

Scaled Linkage in Policy Co-ordination: Catching Invasive Alien Species in a Global Governance Web

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Introduction: Bioinvasion as a Multifaceted Governance Issue-Area

One of the lesser-known areas of nascent global environmental governance concerns the prevention and management of invasive alien species.² Though there are interesting parametric and definitional debates amongst invasion biologists, there is little doubt that invasive species are one of the greatest threats to biodiversity today, and that their reach is global in scope. Most accounts posit invasive alien species (IAS) as second only to habitat destruction in terms of the overall threat posed to biodiversity. Trade, timber, tourism, horticulture, agriculture, aquaculture: many commercial sectors are pathways for the deliberate or unintentional spread of invasive species, making this a particularly difficult governance issue. As importantly, however, IAS pose serious threats to economic development, extractive industries (fishing, forestry, water provision), human health, and national security. In short, it is gradually becoming apparent that this is a multifaceted issue-area, not one limited to biodiversity concerns. The first section of

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² It is perhaps a misnomer to speak of the “management” of invasive species, since it suggests such a thing is ultimately possible. However the term is applied here to refer to both eradication and co-existence measures in response to serious outbreaks. We should note also that many cases are not anthropomorphically induced; invasive occurs naturally on a constant basis, and this raises important ethical issues about the validity of lethal responses.

this paper will outline some of the ways bioinvasion has been framed by various actors, including the scientific epistemic community, climate change activists, the medical profession, post-9-11 securitization advocates, ecological economists, and global governance proponents.

Ongoing research into global governance and invasive alien species (IAS) indicates that there is a very weak international surveillance and policy implementation structure in place, and one facing many challenges if we are to seriously consider its improvement. At this point the development of several databases to help policy planners and practitioners indentify IAS and their most likely pathways and destinations has certainly improved the situation, and internet communications helps propel this further.³ However, there is a substantial amount of regional, national, and community-level policy development, which is in need of compilation and co-ordination.⁴ Most countries have developed IAS policies, and – not surprisingly – these vary according to the level of perceived threat this poses to them. Meanwhile, the *Global Invasive Species Program* (GISP), which one might assume would be the heart of global governance efforts in this area (along with its 2001 Global Strategy on Invasive Alien Species) has neither the mandated legitimacy nor the resources to begin to respond effectively to the complex economic, ecological, and cultural threats and opportunities promised by IAS. It is a small operation (staffed by dedicated but underfunded researchers) which works only in collaboration with the Convention on Biological Diversity (CBD), CAB International, and several other partners. In general, IAS have come to be seen as the CBD’s problem; this is in itself especially problematic, not only because its COP cannot even agree to some basic “guiding principles”, but because, as I explicate below, IAS are not just

³ Though there is some concern with the impacts of certain lists of IAS, and some efforts at publicity are in retrospect lamented, since they simplify the issue; a good example of this is the IUCN’s Invasive Species Specialist Group’s “100 of the World’s Worst Invasive Alien Species” list published in 2000, which distracted from other species of concern and suggested to the public that an authoritative, exhaustive, and effective list of IAS actually exists (it does not, though both the GISP and the IUCN are in the process of building extensive databases – leading to questions about the replication of such work).

⁴ Research assistant Leah Mohammed has compiled extensive databases of national policy legislation and processes of 50 nation-states, as well as over 20 international organizations, 33 NGOs and scientific networks, and many industrial private sector actors. The database on national legislation is currently available on the website of the Global Invasive Species Program (gisp.org) and the others will follow suit; they are also available upon request to the author.

threats to biodiversity, but they have vital climate change, human health, national security, and trade implications as well.⁵

After describing the thematic frames raised above, this paper will build on previous work on the conceptual and governance challenges of bioinvasion (Stoett, 2007) by discussing the importance of realizing a multi-level governance approach to the IAS issue-area, one which can encompass the various thematic frames presented earlier; it explicates the need for scaled policy linkage: multi-level governance which permits broad international agreements to be placed under a thematic umbrella, and which then links to regional agreements similarly positioned to guide the work of local actors and initiatives. This would afford the development of a more effective GISP, and it raises the tantalizing (to some; certainly not to all) possibility of the development of an *International Convention on IAS*. Such a convention would need to navigate the established but difficult terrain of international trade law, human rights law, and immigration law, and it would need to provide resources to compensate those adversely affected by IAS, perhaps as part of the broader effort to compensate those affected by climate change. It would also need to overcome the understandable spectre of *convention fatigue* which has affected most experts and diplomats working on environmental policy issues.⁶ The paper concludes that such a Convention is not feasible at this time, but that the GISP can still take concrete steps, with the IUCN and other bodies, to improve upon data collection, policy co-ordination, and preventive measures in the future. Finally, we need to stress a basic fact which is so often overlooked in protracted discussions of potential directions in global environmental governance, but a particularly acute contextual factor when it comes to discussions about co-ordinated responses to IAS: Few other issue-areas demand such coordination between the public and private sector, and the last section of this paper will deal specifically with this challenge. How we can get from a global approach to effective private self-regulation is of course a mystery most analysts of global governance

⁵ Reference is made to the 2002 COP 6 Decision VI/23 at The Hague, Netherlands.

⁶ An international internet survey (conducted through Monkey Survey) of over 140 experts in the field in October 2009 indicated support for such a Convention amongst a majority of respondents, but the support is tinged with a healthy caution about the costs (financial but also longitudinal) of its development, given the fact that many other conventions/agreements already cover the issues (See Appendix One). Results of the survey are available from the author.

would love nothing more than to solve. However, there are concrete steps that can be taken to encourage this development.

IAS: the Problem

Though bioinvasion is nothing new (see Elton, 1958; Di Castri, 1989), IAS today pose severe challenges to ecological integrity, economic security, environmental philosophy, and international modes of governance (GISP, 2001; McNeely, 2001; Perrings, Williamson, Dalmazzone, 2000; Wittenberg and Cock, 2001). Purposive introductions of alien species have often proven disastrous to local ecologies (Courtenay and Moyle, 1992; Simberloff and Stilting, 1996), and the incidental spread of IAS as a result of global trade is a pervasive problem (van Driesche and van Driesche, 2000); one author refers to them as “pathogens of globalization” (Bright, 1999; Bright, 1998). In addition, the symbioses between globalization and global warming are increasing the likelihood of bio-invasions at both the microbial and species levels, causing shifts in pathogenic virulence (Price-Smith, 2002; Lounibos, 2002). There is evidence that warming trends will induce species migration northward, and this raises concerns about disease and threats to native species (see Hughes, 2000). However, such “unassisted migration” will prove difficult for rare species of plants and trees, and adaptation or extinction is as likely (see Iverson, et. al., 2004). Not so for insects: warming patterns have vastly extended the range of the mountain pine beetle, ravaging Yoho National Park in British Columbia and threatening forests in Washington. In the infamous case of zebra mussels, which have clogged entire swaths of the Great Lakes, we might see northward migration as appropriate reproduction temperatures are more common. Flooding could expand zebra mussel territory even further. It is believed that “...climate change will affect the incidence of episodic recruitment events of invasive species, by altering the frequency, intensity, and duration of flooding ... by allowing aggressive species to escape from local, constrained refugia” (Sutherst, 2000; Kolar and Lodge, 2000).

Extensive research into national approaches to bioinvasion reveals a striking array of policy directions, and a lack of badly needed international coordination. While the Global Invasive Species Programme (GISP) is networked to a large, if scattered,

epistemic community devoted to the issue, it carries little political weight, is chronically under-funded, and competes with several other international programmes for attention. If IAS are indeed a serious health, trade, and ecological threat, then the time for an international convention on the theme may be here. However, the public construction of the frames explicated below will have a marked effect on the chances of success in such an endeavour. In some cases it is very clear who is doing most of this framing, while in others it is more subtle, emerging from years of discourse. Regardless, however, the danger of adhering to the most conventional or most trendy approach is that either weakens the overall need for international co-operation and prevention programs.

Many IAS are the result of purposeful introductions of species in order to control the populations of other species; perhaps the most infamous case here is that of the venomous cane toad (*Bufo marinus*) in Australia, which continues its onslaught across the country despite highly expensive eradication efforts. Native to the southern United States and central and South America, a group of cane toads (originally from Hawaii) was released into the Australian wild in 1935 to control pest scarab beetles harming the production of sugar cane. Other high-profile cases, such as the zebra mussel invasion of the North American Great Lakes, or the infamous brown tree snake invasion of the island of Guam, have been unintentional; the former resulted from the release of ships' ballast water, the latter was a stowaway in military aircraft.

Responding to the problem raises controversial issues. Various efforts to eliminate species with pesticides, herbicides, fungicides, lampricides, and other poisons present concerns for ecological and human health. More broadly, all of the themes discussed below are indicative of current debates over the validity of seeking to maintain the purity of native species, the futility of trying to accomplish this in a world patterned with globalized trade-related pathways for IAS, and the ecosystemic contexts in which some IAS thrive and the great majority perish. The dream of a puritan national natural security may be a remnant of Nazi ideology that we would do better to forget, but the desire to maintain maximum ecosystem integrity is certainly laudable, and it is self-evident that prevention is the best cure for bioinvasion.

Similar to other international environmental issues, the question of how to respond to the ecological threats posed by bioinvasion raises ancillary questions about

national sovereignty, definitions of risk, fear, and acceptable actions, the politicization of science, and yet deeper ontological concerns about human-nature interaction. IAS are a conceptual challenge, because the mode of their introduction varies considerably, from intentional to incidental, and they are to some extent a normal natural phenomenon (see Theodoropoulos, 2003; Edwards, 1998; Colautti and MacIsaac, 2004; Schwatz, 1997; Vermeij, 1996). They are a governance challenge because they cross borders, and often result from trade and other factors, such as the introduction of genetically modified organisms, that rely on other governance mechanisms (Ruiz and Carleton, 2003). They raise ethical challenges because the costs of dealing with them are not always shared amongst those who cause this risk (Beck, 1992); and environmental ethicists struggle with the question of paternalistic intervention (VanDeVeer, 1986). Scientific advances are being made in the quest to increase our predictive capacity for invasive outcomes (Herborg, et.al., 2007; Anderson, Lew and Peterson, 2003), as well as post-invasion responses (Carroll and Dingle, 1996; Veitch and Clout, 2002). Policy responses have been largely taken at the local level, and have not always been proactive (Miller and Fabian, 2004). However, various bilateral, and often voluntary measures have been instituted, for example to deal with Great Lakes ballast water (Costello, Drake, Lodge: 2007); there are numerous multilateral agreements that touch upon IAS, such as the CBD; and in 1997 the GISP was founded by the IUCN (World Conservation Union), CAB International (CABI), and SCOPE; it produced the Global Strategy on IAS (GISP, 2001), which is not an international legal instrument but may emerge as the basis for future global governance efforts, albeit with other agreements on trade, investment, and biosafety, and the many regional agreements which are slowly forming on this issue, several of which of are discussed later in this paper.

It is an opportune time to add the theme of bioinvasion to the examination of the discursive structures that enable diplomatically contested policy advances. With regard to the vexing question of IAS, where global governance can be most easily identified by its absence, several dominant framing tendencies have emerged, including:

1. conservation/biodiversity,
2. climate change/globalization,
3. human security,

4. what I term *national natural security*, and
5. market failure costs.

How an issue is framed by various public epistemic communities is central to its conceptual evolution and policy responses; discourse-analytic approaches seek to capture emerging discourses, which are actively framed by different constituents (Detraz and Betsill, 2009: 304). Due to the volume of the related epistemic community and environmental convention fatigue, the conservation/biodiversity approach dominates the international discourse at present; but it presents a partial picture, and the others will gain in currency as the problem compounds.

IAS as a Biodiversity and Conservation Problem

For the most part, invasive alien species (IAS) have been the stuff of natural science. The presidential address of the Society for Conservation Biology Toronto in 1989 was entitled “The Onslaught of Alien Species, and Other Challenges in the Coming Decades.” In fact, a subfield of ecology, known primarily as invasive biology (though also as invasive ecology) has grown over the preceding several decades, and a highly respected international peer reviewed journal is entitled *Biological Invasions*. Overall the challenges posed by IAS are seen largely within the broader context of the challenge of biodiversity protection, conservation or, even, management. Especially in highly vulnerable contexts such as tropical islands, IAS must be eradicated or prevented altogether as part of the broader, nobler cause of protecting biodiversity. This is the dominant perspective shaped largely by an increasingly international epistemic community of scientists, but it presents two problems to the goal of preventing future bioinvasion: there are cracks of dissent within this frame; and its dominance can obscure other frames which may have more direct appeal to citizens.

Typically, the term “alien species” refers to one occurring outside its normal distribution range; an invasive species is not only alien (in itself a crime only to certain puritan naturists) but also threatens the existence of indigenous species. This is not just about predation, but of interbreeding and cross-pollination (or hybridization), habitat destruction, the introduction of parasites, and disruptions to the food chain. It took some

time for the scientific community to devote considerable effort to related questions; the publication of Elton's path breaking book in 1958 (*The Ecology of Invasions by Animals and Plants*) began the process of not only serious scientific study but the stark scare tactic of using the term "invasion" during one of the heights of the Cold War (Elton, 1958). Of course parametric problems, such as the development of frameworks for the clear distinction between nonindigenous and indigenous species, were early (and remain ongoing) methodological obsessions.

But there are broader strokes of disagreement. While some ecologists are content to refer to IAS as a form of biological pollution, others are less sure. A small cottage industry has sprouted over the semantic debate concerning the choice of words used for invasive species. Larson, for example, has many suggestions, including "terrorists, piggy-backers, opportunists, spawn, mirrors, providers, hybrids, tricksters, matrices, transients, founts and teachers" (Larson, 2007:31). Other titles include exotics, introduced species, non-natives, non-indigenous, transients, pests, weeds, foreign, noxious, tramps, waifs, and many more, often depending on their specific context. There is consternation amongst some environmental ethicists and biologists that, under a biodiversity framing, IAS will be seen merely as part of the broader crisis of extinction that dominates the public discussion today; indeed, they are subsumed as one of many contributory and interlinked threats (including habitat destruction and climate change) to biodiversity.

Indeed, there is a lively debate amongst biologists and philosophers over whether invasive species (or, less emotively, non-native species) are an inherently bad thing. Mark Sagoff asks whether much of invasion biology is simply "an example of political advocacy parading as empirical science? Is there a scientific or empirical – as well as an aesthetic and spiritual – basis for the assumption that non-native species are, indeed, pernicious in their effects on natural areas and environments?" (Sagoff, 2005: 228). He thinks not; similarly, Mark Davis concludes that "...there is no evidence that even a single long-term resident species has been driven to extinction, or even extirpated within a single U.S. state, because of competition from an introduced plant species"; he believes this will be the case at "global, metacommunity, and even most community levels" as well (Davis, 2003: 481). Others rejoin, of course, claiming for example that the historical toll of invasive species such as rats and cats have been the "single greatest cause of

recorded historical extinctions (since A.D. 1600)” on islands; or that of the currently threatened bird populations (over 1180 species threatened with extinction) almost half are threatened “wholly or in part by introduced species” (Donlan, 2003: 1850; Simberloff, 2005:597).⁷

While there is no doubt that IAS are an important topic for biologists, there is concern also that framing the many issues related to the phenomenon has had the long-term effect of limiting the discourse. The Convention on Biological Diversity (CBD), for example, is viewed by some as the international agency best suited to organize a response to the international dimension of the problem, though it is clear that the threat IAS pose to biodiversity is but one aspect, and the CBD has rather limited political power. (Indeed the parties to the 1992 CBD have yet to agree on a set of prevention guidelines put forth in 2002.) There are other ways of looking at the problem that may be more relevant to the human species, more catchy to the public eye, and more indicative of the magnitude of the threat IAS present to environmental security.

Climate Change and Globalization

Another way of framing the issue, with an embryonic scientific orientation, is by emphasizing its link with climate change. This is becoming an increasingly popular approach, albeit one which is largely thrown in as an afterthought by advocates of serious action on climate change policy. Changing temperatures have profound effects on the survivability of species, and we have already begun to speak routinely of species’ migrations as a consequence. While there is little strong scientific evidence to suggest this is in fact occurring, it is a rather logical deduction that warmer climates will render previously colder areas vulnerable to invasions from species that have been limited in range by climate. Thus the pine beetle’s destructive path in Alberta is often attributed to climate change, which has allowed longer life cycles and northern entrenchment; it is common to refer to future generations of migrating plants and trees; finches and

⁷ GISP, IUCN, and others continue to work towards establishing barometric indicators for measuring the impact of IAS; it is clear however that the number of such species in any given ecosystem will be central.

chickadees are already moving hundreds of kilometers into Canada, according a recent Audubon Society study.⁸

The issue relates directly to the human health frame discussed immediately below, since climate change is deemed a facilitative force behind emerging vectors for migrating diseases. Concerns include the higher risks of hookworm (*Ancliyostoma* and *Necator*) infection and “an increase in distribution and number of species of chiggers, including some tropical ones such as *Trombicula batatus*, and the introduction of many tick- and mite-borne diseases” (Soule, 1990). Northern outbreaks of malaria, sandfly fever, bartonellosis, Lyme disease, and other pathogens are all considered possible consequences of a warmer global atmosphere. Climate change is also used to explain some of the unprecedented spread of jellyfish in recent decades, especially in the Sea of Japan, since warmer waters speed growth and reproduction rates.

This area of research is only beginning to materialize, though it continues a pedigree of historical work, and it should accelerate if climate change brings new and dangerous microbes to the industrialized states (of course, many would argue this is already occurring). At the very least it throws a very disruptive curve to the science of invasive biology, since “[i]nteractions among the many factors mediating invasion dynamics, and the interactions between alien and native biota, are extremely difficult to predict under changed climatic conditions” (Richardson and Wilgen, 2004:50). The temptation, of course, is to stress these great unknowns as further evidence that we need widespread adoption of the precautionary principle, and to thus publicize the issue as part of a broader global governance agenda that has received increasing attention. Thus IAS can be linked to energy production and industrialization, and have been famously referred to as “pathogens of globalization” (Bright, 1999). They are examples of the much broader environmental crises that affect the modern age, or even modernity itself as an intellectual epoch. This goes beyond the obvious link with globalized trade as the main pathway of invasion, suggesting in short that humanity has brought this scourge upon itself through its own incessant colonization of earth’s “natural” areas.

8. Birds Study Canada, “Regional Summaries of the 102nd Christmas Bird Count,” The Audubon Society, http://www.audubon.org/bird/cbc/pdf/american_birds102B.pdf.

The links to climate change may in themselves be fruitful conduits or pathways for increased awareness about IAS, but this raises the danger of an unintended effect of stimulating exasperation in the face of such a large global governance challenge, or the outright alienation of those policymakers reluctant to commit to the long-term collective sacrifices effective climate change policy often demands. Some would argue it is better to force our anthropocentrically-inclined attention to more direct issues, such as the impact of IAS on human health itself.

IAS as a Human Security/Health/Rights Issue

Perhaps the most vibrant growth area in the evolving framing of bioinvasion is its link, and more specifically the threat it poses, to human health. Some invading species pack terrible luggage, such as infectious diseases that can take human life, but they are at the very least lethal to the native plants, marine life, and mammals on which humans depend for physical, economic, and even cultural survival. Framing the issue this way are the medical profession, the pharmaceutical industry, development specialists, and advocates of a maximalist conception of security.

This may be the strongest appeal yet, and may have the decidedly advantageous effect of not only involving the well-funded medical and epidemiological community in the discussion, but of generating much more public discussion of the real risks associated with IAS – though it may also generate irrational panic in the process and excite the more militaristic response discussed below. One can however link the impact of IAS to the extant and emerging literature on human security, which seeks to place vulnerable individuals in place of the state as the main focus of efforts (and responsibilities) to protect. Doubtlessly, the changing dynamics of disease vectors are major cause for concern (and an issue for global governance efforts today); Najam refers to General Assembly resolution a/59/565 of December 2, 2004, which states that “poverty, infectious disease and environmental degradation have been recently defined in a common cluster as threats to international security” (Najam 2006:60). For some however, international security is simply another way of saying state security; the human security position is that policies should reflect the provision of human welfare first.

History is full of nasty microbial examples, such as the infamous case of indigenous peoples harmed by foreign microbes brought over by the Europeans during colonization (Crosby, 1986). More recently, the West Nile virus, spread by mosquitoes and birds, was first found in 1937 in Uganda, and was located by 1999 in New York (Lounibos, 2002). Species can be vectors for serious diseases as well as invasive species of their own right: for example, a virus that causes hemorrhagic fever is said to have found its way to Baltimore from Seoul by way of wharf rats that made the journey in cargo ships. IAS can have a devastating impact on food security: the maize grey leaf spot fungus threatens food security in East Africa; the water hyacinth invasion clogs waterways, making fishing impossible. In Africa they can also harbour the snails that carry bilharzia (*Schistosomiasis*) and provide hiding places for crocodiles, increasing the risk of serious injury or death to water users. Aquaculture operations involving introduced species can be especially hazardous to local fisheries, not only damaging occupational prospects but lowering protein consumption and increasing exposure to parasites and other health threats. In Ethiopia, the introduction of *Prosopis* in the late 1970s/early 1980s has resulted in “substantial species invasion. Up to a quarter of arable grazing land has been overtaken by the plant, soil nutrient dynamics have been adversely affected, and the thorns are a hazard to the local population” (Murphy and Cheesman, 2006; Irby, 2004). Invasive plants can increase the likelihood and economic impact of fires as well, and the environmental harm caused by military conflict raises the vulnerability to local invasion. More broadly, military conduct, which involves large shipments of materials and personnel, is in itself an IAS pathway.

There is another aspect to human health that should certainly not be overlooked, and this relates to the aesthetic value of nature (part of what ecological economists refer to as intrinsic value). The 1989 presidential address referred to above also covered the “sociological and public health implications of biological invasions” (Soule, 235), with several examples of the messy impact of IAS on natural flora and fauna. Recreational activities, landscape architecture, and ornamental aquaculture have all contributed their share to the IAS problem, but the impact of IAS can ultimately in turn modify or lessen the experiential satisfaction provided by these activities. More profoundly, Paul Knights offers an array of examples in which local biota have become defining cultural features

for numerous societies, including the establishment of activist groups opposed to the “increasing homogenisation of agriculture and horticulture” (2008:357). When the infamous brown tree snake (*Boiga irregularis*) invaded the Pacific island of Guam in the early 1950s, the ecological destruction was obvious; but as Blackfoot suggests, “Guam’s residents viewed the snakes’ extirpation of their native birdlife as an attack on their culture.”⁹

We must also consider the idea that governance efforts further entrench the biopower of states and corporations and can create obstacles to the realization of environmental justice. This question is rarely raised when discussions of policy responses to IAS take place, yet it is vital as justice is coming to play a much more central role in our evaluation of global environmental governance efforts, especially in the context of adaptations to climate change (Adger, et. al., 2006; Roberts and Parks, 2006). I return to this theme below, but it should be clear that a human security perspective will make certain demands, such as ample community participation and decision-making authority in eradication and restoration projects, that will often conflict with a more technocratic model. It will also raise issues related to civil liberties if quarantine efforts assume military proportion, threaten food supplies, or injure incomes.¹⁰

There is room, then, to further explore the linkage of IAS with an international human security agenda, though doing so raises all the prickly questions about the universality and relativity of human rights, the ambiguity of the very term human security itself (Paris, 2001; Stoett, 2000), and the need to unearth causes of the deeper structural inequalities that predetermine the relative vulnerability of certain populations to both natural and economic disaster. One can argue, more specifically, that IAS are clearly threats to economic livelihoods and to public health, and these threats are as likely to be viewed through a securitization prism as they are through a conservationist ethos.

Thus the IAS issue is already part and parcel of the larger securitization of public health that has seen a marked escalation since September 11, 2001; biological weapons are an element of this, but natural invasions certainly fit the profile (this leads also,

⁹Quoted in Knights, 364.

¹⁰ Peluso (1993) offers an interesting discussion about potential links between militarism and conservation efforts; this has yet to be applied to IAS but it is certainly a conceivable scenario.

however, to the global governance discussion raised later in this paper). As Larson writes, “part of our concerns about [invasive species] may derive from related fears about the invasion of our body by disease and of our nation by invading peoples” (2007: 136). I turn briefly to the latter concern, which hinges on one of the more pervasive human mental constructions, that of the nation-state, next.

“National Natural Security”

The fire ant “invaded” the United States via lumber or coffee shiploads from South America in the 1930s, and continues its long march across America, spreading by land and water (yes, water) from Texas to Florida to Tennessee and North Carolina, Puerto Rico, New Mexico, and California. As a popular biology textbook notes:

Wherever fire ants have gone, they have sharply reduced or wiped out up to 90% of native ant populations. Their extremely painful stings have killed deer fawns, birds, livestock, pets, and least 80 people allergic to their venom. [They] have invaded cars and caused accidents by attacking drivers, made crop fields unplowable, disrupted phone services and electrical power, caused some fires by chewing through underground cables, and cost the United States an estimated \$600 million per year... (Miller, 2004: 459)

Of course, anyone who has been attacked by a squadron of fire ants is likely to appreciate the militaristic concept that they are at war with us, even if this is an obviously absurd notion. What is more striking perhaps is how easily the discourse of warfare is adapted by the scientific community when dealing with invasive species, and how this links to our perception of an inside/outside international politics. Prior to the 1960s there were few references in scientific journals to *invasive* species; they were as often referred to as “colonizers”, “founding populations”, “non-native”, or the relatively cheery, even welcoming, designation of “new arrivals.” The militaristic tone was well established by the 1970s, however, propelled by books such as George Laycock’s *The Alien Animals* in 1966.¹¹ Peretti even discusses the “disturbing historical legacy of purist biological nativism” (Peretti, 1998:188), with links to Nazi ideology. The implication (often voiced explicitly) that a responsible concern with invasive species can be seen as a form of

¹¹ This is not to be confused with the equally interesting book *Alien Animal: a Worldwide Investigation of Lake Monsters, Giant Birds and Birdmen, Black Dogs, Mystery Pumas, and Bigfoot* by Janet and Colin Bord (New York: Stackpole, 1981).

xenophobia has been, rightly in my view, dismissed as political correctness run amok by many others (Simberloff, 2005; Hettinger, 2001). Even Simberloff concedes, however, that “the attacks of 9/11 have surely increased public concern about foreign immigrants and visitors [and] the potential link of introduced species to ecoterrorism and bioterrorism”(2005:185).

Two potentially prevalent streams of thought regarding national security and IAS (both tied closely to the economic and trade issues discussed below) might emerge in the contemporary discourse, especially if it borrows from the realist tradition of IR thought. Both of these streams flow within the valley of militaristic thinking about community inclusion and outside threats, but are also reflective of contemporary policy dilemmas faced by political elites. The first is that IAS pose a genuine threat to national strength, as measured in terms of hard power. By attacking the economic infrastructure of states, as well as the health of human populations, IAS weaken the ability to convert wealth to military power. This may sound phantasmal, until we consider the impact of IAS on power stations, shipping lanes, train corridors, and other measurable sinews of the state organ; and it is obvious that the pathogenic spread of debilitating and deadly diseases reduces the human capital of the state (Price-Smith, 2002). Of course, we also have to consider the possibility that bioinvasions will be deliberately introduced in order to inflict harm on ecosystems (ecocide) or used as weapons against human populations (bioterrorism). This has happened in the past and could easily be considered a form of ecocide or biological imperialism, and probably will happen in the future, despite various multilateral efforts to curb such behavior. While the generally slow speed of spread for deliberately introduced organisms probably renders this approach to sabotage undesirable, the threat of microbial and virus introductions is of course a permanent concern. Interestingly, many indigenous groups would view the introduction of non-native crops as a form of bioterrorism practiced over several centuries, and current concerns with GMOs echo this sentiment.

The second stream relates to the broadening of the security agenda itself to include biosecurity issues. The confluence of environmental security, climate change, and national security agencies and projections make this less an intellectual adventure and more of a reality, especially for states with serious histories of bioinvasion, such as

New Zealand or Australia, which have basically adopted the equation that national security and biosecurity are synonymous terms (a Carolyn King book published in 1984 entitled *Immigrant Killers* described the impact of introduced predators on birds in New Zealand).

State agencies based in countries which will experience serious ecosystem change in various regions, such as the melting of Arctic ice sheets in the Canadian Arctic, will also quite understandably latch onto this stream of thought, which further divides between those who strove primarily to push ecological (and other non-military) issues onto the agenda of high politics and those invasive alien critical theorists who challenge state legitimacy itself as the state assumes ever greater biocontrol, a concept offered by Michel Foucault and others (see Youatt, 2008). This idea derives partially from our relentless (if understandable) drive to categorize all modes of non-human life, including IAS, a process which no doubt precedes even Aristotle's great efforts in this direction, informs the evolutionary theory of Darwin and others, refines our definition of being human, and yet also reifies the power and control of the modern state as the main source of authority over the natural world.¹²

Equating the struggle against IAS with a national security project may simply be a natural extension of the themes of invasion and counterinvasion, both of which have animated international relations discourse for centuries. Campaigns against pathogens and IAS lend themselves easily to military metaphor. In the Philippines, writes historian John Farley, "the medical campaigns against cholera and other diseases were barely distinguishable from the military campaigns against the *insurrectos*" (Farley, 2003:296). After thousands of years of teaching and preaching the values of just war, and hundreds of years of socialization into the state-as-nation building project, such reflexive language should not surprise. It is still strangely comforting to be able to identify the origin of a species by a nationality. The kudzu vine, introduced from Japan in the 1930s to the U.S. to help control soil erosion but soon became, to the disconcertment of landscape architects, virtually impossible to control at all, is a Japanese, and not an American, weed – despite thriving in southeastern American ecosystems for close to a century. Similarly,

¹² An authority, many would argue, shared by powerful biotech and pharmaceutical multinational corporations.

the Asian tiger mosquito came in 1985 in a Japanese ship carrying tires to a Houston, Texas, recapping plant, carrying a wide variety of human ills, from dengue fever to encephalitis. The problem with the Asian tiger mosquito is the international trade in used automobile tires, not the harmfully infectious threat from Asia, but it may be nice to know it is Asian, not American (African killer bees – *Apis mellifera scutellata* -- are another example; in fact they ‘escaped’ from Brazil, not Africa, and have hybridized with previously introduced European species as they spread northward).

Biosecurity will certainly entail both traditional military and asymmetrical warfare concerns, but it would be counter-productive to even think seriously of a garrison approach to IAS. Yet it may well emerge as a possible framing mechanism to get IAS on the national radar. This would not surprise the realist camp within IR theory, nor for that matter the social constructivists who are interested in identifying additional post-9-11 justifications for foreign policy narratives. It would of course disappoint the liberal institutionalists, who may see collaboration on IAS as another conduit towards the international pursuit of enlightened self-interest. But, with notable and empirically grounded exceptions such as New Zealand and Australia, it is unlikely that the ideal of national natural security will take serious root in contemporary thinking informed by scientific observation and the realization that globalization (and climate change) has been (re)shaping current ecosystem characteristics for many centuries. More likely, the economic costs of IAS will dominate the national security debate, and this reflects almost directly the costs of contemporary trade.

IAS as Market Failures: Costs and Trade Issues

Ecological economics, which views nature as capital, is still considered an impertinent young sibling by mainstream economics, but it is gaining ground as the sheer magnitude of the climate change issue begins to overshadow even current economic crises. Many prominent analysts in the epistemological community/transnational expert network have argued passionately that the biggest obstacle to dealing with IAS is in fact the lightly regulated international trade sector.¹³ This is a logical deduction, given the

¹³Personal communications with Stas Burgiel, and see Burgiel et al., 2006.

historical path of many incidental invasions that simply would not have been possible without ocean-crossing vessels. The cases of mussel invasions, which have received prominent media coverage in North America owing to the zebra mussel infestation, demonstrate the importance of trade and shipping routes, and the role of ballast water exchange: cleanup costs are estimated at over \$600 million per year and they have barely scratched the surface of the problem (Lee and Gordon, 2006:94). Margolis, Shogren, and Fischer suggest invasions “constitute a market failure rooted in international trade” and mention the “impossibility of distinguishing legitimate public-goods protection from protectionism without full knowledge of the public-goods value” (2005:306).

This is certainly one of the approaches currently favoured by the GISP, whose latest publication of advice is entitled *A Toolkit for the Economic Analysis of Invasive Species*, and whose authors argue that “...it is now widely recognised that economics is to do with much more than just understanding the costs of invasives or the benefits of managing them. It also concerns understanding the complex causes of the introduction and spread of invasives, the links between human behaviour and natural processes, and finding solutions”(Emerton and Howard, 2008:3). Surely, IAS are more than the externalities of market transactions; and market prices of commodity trading do not accurately reflect the full social and economic costs associated with bioinvasions. These commodities include not just timber, oil, ornamental plants, aquarium fish, disposable waste, and other tradable goods, but the profits gained from the transport, travel, and tourism industries as well. This produces a string of logic: if market failure is responsible, then regulatory intervention may be the only effective remedy. And if the public were more aware of the costs incurred due to IAS, it would be more receptive to that idea.

Though serious methodological disputes persist, efforts to measure the real costs of IAS are now commonplace. Indeed, one organization invested in counter-invasion work claims the worldwide cost of invasive species, including water hyacinth in North America, Asia, Australia, Africa, and Europe, cause “around 1 trillion dollars worth of damage each year globally.”¹⁴ The GISP has used an even higher estimate, based on a 2004 report, of “5% of the global economy, or \$US 1.4 trillion” annually; this is derived

¹⁴CABI International makes this claim in a promotional brochure for its Invasive Species Program (see www.cabi.org).

from a study conducted in 1999 of losses associated with non-native species invasions in the United States, United Kingdom, Australia, South Africa, India, and Brazil placed the figure at \$314 billion (Young, 2006:1).

As its authors concede, however, it is impossible to assert complete accuracy in these terms, and introduced species such as corn, rice, and cattle constitute the vast majority of the global food supply today. Further, there are large differences between figures that do and do not attempt to account for microbial invasion (as the Pimentel study does); this will vary according to rates of infection and parameters of definition. Is the HIV/AIDS virus an invasive species? If so, how would we even begin to calculate the economic toll it has taken? The authors of the above study actually include published health care costs of HIV/AIDS and cholera, and other diseases, but to argue an accurate figure can be ascertained would border on the inane – not to mention the complex terminological questions their inclusion raises. Further controversy and inevitable politicization accompanies the debate over the economic impact of GMOs (invasive species without a native land); estimates will depend on the source's predisposition toward the benefits and possible harms associated with their growth. Newspaper reports that raise alarmist bells about invading monster jellyfish have further publicized the cost of IAS, though we should be careful as to their precision. The point remains: IAS can cost incredible sums of money, including opportunity costs, and someone always has to pay.

This is language that commercial liberals, as well-described by Doyle (1997) and others, can understand. While it would be at best premature to conclude that the existence of a problem will lead to related cooperative efforts, there is certainly great potential for cooperation between trading partners on the twin themes of conservation and IAS prevention; indeed, unique programs of co-operation between even China and the United States are currently underway (Ding et. al., 2006). Put bluntly, the prevention of IAS will often entail the disruption of trade, and the focus thus falls on whether controls for invasive introductions constitute unfair trade barriers. We thus enter the world of international trade law and the related agreements constituted for notable exceptions to the drive toward ongoing trade liberalization, itself a strong narrative in the post-WWII story of globalization. This includes, most notably, the WTO Agreement on the

Application of Sanitary and Phytosanitary (SPS) Measures, which stipulates that any such measures must be applied “only to the extent necessary to protect human, animal or plant life or health, be based on scientific principles, and not be maintained without sufficient scientific evidence.”¹⁵ The SPS Committee recognises three organisations for international standard-setting: the International Plant Protection Convention, the World Organisation for Animal Health and, for food safety standards, the Codex Alimentarius Commission; it is legally capable of recognizing others, however, such as the GISP, though it has not done so. However, “experience to date shows that collective negotiation of standards generally reflects a lower common denominator of protectiveness with trade facilitation as the main objective. Developing countries may lack the resources, expertise or scientific information to participate effectively in standard development and ensure their concerns are taken into account” (Burgiel, 2006).

The Agreement on Technical Barriers to Trade (TBT) is also highly relevant, since it gives more space to the construction of barriers to prevent national harm. Margolis, Shogren, and Fischer conclude that in general, “it is easier to defend a regulation if it can be brought under the TBT rather than the SPS. The transparency and nondiscrimination features of the two agreements are almost the same. The major difference is that an SPS measure must be backed by scientific evidence that advances its goal, and the measure can be applied only to the extent necessary to achieve the proclaimed level of risk reduction. Measures subject to the TBT Agreement do not, as a rule, have any equally verifiable purpose, so there is no equivalent requirement for scientific assessment” (2005:307). Meanwhile, regional trade agreements may offer more latitude as well; for example, “NAFTA allows national governments more latitude over their technical standards and SPS measures...”(ibid:309).

Framing IAS as a market failure issue offers enticing prospects to those who wish to stress the importance of preventive measures, and provides fuel for scientific efforts to use the “nascent science of predicting invasiveness [for] the creation and application of formal, detailed scientific analytical systems for determining whether a species should be allowed” (Young, 2006:32). It may be swallowed by the grander debates over the

¹⁵Article 2.2; see also the GISP Report by Clare Shine, 2008.

benefits and disadvantages of globalization, and the power discrepancies inherent in an international trading system which, many argue, is already biased against the less industrialized participants. If taken on its own, it runs the risk of overlooking other factors, such as clandestine trade in hazardous waste, development assistance, military trade, and even natural disaster relief, which are not generally subsumed within the WTO universe. The discussion could be in turn dominated by the ranks of trade lawyers and foreign investment consultants with little if any ecological expertise or environmentalist inclinations; conversely, anti-globalization activists could raise the loudest voices as IAS become poster species. But it is a vital component of the overall picture which cannot be ignored and more work needs to be done in this area.

There is a final economic aspect to IAS: cleaning them up can actually contribute to job creation. For example, the much-vaunted Working for Water Programme in South Africa has contributed to substantial temporary job creation in underemployed rural areas. This Keynesian advantage will not, however, be much of an incentive to engage in prevention programmes!

Scaled Linkage in Policy Co-ordination: IAS at the International Level

All of the frames for bioinvasion discussed above suggest that IAS present serious public problems, but they would locate the axis of relevant governance in different places. While biologists are likely to (often reflexively) rely on the CBD or other conservationist-oriented mechanisms, climate change advocates would suggest nothing short of a new Kyoto Accord via the upcoming Copenhagen negotiations will stem the tide of increased rates of bioinvasion. Others would place an emphasis on human security, rights, and health, still others on national security concerns and even military responses, and others – especially ecological economists – on trade agreements and the aggressive regulation of trade, investment, and tourism. This panoply of response contexts suggests that policy co-ordination will be key to the success of any global effort, and that there are various levels of governance that can contribute.

There has been much written about *multi-level governance* in recent decades, and we make no attempt to replicate this body of literature here. While most of it has derived

from a non-international context, the growing thickness of the volumes with the title or subtitle “global governance” (not to mention one of the premier refereed journals in the field of international organization) reflects the fairly widespread acceptance that there are many levels of bureaucratic control, public administration, and normative convergence at work in any operative governance regime (see Bache and Flinders, 2005, for a nice overview of the various understandings and applications of a multi-level governance framework). Much of the work on multi-level governance emerges from protracted efforts to both study and further the cause of the European Union, but it can be utilized in a thematic manner as well. The original definitional contribution by Gary Marks retains relevance: multi-level governance is the “system of continuous negotiation among nested governments at several territorial tiers” (1993:392); this, combined with the recognition of the importance of *transnational policy networks* (Rhodes, 1997) puts us on a path toward understanding the complexity of modern governance, not just in the EU but in other contexts as well. As importantly, perhaps, we must view the development of transnational policy networks (on which I expound below) as necessary if we wish to generate related expertise and pressure governments to take definitive action.

There is now a wealth of literature on the impact of international institutions designed to provide environmental security, particularly the interplay between them (Rosendal, 2001; Young, 2002), their domestic impact on capacity-building (VanDeveer, 2005), the cumulative impact on the institution of sovereignty (Litfin, 1998; Eckersley, 2004), treaty compliance (Mitchell, 1994), the special role of experts and activists (Keck and Sikkink, 1998; Conca, 2005; Haas, 2005), and implications for environmental justice (Dobson, 1998, Adger, 2006, Harris, 1999). Cross-institutional issues have been explored (Oberthur and Gehring, 2006) and the trade implications of various agreements emerging from the CBD, such as that on sanitary and phytosanitary measures (Scott, 2007; more generally, Barkin, 2005), have received some treatment. While most analysts are concerned with the architecture of global environmental governance efforts and possible reformation of the United Nations Environmental Programme (see Ivanova and Roy, 2007; and Esty and Ivanova, 2002), many scholars have analyzed global governance from a critical viewpoint (Soederberg, 2007), observing the interplay of corporate strategies and global environmental governance (Levy and Newell, 2005), and the discursive

structures that enable diplomatically contested policy advances (Litfin, 1994; Darier, 1999; Andrée, 2007).¹⁶

According to Joas, Kern and Sandberg, policy networks are best seen as “more or less institutionalized interaction[s] between autonomous and interdependent actors” (2007:237), including “hybrids” involving both governmental and non-governmental actors (the latter including “civil society” groups and the private sector). Hybrid global public policy networks “give access to resources otherwise out of reach and also serve as arenas for actors who otherwise would not be able to influence policymaking” (ibid:238-9; see also Rosenau’s article in Bache and Flinders); however, hybrid networks “may challenge the democratic legitimacy of governmental actors, the efficiency of private sector actors, or the innovativeness and freedom of nongovernmental actors” (239; see also Bache and Flinders, 2005; Djelic and Sahlin-Andersson, 2006). On a topic as sensitive as IAS, which involves issues such as military security, border control, trade agreements, intellectual property, global public health (Aginam, 2005; McMichael and Bouma, 2000) and others, it is clear that the coalition of agents that produced the Global Strategy on Invasive Alien Species faces serious obstacles to its implementation. However scant scholarly research has been published on this important development, or on the governance questions it raises. We must also consider the idea that governance efforts further entrench the biopower of states and corporations and create obstacles to the realization of environmental justice (Illsley, 2002; Bullard, 1999; Dobson, 2003; Fletcher, 2003). This question is rarely raised when discussions of policy responses to IAS take place, yet it is vital as justice is coming to play a much more central role in our evaluation of global environmental governance efforts (see Adger, Paavola, Huq, and Mace, 2006; Roberts and Parks, 2006), including the development of international law (Rajamani, 2006). Finally, IAS provide what is perhaps the ultimate example of the need to apply the precautionary principle (see Whiteside, 2006; Burns, 2006), raising further ethical dilemmas and demands related to the social distribution and prevention of risk (Beck, 1992).

¹⁶ As an aside, I intend to apply this discursive framework to a more detailed compilation of case studies of IAS policy responses, and would appreciate input regarding apposite cases.

Biodiversity policy provides a good example of the complexity of policy networks today; in Canada, for example, its “quintessential biodiversity legal scenario” includes a “general direction from the International Biodiversity Convention to protect species at risk; a constitutional dispute between the federal government and provinces as to who should do it and how; industry resistance to regulation yet inadequate government support for voluntary stewardship; and environmentalists’ concerns that decisions be based on science, and about the extent of governmental discretion given past inaction and reduced funds and staff” (Attridge, 2000:297-298). Add to this the imperative involvement of public reporting and preventive measures needed by workers engaged with the natural resource sector and we have some idea of the maze of needs and possibilities inherent in the IAS issue. A partial list of various actors and levels of behavioural regulation related to the prevention and control if IAS would appear as thus:

- international conventions and secretariats (see Appendix One of this paper for a partial description of the many conventions involved)
- regional agreements; some with organizations, some based on inter-ministerial coordination
- national legislature and policy development and implementation
- national and international scientific communities
- private sector self-regulation and government inspection
- NGO input
- community/municipal government
- educational institutions
- individual consumers, including recreational hikers, fishers, boaters, hunters, tourists, and other actors.

Note that there is an implication of hierarchy here, but not in the conventional sense of the distribution of authority; one could argue that any of these points of convergence are as important as the other. Functionalist and neofunctionalist designs pay tribute to the need to organize their interactions along instrumental lines, but this assumes the existence – or presumes the eventual emergence – of a facilitative political community. This simply

does not exist at the international level, so we need to be much more flexible about our analytic demands and normative expectations. This is why I believe it is more reasonable to discuss “scaled linkages” than it is to push the “multi-level governance” theme when it comes to global environmental policy development, though the two are closely related. On one end of the scale we have international co-ordination, which could be developed further along the lines of the RAMSAR Convention or other mechanisms, and which is designed to link the other areas of governance to an ongoing project. In the case of IAS, the CBD¹⁷ continues to play the most visible role here, but an enhanced GISP could do a much better job if it had sufficient resources and more official support from the international environmental diplomacy community. The scale continues across (not down) to regional organizational efforts, which could include the IUCN groups but also new technical committees reporting to the GISP on regional bioinvasions and resistance techniques; it then continues to the national and municipal levels, and across into the private sector, NGO, and scientific communities. Thus we have a three-level model, with intricate linkages between all three levels:

1. GISP --- regional technical committees ----- national govt's ----- municipal govt's
2. Private sector industries ----- NGO activism ----- scientific community
3. Individual consumers

An extensive survey conducted by graduate students for the author of this paper reveals that there are indeed an impressive number of IAS-related policies at the national level; some of these place direct demands on the private sector, but most are limited to

¹⁷ The 1992 Convention on Biological Diversity (CBD) calls on contracting Parties to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats and species" in Article 8(h). However, as mentioned above, the COPs have not been able to take this very far in terms of concrete commitments from members.

border control and public education efforts.¹⁸ Though The level of policy development is weak in relation to the actual threat posed by IAS, except in states where this has been an ongoing public problem, such as Australia and New Zealand – where biosecurity is essentially synonymous with the prevention of new species introductions, and governments must face severe criticism if there is a perception of inaction. What is missing is a concerted effort to link the different policy levels in an overarching framework, though the Global Invasive Species Program certainly makes strong suggestions in this light. Networking opportunities abound, of course, spurred by inter-agency collaboration. For example, the recent International Congress on Biological Invasions, held in Fuzhou, China, was co-sponsored by CABI¹⁹ and the Chinese Academy of Agricultural Sciences, in collaboration with Agriculture and Agri-Food Canada, Australia’s Commonwealth Scientific and Industrial Research Organization, the FAO and IAEA, GISP, the USDA, and Kansas State University. But this is not the same as the provision of a governance regime that both embraces diversity and rejects hierarchy while simultaneously promoting the development of norms amongst various actors and stakeholders. While the GISP has adopted a much more holistic approach than previous, crisis-driven policy responses, it nonetheless lacks the mandate to make bolder and more intrusive policy demands. Another ongoing problem is the lack of capacity in many states, including particularly vulnerable island states, to develop data bases of extant invasive species and thus indicators of policy successes or failures. Data deficiency thus becomes a major threat in itself, as countries that can afford monitoring systems have a further advantage over those that cannot. There is no effective mechanism to bridge this gap at present.²⁰

If there is a dearth of serious policy co-ordination at the international level, it is not because the issue-area of IAS has been ignored; on the contrary, eleven international agreements have a clause, written in the original text or subsequent decisions and resolutions, stating that members should prevent them.²¹ Several international

¹⁸ The results of the survey of 40 countries can be found at GISP.org

¹⁹ As mentioned previously, CABI has emerged as a central player in the IAS issue-area. Readers may know it better by its original full title, the Centre for Applied Biosciences International.

²⁰ Work on developing effective indicators does continue, however.

²¹ Convention on Biological Diversity (CBD), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Migratory Species of Wild Animals (CMS), International

organizations have publications and voluntary measures for preventing the introduction of IAS.²² Interestingly, five of the guidelines and voluntary measures involve the protection of marine environment, reflecting its importance. Many of the publications and voluntary measures are vague and are meant to apply to general situations. The IUCN's guidelines are meant to aid in the implementation of the CBD's decisions related to IAS. All publications and voluntary measures are designed to raise awareness about IAS issues. Several clauses are limited in scope: for example, Agenda 21 of the UNCED applies to combating deforestation, whereas, OIE applies to animal diseases.²³ Unsurprisingly, of the 11 organizations, the CBD has the most comprehensive agreement for IAS, including multiple decisions, suggested guidelines, an in-depth review of ongoing work on IAS, and clearing-house mechanisms for cooperation and collaboration between international organizations, research institutions and members. Following the CBD is the Ramsar Convention, which provides guidelines on the methods of control and recognizes that IAS will become more problematic with "increasing global trade, global change and changing land use patterns."²⁴ CITES promotes the eradication or control of IAS in their non-native habitats, and also encourages collaboration and cooperation between conventions, organizations and members. Furthermore, the Animal Committee of CITES is producing a list of actual and potential IAS with management suggestions on

Civil Aviation Organization (ICAO), International Convention for the Control and Management of Ship's Ballast Water and Sediment (IMO Ballast Water Convention), International Plant Protection Convention (IPPC), Convention on Wetlands (Ramsar Convention), United Nations Convention on the Law of the Sea (UNCLOS), United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, United Nations Conference on Environment and Development (UNCED), and World Organization for Animal Health (OIE).

²² The Food and Agriculture Organization's (FAO) *Technical Guidelines for Responsible Fisheries: Precautionary Approach to Capture Fisheries and Species Introductions* (1995), *Code of Conduct for the Import and Release of Exotic Biological Control Agents* (1995), and *Code of Conduct for Responsible Fisheries* (1995); The World Conservation Union's (IUCN) *Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species* (2000) and *The Species Survival Commission's Guidelines for Re-Introductions* (1995); The International Council for the Exploration of the Sea (ICES) *Codes of Practice on the Introduction and Transfer of Marine Organisms* (2004); the Programme of Action for the Sustainable Development of Small Island Developing States (1994); and United Nations Environment Programme's (UNEP) Programme of Action of the Protection of the Marine Environment from Land-based Activities (1995).

²³ United Nations Department of Economic and Social Affairs: Division for Sustainable Development. (2004, December) *United Nations Conference on Environment and Development—Agenda 21*. Retrieved 24 July 2008, from <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter11.htm> and World Organization for Animal Health Agreement. (2006, July) *International Committee of the OIE*. Retrieved 24 July 2008, from http://www.oie.int/eng/OIE/textfond/en_selection_resolution_lutte.htm

²⁴ Ramsar Conference of the Parties. (1999) *COP 7 Document 24: Invasive Species and Wetlands*. Retrieved 23 July 2008 from http://www.ramsar.org/cop7/cop7_doc_24_e.htm

how to deal with them.²⁵ The IMO Ballast Water Convention advocates “Parties must prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens,” but no date has been specified for the latter clause.²⁶ In 1997, the IMO published the *Guidelines for the Control and Management of Ship’s Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens*.

Two well-known international institutions indirectly imply preventing the introduction or spread of IAS is essential for human health and economic growth. The World Health Organization (WHO) seeks to prevent the international spread of diseases with a minimal interference in world traffic.²⁷ And, as discussed above, the WTO’s *Agreement on the Application of Sanitary and Phytosanitary Measures* addresses all sanitary and phytosanitary issues that affect, directly or indirectly, international trade.²⁸ Standards, guidelines and recommendations apply to food safety, and human, animal, and plant health. Many of the issues, such as pests, diseases and disease-causing organisms, relate to IAS, though the latter are never explicitly mentioned. Furthermore, several WTO member countries provide lists of quarantine pests, establishments authorized to export, press releases, and alerts.²⁹

This flurry of activity seems rather unorganized, perhaps emblematic of the typical over-governance of global governance scenario. While all of the thematic frames discussed above are arguably well established, with historical paths and contemporary temptations, effective global governance in this area remains relatively embryonic. But this is typical in other areas as well, including climate change and habitat preservation. Of course, if we equate global governance with effective political control then we are far from the mark; but a transnational policy network on IAS is certainly forming, complete with public and private sector participants. Similarly, efforts at global epidemiology

²⁵ Convention on International Trade in Endangered Species of Flora and Fauna Conference of the Parties [CITES COP]. (1997) *COP 10 Decisions of the Conference of the Parties*. Retrieved 23 July 2008 from <http://www.cites.org/eng/cop/10/E10-Decisions.pdf>

²⁶ International Maritime Organization [IMO]. (2004) *International Convention for the Control and Management of Ships’ Ballast Water and Sediments*. Retrieved 23 July 2008 from <http://www.imo.org/>

²⁷ World Health Organization. (2005) *International Health Regulations*. Retrieved 24 July 2008, from <http://www.who.int/csr/ihr/WHA58-en.pdf>

²⁸ World Trade Organization. (Adopted 1994) *The WTO Agreement on the Application of Sanitary and Phytosanitary Measures*. Retrieved 21 July 2008, from http://www.wto.org/english/tratop_e/sps_e/spsagr_e.htm

²⁹ World Trade Organization. (no date) *Links to members’ SPS-related websites*. Retrieved 21 July 2008, from http://www.wto.org/english/tratop_e/sps_e/spslinks_e.htm

surveillance and prevention are slowly evolving, despite the enormous risks to human health of inaction (see Dodgson and Lee, 2002; Cooper, Kirton, and Schrecker, 2007; and Keefe and Zacher, 2008). A World Bank report refers to the GISP, which was formed in 1998 by the IUCN, CABI, and SCOPE, as an “informal but highly effective partnership to promote urgent and necessary action on invasives” (quoted in Young, 2006: 19). Were it to receive commensurate support, both moral and financial, from interested governments, it could form the hub of an extensive network of international conventions and agencies which deal with IAS-related issues; and it could work with the many regional organizations which are already co=ordinating policy responses on related issues. A very partial list of regional agreements would include the SADC (Southern African Development Community) Fisheries Protocol of 2001; the CEC (Commission for Environmental Cooperation) of NAFTA; the Convention on the Conservation of European Wildlife and Natural Resources (Bern Convention, 1979); the South Pacific Regional Environment Programme’s Regional Invasive Species Strategy (2000 -- this was updated in 2008 and is awaiting endorsement from member countries and territories); and the 2006 Caribbean Regional Invasive Species Intervention Strategy (CRISIS), which was developed and will be implemented through the Caribbean Invasive Species Surveillance and Information Programme.

Building a Governance Web: A New Convention?

One possibility is the construction of an international convention on IAS. This could legitimize the role of an expanded GISP, and promote scaled linkages in policy coordination. It would face many challenges, however, ranging from the competing importance of other agreements to the reluctance of state officials to put sovereign decision-making authority on the line. Indeed it would be a weak convention by most standards, but weak conventions are in fact the standards when it comes to environmental policy. There is widespread agreement that IAS remain an underpublicized issue-area, and that global efforts are needed in this regard. Again, it is a framing question: can local needs and problems benefit from the promotion of a global image of IAS as a problem of the commons? I believe they can, assuming we do not fall into the trap of systematically ignoring local needs in the process.

Do we need an *International Convention on IAS*? A recent cross-national internet survey of IAS specialists indicates that there is support for the idea, but it is cautious: there are already conventions which can deal with the issue, and convention fatigue has set in amongst ecologists and others concerned with environmental governance.³⁰ At the same time there is growing frustration that the international community does not take this issue seriously; that countries most affected are doing not only the heaviest lifting, but in some cases all the lifting, even though IAS can spread very quickly to new areas; and that present arrangements are so voluntary in nature that there is no incentive to move into serious prevention mode. As one senior official involved in IAS prevention indicated, “[q]uite simply, until invasive species has a dedicated international legal instrument which confers some ‘teeth’, I doubt we’ll make the much-needed progress in invasive species.”³¹ Beyond a stronger push on WTO trade restrictions, such a Convention could establish a funding mechanism to overcome capacity deficits, support scientific research, establish IAS-sanctuaries in some key island areas, publicize lists of annexed dangerous species, co-ordinate regional activities and ensure national and municipal policies are developed in mutual awareness, focus activity on specific pathways, and help to co-ordinate the activities of the medical, human rights, business, and biology sectors.

My impression at this point is that it would be a very long arduous road to negotiate such a thing, given the complexity of this multi-framed issue. It would not escape the usual dilemmas of authority and resource competition with extant trade (and, even, environmental) agreements. It would be denounced by some as a desperate attempt to manage business-as-usual, as opposed to a more concerted effort to change the over-consumptive international political economy. Yet it certainly remains a logical option. It would bring unprecedented publicity to the issue, especially if a summit accompanied the final negotiations. And, given the propelling force of the various optical and intellectual frames discussed above, such a Convention would perhaps escape the confines of GEG, and emerge as a global governance instrument linking science, human rights, and trade. A renewed GISP could serve as a secretariat, and could encourage regular ministerial-level meetings. A global list could be established, perhaps in a format similar to that of the

³⁰ Some responders were quite forceful in their opinion that even discussing the possibility of such a new convention was a waste of precious time and resources better spent on the ground.

³¹ Personal email communication, 05/10/2009.

CITES Appendices, to regulate trade. It could also channel adaptation, eradication, and restoration funding in an equitable manner, so that those most affected by IAS would not be the subjects of blatant environmental injustice. It is a tantalizing, if highly unlikely, possibility.

The Private Sector

Another important point is that, though global governance is generally a public affair, private industry will remain central here. One cannot implement any of the conventions discussed in this paper without the cooperation of the private sector; in fact, it is a decisive element of any strategic plan. For example, preliminary research suggests that, while companies with international interests are ready to take the plunge and adjust to new international arrangements such as the IMO's Ballast Water Convention, shipping firms that work primarily within the North American Great Lakes were initially quite reluctant to do so (though they have released a supplemental voluntary ballast water management plan for the control of the hemorrhagic *septicemia* virus, which destroys the circulatory system of fish). Indeed, the shipping industry has probably been more intensively involved with IAS issues than other transport or export-oriented industries precisely because of the negative publicity associated with ballast water discharge, but it also indicates reason for hope since concrete actions have been taken (see Stoett and Mohammed, 2008; and Knight, 2007, for an industry perspective).

While the industrial sectors involved in this issue-area (and there are so many that it would be impractical to think of them as a monolithic block, from agro-forestry to tourism to military contracting) could be expected to oppose aggressive market intervention, there may in fact be an advantage from global regulations which level playing fields and effectively ostracize those firms which do not comply. Governments would have to supply incentives, however, to ensure co-operation, and not just promise punishment for those who do not. If we are to take this threat seriously then subsidies and tax breaks should not be out of the question. Here the link with global warming policy becomes both troublesome and opportunistic, since both issue-areas do demand sacrifice, but both promise positive publicity and lowered efficiency costs in the long-term.

Beyond the practical implications of including the private sector in any serious future strategies, there is another reason it simply must be involved: it is often expected or contracted to provide technical and scientific expertise in the fight against IAS. And what if eradicating and controlling IAS became really, really big business? Has a political economy of bioinvasion, composed of counter-invasive industries and specialists, dependent on the proliferation of IAS for its own survival, already emerged? At present there are many corporations involved, of course, mainly from the chemical industry but also multi-purpose agricultural corporations, and non-profit organizations such as CABI, which now hosts the GISP Secretariat in Nairobi, Kenya. Broader debates over the private/public sector management and ownership of water spring to mind here. Surely IAS are a problem of the commons, yet the expertise needed to deal with the resultant ecosystem stresses will often be found in the private sector. It is necessary to stress the human dimension of the issue to avoid both the market-driven pursuit of exploitative profits, and the domination of technocratic corporatist bureaucracies; but it would be churlish to imagine effective action without private sector participation, on both the prevention and eradication side of the coin. Any successful treaty or convention without strong surveillance and enforcement capacity must instil a sense of corporate responsibility to be successful today; this is of course easier to say than to realize.

Conclusion

In their “Call for papers”, one of the questions posed by the organizers of this conference was: How can we explain instances of 'non-governance'? While a maze of governance options on IAS exists, if we expect to derive a clear sense of order and an institutionalized hierarchy of mutual expectations, it is clear that we have non-governance at the international level. This is not unique, of course. We do not have an effective forestry regime; ocean governance remains a hodge-podge of conventions and agreements; a firm commitment on climate change has eluded us so far; and the list could go on for quite some length. But we should strive for more, given the magnitude of the threats currently posed to biodiversity, human health, cultural and national identity, and economic survival by the specter of IAS.

In terms of governance architecture, there are no short-cuts available in the field of IAS prevention. While international standard-setting and information exchange is vital, and the GISP seems the most logical place to undertake this work, the real work of prevention will take place in both public and private sector diligence at the local and community levels. This should not surprise observers of global environmental governance, since it is quite normal that international regimes need to engage in regulatory capacity-building if they are to have a serious impact. It can be argued however that there is a desperate need for a broader statement of principles and normative space should be created for a global approach to this vexing problem.

If we are to cast an effective governance web around the threat of IAS, one which embraces the variety of thematic frames explicated in this paper, it will entail cooperative efforts at a dizzying number of vantage points, not least of which will be the intimate involvement of private sector actors. Rather than ascribe to the phantasmal notion that any one international agreement or transnational policy network can have a definitive impact, we must conceive of scaled policy linkages which will enable capacity building, adaptation and mitigation measures, and most importantly, preventive programs to be put into place. A new Convention, which explicates the linkages from the extant international conventions to the regional programs to private sector obligations, would help publicize the issue and organise the various actors involved. It may be equally phantasmal, however, to imagine this possible in the near future. But one thing is for sure: giant jellyfish, fire ants, and pine beetles do not care one iota about human indecision and lack of political will, though they will happily continue to benefit from it.

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**Appendix:
International Agreements With IAS Content**

1. Convention on Biological Diversity (CBD)

(SCBD, 1992)

Article 8(h)

>Parties are to 'prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species'

(CBD COP, 2002)

COP Decision VI/23 Alien Species that Threaten Ecosystems, Habitats or Species (2002)

>Adopted the Guidelines for the Implementation of Article 8(h)

>Article 10 Urges Parties to:

- adjust or develop policies, legislation and institutions;
- facilitate the involvement of stakeholder groups;
- develop capacity for risk assessments;
- collaborate with trading partners and neighbouring states;
- incorporate IAS considerations into national biodiversity plans... sectoral and cross-sectoral policies...

➤ Cartagena Protocol

(GISP, 2000)

Objective is to ensure adequate level of protection in the safe transfer, handling and use of LMOs

(Moore, 2005)

Objective is to protect biodiversity from potential risks posed by LMOs

Mechanism is the Advance Informed Agreement (AIA) Procedure to ensure countries are properly informed prior to importing LMOs

2. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

(CITES COP, 1997)

COP Decision 10.53 (directed to the Parties)

Party states should:

- consider problems of IAS when developing national legislation
- consult with the management authority of a country of import when considering exports of potentially invasive species
- consider opportunities for synergy between CITES and the CBD and explore possibilities for cooperation and collaboration

COP Decisions 10.75, 10.85 (directed to the Animals Committee and Plants Committee respectively)

- formal liaison to be established with IUCN Invasive Species Specialist Group between COP 10 and 11 to review species in international trade with regards to their potential for becoming invasive
- collaboration should take place in the development of a database on IAS

COP Decisions 10.76, 10.86 (directed to the Animals Committee and Plants Committee respectively)

- cooperation shall be established with the IUCN Invasive Species Specialist Group for the implementation of their Draft IUCN Guidelines for the Prevention of Biodiversity Loss due to Biological Invasion

(USDA, 2008)

>Applies to species of flora and fauna which are threatened or endangered in exporting countries (as listed in Appendices I, II, III)

>Covers international introductions through trade (export, re-export, import and introduction from the sea)

>Focus is to prevent harm in the exporting country but also applies when the organism is considered endangered in the exporting country and an invasive species in the importing country

3. Convention on Migratory Species of Wild Animals (CMS or Bonn Convention)

(SCMS, 2003)

Article III (4.c)

>Parties that are the range states of a migratory species listed in Appendix 1 (list of endangered migratory species) shall endeavor to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced species

Article V (5.e)

>Agreements from Annex II Migratory Species 'where appropriate and feasible...should provide for...strict control of the introduction of, or control of already introduced exotic species detrimental to migratory species'

(USDA, 2008)

Applies to exotic species which endanger migratory species

4. Convention on Wetlands (Ramsar Convention)

(Ramsar COP, 1999a)

COP 7 Document 24

>Presents a consideration of how to treat the threat of IAS within the policy framework of the Convention

>Recognizes

Various effects of IAS such as species extinction, damage to populations of wild and domesticated organisms, significant alteration of ecosystems.

That problems of IAS will become more acute with increasing global trade, global change and changing land use patterns

How human changes to an ecosystem can exacerbate the problem

That the addition of pollutants or nutrients can exacerbate the problem

That water environments can enable and enhance the establishment and spread of IAS

>Presents Methods of Control including

Mechanical Control

Chemical Control

Biological Control

Ecosystem Manipulation

Integrated Management

Prevention and Control

(Ramsar COP, 1999b)

COP 7 Resolution VII.14 on Invasive Species and Wetlands

>Promotes:

Prevention of the introduction of IAS

Creation of inventories of IAS and risk-assessments

Addressing of the environmental, economic and social impacts of IAS

Adoption of legislation and programmes to prevent the introduction of IAS

Capacity building for the identification of IAS

Facilitating awareness, and resourcing the identification and control of new IAS

5. International Convention for the Control and Management of Ship's Ballast Water and Sediments

(IMO, 2004)

Article 2 General Obligations

>'Parties to undertake to... prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments'

>'Parties are given the right to take... more stringent measures... consistent with international law'

(GISP, 2000)

> Some parties to the Convention have requested the IMO's Marine Environment Protection Committee to work on legally binding provisions on ballast water management, either as an Annex to the International Convention on the Prevention of Pollution from Ships as a new instrument

6. International Health Regulations
(GISP, 2000)

> Purpose is to ensure maximum security against the international spread of diseases with a minimum interference with world traffic
> Amended to strengthen the use of epidemiological principles to detect, reduce or eliminate the sources from which the infection spreads, to improve sanitation in and around ports and airports and prevent the dissemination of vectors...

7. International Plant Protection Convention (IPPC)
(SIPPC, 1997)

Article 1 Purpose and Responsibility

'...to prevent the spread and introduction of pests of plants and plant products and to promote measures for their control..'

Article 4 National Organization for Plant Protection

Each party shall make provisions for an official plant protection organization with a mandate to:

- > Report on the existence, outbreak and spread of plant pests and of controlling those pests
- > Inspect plant and plant products moving in international traffic
- > Inspect and supervise storage and transportation facilities involved in international traffic whether of plants and plant products of other commodities with the objective of preventing the dissemination of pests of plants and plant products across national boundaries
- > Disinfest/disinfect plants and plant products moving in international traffic and their containers, storage places or transportation facilities
- > Issue Phytosanitary certificates

Article 6 Requirements in Relation to Imports

1. Requirements aimed at preventing introduction

Party states may:

- > Create import restrictions, requirements or prohibitions
- > Inspect or detain consignments
- > Treat, destroy or refuse entry to consignments
- > Create lists of pests which are prohibited

(GISP, 2000)

> Covers any IAS that could be considered a pest to plants
> Standards developed by the IPPC are recognized by the WTO under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)
> Regional agreements exist under the IPPC for Europe and the Mediterranean, Asia-Pacific, Near East, Pacific, Caribbean, North America, South America and Africa

8. United Nations Convention of the Law of the Sea
(UNCLOS, 1982)

Article 196 Use of Technologies or Introduction of Alien or New Species

Members should take all necessary measures to prevent the intentional or unintentional introduction of species to the marine environment.

9. United Nations Convention of the Law of Non-Navigational Uses of International Watercourses
(1997)

Article 22 Introduction of Alien or New Species

Members will take the necessary measures to prevent the introduction of alien or new species that may harm the ecosystem.

10. United Nations Conference on Environment and Development—Agenda 21 (Rio Conference)
(UNCED, 1992)

Chapter 11 Combating Deforestation

>Governments should protect forests from, *inter alia*, the uncontrolled introduction of alien species, pests and diseases.

>Chapter 15 Conservation of Biological Diversity

IAS are listed as one of main causes of the loss of global biodiversity.

11. World Health Organization—International Health Regulations
(WHO, 2005)

WHA58.3 Revision of the International Health Regulations

>purpose is to ensure the maximum security against the int'l spread of diseases with a minimum interference with world traffic. Following the increasing emphasis on epidemiological surveillance for communicable disease recognition and control, the amended regulations are intended to strengthen the use of epidemiological principles as applies internationally, to detect, reduce or eliminate the sources from which infection spreads, to improve sanitation in and around ports and airports, to prevent the dissemination of vectors and, in general, to encourage epidemiological activities on the nat'l level so that there is little risk of outside infection establishing itself

>Goals:

1. detect, reduce or eliminate sources from which infection spreads
2. improve sanitation in and around ports and airports
3. prevent dissemination of vectors

12. World Organization for Animal Health Agreement
(2006)

Resolution XXXI

1. Animal diseases cause very large but usually unquantified economic losses in all countries of the world through direct and indirect effects of disease incidence. Further costs are incurred through measures required to prevent the introduction of exotic diseases,

13. World Trade Organization—Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)
(WTO, 1994)

>This agreement does not specifically address the issue of IAS or bioinvasion. The agreement addresses all sanitary and phytosanitary issues that affect, directly or indirectly, international trade.

>Standards, guidelines and recommendations apply to food safety, and human, animal, and plant health. Many of the issues, such as pests, diseases and disease-causing organisms, relate to IAS.

>Several member countries provide lists of quarantine pests, establishments authorized to export, press releases, and alerts.

Codes of Conduct

1. FAO Code of Conduct for the Import and Release of Exotic Biological Control Agents

(GISP, 2000)

>Aims to facilitate the safe import, export and release of biological control agents by creating procedures for public and private entities, especially where national legislation does not exist or is inadequate

>Outlines responsibilities for authorities of an exporting country to ensure that regulations of the importing country are followed

2. FAO Code of Conduct for Responsible Fisheries

(GISP, 2000)

>Aims to ensure effective conservation, management and development of living aquatic resources, respecting ecosystems and biodiversity

>Recommends discussion with neighbouring states prior to introduction of non-indigenous stocks into transboundary aquatic ecosystems

>Promotes minimizing the harmful effects of non-indigenous and genetically altered stocks, especially where there is significant potential for their spread into other states

>Promotes minimizing the harmful genetic and disease effects to wild stock from genetically altered and non-indigenous stock

3. FAO Technical Guidelines for Responsible Fisheries: Precautionary Approach to Capture Fisheries and Species Introductions

I've skimmed the document and tried various search strings, but haven't found any regulations concerning IAS present in this document

4. The World Conservation Union—Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (IUCN, 2000)

>Guidelines designed for increase awareness and understanding of the impact of alien species. Provides guidance for the prevention of introduction, re-introduction, and control and eradication of alien invasive species

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