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PERSPECTIVE

What starts with laughter ends in tears: Invasive alien species regulations should not hinder scientific research

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Abstract

Biological invasions represent one of the major threats to the world's biodiversity. National and international efforts are taken to address the complexity and dynamic of invasions in legislation. However, based on the Polish experience of implementing the European Union's regulation on invasive alien species (IAS), we suggest that an unclear and disorganized process of law implementation results in the regulations being counterproductive. We describe how a well-planned policy can become a burden impeding effective research and, consequently, scientific feedback to improve the policy. The results of our study suggest that there is a large scale of scientists' noncompliance with new legal requirements. For many researchers, the implementation of the new IAS regulation was changing the rules in the middle of the game. Researchers strictly following the new regulations must wait for the relevant permits and may risk the successful completion of their projects. Conversely, researchers who prioritize project completion may be forced to continue their research violating the law. We argue that this example of implementing the new IAS regulation illustrates the need to include some intermediate solutions providing more flexibility and time for researchers to adjust to policy change, thus minimizing the negative impacts of the new legislature on scientific progress.

KEYWORDS

biological invasions, invasive alien species research, policy implementation, researchers, science-policy interface

1 | INTRODUCTION

Biological invasions are recognized as one of the most important contemporary threats to the world's biodiversity (Robertson et al., 2020). They are not only an environmental problem (CBD, 2002) but also an economic and social challenge throughout the world (Lubell et al., 2017).

In the European Union (EU), upon its entrance into force in 2015, Regulation (EU) No 1143/2014 of the European Parliament and of the Council of October 22, 2014 on the prevention and management of the introduction and spread of invasive alien species (IAS; EU Regulation, 2014) was perceived as a major step towards reducing the threat from biological invasions not only in the EU or Europe

but as a model solution to copy elsewhere (Genovesi et al., 2015; Tollington et al., 2017). Its inherent element is the list of IAS of Union concern (EU IAS) that fall under particularly strict controls, including the implementation of permit systems by the EU Member States for the use of these species, in order to reduce the risk of their release or escape into the wild.

Examples of biological invasions triggered by scientists (e.g., Anderson et al., 2017; Measey et al., 2012) imply that scientific research must not be excluded from the set of limitations designed to manage introduction pathways of IAS. However, in contrast to restrictions put on other types of activities, restrictions designed for scientific research on EU IAS warrant their continued use in the future (EU Regulation, 2014). Although scientists still need to put significant efforts to prevent individuals of the studied IAS from finding their way into the wild, they are allowed, for instance, to breed them, which is strictly forbidden for private owners (EU Regulation, 2014). This dichotomy in approach acknowledges the fact that providing sound science on IAS is a prerequisite to successfully combat them (Essl et al., 2017).

However, upon implementation of the new European law at national levels, scientists carrying out research on the regulated IAS may be faced with specific practical problems, unfamiliar to other stakeholders. In particular, research projects that had begun before new regulations came into force may become difficult or impossible to continue under new circumstances because legal conditions and requirements, as well as permits for research, may no longer be valid. Having this in mind, we look into the procedural requirements that researchers are faced with and we conjecture their effects on IAS research and management. We describe how a well-planned policy can become a burden impeding effective research and, consequently, limiting scientific feedback to improve the policy.

2 | NEGLIGENCE, BUREAUCRACY, UNCERTAINTY: THE BACKSTAGE OF CONDUCTING RESEARCH ON IAS

In Poland, a system of permits for IAS, issued by the General Directorate of Environmental Protection (GDEP) and by the regional directorates was introduced already on September 9, 2011, under a decree defining a list of IAS (PL IAS) that may threaten native species or habitats (Minister Decree, 2011); it came into force on April 5, 2012. Some PL IAS were later included in the EU IAS list. However, it took about 8 years to fully implement the provisions set out in the EU Regulation into the Polish legislation.

The Polish National Alien Species Act was signed on August 11, 2021 (Polish Regulation, 2021) and came into force on December 18, 2021. It implied that scientists carrying out research on the EU IAS that had not been previously listed as PL IAS must obtain a permit within 6 months. Scientists dealing with EU IAS that had previously been listed as PL IAS had 12 months to obtain a new permit (Figure 1). Permits previously issued for research on PL IAS not included in the EU IAS list remained valid until the setout date. On December 29, 2022, another decree came into force (Minister Decree, 2022), ending the 8-year-long process of the EU Regulation implementation. It specified means of marking IAS individuals of different taxonomic groups, thus finally providing details on how to put into practice the condition set out in the Alien Species Act over 1 year earlier.

To assess the efficiency of putting the new act into practice, we sampled the process halfway through. On July 14, 2022, we sent an official request to the GDEP, enquiring about the number of applications and permits issued. We were informed that, by that time, only 241 applications had been received and 20 permits had been issued. Among these applications, merely 12 came from scientific or research entities. Notably, only a single permit for a research institution had been issued.

These numbers are astonishingly low, considering the scale of the IAS use in Poland for multiple purposes, including companion animals, aquaculture, horticulture, or scientific research. What is particularly important for the substance of our communication here: after almost a year of the national Alien Species Act legislation in force, only one research entity in Poland had been authorized with a permit required to legally keep and study IAS individuals. The low level of response from private and commercial owners, as well as institutions carrying out research on IAS, was certainly caused by the fact that they were either totally unaware of the new obligations, or they were deterred by a maze of complex regulations, overlapping periods, and deadlines. Broad information campaigns or system help for the applicants were not provided by the authorities.

3 | SCIENTISTS CHALLENGED TO LEGALLY CONTINUE THEIR RESEARCH ON IAS

To check how the new framework on IAS is perceived by the Polish scientists already performing or planning the research or education on biological invasions, on June 22, 2022, that is, 4 days after the first deadline to apply for a permit according to the new regulations, we launched an online survey. We asked 16 questions on scientists' awareness of the new law on IAS and its influence on the feasibility of the ongoing and potential new research.

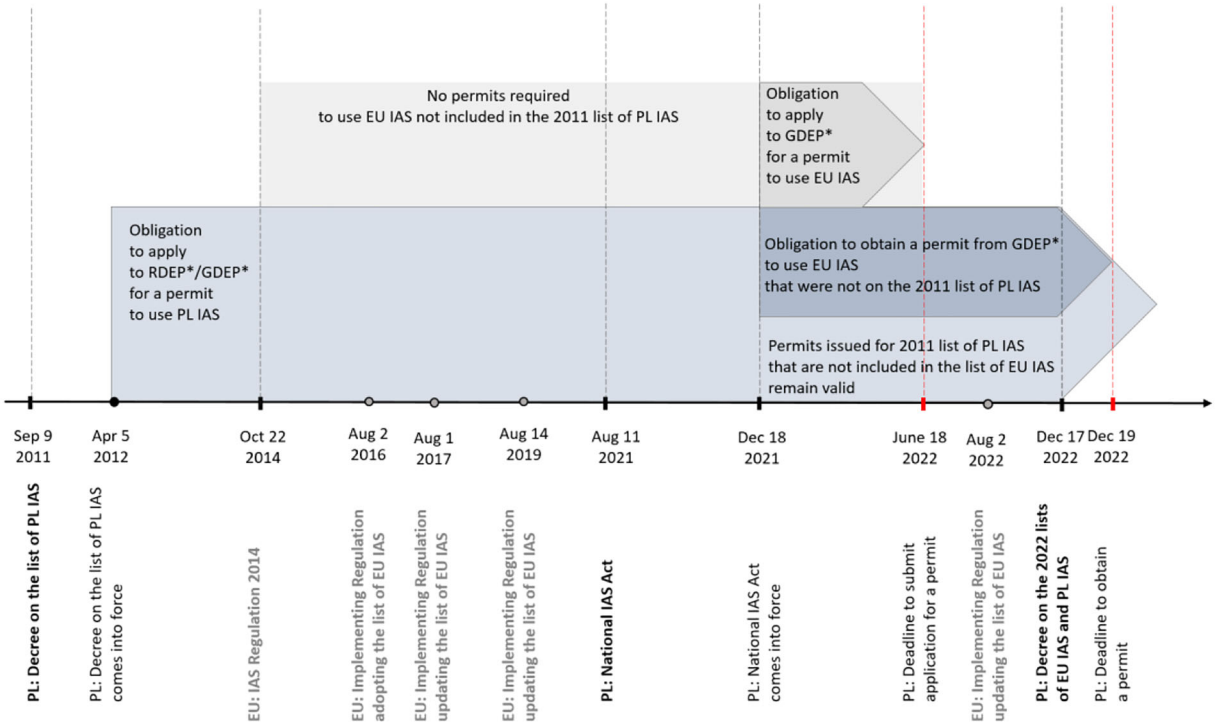

FIGURE 1 The requirements concerning research on IAS in Poland during the implementation process of the EU and national legislation. Names of the enacted legal documents are in bold; GDEP, General Directorate of Environmental Protection; RDEP, Regional Directorates of Environmental Protection.

(Supporting Information) Following the Code of Ethics for Researchers (Commission for Research Integrity, 2020) applied by the Polish Academy of Sciences as we collected anonymized human data, the research did not require a formal ethics review. Nevertheless, we followed the best practices providing the respondents full anonymity. We did not gather any sensitive data related to the particular respondent (such as the name of the institution where the respondent is employed, e-mail address, age, gender, scientific title, or type of position, or any other information that would potentially allow to link a given answer or a set of answers with a specific respondent). At the beginning of the survey respondents were informed that we do not collect any data allowing for their identification and that they can decide which questions they are willing to answer (answers for the questions were not mandatory to continue the survey).

The survey was conducted in two steps. First, it was e-mailed to 86 scientists collaborating with the Institute of Nature Conservation, Polish Academy of Sciences, in the field of biological invasions. Then, on June 30, 2022, we published an open invitation in social media, specifically on the Facebook profile "Łowca Obcych" (https://www.facebook.com/LowcaObcych; 14,000 followers), dedicated specifically to IAS. We closed the online survey on August 8, 2022. To assess the total number of Polish scientists dealing with IAS, we searched the Polish Science Database (https://nauka-polska.pl/, accessed on March 7, 2023). Using the search criterion "biological invasions" in Polish and English, we found 69 and eight researchers, while the same search for "invasive alien species" and‘ "alien species" or "invasive species" provided 22 and 23 researchers, respectively. Based on these results and our individual networks, we estimated that there are between 70 and 100 scientists working on IAS in Poland. In our survey, we collected a total of 44 completed questionnaires; therefore, we consider this to be a sufficient number to support our reflections presented in this paper.

A total of 14 respondents (32%) answered that in 2022 they were not conducting any research on IAS, or holding IAS individuals, thus the new regulations do not affect their academic or teaching activity. Out of the 30 remaining respondents, 14 declared that in 2022 they were conducting research or teaching activities that involved the acquisition or keeping of IAS individuals (Figure 2). Of these 14 respondents, 11 admitted that in 2022 they continued activities that had begun prior to the new regulations. Notably, only seven of the 30 respondents involved in IAS studies applied to GDEP for a permit, which was a legally binding obligation after December 18, 2021. Among those who did apply, two received an answer from GDEP with a request to

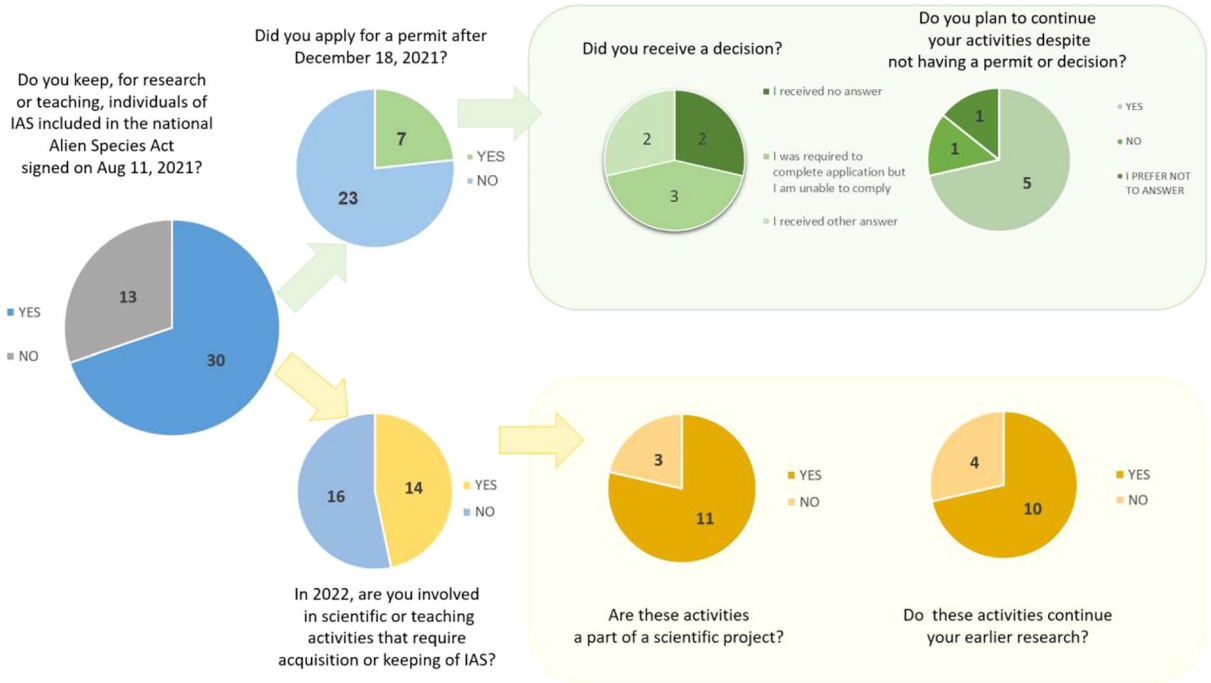

FIGURE 2 Answers to the questions on the current research on IAS of the Union and Poland's concern, under the National Alien Species Act, signed on August 11, 2021 (Polish Regulation, 2021).

complete the application, while the remaining five either did not receive any answer, or the requirements set out in the permit were impossible to meet (e.g., the obligation to conduct field experiments exclusively on the applicant's premises). At the same time, almost each of the seven respondents declared that they were going to continue their research despite their lack of the legally required permit (irrespective of the reason for not obtaining it). Most likely, this would also be the case for the 23 respondents who did not apply for the permit.

4 | WHY DID NOT THE PERMIT SYSTEM WORK?

The main factor behind the inefficiency of the permit system was negligence in providing an appropriate time frame, adequate for fulfilling the legal requirements, both by the applicants and by the issuing body. In addition to that short vacatio legis (6 months to meet the first deadline), the operation of the system was hindered by the fact that information campaigns preceding its introduction had not been carried out, and it did not allow the scientific community to prepare for the coming changes.

As a result, the total number of applications countrywide was very low: 241, including only 12 from research units. We argue that most stakeholders were unaware of the legal obligation to urgently obtain a permit. This situation affected not only the academia but also, and arguably on a larger scale, private owners of IAS, some of whom found themselves illegally possessing their pets only after the deadline for applying for a permit had passed. At the same time, however, although the number of applications sent was low, it did not prevent the permit-issuing system from becoming clogged. This was caused by the fact that very little time was provided for the GDEP to test and adjust it and to elaborate smooth processing procedures, without unnecessary and time-consuming bureaucracy.

Regarding the scientific community, another drawback was that no intermediate solutions were foreseen for research projects that had already been ongoing. We suppose this might have deterred part of researchers from applying for a permit, in fear of risking their projects' completion in case of receiving legally binding negative decisions.

5 | UNEXPECTED CONSEQUENCES OF INEFFECTIVE IMPLEMENTATION OF NEW REGULATIONS

The consequences of the inappropriate introduction of new legislation may be counterproductive in terms of reducing the risks of biological invasions. From the perspective of a private owner of an IAS pet who was unexpectedly faced with the risk of being punished for its illegal possession, these effects may be immediate: the direct aftermath may be getting rid of the problem by

releasing the animal into the wild. Such a scenario would be completely opposite to the outcome that was intended upon introducing the new restrictions.

Consequences for academia are less straightforward and have not been commonly acknowledged so far. At best, if threatened with the potential failure of an ongoing "pre-regulation" project, research teams must rely on flexibility of the funding agencies to find solutions for the "postregulation" reality, for instance, by agreeing to change the experimental design or to extend the duration of the project. However, the results of our survey point out that when the choice is between putting an ongoing project at risk of failure and continuing it irrespective of the new rules, a last resort may be to go for the latter option.

In the long run, therefore, ineffective implementation of restrictions on IAS may hinder scientific research on biological invasions. Hence, instead of providing key solutions, at the end of the day, these restrictions may contribute to exacerbating the problem.

6 | CONCLUSIONS AND RECOMMENDATIONS

Biological invasions represent a very complex challenge regarding the implementation of legal solutions to combat them. Environmental governance in this respect faces problems even in countries with the longest experience and broadly accepted best practices, such as community engagement and consultation, including New Zealand or South Africa (e.g., Hulme, 2020; Lukey & Hall, 2020). Our paper outlines a case study of the complexities that recent changes in the regulatory framework on IAS caused for scientists dealing with biological invasions in Poland—a country with a relatively short history of implementation of regulatory frameworks. The ultimate practical outcome of this situation was a complete failure of the system upon its introduction: virtually none of the surveyed researchers had the legally required permit to study IAS, yet most of them declared that they were going to continue their activities, irrespective of possible consequences.

What we want to highlight is that improper implementation of legal rules and public policies can have long-standing consequences for conducting the research. We see this as a multifaceted dilemma that academics are faced with. The challenges relate to the question of how to proceed with the approved and ongoing research projects (often financed by the EU or national institutions), without having a permit that had not been initially required. To which institution should a researcher remain loyal? To the one financing the already ongoing research (by continuing the study as scheduled) or to the one executing the new law (by discontinuing the study)?

Although our example is limited just to a specific issue in a single country, it clearly illustrates the problem outlined by Meyerson et al. (2022) in the context of working towards effective modular programs for managing biological invasions globally. Comparing their approach to a continuum of Russian dolls of different sizes that nest inside one another, they call for a more integrative approach across multiple scales and stakeholders in order to bridge the existing gaps between science, management, and policy on IAS at various geopolitical dimensions. Each single "doll," representing a piece of regulatory or nonregulatory framework operating in a particular region and for selected stakeholders, needs to be developed in a way that ensures its compliance with other larger and smaller "dolls." Potential consequences of modification of component frameworks without adequate attention to other "dolls" include conflicting regulations and/or important issues and being left out of policies. The lack of detailed analyses in other member states does not allow for a thorough assessment of the efficiency of the permit-issuing system at the EU scale. However, according to the review of the application of the EU Regulation, between August 2016 and December 2018, out of 28 reporting EU Member States, 12 issued a total of 100 permits for 32 IAS of Union concern, including 87 permits for scientific research (the remaining 13 were for ex situ conservation; Commission Report, 2021). Although this information is too general to draw solid conclusions, it cannot be ruled out that the mechanism that we found in Poland had operated also at a wider European scale, at least in the early years of the EU Regulation implementation: the number of permits issued by 2018 in whole EU is very low and it is symptomatic than more than half of the EU member states had not issued any permits whatsoever in that period. Therefore, if implemented incorrectly, the EU Regulation, considered to be a model policy for other regions (Genovesi et al., 2015; Tollington et al., 2017), may have a perverse and unexpected outcome by representing a burden that impedes effective research and, consequently, limits the scientific feedback intended to improve the policies on IAS on a wider level.

The same review identified the most important factors that impede the process of implementation of the EU Regulation, including gaps in scientific knowledge on threats posed by some IAS, and in novel methods for their management (Commission Report, 2021). At the same time, however, although a number of further research needs were defined to support the implementation of this regulation, reducing the scientific output towards solving the IAS problem was not perceived as a factor potentially limiting the success of this law (Tollington et al., 2017; Roman & Mauerhofer, 2022).

A plausible reason for not identifying this issue so far is that it had never been directly tested prior to our

studies: We demonstrated that, when explicitly asked, most of the surveyed researchers admitted that the new regulations negatively affected their field of activity relevant to IAS. In particular, the results of our study suggest that there is a large scale of scientists' noncompliance with legal requirements.

As the scientific background on causes, consequences, and mitigation of biological invasions remains the major prerequisite to manage this challenge, IAS regulations must not hinder the scientific research. A lesson from the case of implementing the new IAS regulation in Poland is that some intermediate tools or solutions are needed for researchers to adjust to policy change. Therefore, based on our reflections, experiences, and the survey results, we recommend:

- setting up attainable requirements that will need to be met and a clearly defined vacatio legis for those who proceed in accordance with the previous legislation yet are willing to update to the new one;
- providing entities conducting research or education activities with clear and timely information and guidance on the forthcoming procedures by using effective communication tools, such as direct or online meetings with researchers
- providing streamlined processing procedures for applicants conducting research or education activities, particularly when organizational resources of the governing institution are limited;
- providing officers who deal with processing permit applications with clear guidance and scientific advice;
- adjusting the stringency of permit conditions to the actual increase in risks posed by the studied IAS in specific, local contexts, and balancing these risks with the potential contribution of the research or education to mitigating these risks at a wider scale.

AUTHOR CONTRIBUTION

APK, AO, KN, and WS came up with the idea for the paper; APK and AO designed the online survey and analyzed collected data; APK, APO, KN, RM, and WS wrote and edited the paper.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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