

Most (Un)wanted: Explaining Emerging Relationships Between “Invasive Alien” Species and Animal Governance

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Abstract

Invasive alien species (IAS) contribute to biodiversity loss, yet animals deemed invasive are both part of biodiversity and individuals themselves. This poses a challenge for global environmental politics, as governance system goals for biodiversity conservation and animal protection can conflict. Using an integrative governance (IG) framework, we map global and European Union IAS and animal governance instruments and systems, and relationships between them. Relationships are explained by actors’ unequal power dynamics, prioritization of human and environmental health, hegemonic anthropocentric discourses, and trade globalization. These factors encourage valuing certain animals—native and domestic—above others. Relationships between the governance systems have been limited. However, integration is deepening because of the transnational and interlinked nature of biodiversity loss and other issues, such as climate change and biosecurity. Nevertheless, as engagement with nonhuman entities brings new challenges, practicing greater IG could go further than this, as acknowledgment of animals’ interests is lacking in IAS governance.

Keywords: animal health, biodiversity conservation, integrative governance, invasive alien species, transformative governance, animal welfare, environmental ethics

Invasive alien species (IAS) as defined by the Convention on Biological Diversity (CBD 2022) are “species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity.” IAS are considered one of the five most significant direct drivers of biodiversity loss, with almost one-fifth of Earth at risk of plant and nonhuman animal (hereinafter animal) invasions (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES] 2019). Other negative consequences include economic damage, competition for resources with farmed animals and humans, and the spread of zoonotic diseases (Dobson et al. 2013; French 2017). Diagnose

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Global Environmental Politics 23:4, November 2023, https://doi.org/10.1162/glep_a_00715

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et al. (2021) estimate that in 2017, the annual mean cost of IAS globally was as high as US\$ 162.7 billion and is rising threefold per decade.

The CBD elucidates forty-four pathways for the introduction of IAS through human activity, including intentional release and as transport stowaways (see Harrower et al. 2020, 9). The pertinence of this topic is growing as IAS are increasingly moved via global trade pathways, demand for exotic pets, habitat destruction, and climate change, among other causes (CBD 2002). Consequently, IAS numbers have risen by approximately 70 percent since 1970 across twenty-one countries, and the rate of introduction is rising (IPBES 2019). Cane toads, gray squirrels, domestic cats, and rodents (especially on islands) are considered particularly harmful invasive species in certain ecosystems (Lowe et al. 2000). This has led some governments to impose strict rules to prevent or eradicate IAS, with New Zealand and Australia considered leaders in this field of biosecurity (Genovesi et al. 2015). Less discussed in academic literature are the neutral or positive effects of IAS. These species may provide ecosystem services and cultural benefits, enhance human connectedness with nature, and support local livelihoods and human well-being (Kourantidou et al. 2022; Sax et al. 2022; Shackleton et al. 2019).

Concurrently, there is mounting global concern for animal welfare, with the first United Nations (UN) resolution focused on animal welfare adopted in 2022 (Mellor 2016; United Nations Environment Programme [UNEP] 2022). Concern for wild animal welfare, in particular, is also growing (Berg et al. 2020). Increasing recognition of animal sentience will have political consequences. The possible extension of legal personhood to animals and nature imposes moral and legal limits on human uses of the environment, and situations might arise where individual animal interests conflict with ecosystem or species interests, as is the case with IAS (Futhazar 2020). This has ramifications for global environmental governance, which will distinguish which entities matter morally and warrant protection by our laws and institutions and how trade-offs between the interests of these entities can be ameliorated.

Notwithstanding, the interests of individual animals classified as invasive go virtually unrecognized in policy and practice (Wallach et al. 2018). IAS are deemed a global environmental and economic problem that, given their proliferation across national borders, precipitates management through transnational governance and cross-sectoral collaboration to address gaps in the international regulatory framework (CBD 2002). Currently, provisions for the formal governance of IAS are set forth in several international conventions (most importantly the CBD), Regulation 1143/2014 of the European Union (EU; EU IAS Regulation), and national policies. Management strategies for IAS follow a hierarchy outlined by the CBD: prevention, mitigation of impacts, control, and eradication (CBD 2021). Dependent on species, management strategies can involve lethal eradication methods, such as shooting, trapping, and biological control (poisoning), which can also affect nontarget species and the environment (Mankad et al. 2019). Meanwhile, formal governance of individual

animal health and welfare, which primarily focuses on domestic (farmed and companion) animals, is supported by the global standards of the World Organisation for Animal Health (WOAH),¹ EU animal health and welfare legislation, and national policies. Therefore, given the possible synergies and trade-offs between these two perspectives on governing animals, what is needed is an academic discussion of the relationships between the IAS governance system, which is nested in the wider biodiversity governance system and focuses on managing species deemed invasive, and the animal governance system, concentrated on the health, welfare, and, occasionally, rights of individual animals.

IAS governance raises philosophical and ethical questions about whether we should eradicate certain species in particular ecosystems to preserve others and guard potentially affected sectors (such as animal agriculture), and under what conditions it is acceptable to use lethal methods (Dubois et al. 2017). Where our moral priorities lie—with preserving native species or protecting individual animals, be they native or invasive—is a complex debate. This has implications for global environmental politics, as transference of norms from the animal governance system may determine what constitutes appropriate governance of IAS. Additionally, there is still a lack of engagement in global governance with posthumanist relational ontologies of multispecies justice, which seek to understand the types of relationships humans ought to cultivate with other animals to produce just outcomes (Celermajer et al. 2020; Haraway 2018).

Accordingly, this article will go some way toward answering questions posed by Gonzalez Cruz and Johnson (2022) on IAS in post-2020 global environmental politics by providing insights into the governance consequences of the IAS problem structure emerging within a biodiversity framework, the impact of conceptualizations of biosecurity, and what this means for our coexistence in multispecies assemblages. It does so by answering the following question using an integrative governance (IG) framework, encompassing “the theories and practices that focus on the relationships between governance instruments and/or systems” (Visseren-Hamakers 2018, 1342): What are the relationships between the global IAS and animal governance systems, and how can these be explained?

This article focuses on global and EU-level governance of terrestrial and freshwater animal species deemed invasive. Specific management methods of IAS are not explained in detail, as there are comprehensive discussions elsewhere (Crowley et al. 2017; Foxcroft and McGeoch 2011). The proceeding analysis begins with a discussion of the theoretical underpinnings of global governance related to animals, which can be distinguished between governing animals as individuals or as species. Second, the IG framework used to analyze relationships between governance systems is introduced. Subsequently, the results are presented and discussed. To conclude, brief recommendations for policy and future research are outlined.

1. Known as the OIE until May 2022.

Governance, Animal Ethics, and Transformative Change

Governance entails the rules that define practices, assign roles, and guide interaction between multiple actors at different levels to address collective problems (Young 1997). Species conservation, and governing IAS particularly, transcends state borders. Academic literature addressing the ecological effects and management of IAS is well developed. Island ecosystems, which are particularly susceptible to the negative consequences of introduced species, are frequently studied from a natural science perspective (e.g., Rivera-Milan and Haakonsson 2020). However, social scientific perspectives on IAS governance are limited, and there are calls for more interdisciplinary and multidimensional approaches (Carter et al. 2020). An exception is research addressing public perceptions of IAS, explaining how diverse values underpin the acceptability of different management techniques (Kourantidou et al. 2022). Furthermore, there is a nascent body of literature examining IAS welfare, which is considered an under-addressed issue in conservation (Hampton and Hyndman 2019). This suggests that societal norms on governing species are changing, which has implications for IAS governance.

These changing norms are underpinned by animal ethics debates, which raise questions about animal sentience, personhood, intrinsic value, multispecies justice, and the degree to which humans should intervene to ensure animal welfare and, indeed, what welfare actually means in practice (Cochrane et al. 2018; Wallach et al. 2020). Empirically, consideration of animal rights is limited, regardless of species. Several scholars, including the authors of this article, consider this problematic given the number of animals affected (Anthis and Paez 2021; Bovenkerk and Keulartz 2021; Sunstein and Nussbaum 2004). Approximately 80 billion animals annually are killed for food (Ritchie and Roser 2018), with no readily available comparable global figure for animals deemed invasive.

Similarly, environmental governance literature neglects a wider debate on justice that considers animals (Santiago-Ávila and Lynn 2020). There is resistance in environmental politics to “transform basic institutions whose political economy is premised on the exclusion and exploitation of the nonhuman” (Celermajer et al. 2020, 134). This is despite calls for transformative change, in which “a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values,” is needed to address biodiversity loss (IPBES 2019, 889).

Explaining Governance Relationships Using IG

Increasingly, scholars acknowledge that effective governance cannot occur in issue-specific silos, as different regime complexes are interlinked and interact (Orsini 2013; Vogler 2003; Zelli and van Asselt 2013). The IG literature encompasses work on regimes and regime complexes, but here the term *governance*

systems is used, because it allows us to draw theoretical and conceptual inspiration from broader governance literature beyond international relations. An IG framework, thus, can be used to analyze and explain interaction (Figure 1), with governance systems understood as the collection of formal and informal governance instruments within a particular policy domain. Relationships are explained in terms of actors, institutional, discursive, and structural factors (for a detailed explanation of the framework and associated governance theories, see Visseren-Hamakers 2018).

Other frameworks for analyzing interlinkages tend to focus on specific systems and relationships *within* them (e.g., Cumming et al. 2020). The IG framework is used for analyzing relationships *between* governance systems and is based on pragmatism, encompassing diverse theories and explanations, rather than departing from a specific theoretical standpoint (Dewey 1908). An IG analysis is a useful tool in global environmental politics because it highlights power relations and can be used in practice to shape governance instruments inclusive of different sectors and actors (including animals).

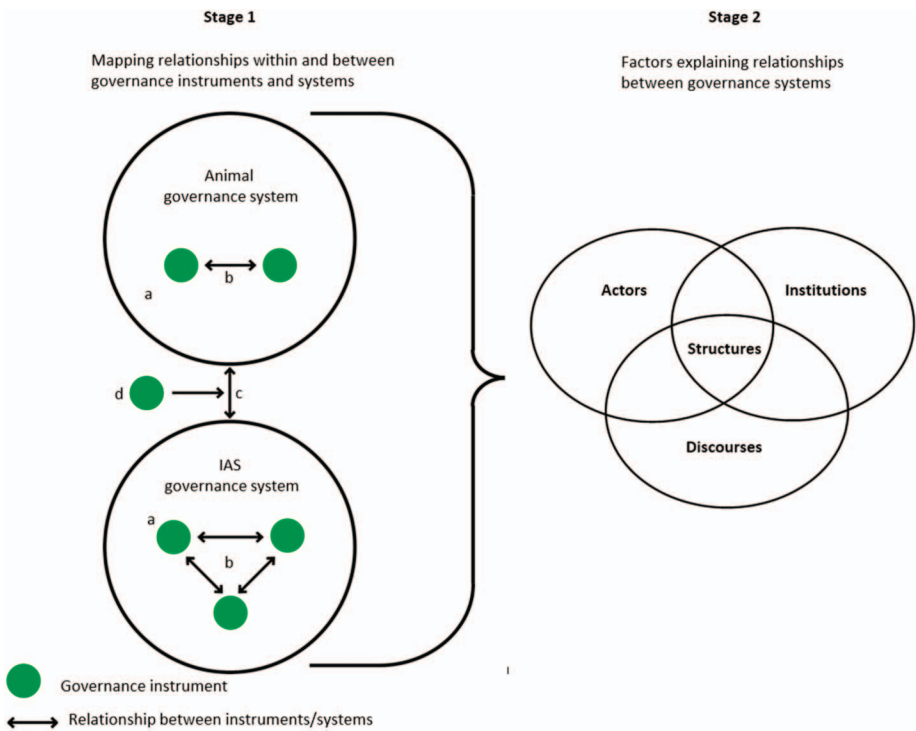


Figure 1
IG Framework

Adapted from Visseren-Hamakers (2018).

Analysis using the IG framework in this article proceeds as follows. Stage 1 includes the following steps:

- Mapping animal and IAS governance instruments (a)
- Mapping relationships between instruments within the animal and IAS governance systems (b)
- Mapping relationships between the animal and IAS governance systems (c)
- Mapping governance instruments external to the systems that influence relationships between them (d)

In stage 1, the main governance instruments that interact or influence the relationship between the two systems are mapped (steps a and d). The IG framework goes beyond traditional economic, regulatory, and informational policy instruments (Bemelmans-Videc et al. 1998). It includes broader governance instruments, such as agreements, standards, and relevant parts of conventions, which may contain several of such traditional instruments.

For mapping relationships (steps b and c), the IG framework draws on Oberthür and Gehring's (2006) typology of mechanisms to identify interaction between governance instruments: *cognitive interaction*, resulting in knowledge transfer; *interaction through commitment*, where rules and commitments under one instrument influence another; *behavioral interaction*, where behavioral change by one instrument influences another; and *impact-level interaction*, where instruments are interdependent on a target issue of governance. A relationship, then, is understood to exist where a source instrument, or system of instruments, affects the development or performance of another through one of the above types of interaction (Gehring and Oberthür 2009).

Stage 2 entails *explaining* the relationships between governance systems. This is empirically studied through factors outlined in Table 1, which can overlap and influence one another.

The influence of *actors* is understood in terms of the distribution of power, agency, and resources, where power entails the ability to influence outcomes and the behavior of other actors (Biermann et al. 2010; Giddens 1984; Weber et al. 1978). Moreover, the distribution of resources gives an indication of the power dynamics between actors, with more power ascribed to those possessing greater resources.

The influence of *institutions* external to the two governance systems studied is another explanatory dimension. Institutions are "the conventions, norms and formally sanctioned rules of a society. They ... support certain values, and produce and protect specific interests" (Vatn 2015, 78). Institutions can be seen as shaped by culturally specific norms and practices (Hall and Taylor 1996). Such norms and practices underlie how institutions influence governance system relationships.

Discourses offer an explanation of governance system relationships because the subjective viewpoints of different actors influence behavior and practice

Table 1
Explanatory Factors for Governance Relationships

<i>Explanatory Factor</i>	<i>Mechanism(s)</i>	<i>Examples of Explanatory Factors</i>
Actors	Distribution of power, agency, and resources Participation of different actors at different levels	Actors: public, private (market), NGO, combination Levels: global, regional, national, subnational, multilevel Resources: financial, knowledge, operational, physical, rights Participation of actors between systems: partnerships, working groups
Institutions	Vertical interplay between institutions at different governance levels Horizontal interplay between institutions at the same governance level	External institutional context: laws, policies, rules, procedures, norms, agreements
Discourses	Influence of values, culture, and norms	Discourses on animals, species, and other related discourses Hegemonic/emerging norms and values Change in discourse
Structures	Societal structures providing context for governance system relationships	Trade pathways Economic systems, e.g., capitalism

Based on literature from Bergsten et al. (2019), Eckersley (1999), Giddens (1984), Hall and Taylor (1996), Kuindersma et al. (2012), Gehring and Oberthür (2009), Schmidt (2008), Weber et al. (1978), and Young (1997).

(Dryzek 2013). A discourse is an “ensemble of ideas, concepts and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices” (Hajer and Versteeg 2005, 175). Thus, over time, discourses influence relationships, as certain actors have more discursive power than others, and they shape the institutionalization of certain norms.

Finally, societal *structures* can influence, or be influenced by, other explanatory factors at a macro level and could include political-economic, ecological, and social factors (Fougères et al. 2020).

Methodology

In addition to the global governance level, we take the EU as the regional focus because the 2015 EU IAS Regulation is a noteworthy standard for managing IAS (Futhazar 2020). The EU has significant global authority, for example, through influencing the drafting of the CBD Post-2020 Global Biodiversity Framework, which includes a target (Target 6) for managing IAS (Genovesi et al. 2015). Additionally, Europe is considered a world leader in terms of animal welfare (although welfare issues persist in widespread intensive farming) because ideas developed there often spread globally (Rollin 2019).

In a process of triangulation, data collection from academic and gray literature, including policy documents, took place concurrently with thirty semi-structured interviews and nonparticipatory observation from September 2020 to March 2022. Academic literature was selected on the basis of a keyword search in scientific databases and through snowball sampling ([Supplemental Appendix 1](#)). Literature was not restricted to a particular discipline and covers animal ethics, ecology, philosophy, and political science, among other disciplines. Approximately 300 articles, books, and book chapters were consulted. Interviews and gray literature representing the animal and IAS governance systems were identified during desk research and through snowball sampling ([Supplemental Appendix 2](#)). Interviews with participants were conducted online, recorded, and analyzed using Atlas TI. Nonparticipatory observation at international meetings enabled the viewing of empirical mechanisms of IG in practice ([Supplemental Appendix 3](#)). Data obtained from all methods were used for the analysis. Note that no global external governance instruments were found to explicitly influence relationships, hence step d of stage 1 is excluded from analysis.

Results

Stage 1, Step a: Mapping Governance Instruments Within Governance Systems

Table 2 lists chronologically significant global and EU animal and IAS governance instruments, based on literature reviewed and interview data.

Table 2
Main Global and EU Governance Instruments Focusing on Individual Animals, IAS, or Both

<i>Governance Instrument</i>	<i>Year of Adoption</i>	<i>Focus</i>	<i>Level</i>
EU legislation on protection of animals in slaughterhouses	1974	animal	EU
Agreement on International Humane Trapping Standards	1997	both	global
WOAH guidelines for animal welfare (regularly updated)	2004	animal	global
CITES Resolution Conf. 13.10	2007	IAS	global
Lisbon Treaty Article 13 Title II	2009	animal	EU
CBD: Aichi Target 9	2011	IAS	global
WOAH guidelines for assessing risk of nonnative animals becoming invasive	2011	both	global
EU Strategy for Protection and Welfare of Animals	2012 (update in progress)	animal	EU
EU Regulation 1143/2014 on Invasive Alien Species	2015	IAS	EU
Sustainable Development Goal 15.8	2015	IAS	global
EU Animal Health Law	2016 (updated 2021)	animal	EU
WOAH Global Animal Welfare Strategy	2017	animal	global
Manual for management of vertebrate invasive alien species of Union concern, incorporating animal welfare	2022	both	EU
EU Positive List (of species allowed as pets)	in development	both	EU

See [Supplemental Appendix 4](#) for more detailed descriptions of the instruments.

Stage 1, Step b: Mapping Relationships Between Instruments Within Systems

Table 2 indicates that no international process focused *solely* on IAS exists. The CBD established IAS as a crosscutting issue at COP 4 (CBD 1998). Moreover, the CBD's IAS guidelines, specifically Aichi Target 9, provides the basis for the 2015 EU Regulation on IAS, in an example of cognitive interaction and interaction through commitment.

Within the animal governance system, the WOAAH and EU rules on animal health and welfare are mutually reinforcing. The EU's focus on welfare, beginning in 1974 with legislation on the protection of animals at slaughter, predates WOAAH's guidelines for animal welfare and its Global Animal Welfare Strategy, published in 2004 and 2017, respectively (European Commission 2016; World Organisation for Animal Health [WOAH] 2017). This exemplifies interaction through commitment and behavioral interaction; the institutionalization of higher standards of animal welfare by the EU is reflected in WOAAH's newfound prioritization of welfare. At the impact level, instruments within each system inevitably are interdependent due to their shared relevance for animals.

Stage 1, Step c: Mapping Relationships Between the Animal and IAS Governance Systems

Historically, there has been little interaction between the animal and IAS governance systems, with only four instruments combining animal health, welfare, and IAS elements, one of which is in development (the EU Positive List). However, interaction is growing, as IAS are seen as a threat to both domestic animal health and native wild species. Horizontal interplay occurs at the global level through cognitive interaction, where knowledge on animal health and welfare is transferred to the IAS governance system.

Nevertheless, impact-level contradictions between the two systems occur due to their differing problem structures, with the animal governance system focused primarily on individual domestic animals, whereas IAS are considered primarily at the species level. For example, the 2009 EU Lisbon Treaty recognized animal sentience and precipitated mainstreaming animal welfare norms in Europe (Ryland and Nurse 2013). However, the legal requirement to eradicate IAS included on the EU's IAS List of Union Concern negates acknowledging them as sentient individuals.

The animal governance system is well established (WOAH was established in 1924), and therefore it evolved in isolation from the IAS governance system, which emerged primarily in the last two decades as a reactive response to the proliferation of species considered invasive. Behavioral interaction occurs where there are relationships, with the direction of influence primarily from the former to protect domestic animal health, and by facilitating the inclusion of welfare provisions in IAS instruments. A significant development here is the launch in 2022 of the first EU *Manual for the Management of Vertebrate Invasive Alien Species*

of *Union Concern, Incorporating Animal Welfare*, which is the result of a project by a consortium of global and EU actors from both governance systems (Smith et al. 2022).

Consequently, interaction between the two systems is increasing, according to interviewees and as evidenced by the creation of cross-sectoral governance instruments in the last decade. Such interaction through commitment occurs between WOA and other international bodies, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the World Customs Organization (WCO), and the Food and Agriculture Organization (FAO). WOA has instruments for both IAS and animal health and welfare (see Table 2), which are not explicitly linked at present. Similarly, there is overlap between the systems at a global level through the 1997 Agreement on International Humane Trapping Standards.

The exotic pet trade is another context in which the governance systems overlap through all four types of interaction mechanism. Exotic animals are potentially invasive species but are also deemed valuable as pets (Schuppli et al. 2014). Accordingly, the proposed European Positive List considers risk of invasiveness in determining which animals to permit as pets and provides guidance on animal health and welfare.

Stage 2: Explaining Relationships Between Governance Systems

The main explanations for the relationships between the animal and IAS governance systems are outlined in Figure 2. Divergent and evolving discourses are the most significant factor. Globalization, trade, the prioritization of human interests, and competition between actors are also influential.

Divergent Discourses

Of the interrelated explanatory factors, *discourses* are where the impact-level goals of the two governance systems overlap and conflict most evidently. Both systems aim to mitigate the impact of IAS for different reasons: to protect the health of domestic animals and to preserve native wild species. IAS are predominantly characterized negatively by policy makers and are targeted for eradication due to their reported environmental and economic harm (Inglis 2020). The health, welfare, and rights of IAS are rarely considered (Futhazar 2020). Therefore, the animal governance system's promotion of welfare and rights conflicts with the goal of eradicating IAS. One interviewee commented that there is "undoubtedly a tension between decisions around what's right for biodiversity and decisions in terms of optimizing animal welfare" (interviewee 24). Even within groups of similar actors, polarized discourses proliferate, for instance, the division between animal protection nongovernmental organizations (NGOs) that support lethal methods for managing invasive animals because keeping wild animals in captivity may be detrimental to their welfare and NGOs

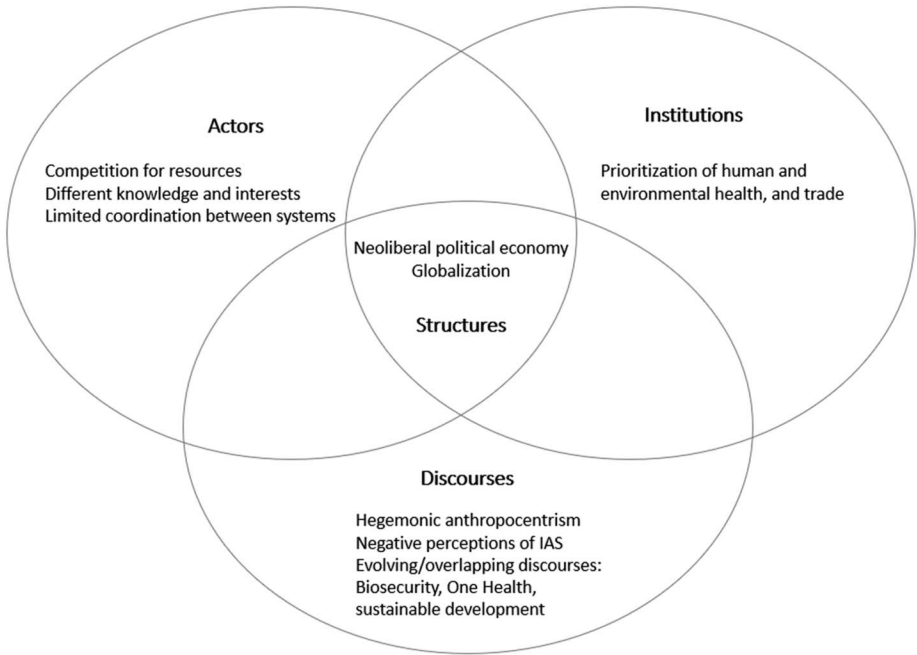


Figure 2
Main Explanations for Relationships Between IAS and Animal Governance Systems

advocating a compassionate conservation stance, in which killing of animals is ethically objectionable (interview 1; Wallach et al. 2018).

Most interviewees confirmed that IAS are viewed overwhelmingly negatively. Only interviewee 13 noted the positive values some attribute to IAS, such as cultural and economic benefits. Consequently, hegemonic discourses on the negative effects of IAS condition actors' perceptions and values by promoting the protection of animals classed as native or domestic. Furthermore, global anthropocentric interests are usually prioritized over the interests of animals, which are viewed as property or resources for humans to use. This symbolizes the unequal power relations between human and nonhuman actors. Consequently, an instrumental view of animals is reinforced by both global governance systems. These discourses and structural factors support the interaction of actors primarily to protect human interests and tacitly domestic animal health.

Evolution of Discourses: Biosecurity, One Health, and Sustainable Development

The animal and IAS governance systems increasingly overlap through certain discourses. Particularly relevant is biosecurity, which “[encompasses] the set

of pre-border, border, and post-border actions and policies utilized to minimize the impacts of invasive species on natural resources, agriculture, economy, human health, and culture" (International Union for Conservation of Nature 2016). Biosecurity is framed by discourses on "bioinvasion," which are related to structural factors, including globalization as well as human and environmental security (Stoett 2010).

Accordingly, discourses on the interlinkages between human, environmental, and animal health and welfare are becoming prevalent. The multisectoral One Health approach is particularly prominent, with One Biosecurity a novel adaption of this proposed in the wake of the COVID-19 pandemic (Hulme 2021). Actors and institutions influencing the two systems collaborate and cooperate on health concerns, for example, through the One Health Joint Plan of Action launched in 2022 by the "Quadripartite" (WOAH, FAO, World Health Organization, UN Environment Programme) (WOAH 2022). Nevertheless, interviewee 13 stated, "One Health is a good way to open people's eyes to the systems dimension but does not necessarily lead to tidy solutions for policy makers."

However, despite the lack of tidy solutions, consideration of interlinkages is growing in global environmental politics. Animal health, welfare, and rights were not considered part of sustainable development until recently (Visseren-Hamakers 2020). The acknowledgment of animals by the UN in its resolution on the animal welfare–environment–sustainable development nexus is evidence of this (UNEP 2022). Nevertheless, there is an inherent contradiction between sustainable development and the protection of animal interests, particularly those of species deemed invasive. This contradiction is reiterated by Target 15.8 of the Sustainable Development Goals, which entails preventing and eradicating IAS.

Globalization, Trade, and the Prioritization of Human Interests

At the global governance level, societal economic *structures* that prioritize trade reinforce a differentiation of treatment between animals, thereby limiting interaction between the governance systems. Globalization and the facilitation of trade entrenched by the neoliberal political economy, as institutionalized in the World Trade Organization (WTO) and EU, among others, is highlighted by all interviewees as the most significant structural factor explaining (limited) relationships. Not only is trade a pathway for IAS dispersal but it also creates an economic incentive to protect some animals over others, namely, farmed animals deemed valuable property over invasive species (unless those invasive species are considered economically beneficial, such as American mink farmed for fur in Europe; Justo-Hanani and Dayan 2021). Interviewee 20 asserted that trade pathways blur the understanding of where responsibility for preventing and managing IAS lies but that, where humans intervene, we have a responsibility for animal welfare.

The influence of the WTO Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures was cited by several interviewees (3, 5, 6, 13, 23) as influencing governance relationships because both animal welfare standards and IAS introduction pathways are affected by international trade. However, the WTO and the SPS at present do not facilitate interaction because animal welfare and IAS are treated as separate issues (interviewee 5).

Competition and Coordination Between Actors

Actors influence the relationships between governance systems given their different knowledge, interests, and resources. At the global level, the CBD and WOAH secretariats are increasingly aligned, with the latter expanding its role in wildlife health through its wildlife working group formed in 1994. Furthermore, WOAH collaborates with the International Coalition for Animal Welfare, which represents animal welfare NGOs, the International Union for Conservation of Nature's Invasive Species Specialist Group, CITES, WTO, and WCO, among others.

A significant global collaboration of secretariats that facilitates interaction between the two systems is the CBD's IAS interagency liaison group, established in 2011 (Table 3). It promotes cross-sectoral cooperation to address gaps and inconsistencies in international regulatory frameworks for the prevention, control, and eradication of IAS (CBD 2021).

As explicated, globalization and the prioritization of trade explain why certain groups of actors work together, such as the WOAH and CITES, which collaborate on animal health and welfare issues (although welfare protection is often not fully realized in practice in pursuit of economic priorities) (CITES 2015). Consequently, actors collaborating across governance systems wield greater power to influence relationships, and efforts to foster closer collaboration between the two systems have expanded in the last decade.

Despite this evidence of increasing coordination, competition for resources among actors explains why relationships between the governance systems are limited. There is consensus among interviewees and in literature that there is a lack of funding and prioritization by policy makers for mitigating IAS at all levels of governance. For example, in the United Kingdom, expenditure in 2016–2017 was £0.9 million for IAS, compared to £200 million for animal (predominantly farmed animal) health (Wildlife and Countryside Link 2020). The political economy underpinning the animal governance system means it has greater funding because of the economic interests involved in animal agriculture.

Discussion: Governing Invasive Species as Individuals?

Our article contributes to IG debates, which until recently lacked explanatory analyses of relationships between governance *systems* (Visseren-Hamakers

Table 3

Members of the CBD Inter-agency Liaison Group on Invasive Alien Species and Their Relevance to Each Governance System

<i>Participating Intergovernmental Secretariat</i>	<i>Animal Governance System</i>	<i>IAS Governance System</i>	<i>Other</i>
Centre for Agricultural Biosciences International (CABI) ^a			X
Convention on Biological Diversity (CBD)		X	X
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	X	X	X
Food and Agriculture Organization (FAO)	X	X	X
International Civil Aviation Organization (ICAO)			X
International Maritime Organization (IMO)			X
International Plant Protection Convention (IPPC)		X	X
International Union for the Conservation of Nature (IUCN)		X	X
World Organisation for Animal Health (WOAH)	X	X	
World Trade Organization (WTO)			X

Data are from CBD (2021).

^aCABI has expertise in invasive plant species but as this article focuses on animals it has not been included under the IAS system.

2018). According to governance literature, integrative fit entails the management of interdependencies between issues, whereas collaborative fit occurs when actors who influence common issues collaborate (Bergsten et al. 2019). Although both are evident to a minor extent in the case of animal and IAS governance, low integrative fit characterizes the governance relationships because system interdependencies are seldom taken into account, particularly the negative animal health, welfare, and rights implications of IAS management. This may be explained by institutional path dependency inhibiting integration by locking in certain forms of interaction, underpinned by actors' fixed preferences and behavior (Pierson 2000). This analysis, therefore, helps answer the question posed by Gonzalez Cruz and Johnson (2022) about the governance consequences of the IAS problem structure emerging purely within a biodiversity framework, showing it to be a barrier to cross-sectoral integration.

Notwithstanding, collaborative fit through integration at the global governance level has increased in the last decade, particularly via the CBD's IAS interagency liaison group. Given issues with rapidly evolving and interrelated problem structures, such as IAS and climate change, the IG framework could be used in future for developing and refining integrative governance instruments for managing regime interactions. Such instruments would take into account the need for governance to be adaptive, for example, through rules with general (rather than specific) principles and informal and context-dependent governance arrangements, allowing for a degree of self-organizing between actors (Clement and Standish 2018). IG can ensure that such efforts have sustainable, compassionate, and just impacts across sectors, levels of governance, and geographies.

Furthermore, environmental policy integration scholars state that relationships between governance systems are facilitated by shared aims and resources but impeded by opposing policies, discourses, and norms (Persson and Runhaar 2018). Our analysis finds that there is limited sharing of resources for the prioritization of *preventing* IAS. Opposing discourses on animal issues and the weight of short-term economic interests, such as in animal agriculture, may be a reason for this. Nevertheless, shared aims of actors are evident in terms of managing IAS and improving welfare standards. This has broader implications for other regimes, notably trade, where there has been historic caution about introducing explicit animal welfare rules in WTO instruments and the General Agreement on Tariffs and Trade, which could be seen as barriers to international trade (WOAH, n.d.). However, both managing pathways of IAS introduction and improving the welfare of animals traded across borders may necessitate stricter trade rules.

There is also acknowledgment of the need for policy integration on interlinked issues, such as human, animal, and environmental health and sustainable development. The IG analysis here indicates that governing interaction between these regimes requires a shared vision and incorporation of different

societal values. This supports the suggestion by Armitage et al. (2012) that hybrid governance between different actors and institutions helps manage social and ecological synergies and trade-offs, such as inherent conservation dilemmas like managing IAS. Accordingly, given evolving discourses on inter-linked environmental and social issues, this article reinforces academic and societal calls for transformative governance in which emerging ecocentric values that encourage a more ethical and just relationship between people and nature are institutionalized (Naito et al. 2021; Visseren-Hamakers and Kok 2022). Integrating policies that consider the interests of more-than-humans answers a need in global environmental politics to define what environmental security is and whom it is for (Gonzalez Cruz and Johnson 2022). This is important, because as the EU manual on IAS management and welfare states, “there is an increasing public concern for invasive alien animals as sentient beings, and, more generally, an increasing interest from civil society in the humane treatment of animals” (Smith et al. 2022, 3). Transformative governance is also influential in the context of the CBD’s Post-2020 Global Biodiversity Framework and beyond, where societal values are increasingly incorporated into policy.

However, a broader global discourse on human–nonhuman relationships that takes into account animal interests is still nascent in science and policy, particularly when it comes to “unwanted” species. What is meant by concepts such as “native,” “invasive,” “exotic,” and “bioinvasion” is constructed and can be reconstructed (Chruliew 2020). Interviewee 6 reiterated that “‘invasive’ is not a neutral term but it’s abstract, so it doesn’t evoke people’s emotions, and emotions are key here.” Depending on the movement pathway, invasive animals could be reconceptualized as climate refugees or victims of trafficking, although this does not necessarily guarantee humane treatment (Bettini 2013). This has implications for governance relationships, as reframing language used in policy and practice to reduce negative species bias requires further integration between the systems. This is not a case of IAS denialism, allegations of which have been found to be misplaced (Munro et al. 2019), but acknowledges that all animals deserve moral consideration beyond our subjective distinctions. Such equitable consideration of individual animal interests is necessary to achieve multispecies justice (Celermajer et al. 2020).

Animals as subjects in their own right are not represented in either governance system, as both are anthropocentric. Considering IG normatively from posthumanist and feminist perspectives, which deconstruct human species supremacy, would acknowledge animals as actors with interests of importance and agency to influence governance processes (Braidotti 2009). In practice, this could mean electing proxy representatives of other-than-human entities (Kopnina et al. 2021). The fact that IAS are introduced by humans, either deliberately or through lack of preventative measures, leads us to question where responsibility lies for potential damage caused. Indeed, whereas elsewhere, humans assume responsibility for the individual well-being of certain animals

(e.g., companion animals), IAS are predominantly managed as species. Considering their individual interests would not support mitigation techniques harmful to their welfare. Emerging technologies like biocontrol (introducing organisms or pathogens harmful to IAS) cannot be reversed, and the manner of death does not always comply with animal welfare standards (Hampton and Hyndman 2019; Mankad et al. 2019). This poses challenges for global governance of IAS and raises ethical questions for practitioners and policy makers involving different sectors and difficult trade-offs.

Conclusions

IAS and changing societal values on animals are increasingly pertinent topics in global environmental politics. This article mapped and explained relationships between the animal and IAS governance systems using an IG framework. We reveal that, historically, there are few governance instruments addressing both issues simultaneously. However, interaction between the systems at the global and EU levels is growing.

The limited interactions can partly be explained by the fact that the governance systems have evolved over different time frames. The animal governance system has been well established for nearly a century. Meanwhile, the primarily reactive and problem-driven governance system for animals deemed invasive predominantly developed in the last two decades. Trade-offs between the governance systems are apparent because of impact-level contradictions between actors and governance instruments. Divergent discourses include animal welfare, animal rights, biodiversity conservation, and sustainable development. The animal governance system wields more power due to a greater allocation of resources and focus on domestic animals deemed valuable to humans by current economic structures.

Where there is interaction between the governance systems, protecting anthropocentric interests, including human (and, as an extension, domestic farmed animal) health and trade, is more salient than improving ethical IAS management. At the global level, efforts to foster integration have deepened in the last decade through cognitive and behavioral interaction and interaction through commitment. This is due to shared interests of actors in mitigating the effects of IAS and evolving discourses on biosecurity and One Health, as evidenced by collaborations of different intergovernmental secretariats. This has implications for policy and practice because preventing the spread of IAS is key to avoiding ethical dilemmas associated with pitting native and domestic animals against species deemed invasive, at the expense of the latter.

These ethical dilemmas will increasingly come to the fore, as invasion scientists state that governing “invasive alien” species requires improved international cooperation to reduce the impacts of IAS on biodiversity, ecosystem services, and human livelihoods (Pyšek et al. 2020). Moreover, they argue, it is crucial to strengthen biosecurity regulations and to implement management

strategies that address other global changes, such as climate change (Pyšek et al. 2020). Interviewee 1 elucidated that animal welfare, species conservation, and climate change are interrelated, and this requires further research. As the proliferation of some IAS is exacerbated by climate change, addressing this requires synergistic policy responses. Likewise, animal ethics and welfare are neglected in climate policy (McShane 2018).

It is increasingly evident that this not just a biodiversity, trade, or health issue but one related to human and nonhuman justice. However, there is resistance to transforming institutions when their political economy is dependent on the exclusion and exploitation of animals. For example, there are vested economic interests in promoting management measures to control IAS. Nevertheless, global norms on animals are shifting, which means considering animal agency in environmental politics. Consequently, the need to address the interests of multiple stakeholders with regard to ethical IAS governance requires further investigation (Shivambu et al. 2020). This is important because global perceptions tend to follow the way animal welfare has evolved to be understood in Europe (Rollin 2019). Moreover, IG in relation to IAS in aquatic ecosystems requires investigation. The IMO and Ballast Water Convention were cited by interviewees as significantly influencing governance relationships, but protection for marine animals is underdeveloped compared to terrestrial animals, and welfare standards apply only to farmed (not wild) fish (WOAH 2019).

We are at a critical juncture, with the COVID-19 pandemic fostering cooperation between different governance systems under the shared aim of protecting human and animal health. However, greater IG could go further than this, as acknowledgment of individual animal interests is almost entirely lacking in IAS governance. There are compelling arguments for transformative change in which we find ways of coexisting with animals in the Anthropocene, where animals are acknowledged as relevant actors themselves (Bovenkerk and Keulartz 2021). Extrapolating how and why governance systems interact, and with what effect, will enable the fostering of governance practices that support coexistence in our evolving multispecies assemblages. Invasive animals are, after all, both part of biodiversity and individuals themselves.

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Acknowledgments

We thank all of those interviewed for this research and those who assisted in refining the manuscript, including the reviewers and editors of *Global Environmental Politics*.

References

- Anthis, Jacy Reese, and Eze Paez. 2021. Moral Circle Expansion: A Promising Strategy to Impact the Far Future. *Futures* 130: 102756. <https://doi.org/10.1016/j.futures.2021.102756>
- Armitage, Derek, Rob de Loë, and Ryan Plummer. 2012. Environmental Governance and Its Implications for Conservation Practice. *Conservation Letters* 5 (4): 245–255. <https://doi.org/10.1111/j.1755-263X.2012.00238.x>
- Bemelmans-Videc, Marie-Louise, Ray C. Rist, and Evert Vedung. 1998. *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation*. Comparative Policy Analysis. New Brunswick, NJ: Transaction.
- Berg, Charlotte, Henrik Lerner, Andrew Butterworth, and Chris Walzer. 2020. Editorial: Wildlife Welfare. *Frontiers in Veterinary Science* 7: 576095. <https://doi.org/10.3389/fvets.2020.576095>, PubMed: 33195575
- Bergsten, Arvid, Tolera Senbeto Jiren, Julia Leventon, Ine Dorresteijn, Jannik Schultner, and Joern Fischer. 2019. Identifying Governance Gaps Among Interlinked Sustainability Challenges. *Environmental Science and Policy* 91: 27–38. <https://doi.org/10.1016/j.envsci.2018.10.007>
- Bettini, Giovanni. 2013. Climate Barbarians at the Gate? A Critique of Apocalyptic Narratives on “Climate Refugees.” *Geoforum* 45: 63–72. <https://doi.org/10.1016/j.geoforum.2012.09.009>
- Biermann, Frank, Michele Betsill, Joyeeta Gupta, Norichika Kanie, Louis Lebel, Diana Liverman, Heike Schroeder, Bernd Siebenhüner, and Ruben Zondervan. 2010. Earth System Governance: A Research Framework. *International Environmental*

- Agreements: Politics, Law, and Economics* 10 (4): 277–298. <https://doi.org/10.1007/s10784-010-9137-3>
- Bovenkerk, Bernice, and Jozef Keulartz. 2021. *Animals in Our Midst: The Challenges of Co-existing with Animals in the Anthropocene*. Cham, Switzerland: Springer. <https://doi.org/10.1007/978-3-030-63523-7>
- Braidotti, Rosi. 2009. Animals, Anomalies, and Inorganic Others. *PMLA* 124 (2): 526–532. <https://doi.org/10.1632/pmla.2009.124.2.526>
- Carter, Lucy, Aditi Mankad, Airong Zhang, Matthew Curnock, and Chris Pollard. 2020. A Multidimensional Framework to Inform Stakeholder Engagement in the Science and Management of Invasive and Pest Animal Species. *Biological Invasions* 23: 625–640. <https://doi.org/10.1007/s10530-020-02391-6>
- Celermajer, Danielle, David Schlosberg, Lauren Rickards, Makere Stewart-Harawira, Mathias Thaler, Petra Tschakert, Blanche Verlie, and Christine Winter. 2020. Multispecies Justice: Theories, Challenges, and a Research Agenda for Environmental Politics. *Environmental Politics* 30: 119–140. <https://doi.org/10.1080/09644016.2020.1827608>
- Chrulew, Matthew. 2020. Reconstructing the Worlds of Wildlife: Uexküll, Hediger, and Beyond. *Biosemiotics* 13 (1): 137–149. <https://doi.org/10.1007/s12304-020-09376-x>
- CITES. 2015. World Animal Health Organisation (OIE) and CITES Agree to Collaborate on Animal Health and Welfare Issues Worldwide to Safeguard Biodiversity and Protect Animals. Available at: <https://cites.org/eng/node/18857>, last accessed April 10, 2023.
- Clement, Sarah, and Rachel Standish. 2018. Novel Ecosystems: Governance and Conservation in the Age of the Anthropocene. *Journal of Environmental Management* 208: 36–45. <https://doi.org/10.1016/j.jenvman.2017.12.013>, PubMed: 29247883
- Cochrane, Alasdair, Robert Garner, and Siobhan O’Sullivan. 2018. Animal Ethics and the Political. *Critical Review of International Social and Political Philosophy* 21 (2): 261–277. <https://doi.org/10.1080/13698230.2016.1194583>
- Convention on Biological Diversity. 1998. *Report of the Fourth Meeting of the Conference of the Parties to the Convention on Biological Diversity*. Bratislava, Slovakia: CBD.
- Convention on Biological Diversity. 2002. COP 6 Decision VI/23: Alien Species that Threaten Ecosystems, Habitats or Species. Available at: <https://www.cbd.int/decision/cop/?id=7197>, last accessed April 10, 2023.
- Convention on Biological Diversity. 2021. Inter-agency Liaison Group on Invasive Alien Species. Available at: <https://www.cbd.int/invasive/lg/>, last accessed April 10, 2023.
- Convention on Biological Diversity. 2022. What’s the Problem? Available at: <https://www.cbd.int/invasive/problem.shtml>, last accessed April 10, 2023.
- Crowley, Sarah, Steve Hinchliffe, and Robbie McDonald. 2017. Invasive Species Management Will Benefit from Social Impact Assessment. *Journal of Applied Ecology* 54 (2): 351–357. <https://doi.org/10.1111/1365-2664.12817>
- Cumming, G. S., G. Epstein, J. M. Anderies, C. I. Apetrei, J. Baggio, Ö. Bodin, S. Chawla, H. S. Clements, M. Cox, L. Egli, G. G. Gurney, M. Lubell, N. Magliocca, T. H. Morrison, B. Müller, R. Seppelt, M. Schlüter, H. Unnikrishnan, S. Villamayor-Tomas, and C. M. Weible. 2020. Advancing Understanding of Natural Resource Governance: A Post-Ostrom Research Agenda. *Current Opinion in Environmental Sustainability* 44: 26–34. <https://doi.org/10.1016/j.cosust.2020.02.005>

- Dewey, John. 1908. What Does Pragmatism Mean by Practical? *Journal of Philosophy, Psychology, and Scientific Methods* 5 (4): 85–99. <https://doi.org/10.2307/2011894>
- Diagne, Christophe, Boris Leroy, Anne-Charlotte Vaissière, Rodolphe E. Gozlan, David Roiz, Ivan Jarić, Jean-Michel Salles, Corey J. A. Bradshaw, and Franck Courchamp. 2021. High and Rising Economic Costs of Biological Invasions Worldwide. *Nature* 592 (7855): 571–576. <https://doi.org/10.1038/s41586-021-03405-6>, PubMed: 33790468
- Dobson, Andrew, Kezia Barker, and Sarah L. Taylor. 2013. *Biosecurity: The Socio-politics of Invasive Species and Infectious Diseases*. Abingdon, UK: Routledge. <https://doi.org/10.4324/9780203113110>
- Dryzek, John. 2013. *The Politics of the Earth: Environmental Discourses*. 3rd ed. Oxford, UK: Oxford University Press.
- Dubois, Sara, Nicole Fenwick, Erin Ryan, Liv Baker, Sandra Baker, Ngaio Beausoleil, Scott Carter, Barbara Cartwright, Federico Costa, Chris Draper, John Griffin, Adam Grogan, Gregg Howald, Bidida Jones, Kate Littin, Amanda Lombard, David Mellor, Daniel Ramp, Catherine Schuppli, and David Fraser. 2017. International Consensus Principles for Ethical Wildlife Control. *Conservation Biology* 31 (4): 753–760. <https://doi.org/10.1111/cobi.12896>, PubMed: 28092422
- Eckersley, Robyn. 1999. The Discourse Ethic and the Problem of Representing Nature. *Environmental Politics* 8 (2): 24–49. <https://doi.org/10.1080/09644019908414460>
- European Commission. 2016. 40 Years of Animal Welfare. Available at: https://ec.europa.eu/food/system/files/2016-12/aw_infograph_40-years-of-aw.pdf, last accessed April 10, 2023.
- Fougères, Dorian, Angela Andrade, Mike Jones, and Pamela McElwee. 2020. Transformative Conservation in Social-Ecological Systems. Discussion paper, World Conservation Congress.
- Foxcroft, Llewellyn, and Melodie McGeoch. 2011. Implementing Invasive Species Management in an Adaptive Management Framework. *Koedoe* 53 (2): 11. <https://doi.org/10.4102/koedoe.v53i2.1006>
- French, Nigel. 2017. Impacts of Non-native Species on Livestock. In *Impact of Biological Invasions on Ecosystem Services*, edited by M. Vila and P. E. Hulme (pp. 139–154). New York, NY: Springer. https://doi.org/10.1007/978-3-319-45121-3_9
- Futhazar, Guillaume. 2020. The Conceptual Challenges of Invasive Alien Species to Non-human Rights. *Journal of Human Rights and the Environment* 11 (2): 224–243. <https://doi.org/10.4337/jhre.2020.02.04>
- Gehring, Thomas, and Sebastian Oberthür. 2009. The Causal Mechanisms of Interaction Between International Institutions. *European Journal of International Relations* 15 (1): 125–156. <https://doi.org/10.1177/1354066108100055>
- Genovesi, Piero, Carles Carboneras, Montserrat Vila, and Paul Walton. 2015. EU Adopts Innovative Legislation on Invasive Species: A Step Towards a Global Response to Biological Invasions? *Biological Invasions* 17 (5): 1307–1311. <https://doi.org/10.1007/s10530-014-0817-8>
- Giddens, Anthony. 1984. *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge, UK: Polity Press/Blackwell.
- Gonzalez Cruz, Jesann, and McKenzie F. Johnson. 2022. Invasive Species in Post-2020 Global Environmental Politics. *Global Environmental Politics* 22 (2): 12–22. https://doi.org/10.1162/glep_a_00625

- Hajer, Maarten, and Wytse Versteeg. 2005. A Decade of Discourse Analysis of Environmental Politics: Achievements, Challenges, Perspectives. *Journal of Environmental Policy and Planning* 7 (3): 175–184. <https://doi.org/10.1080/15239080500339646>
- Hall, Peter, and Rosemary Taylor. 1996. Political Science and the Three New Institutionalisms. *Political Studies* 44 (5): 936–957. <https://doi.org/10.1111/j.1467-9248.1996.tb00343.x>
- Hampton, Jordan, and Timothy Hyndman. 2019. Underaddressed Animal-Welfare Issues in Conservation. *Conservation Biology* 33 (4): 803–811. <https://doi.org/10.1111/cobi.13267>, PubMed: 30549308
- Haraway, Donna. 2018. Staying with the Trouble for Multispecies Environmental Justice. *Dialogues in Human Geography* 8 (1): 102–105. <https://doi.org/10.1177/2043820617739208>
- Harrower, C., R. Scalera, S. Pagad, K. Schönrogge, and H. Roy. 2020. *Guidance for Interpretation of the CBD Categories of Pathways for the Introduction of Invasive Alien Species*. Luxembourg: European Commission.
- Hulme, Philip. 2021. Advancing One Biosecurity to Address the Pandemic Risks of Biological Invasions. *BioScience* 71 (7): 708–721. <https://doi.org/10.1093/biosci/biab019>, PubMed: 34211340
- Inglis, Meera. 2020. Wildlife Ethics and Practice: Why We Need to Change the Way We Talk About “Invasive Species.” *Journal of Agricultural and Environmental Ethics* 33 (2): 299–313. <https://doi.org/10.1007/s10806-020-09825-0>
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. 2019. Global Assessment Report on Biodiversity and Ecosystem Services. Available at: <https://ipbes.net/global-assessment>, last accessed April 10, 2023.
- International Union for Conservation of Nature. 2016. *Biosecurity Journey: Biosecurity for a Resilient Planet*. Available at: https://www.iucn.org/sites/dev/files/content/documents/revised_biosecurity_journey_24_aug_2016.pdf, last accessed February 25, 2021.
- Justo-Hanani, Ronit, and Tamar Dayan. 2021. Risk Regulation and Precaution in Europe and the United States: The Case of Bioinvasion. *Policy Sciences* 54 (1): 3–20. <https://doi.org/10.1007/s11077-020-09409-9>
- Kopnina, Helen, Reingard Spannring, Shé Mackenzie Hawke, Colin D. Robertson, Alessio Thomasberger, Michelle Maloney, Marco Morini, William Lynn, Naziru Zakari Muhammad, Francisco J. Santiago-Ávila, Hana Begovic, and Mariusz Baranowski. 2021. Ecodemocracy in Practice: Exploration of Debates on Limits and Possibilities of Addressing Environmental Challenges Within Democratic Systems. *Visions for Sustainability* 15: 9–23. <https://doi.org/10.13135/2384-8677/5832>
- Kourantidou, Melina, Phillip J. Haubrock, Ross N. Cuthbert, Thomas W. Bodey, Bernd Lenzner, Rodolphe E. Gozlan, Martin A. Nuñez, Jean-Michel Salles, Christophe Diagne, and Franck Courchamp. 2022. Invasive Alien Species as Simultaneous Benefits and Burdens: Trends, Stakeholder Perceptions and Management. *Biological Invasions* 24: 1905–1926. <https://doi.org/10.1007/s10530-021-02727-w>
- Kuindersma, Wiebren, Bas Arts, and Mariëlle van der Zouwen. 2012. Power Faces in Regional Governance. *Journal of Political Power* 5 (3): 411–429. <https://doi.org/10.1080/2158379X.2012.735116>
- Lowe, S., M. Browne, and S. Boudjelas. 2000. 100 of the World’s Worst Invasive Alien Species: A Selection from the Global Invasive Species Database. Invasive Species Specialist Group. Available at: <https://www.issg.org/database/species/search.asp?st=100ss&fr=1&sts=>, last accessed February 25, 2021.

- Mankad, Aditi, Uttara Kennedy, and Lucy Carter. 2019. Biological Control of Pests and a Social Model of Animal Welfare. *Journal of Environmental Management* 247: 313–322. <https://doi.org/10.1016/j.jenvman.2019.06.080>, PubMed: 31252230
- McShane, Katie. 2018. Why Animal Welfare Is Not Biodiversity, Ecosystem Services, or Human Welfare: Toward a More Complete Assessment of Climate Impacts. *Ethics Forum* 13 (1): 43–64. <https://doi.org/10.7202/1055117ar>
- Mellor, David. 2016. Updating Animal Welfare Thinking: Moving Beyond the “Five Freedoms” Towards “A Life Worth Living.” *Animals* 6 (3): 5344546. <https://doi.org/10.3390/ani6030021>, PubMed: 27102171
- Munro, David, Jamie Steer, and Wayne Linklater. 2019. On Allegations of Invasive Species Denialism. *Conservation Biology* 33 (4): 797–802. <https://doi.org/10.1111/cobi.13278>, PubMed: 30624797
- Naito, Rumi, Jiaying Zhao, and Kai Chan. 2021. An Integrative Framework for Transformative Social Change: A Case in Global Wildlife Trade. *Sustainability Science* 17: 171–189. <https://doi.org/10.1007/s11625-021-01081-z>, PubMed: 35075372
- Oberthür, Sebastian, and Thomas Gehring. 2006. *Institutional Interaction in Global Environmental Governance: Synergy and Conflict Among International and EU Policies*. Cambridge, MA: MIT Press. <https://doi.org/10.7551/mitpress/3808.001.0001>
- Orsini, Amandine. 2013. Multi-forum Non-state Actors: Navigating the Regime Complexes for Forestry and Genetic Resources. *Global Environmental Politics* 13 (3): 34–55. https://doi.org/10.1162/GLEP_a_00182
- Persson, Asa, and Hens Runhaar. 2018. Conclusion: Drawing Lessons for Environmental Policy Integration and Prospects for Future Research. *Environmental Science and Policy* 85: 141–145. <https://doi.org/10.1016/j.envsci.2018.04.008>
- Pierson, Paul. 2000. Increasing Returns, Path Dependence, and the Study of Politics. *American Political Science Review* 94 (2): 251–267. <https://doi.org/10.2307/2586011>
- Pyšek, Petr, Philip Hulme, Dan Simberloff, Sven Bacher, Tim Blackburn, James Carlton, Wayne Dawson, Franz Essl, Llewellyn Foxcroft, Piero Genovesi, Jonathan Jeschke, Ingolf Kühn, Andrew Liebhold, Nicholas Mandrak, Laura Meyerson, Aníbal Pauchard, Jan Pergl, Helen Roy, Hanno Seebens, Mark van Kleunen, Montserrat Vilà, Michael Wingfield, and David Richardson. 2020. Scientists’ Warning on Invasive Alien Species. *Biological Reviews* 95 (6): 1511–1534. <https://doi.org/10.1111/brv.12627>, PubMed: 32588508
- Ritchie, Hannah, and Max Roser. 2018. Meat and Dairy Production. Available at: <https://ourworldindata.org/meat-production>, last accessed April 10, 2023.
- Rivera-Milan, Frank, and Jane Haakonsson. 2020. Monitoring, Modeling and Harvest Management of Non-native Invasive Green Iguanas on Grand Cayman, Cayman Islands. *Biological Invasions* 22 (6): 1879–1888. <https://doi.org/10.1007/s10530-020-02233-5>
- Rollin, Bernard. 2019. Animal Welfare Across the World. *Journal of Applied Animal Ethics Research* 1 (1): 146–170. <https://doi.org/10.1163/25889567-12340008>
- Ryland, Diane, and Angus Nurse. 2013. Mainstreaming After Lisbon: Advancing Animal Welfare in the EU Internal Market. *European Energy and Environmental Law Review* 22 (3): 101–115. <https://doi.org/10.54648/EELR2013008>
- Santiago-Ávila, Francisco J., and William S. Lynn. 2020. Bridging Compassion and Justice in Conservation Ethics. *Biological Conservation* 248: 108648. <https://doi.org/10.1016/j.biocon.2020.108648>

- Sax, Dov, Martin Schlaepfer, and Julian Olden. 2022. Valuing the Contributions of Non-native Species to People and Nature. *Trends in Ecology and Evolution* 37 (12): 1058–1066. <https://doi.org/10.1016/j.tree.2022.08.005>, PubMed: 36210286
- Schmidt, Vivien. 2008. Discursive Institutionalism: The Explanatory Power of Ideas and Discourse. *Annual Review of Political Science* 11 (1): 303–326. <https://doi.org/10.1146/annurev.polisci.11.060606.135342>
- Schuppli, Catherine, David Fraser, and H. J. Bacon. 2014. Welfare of Non-traditional Pets. *Revue Scientifique et Technique—Office International des Epizooties* 33 (1): 221–231. <https://doi.org/10.20506/rst.33.1.2287>, PubMed: 25000795
- Shackleton, Ross T., Charlie M. Shackleton, and Christian A. Kull. 2019. The Role of Invasive Alien Species in Shaping Local Livelihoods and Human Well-Being: A Review. *Journal of Environmental Management* 229: 145–157. <https://doi.org/10.1016/j.jenvman.2018.05.007>, PubMed: 30049620
- Shivambu, Ndivhuwo, Tinyiko Shivambu, and Colleen Downs. 2020. Assessing the Potential Impacts of Non-native Small Mammals in the South African Pet Trade. *NeoBiota* 60: 1–18. <https://doi.org/10.3897/neobiota.60.52871>
- Smith, K. G., A. L. Nunes, J. Aegerter, S. E. Baker, I. Di Silvestre, C. C. Ferreira, M. Griffith, J. Lane, A. Muir, S. Binding, M. Broadway, P. Robertson, R. Scalera, T. Adriaens, P.-A. Åhlén, A. Aliaga, K. Baert, D. E. Bakaloudis, S. Bertolino, L. Briggs, E. Cartuyvels, F. Dahl, B. D’hondt, M. Eckert, F. Gethöffer, E. Gojdičová, F. Huysentruyt, D. Jelić, A. Lešová, M. Lužnik, L. Moreno, G. Nagy, L. Poledník, C. Preda, J. Skorupski, D. Telnov, T. Trichkova, H. Verreycken, and M. Vucić. 2022. *A Manual for the Management of Vertebrate Invasive Alien Species of Union Concern, Incorporating Animal Welfare*. 1st ed. Available at: https://easin.jrc.ec.europa.eu/easin/Document/Final-deliverables-humane/Manual_management_vertibrate_IAS_incl_welfare_medres.pdf, last accessed April 10, 2023.
- Stoett, Peter. 2010. Framing Bioinvasion: Biodiversity, Climate Change, Security, Trade, and Global Governance. *Global Governance* 16 (1): 103–120. <https://doi.org/10.1163/19426720-01601007>
- Sunstein, Cass, and Martha Nussbaum. 2004. *Animal Rights: Current Debates and New Directions*. Oxford, UK: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195305104.001.0001>
- United Nations Environment Programme. 2022. Animal Welfare–Environment–Sustainable Development Nexus. Resolution adopted by the United Nations Environment Assembly, March 2.
- Vatn, Arild. 2015. *Environmental Governance: Institutions, Policies and Actions*. Cheltenham, UK: Edward Elgar.
- Visseren-Hamakers, Ingrid. 2018. Integrative Governance: The Relationships Between Governance Instruments Taking Center Stage. *Environment and Planning C: Politics and Space* 36 (8): 1341–1354. <https://doi.org/10.1177/0263774X18803634>
- Visseren-Hamakers, Ingrid. 2020. The 18th Sustainable Development Goal. *Earth System Governance* 3: 100047. <https://doi.org/10.1016/j.esg.2020.100047>
- Visseren-Hamakers, Ingrid, and Marcel Kok, editors. 2022. *Transforming Biodiversity Governance*. Cambridge, UK: Cambridge University Press. <https://doi.org/10.1017/9781108856348>
- Vogler, John. 2003. Taking Institutions Seriously: How Regime Analysis Can Be Relevant to Multilevel Environmental Governance. *Global Environmental Politics* 3 (2): 25–39. <https://doi.org/10.1162/152638003322068191>

- Wallach, Arian, Chelsea Batavia, Marc Bekoff, Shelley Alexander, Liv Baker, Dror Ben-Ami, Louise Boronyak, Adam Cardilin, Yohay Carmel, Danielle Celermajer, Simon Coghlan, Yara Dahdal, Jonatan Gomez, Gisela Kaplan, Oded Keynan, Anton Khalilieh, Helen Kopnina, William Lynn, Yamini Narayanan, Sophie Riley, Francisco J. Santiago-Ávila, Esty Yanco, Miriam Zemanova, and Daniel Ramp. 2020. Recognizing Animal Personhood in Compassionate Conservation. *Conservation Biology* 34 (5): 1097–1106. <https://doi.org/10.1111/cobi.13494>, PubMed: 32144823
- Wallach, Arian, Marc Bekoff, Chelsea Batavia, Michael Paul Nelson, and Daniel Ramp. 2018. Summoning Compassion to Address the Challenges of Conservation. *Conservation Biology* 32 (6): 1255–1265. <https://doi.org/10.1111/cobi.13126>, PubMed: 29700860
- Weber, Max, Guenther Roth, and Claus Wittich. 1978. *Economy and Society: An Outline of Interpretive Sociology*. Berkeley, CA: University of California Press.
- Wildlife and Countryside Link. 2020. *Prevention Is Better than Cure: A Diagnosis on the State of UK Invasive Species Biosecurity*. London, UK: WCL.
- World Organisation for Animal Health. 2017. OIE Global Animal Welfare Strategy. Available at: https://www.woah.org/fileadmin/Home/eng/Animal_Welfare/docs/pdf/Others/EN_OIE_AW_Strategy.pdf, last accessed April 10, 2023.
- World Organisation for Animal Health. 2019. International Standards on Animal Welfare. Available at: <https://www.woah.org/infographic/StandardsAW/index.html>, last accessed April 10, 2023.
- World Organisation for Animal Health. 2022. *One Health Joint Plan of Action*. Available at: <https://www.woah.org/app/uploads/2022/04/oh-joint-plan-of-action-summary.pdf>, last accessed April 10, 2023.
- World Organisation for Animal Health. n.d. OIE Animal Welfare Standards and the Multilateral Trade Policy Framework. Available at: https://www.woah.org/fileadmin/Home/eng/Animal_Welfare/docs/pdf/Others/Animal_welfare_and_Trade/A_WTO_Paper.pdf, last accessed April 10, 2023.
- Young, Oran. 1997. *Global Governance: Drawing Insights from the Environmental Experience*. Cambridge, MA: MIT Press.
- Zelli, Fariborz, and Harro van Asselt. 2013. Introduction: The Institutional Fragmentation of Global Environmental Governance: Causes, Consequences, and Responses. *Global Environmental Politics* 13 (3): 1–13. https://doi.org/10.1162/GLEP_a_00180