools to be adapted and improved. Appraisals should be published and permanently accessible, to inform the scoping of future projects. There are examples of post-project evaluations in the literature, however, these can be time-consuming to find and vary in accessibility. Dedicated, open-access publication spaces for both post-management appraisals and pre-project scoping reviews would enable wider sharing of experiences.

Challenges to adoption

Perhaps the greatest challenge to incorporating SIA into invasive species management is that this is not a method for gaining social acceptance of pre-determined projects. Consequently, should this process be adopted there will be occasions where initiatives, at least in their original form, will be rejected because they create unacceptable social impacts. This may be challenging for advocates of particular projects, but is more democratic than relying on authority or secrecy. It is also worth reiterating that SIA directly allows for the positive social impacts and opportunities of management to be explored and maximised.

There are other challenges to adopting SIA. First, measuring social impact is hard: some issues are difficult to express, let alone quantify. Consequently, assessments
may be inclined to focus on impacts that can be counted, and therefore risk missing the impacts ‘that count’ (Vanclay 2012). This is particularly true of cultural or personal, often emotional, attachments to places, species, and individual organisms, the strength and significance of which should not be underestimated. However, methods to assess and express cultural, personal and ethical values are being developed (Chan et al. 2012) and applied to management planning (Lynn 2012; Context 2015). Second, whilst frameworks can be devised and adapted, there is no universally applicable SIA. Social impacts could include just about anything people are interested in or care about, and operational necessity may inadvertently exclude novel or unexpected issues. We have emphasized the importance of appraisal and sharing experiences, but adaptation and adjustment of the process will need to be continuous. Third, for SIA to be effective, managers need to develop trusting relationships with stakeholders and affected communities, which includes recognising and working to address power imbalances. Previous failures, or existing animosity, can increase the perceived risks of management and decrease confidence in its potential for success (Evans, Wilkie & Burkhardt 2008). Early, meaningful public engagement may therefore be vital in achieving sustainable outcomes for invasive species management (Ford-Thompson et al. 2012; Moon, Blackman & Brewer 2015), and SIA provides a practical mechanism for delivering this.

In conclusion, many invasive species management projects receive widespread societal support and achieve successes that protect economies, public health, biodiversity and ecosystems. However, like any environmental intervention, invasive species management can create negative social, economic and environmental
impacts that need to be evaluated against alternatives. Social impact assessment is
constructive, pragmatic, flexible, and well placed to contribute to democratic
decision-making. As the ‘deliberative turn’ (Parkins & Mitchell 2005) in environmental
management picks up pace, we propose that social impact assessments could very
usefully be incorporated into invasive species management.
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Figure 1. Social Impact Assessment framework, adapted for application to invasive species management.