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THAILAND'S INVASIVE SPECIES LEGAL GAP: A CASE STUDY OF THE BLACKCHIN TILAPIA (SAROTHERODON MELANOTHERON)

A LACUNA LEGAL DA TAILÂNDIA SOBRE ESPÉCIES INVASORAS: UM ESTUDO DE CASO DA TILÁPIA-DE-QUEIXO-PRETO (SAROTHERODON MELANOTHERON)

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Abstract
Thailand has struggled to control invasive alien species (IAS), which are among the top five most critical drivers of global biodiversity loss. Despite being a vital biodiversity hotspot, Thailand lacks a specific law on IAS, leading to numerous ecological and economic crises. In an effort to examine this problem, the authors undertook a qualitative documentary research approach, combining doctrinal analysis of the law and a case study of Thailand's Blackchin Tilapia (*Sarotherodon melanotheron*) outbreak. A comparative legal analysis was conducted to compare the legislative frameworks of Thailand and Japan. The analysis disclosed three connected structural faults. These included (1) the 'blacklist' (prohibited list) system makes the importation of any species not yet formally regulated possible, an act that opposes the Precautionary Principle; (2) institutional authority is weak in the customs, fisheries, and livestock agencies because of institutional fragmentation, resulting in enforcement gaps; and (3) the statutory definition of 'pollution' does not extend to biological invasions, restricting the provisions for strict liability on IAS damages. However, Japan's UAS (Uncategorized Alien Species) system offers a superior proactive model. This article provides a critical legal perspective on Thailand's IAS Unique Contribution, offering practical ideas for

Resumo
A Tailândia tem enfrentado dificuldades para controlar as espécies exóticas invasoras (EEI), que estão entre os cinco vetores mais críticos da perda global de biodiversidade. Apesar de ser um hotspot de biodiversidade de vital importância, a Tailândia carece de uma lei específica sobre EEI, o que tem levado a inúmeras crises ecológicas e econômicas. No esforço de examinar este problema, os autores adotaram uma abordagem qualitativa de pesquisa documental, combinando a análise dogmática do direito com um estudo de caso do surto da tilápia-de-queixo-preto (Sarotherodon melanotheron) na Tailândia. A análise jurídica comparada foi empregada para comparar os arcabouços legislativos da Tailândia e do Japão. A análise revelou três falhas estruturais interconectadas, quais sejam: (1) o sistema de "blacklist" (lista de espécies proibidas) torna possível a importação de qualquer espécie ainda não formalmente regulamentada — ato que se opõe ao Princípio da Precaução; (2) a autoridade institucional é fragmentada entre as agências aduaneiras, pesqueiras e pecuárias, resultando em lacunas de fiscalização; e (3) a definição legal de "poluição" não se estende às invasões biológicas, restringindo as disposições de responsabilidade objetiva por danos causados por EEI. Em contrapartida, o sistema japonês de UAS (Uncategorized Alien Species —

legislative amendments, with specific processes and suggestions.

Keywords: Aquatic Animals. Biosecurity. Legal Framework. Precautionary Principle. Thailand.

Espécies Exóticas Não Categorizadas) oferece um modelo proativo superior. Este artigo oferece uma perspectiva jurídica crítica sobre a lacuna legal tailandesa em matéria de EEI, apresentando ideias práticas para emendas legislativas, com processos e sugestões específicos.

Palavras-chave: *Animais Aquáticos. Biossegurança. Arcabouço Legal. Princípio da Precaução. Tailândia.*

1 INTRODUCTION

What happens when species begin to move across the planet faster than evolution can respond? In today's highly connected world, global trade, tourism, shipping, and aquaculture have effectively dissolved many of the natural barriers that once limited species movement. As a result, organisms and species are now transported across oceans and continents daily, often establishing themselves as invasive populations in new environments.

Invasive alien species (IAS) are now widely recognized as one of the five leading drivers of global biodiversity loss, alongside habitat destruction, climate change, pollution, and overexploitation (Okorondu *et al*., 2022). Their impacts are not only ecological but also economic. A comprehensive global analysis estimated that biological invasions have cost the world economy approximately $1.288 trillion over the past five decades (Diagne *et al*., 2021). These costs—and the associated ecological damage—continue to rise, underscoring the growing urgency of addressing biological invasions.

Thailand occupies a particularly vulnerable position within this global phenomenon. The country sits at the heart of mainland Southeast Asia, with a tropical monsoon climate, and extensive river systems crisscrossing the land. Moreover, Thailand has long coastlines on both the Gulf of Thailand and the Andaman Sea, which make it a biodiversity hotspot. That is the good news. The bad news? Those same characteristics make Thailand particularly well-suited to hosting invasive species. Once a non-native species arrives, it tends to thrive.

Here is another problem. Thailand is one of the world's largest producers of aquaculture products, including shrimp, Tilapia, and ornamental fish (Sampantamit *et al*., 2020). That means people are intentionally bringing in aquatic organisms from all over the world in high volume and at high speed. Fortunately, alongside the potential for ecological destruction, these sectors also bring significant economic benefits. Nevertheless, there is a hidden cost. Biosecurity in Thailand is weak. Poorly managed. Moreover, that hidden cost is coming due right now – as the Blackchin Tilapia outbreak shows (Hutasingh, 2024).

The ongoing outbreak of the Blackchin Tilapia (Sarotherodon melanotheron) exemplifies the catastrophic consequences of legal and institutional failure (Cowan, 2025; Hutasingh, 2024). This fish is West African in origin and tolerates high salinity and brackish waters (Chaianunporn *et al*., 2024). In some contexts, people actually value it for these traits (Sampantamit *et al*., 2020). Depending on whom you ask, after its introduction into Thailand around 2011, the species spread into Thailand's many river systems and lakes. Ten years later, it has spread unabated.

How bad is the damage? In one sub-district of Samut Songkhram province alone, the economic loss exceeded $3.8 million in 2020 (Janpakdee, 2024), which is just one small area. Experts estimate the outbreak could cost the country at least $293 million. The Thai government has allocated more than 450 million baht for containment and remediation, but these efforts have yet to yield significant results. Globally, the world spends over $400 billion annually to prevent, control, and eradicate IAS (Janpakdee, 2024). The species outcompetes native species in its native habitats, damages commercial shrimp farms, and, once established, is difficult to eradicate.

Crucially, this paper argues that the Blackchin Tilapia crisis is not unforeseeable or a natural accident, but instead a predictable and preventable consequence of structural deficiencies in Thailand's legal framework for IAS management. Moreover, Thailand currently lacks any dedicated 'master law' governing the prevention, control, or eradication of IAS. Instead, the country relies on a fragmented 'patchwork' of statutes enacted for fundamentally different purposes. This includes primary legal instruments such as the Royal Ordinance on Fisheries B.E. 2558 (2015) (Supongpan & Peakaue, 2016), which was primarily designed to combat illegal, unreported, and unregulated (IUU) fishing, and the Enhancement and Conservation of National Environmental

Quality Act B.E. 2535 (1992), which was primarily designed to address industrial pollution. Neither statute was designed with biosecurity or IAS prevention as a core objective.

This research addresses a legal gap that has never been addressed in legal discussions. While many pieces of scientific literature have addressed the ecological impacts of IAS in Thailand, and many policy papers call for "better management," there seems to be no article-length legal analysis that systematically assesses which statutory provisions are deficient and how they can be rectified at the textual level. A comparative legal investigation of the Japanese Invasive Alien Species Act (Act Number 78 of 2004) (Takahashi, 2006) indicates that enacting a proactive, precautionary legal regime is both realistic and urgently needed. Japan, as an island nation with high endemism and vulnerability to invasions, recognized the critical nature of a legal transition from a patchwork of sectoral laws to an integrated master law. Therefore, one should examine Japan's efforts in this sector toward legal reform.

This research is guided by four specific and interrelated research objectives (ROs).

RO1: To analyze the legal principles, concepts, and international obligations governing the importation of invasive alien aquatic species as they apply to Thailand, including the Precautionary Principle, the Polluter Pays Principle, and Thailand's binding commitments under the Convention on Biological Diversity (CBD) and the Cartagena Protocol on Biosafety.

RO2: To identify and systematically categorize the structural legal problems within Thailand's current framework by examining the Royal Ordinance on Fisheries B.E. 2558 (2015) (Supongpan & Peakaue, 2016), the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992), and the pending draft Biodiversity Act (as of 2026).

RO3: To conduct a detailed comparative legal analysis with Japan's Invasive Alien Species Act (2004), focusing specifically on its 'Uncategorized Alien Species' (UAS) system, its three-tier classification scheme (IAS, LORCA, UAS), its provisions for emergency response and corporate liability, and its applicability as a legal transplant model for Thailand.

RO4: To propose concrete, actionable legal and policy reforms that would shift Thailand's framework from a reactive, blacklist (prohibited list) -based, fragmented system to a proactive, precautionary, integrated biosecurity governance model.

2 METHODOLOGY

This research uses qualitative doctrinal legal research methods (Boonrueang, 2020) with documentary research as the primary approach. Doctrinal legal analysis (a.k.a. black-letter or library-based research) studies legal texts, precedents, and legal principles through systematic evaluation (Hutchinson & Duncan, 2012). The methodology identifies statutory gaps, legal inconsistencies, and structural deficiencies. The research process consisted of four separate stages.

2.1 Phase 1: systematic collection of primary legal sources

The first phase involved the systematic collection of primary legal sources. For Thailand, these included the Royal Ordinance on Fisheries B.E. 2558 (2015) (Supongpan & Peakaue, 2016), the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992), the Civil and Commercial Code (relevant provisions on tort and animal liability), ministerial regulations and notifications issued under these statutes, and the most recent version of the draft Biodiversity Act as publicly available in 2026. For Japan, the primary source was the Invasive Alien Species Act (Act No. 78 of 2004), along with English-language translations and official commentary from Japan's Ministry of the Environment.

2.2 Phase 2: collection of secondary sources

The second phase involved collecting secondary sources, including peer-reviewed journal articles that examined IAS legal frameworks, biosecurity governance, and comparative environmental law. The research team gathered research reports from Thai government agencies and academic institutions. Additionally, official documents and news reports (Cowan, 2025) were reviewed concerning the Blackchin Tilapia outbreak

(Chaianunporn *et al*., 2024), its import history, spatial distribution (Diagne *et al*., 2021), and economic impacts (Janpakdee, 2024).

2.3 Phase 3: IAS Blackchin Tilapia (*Sarotherodon melanotheron*) outbreak research

In the third phase of the study, the researchers used the case study method to study the Blackchin Tilapia (*Sarotherodon melanotheron*) outbreak. The case study traced the species' import chronology, beginning with its initial introduction for research purposes around 2010 (Cowan, 2025). The research then evaluated the existing conditions for the import permit, including the species' legal classification at the time of import, all prohibited lists, documented pathways of escape or release, the timeline of population establishment and spread, and documented ecological and economic consequences. The case study provides factual evidence for the legal research, demonstrating that the identified statutory deficiencies are not merely theoretical but have caused real and measurable harm.

2.4 Phase 4: comparative legal analysis

The fourth phase employed comparative legal analysis. This involved side-by-side comparison of specific provisions of Thai and Japanese law, organized around three analytical dimensions: (1) the underlying paradigm (reactive prohibited list vs. proactive whitelist/permitted list UAS); (2) the allocation of authority and institutional integration (fragmented vs. centralized/coordinated); and (3) the availability of effective remedies for damages (burden of proof and strict liability vs. reversed burden and environmental bonds). Data analysis was conducted using descriptive and analytical synthesis, presenting findings in clear, accessible prose organized by thematic deficiency.

2.5 Ethics statement

This research did not involve human subjects, and no ethics approval was required. All sources are publicly available legal and academic documents.

3 RESULTS

The analysis reveals three interconnected structural deficiencies in Thailand's legal framework for controlling the importation of invasive alien aquatic species (Chaianunporn *et al*., 2024; Nakamura & Amador, 2022). Each deficiency is presented below, followed by a comparative analysis of the corresponding provision or mechanism in Japan's Invasive Alien Species Act (2004) (Mito & Uesugi, 2004).

3.1 Deficiency one: the reactive 'blacklist' (prohibited list) system

Thailand's Royal Ordinance on Fisheries B.E. 2558 (2015) contains two key provisions for IAS control (Nootmorn, 2020; Supongpan & Peakaue, 2016). Section 64 empowers the Minister to require import permits for specific aquatic species (Munprasit & Nootmorn, 2021). Section 65, the most powerful tool, empowers the Minister to absolutely prohibit the importation, culture, export, or possession of any aquatic species that threatens the ecosystem. Pursuant to Section 65, the Ministry issued notifications in 2018 and 2021 establishing a prohibited list of 13 invasive species, including the Blackchin Tilapia, though only after the outbreak had occurred.

The structural problem is that this framework operates on a prohibited list logic. Under this system, any species is permitted unless explicitly prohibited (Xiao *et al*., 2024). For any novel species—a newly commercialized aquarium fish, a new aquaculture species, or a species whose invasive potential has not been studied—there is no legal barrier to importation as long as basic customs and disease requirements are satisfied.

The prohibited list system produces serious operational consequences. Adding a species requires substantial scientific evidence of invasiveness, followed by formal rulemaking that typically takes years. During this period, the species may already be present in the country, have escaped, and be establishing a self-sustaining population. By the time the formal prohibition is issued, eradication is often no longer feasible. This is precisely what occurred with the Blackchin Tilapia: it was imported and cultured for years before the government prohibited it, by which time it had already spread beyond containment.

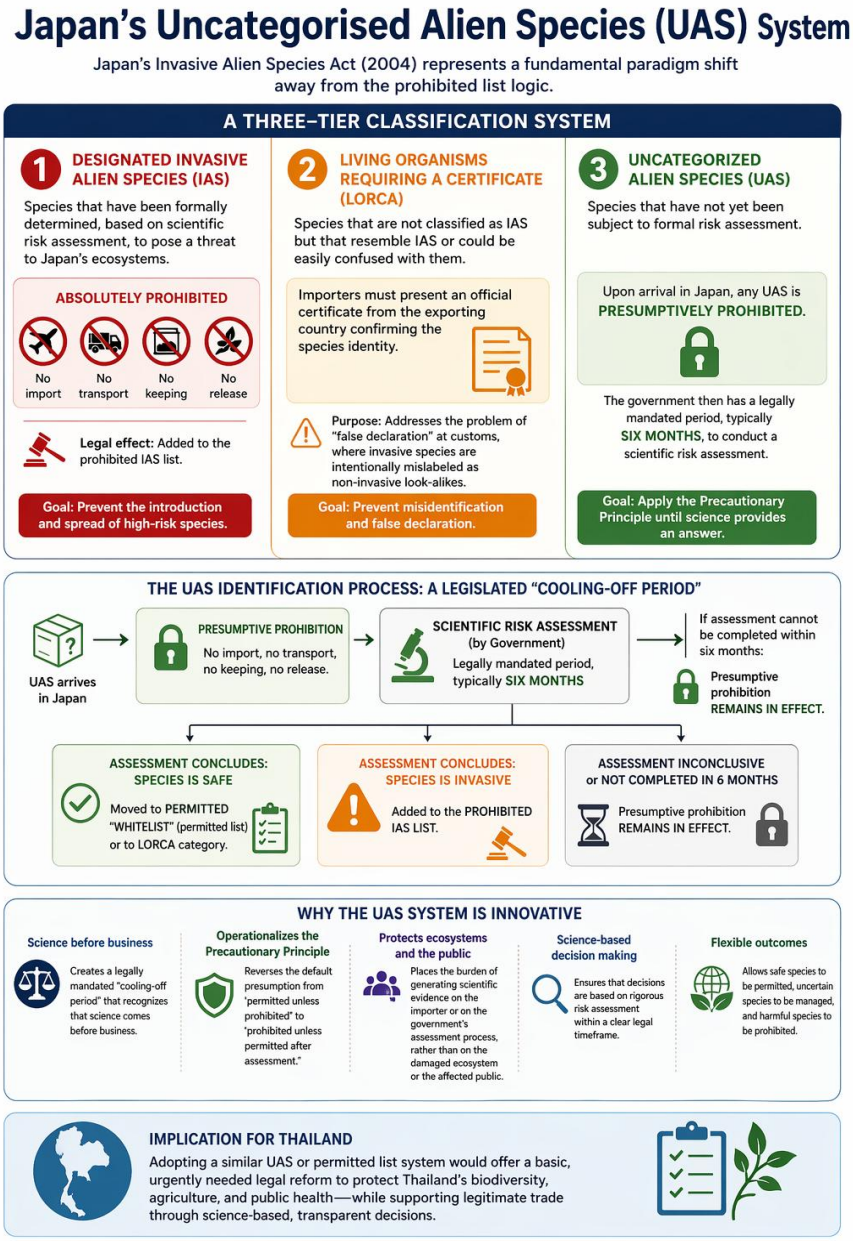
The prohibited list system contradicts the Precautionary Principle (PP), codified in Principle 15 of the Rio Declaration (1992) (Slišković *et al*., 2024; Wheeler & Beatley, 2022). The PP mandates that the lack of full scientific certainty cannot justify postponing cost-effective measures to prevent serious or irreversible damage. Applied to IAS, the PP requires prohibiting importation until the species is demonstrated to be safe. The prohibited list permits importation until the species is demonstrated to be dangerous, by which time damage has often already occurred.

3.1.1 Comparative analysis: Japan's uncategorized alien species (UAS) system

Japan's Invasive Alien Species Act (2004) represents a fundamental shift away from the logic of prohibited lists. The Act establishes a three-tier classification system (Mito & Uesugi, 2004) (Figure 1).

Figure 1

Japan's 3-tier classification system for uncategorized alien species (UAS).



First, *Designated Invasive Alien Species (IAS)* are species that have been formally determined, based on scientific risk assessment, to pose a threat to Japan's ecosystems (Katayama, 2025; Mizutani & Goka, 2010). These species are absolutely prohibited: no import, no transport, no keeping, no release.

Second, *Living Organisms Requiring a Certificate (LORCA)* are species that are not classified as IAS but that resemble IAS or could be easily confused with them ("Alien

Species," 2024). Importers of LORCA species must present an official certificate from the exporting country confirming the species identity. This provision addresses the problem of ‘false declaration’ at customs, where invasive species are intentionally mislabeled as non-invasive look-alikes.

Third, and most innovatively, *Uncategorized Alien Species (UAS)* are species that have not yet been subject to formal risk assessment. Under the Japanese Act, any UAS is presumptively prohibited upon arrival. The government then has a legally mandated period, typically six months, to conduct a scientific risk assessment. If the assessment concludes that the species is safe, it is moved to a permitted ‘whitelist’ (permitted list) or to the LORCA category. If the assessment concludes that the species is invasive, it is added to the prohibited IAS list. If the assessment cannot be completed within six months, the presumptive prohibition remains in effect.

The UAS identification process is the most innovative part of the Japanese Act, as it creates a legally mandated 'cooling-off period' that recognizes that science comes before business. It operationalizes the Precautionary Principle in concrete statutory language. It reverses the default presumption from ‘permitted unless prohibited’ to ‘prohibited unless permitted after assessment.’ It places the burden of generating scientific evidence on the importer or on the government's assessment process, rather than on the damaged ecosystem or the affected public. For Thailand, adopting a similar UAS or permitted list system would offer a basic, urgently needed legal reform.

3.2 Deficiency two: fragmented institutional authority and enforcement gaps

The second structural deficiency concerns the allocation of authority among multiple government agencies. The authorities in Thailand divide control over the importation of aquatic animals among three main agencies, each with distinct legal responsibilities.

The *Department of Fisheries* (Ministry of Agriculture and Cooperatives) has authority over the species-specific prohibitions and permits established under the Royal Ordinance on Fisheries. Its expertise lies in fisheries management, aquaculture, and, to a limited extent, aquatic animal health.

The Department of Customs (Ministry of Finance) has the authority to conduct physical inspections of imported goods at border checkpoints, as provided under the Customs Act B.E. 2560 (2017). The main function of this organization is to verify tariff classifications, collect duties, and identify contraband. The staff members of this organization do not possess the necessary skills to identify different species within taxonomic systems.

Thailand's Department of Livestock Development under the Ministry of Agriculture and Cooperatives has authority over animal disease inspection under the Animal Epidemics Act B. E. 2558 (2015). The organization conducts its mission to protect human health and livestock and domestic animals from pathogens, excluding invasive species that harm ecosystems.

The enforcement gap arises from the fragmented allocation of officials and guidelines across agencies. An example of this is that even though an aquatic animal possesses high invasive potential, it might not yet be listed on the Fisheries Department's prohibited list, while simultaneously correctly declared to Customs and free of notifiable diseases. As such, the animal will pass through all three inspection points legally. No single agency has both the legal authority and the technical expertise to assess ecological invasiveness as an independent criterion.

These limitations thus cause the Customs officer to not properly identify a species that does not appear on a prohibited list. In contrast, the Livestock officer is mandated to check for disease, not invasiveness, and the Fisheries officer, who possesses the relevant expertise, is typically not present at border inspection points. The result is a system in which no official is in a position to ask the critical question, "Is this species ecologically dangerous?"

The Blackchin Tilapia outbreak exposed these accountability problems. No agency had a clear responsibility for prevention. None was designated to lead the rapid response. Coordination across agencies was absent. Delays and jurisdictional disputes followed.

3.2.1 Comparative analysis: Japan's centralized coordination

The Invasive Alien Species Act of 2004 in Japan involves multiple agencies while establishing a primary authority for central oversight. The Act designates Japan's Ministry of the Environment as the lead agency for IAS policy, with the Minister of the Environment empowered to designate IAS species after consultation with relevant sectoral ministries (Agriculture, Fisheries, Trade). The Act establishes an official inter-ministerial system to administer disputes over jurisdiction and to maintain uniform enforcement regulations.

For border control, the Act allows Customs officers to stop any shipment suspected of containing UAS or misclassified species. After this, the shipment can be sent to environmental officials for taxonomic verification. This creates a 'mandatory hold and refer' procedure that closes the enforcement gap. For Thailand, where customs officers currently lack both the authority and the expertise to screen for invasiveness, a similar provision, requiring customs to hold shipments of novel species pending ecological assessment, would be transformative.

3.3 Deficiency three: exclusion of biological invasion from the definition of 'pollution'

The third structural deficiency concerns civil remedies for IAS damages. Thailand's Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) is the main environmental liability framework (Cherkaoui, 2025). The Act addresses water pollution, air pollution, waste management, noise, vibration, and governs the EIA system.

Sections 96 and 97 codify the Polluter Pays Principle as strict liability: a person who causes pollution is liable without requiring the plaintiff to prove fault or intent. Strict liability shifts the burden from the victim to the polluter, who is better positioned to prevent harm.

However, strict liability applies only to 'pollution' as defined in Section 4. Section 4 defines pollution as waste, hazardous substances, chemicals, radiation, energy, or noise.

The definition does not include living organisms, biological pollution, or invasive alien species. It was drafted in the early 1990s with industrial pollution in mind, not biosecurity.

The consequence is severe. When a Thai farmer suffers losses because Blackchin Tilapia have destroyed their shrimp ponds, they cannot sue under strict liability. Biological damage is not "pollution" under the Act. The farmer must sue under the general tort provisions of the Civil and Commercial Code.

To establish a tort claim, the plaintiff must prove three elements: (1) the defendant committed a wrongful act; (2) the plaintiff suffered damages; and (3) a causal connection between the act and the damages. The affected farmer bears all three burdens. To prove causation, the farmer would need to trace a specific invasive fish back to a specific importer's escape event, years earlier, across multiple jurisdictions. This is forensic evidence that individual farmers cannot reasonably produce. Section 433 of the Civil and Commercial Code, which addresses animal liability, was designed for domestic animals—dogs, cattle, horses—not for self-reproducing invasive populations.

The Blackchin Tilapia outbreak has caused documented damages in the hundreds of millions of baht, yet no affected farmer has recovered compensation from any importer (Cowan, 2025; Janpakdee, 2024). The law provides a right without a remedy. This is not a minor procedural inconvenience but a fundamental failure of environmental justice.

3.3.1 Comparative analysis: Japan's corporate liability and environmental bonds

Japan's Invasive Alien Species Act (2004) addresses the liability gap through two mechanisms. First, the Act imposes criminal and administrative fines on violators. Article 36 imposes fines of up to 100 million yen (approximately $627,000 USD) on corporations that deliberately release invasive species. This penalty level creates an effective deterrent.

Second, Japan requires environmental security bonds for high-risk imports. An importer seeking to bring in a potentially invasive species must post a bond sufficient to cover containment, eradication, and remediation costs in the event of an escape (Takahashi, 2006). If no escape occurs, the bond is returned. If an escape does occur, the government can immediately draw on the bond for emergency response, without waiting for a court judgment. This mechanism forces importers to internalize the external costs associated with biosecurity risks.

For Thailand, amending the definition of 'pollution' to include biological invasions would unlock the strict liability provisions of the 1992 Act. Adding a requirement for environmental bonds for high-risk imports would provide both deterrence and a rapid response funding mechanism.

3.4 Case study confirmation: the Blackchin Tilapia crisis

The Blackchin Tilapia (*Sarotherodon melanotheron*) outbreak confirms all three structural deficiencies identified in this study. The species was imported from Ghana in 2010 for research purposes. At the time of import, it was not listed on any prohibited list because no formal risk assessment had been conducted. The import permit was approved by an internal Department of Fisheries committee—the Institutional Biosafety Committee (IBC)—operating under administrative guidelines rather than statutory authority. The permit included containment conditions, but they were not effectively monitored or enforced.

Shortly after these events, the species escaped or was released. The precise pathway remains disputed. The company that imported the fish maintains that no escape occurred, while affected farmers and parliamentary investigators have raised doubts. What is not disputed is that the species rapidly established itself in natural water bodies. The first outbreak was detected in Samut Songkhram province around 2012, and by 2016, a more widespread invasion was observed.

By the time the government formally added the Blackchin Tilapia to the prohibited list under Section 65 of the Fisheries Ordinance in March 2018 ("Ban announced," 2018), the species was already widespread across multiple provinces. Eradication was no longer feasible. The fragmentation of authority among Fisheries, Customs, and Livestock agencies meant that no single agency had both the legal mandate and the operational capacity to prevent the initial import or respond effectively to the early stages of escape.

Affected farmers have been unable to recover damages. In September 2024, a class action lawsuit was filed against the importing company, seeking 2.5 billion baht in compensation. The court accepted the class action in March 2025. However, the Environmental Quality Act's strict liability provisions do not apply because biological invasion is not "pollution" under Section 4. Tort claims under the Civil and Commercial

Code require proof of causation that individual farmers cannot reasonably provide. The government has allocated 450 million baht for remediation (2024-2027). This is public money that could have been saved had a preventive legal framework been in place.

4 DISCUSSION

This study examined three structural deficiencies in Thailand's legal framework for managing aquatic IAS. These included the reactive prohibited list system, fragmented institutional authority, and the exclusion of biological invasions from the statutory definition of 'pollution.' Each deficiency was analyzed through a comparative lens using Japan's Invasive Alien Species Act (2004) as a comparative model. The findings have several implications for Thai law reform and for other jurisdictions.

First, the prohibited list system represents a fundamental mismatch between legal design and ecological reality, as it assumes regulators can identify and prohibit dangerous species *before* they cause harm. However, in the real world, gathering evidence, conducting rulemaking, and issuing prohibitions can take years, during which time the IAS may already have established itself. This is not a failure of implementation, but instead a failure of the underlying legal logic. The Japanese UAS system offers a coherent alternative: shift the default presumption to prohibition, require pre-import risk assessment for all novel species, and place the burden of proving safety on the importer. This approach aligns with the Precautionary Principle and has proven workable in practice (Mito & Uesugi, 2004).

Second, fragmented authority is not merely an administrative inconvenience but a substantive legal gap. When no single agency has both the mandate and the capacity to screen for invasiveness, the legal system as a whole fails to regulate a critical risk. Thailand's current allocation of authority reflects historical institutional boundaries rather than any rational biosecurity policy. The Japanese model of centralized coordination—with a lead agency, formal inter-ministerial mechanisms, and mandatory referral procedures at the border—provides a template for reform.

Third, excluding biological invasions from the definition of ‘pollution’ is a drafting oversight with severe consequences. Strict liability is a cornerstone of modern environmental law, but it applies only to the categories of harm enumerated in the statute.

By failing to anticipate biological pollution, the drafters of the 1992 Act left a gap that courts cannot fill through interpretation. Legislative amendment is required. Japan's use of corporate fines and environmental bonds demonstrates that effective liability mechanisms for IAS are both feasible and economically rational.

The Blackchin Tilapia outbreak is not an isolated incident. It is the latest in a series of IAS crises in Thailand, including the golden apple snail (*Pomacea canaliculata*) in the 1980s and the suckermouth catfish (*Hypostomus plecostomus*) in the 2000s. Without structural legal reform, future outbreaks are inevitable. The draft Biodiversity Act, which has been under consideration since at least 2023 (Mungkarndee & Nantananate, 2023), represents an opportunity to address these deficiencies. As of 2026, the Act has been approved at the committee level and is currently under review by a subcommittee ("The National Biodiversity Fund," 2025). However, there is no indication that it has been submitted to or is pending before parliament. Urgent legislative action is required.

5 CONCLUSION

This research concludes that Thailand's recurring crises with invasive alien aquatic species—most recently and devastatingly the Blackchin Tilapia outbreak—are not inevitable natural accidents. They are direct, predictable, and preventable consequences of an outdated, fragmented, and structurally deficient legal framework. Three specific deficiencies have been identified and analyzed.

First, the prohibited list system embedded in the Royal Ordinance on Fisheries B.E. 2558 (2015) permits the importation of any species not yet formally prohibited. This directly contradicts the Precautionary Principle and ensures that legal prohibitions always arrive too late, after ecological damage has already occurred.

Second, the fragmentation of authority among the Department of Fisheries, the Department of Customs, and the Department of Livestock Development creates enforcement gaps that invasive species can exploit. No single agency has both the legal authority and the technical expertise to screen for ecological invasiveness as an independent criterion at the border.

Third, the restrictive definition of "pollution" in Section 4 of the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) does not cover

biological invasions, making strict liability inapplicable to damage caused by IAS. The only option left for the affected farmers would be to rely on tort claims under the Civil and Commercial Code, which imposes an unattainable burden of proof on causation.

Japanese Invasive Alien Species Act (2004) is proof that a different paradigm—one that is proactive, precautionary, and preventive—is possible. Its UAS permitted list system, its border control procedures, its corporate liability scheme, and its environmental bond concept all provide a blueprint for Thai legislation that can effectively address biological invasions. Without a paradigm shift towards prevention, Thailand will continue to be at risk of future invasions that may be more severe than the current ones.

6 RECOMMENDATIONS

Based on the findings of this research, the following four concrete, actionable recommendations are directed to Thailand's legislature (the National Assembly) and the relevant executive ministries (the Ministry of Agriculture and Cooperatives, the Ministry of Natural Resources and Environment, and the Ministry of Finance).

6.1 Enact a dedicated IAS master law or amend the fisheries ordinance to establish a UAS/Whitelist (permitted list) system

Instead of the reactive approach, which involves the prohibited list, there should be a proactive approach known as the UAS or whitelist system. The law should provide that any new alien aquatic species that does not fall into the approved list is automatically prohibited. The competent authority, consisting of the Department of Fisheries working hand-in-hand with the scientific advisory board, will have a maximum period of nine months within which to undertake a scientific ecological risk assessment. It is the responsibility of the importer to produce evidence of safety, and only after such a determination can the alien aquatic species be listed and imported.

6.2 Reverse the burden of proof in civil environmental litigation for IAS damages

Either the Civil Procedure Code or an environmental law should be modified to create a presumption in favor of the victims. In particular, where it can be proven that an invasion by a non-native species occurred within a specific geographical distance (such as 10 kilometers) from the site that had imported or raised such species, then the onus will fall upon the operator of such site to prove that his/her facility was not the origin of the released species.

6.3 Amend section 4 of the environmental quality act to redefine ‘pollution’ to include biological invasions

The National Assembly must revise the wording in Section 4 of the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) so that "pollution includes invasive alien species or other living things which adversely affect the environment, economy, or biodiversity." With this one provision in place, Section 96 and 97 will enable both the government and victims to sue for damages and remediation expenses without being required to prove fault or cause under traditional tort law.

6.4 Mandate environmental security bonds for high-risk import activities

The Department of Fisheries must promulgate legislation that mandates any entity applying for authorization to import a novel or invasive aquatic organism to provide an obligatory environmental security bond. The value of such a bond must be determined by conducting an official risk assessment that will sufficiently cover the cost of containing, eliminating, and restoring the ecosystem in the case of escape. In the absence of escape during a specified time frame, such as five years, the bond money will be refunded to the importer. Should there be any escape, the authorities may utilize the bond money as an emergency fund before the completion of any legal process.

These four recommendations, taken together, would constitute a comprehensive legal reform package that shifts Thailand from a reactive, fragmented, prohibited-list-

based framework to a proactive, integrated, precautionary biosecurity governance model. Such a shift is urgently needed to prevent the next invasive species crisis.

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