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LEGAL REGULATION OF INVASIVE ALIEN SPECIES WITH REGARDS TO CLIMATE CHANGE IN UKRAINE

The present paper is devoted to the problems of legal regulation of protecting biological diversity from the harmful effects of invasive alien species (hereinafter, IAS) with regards to climate change. Taking into consideration the fact that one of the main principles of environmental protection is the preservation of spatial and species diversity, legal understanding of the interconnectedness between climate change and harmful biological influences, is of great scientific and practical significance.

Notably, the protection of the environment from the adverse effects of IAS and climate change is interconnected with the conservation and sustainable use of biological resources, as stated by the provisions of the Convention on Biological Diversity (Rio de Janeiro, 1992) and its protocols and decisions. Thus, one should acknowledge that climate change and invasive alien species are not only two of the key threats to biodiversity, but are directly interrelated and can act synergistically, presenting additional pressure for conservation and sustainability.

Meanwhile, current legal regulation of both, climate change and IAS is relatively new to Ukrainian legislation, mostly done by means of international legal instruments. The existing national legal acts are

generally of a strategic nature and address these issues separately with few legal provisions mentioning their interconnection.

The paper substantiates the need to acknowledge and legally define the interrelation between climate change and invasive alien species. Thus, the development of appropriate regulatory framework for prevention and control of IAS should be carried out with consideration of climate change issues. In turn, national environmental legislation, in particular national framework law 'On Environmental Protection' as well climate change policy and laws should be complemented by provisions incorporating IAS management as a tool for reducing pressure on ecological services and enhancing ecosystem resilience.

Keywords: climate change; invasive alien species; biological diversity; environmental legislation.

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Правове регулювання інвазійних чужорідних видів в контексті зміни клімату в Україні

Стаття присвячена проблемам правового регулювання охорони біорізноманіття від шкідливого біологічного впливу інвазійних чужорідних видів (далі – ІЧВ) з огляду на зміни клімату. Враховуючи те, що одним із головних принципів охорони навколишнього середовища є збереження просторового та видового різноманіття, правове розуміння взаємозв'язку зміни клімату та шкідливих біологічних впливів має велике наукове та практичне значення.

Примітно, що захист навколишнього середовища від несприятливого впливу ІЧВ та зміни клімату взаємопов'язаний із збереженням та сталим використанням біологічних ресурсів, як зазначено в положеннях Конвенції про біологічне різноманіття (Ріо-де-Жанейро, 1992 р.) та її протоколах та рішеннях. Таким чином, слід визнати, що зміна клімату та інвазійні чужорідні види є не лише двома ключовими загрозами для біорізноманіття, вони безпосередньо взаємопов'язані та можуть діяти синергетично, створюючи додатковий тиск на збереження та стійкість екосистем.

Водночас нинішнє правове регулювання як зміни клімату, так і інвазії чужорідних видів є відносно новим для українського законодавства та здебільшого здійснюється за допомогою міжнародно-правових інструментів. Існуючі національні нормативно-правові акти, як правило, мають стратегічний характер і регулюють ці питання окремо, з нечисленними правовими положеннями, які розглядають їх взаємозв'язок.

Обґрунтовано необхідність визнання та юридичного визначення взаємозв'язку між зміною клімату та інвазійними чужорідними видами, які набувають характер біологічного забруднення. Таким чином, розроблення відповідної нормативної бази для запобігання та контролю інвазійних чужорідних видів має здійснюватися з огляду на зміни клімату. У свою чергу екологічне законодавство, зокрема Закон України «Про охорону навколишнього природного середовища», а також національна політику та закону в галузі зміни клімату слід доповнити положеннями, що включають управління ІЧВ як інструмент для зниження навантаження на екологічні послуги та підвищення стійкості екосистем.

Ключові слова: зміна клімату; інвазійні чужорідні види; біологічне різноманіття; екологічне законодавство.

Problem statement. According to the Millennium ecosystem assessment [1], which points out that 60% of the natural ecosystems of our planet are already degraded, climate change and IAS are two of the main causes of ecosystem degradation and biodiversity loss.

Climate change by itself is one of the most urgent, complex and pressing issues of the present. The factors contributing to it are complex, as well as the consequences, due to the fact that as climate change impacts all the spheres of social, economic and political life. However, first and foremost climate change impacts the environment, threatening the fragile ecosystems and biodiversity, drastically speeding the existing environmental issues, one of which is biological invasions. The harmful effects of IAS on the environment are now considered one of the main threats to biodiversity and the environment as a whole. Combined with climate change, it poses ecological challenges and demands efficient policy responses and elaborate legal regulation.

Currently, there is no developed national legislation on preventing and controlling the spread of IAS in Ukraine. As a result, only some aspects are regulated by the norms of international legal documents. Climate change issues also have no solid legal national framework, being predominantly addressed by the provisions of strategic policy documents. The existing national legal acts mainly address the issues of IAS and climate change separately with few legal provisions mentioning their interconnection.

Thus, one should acknowledge and legally define that climate change and invasive alien species are not only two of the key threats to biodiversity, but are directly interrelated and when in the compound can act synergistically and present additional hurdles for conservation and sustainability.

Recent research and publications analysis. The Convention on Biological Diversity (Rio de Janeiro, 1992) and documents adopted on its implementation are the main sources of legal regulation of protection of biological diversity from invasion of alien species. It has been scientifically substantiated that climate change has direct and second order impacts that facilitate the introduction, establishment and/or spread of IAS. Additionally, IAS can increase the vulnerability of ecosystems to other climate-related stressors and also reduce their potential to sequester greenhouse gasses [2].

Although the interrelation of IAS and climate change has been evidenced by multiple works in the field of natural sciences [2–11], none of the legal acts (including the current Ukrainian environmental legislation) provides the regulation of IAS with regards to climate change. Meanwhile, some aspects of the legal regulation of IAS have been researched [12–16]. The legal regulation of climate change in Ukraine has also been the subject of separate legal research [17–21]. However, there have been no scientific works devoted to the interrelation of IAS and climate change in Ukraine from a legislative perspective.

Statement of the article objective. The article is aimed at studying the national legal regulation of IAS, substantiating the need to develop specific legislation on IAS with regards to climate change that would consider the interconnection between these two issues and, thus, effectively ensure the protection of biodiversity in Ukraine.

Presentation of the main material. Increasing pace of globalization, fragmentation and degradation of habitats, construction of overpasses, as well as climate change are

identified as key causes of biodiversity loss, which may increase the rate of invasive alien species (IAS) into new areas outside their natural habitats and increase their invasive properties. IAS can be defined as a non-native plant, animal or other organism that dominates the new ecosystem and impairs its function and structure, displacing or damaging native fauna and flora and posing threats to local biodiversity, which results in environmental, economic or public health effects [22].

Noteworthy, a significant part of alien species exhibits invasive properties, and the phenomenon of their mass development is often characterized as biological pollution. This means that climate change is one of the reasons for the spread of invasive alien species that can take the form of biological pollution. Scientists call this process “indirect (or diffuse) input”, which means changes in distribution and thus movement to higher latitudes of species through man-induced global climate change [23]. Understanding and recognition of the seemingly non-obvious link between IAS and climate change can play a huge role in development of effective legal regulation for ensuring biodiversity protection as well as biological security.

Thus, the change in species’ habitats due to the altered conditions under the climate change cause the rapid emergence and settlement of invasive species, including many dangerous weeds, allergens, poisonous, etc. Notably, invasive species are usually more resilient and gradually completely replace the local ones. For the territory of Ukraine, striking examples are ragweed and borscht, which today are found throughout the country and pose a significant threat to public health. Thus, the growth of summer extreme temperatures threatens the extinction of certain species and the emergence of new (including invasive) species, which will affect the species composition and reduction of forest areas [24].

It should be clarified that there are three types of biota responses to climate change: migration, adaptation, and extinction. Migration under normal conditions is an ecologically balanced process, but due to the increasing rate of change in the environment and the presence of anthropogenic barriers (ecological holes), the balance is disturbed. Invasive species displace aborigines and occupy their more economical ones, breaking coevolutionary ties. Accordingly, the most common migrants are not the species that are preferable for the environment. Meanwhile, adaptation is a long evolutionary process, and today’s climate is changing faster than evolutionary possibilities. This causes the vulnerability of species with a long development cycle (perennials) and their replacement by annual weeds in particular. Globally, this leads to a reduction in energy reserves in ecosystem biomass and, ultimately, to a disruption of the energy pyramid. For the conditions of Ukraine with its anomalous plowing of territories (56%) the risk of settlement of unproductive annuals is very high [24].

According to the study of Buksha et al. (2017), the increase in summer extreme temperatures threatens, among others, the emergence of new (including IAS) species, which will affect the species composition and reduction of forest areas in Ukraine [25]. The 2020 Analytical Report of National Institute for Strategic Studies “Climate change: consequences and adaptation measures’ states that rising winter

temperatures are causing the expansion in the range of certain pests, among which are IAS, that can pose a significant threat to plants [24].

The negative impact of climate change and IAS on the forest areas in Ukraine is not a matter of future, but the present. This is evidenced by the fact that the main current problems of deciduous forests of Ukraine is the mass drying of ash, which is predominantly caused by the fungus *Chalara* (*Chalara fraxinea*), an invasive species from East Asia that has virtually destroyed gums throughout Europe [26]. According to the press report of the State Forest Resources Agency of Ukraine, the area of drying forests due to pests and diseases increased by 50% compared to the annual figure for 2010 and is 302 thousand hectares [27].

The scale of the problem of invasive alien species' impact on the environment is beyond doubt, being acknowledged and addressed by the international community in several international acts and regulations. Meanwhile, the national legislation of Ukraine in this sphere is quite scarce, limited to some provisions of Law on "Fundamental Principles (Strategy) of the State Environmental Policy of Ukraine for the Period up to 2030", that has more of a strategic nature than a regulatory mechanism.

One can suggest that according to Art. 9 of the Constitution of Ukraine international agreements, the binding nature of which has been approved by the Verkhovna Rada of Ukraine, are part of the national legislation of Ukraine. Consequently, there is no need in development and adoption of the national legal framework, as the provisions of international acts in the sphere of control and prevention of the spread of IAS and their negative impact on ecosystems can be directly applied and ensure effective environmental protection from their negative impact on the environment in Ukraine. However, international law scholars substantiate that it is the domestic law, which shall embody the normative guidelines of international law in the national legal space as international law solely could not be able to carry out its regulatory function without the existence of domestic law [28].

Further, it is suggested to consider and review the international legal ways of managing invasive alien species. Among international legal acts, which contain provisions on measures or stipulate the necessity of implementation of measures to prevent the spread of IAS and their negative impact on ecosystems, habitats, biodiversity and the environment in general, the following should be mentioned: the Convention on Biological Diversity (Rio de Janeiro, 1992), its protocols and decisions, among which the Cartagena Protocol on Biosafety (Montreal, 2000); The Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979); the International Plant Protection Convention (new revised text approved by the FAO Conference, (1997); Resolution 13.10 (Rev. COP 14) in the framework of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973); resolutions VII.14 and VIII.18, related to invasive species and wetlands, adopted under the Convention on Wetlands of International Importance especially as Waterfowl Habitat; United Nations

Convention on the Law of the Sea (1982); The Framework Convention on the Protection and Sustainable Development of the Carpathians (2003), its protocols on conservation and sustainable use of biological and landscape diversity (2008), on sustainable tourism (2011) and many other documents, which mention measures on combating IAS. A special place is occupied by specialized international programs and strategies: Global Invasive Species Programme, (1999); A Global Strategy on Invasive Alien Species, (2001); European Strategy on Invasive Alien Species, (2002).

However, it is noteworthy that protecting the environment from the harmful biological effects of the invasion of alien species is closely connected (even dependent to a certain extent) on the conservation and sustainable use of biological resources. The principal document in this sphere is the Convention on Biological Diversity) (Rio de Janeiro, 1992) (hereinafter – the Convention, as well as its protocols and decisions, which enshrine several provisions, based on which the outlined issues are regulated. Thus, Article 8 (h) of the Convention stipulates that one of the conditions of *in-situ* conservation (preservation of ecosystems and natural habitats, as well as maintenance and restoration of viable populations of species in their natural environment, and in the case acclimatized or cultivated species – in the environment in which they have acquired their characteristic features) is that each Contracting Party shall, to the extent possible and appropriate, prevent, control or destroy the introduction of alien species which threaten ecosystems, habitats or species [29].

As it has been mentioned above, several documents concerning the control of IAS have been adopted in furtherance of the provisions of the Convention. This includes decision VI/23, “Alien species that threaten ecosystems, habitats or species”, adopted by the 6th Conference of the Parties in 2002 [30]. The Annex to this Decision developed “Guidelines for the Prevention and Mitigation of Invasions of Alien Species Threatening Ecosystems, Habitats, or Species”. According to these documents, the term “invasive alien species” is determined as an alien species whose introduction and/or spread threatens biodiversity. In addition, this document stresses the importance of adopting and implementing national and regional strategies and action plans to combat IAS. In particular, recommendations are made to all governments and organizations to develop effective strategies to minimize the spread and impact of invasive alien species. And urges parties, governments and relevant organizations, at the appropriate level, with the support of relevant international organizations to promote and carry out, as appropriate, research and assessments on the characteristics of invasive species and the vulnerability of ecosystems and habitats to invasion by alien species, and the impact of climate change on these parameters (as distinct from the direct effects of climate change on species distribution).

Decision XI/28 on “Invasive Alien Species” adopted at the 11th meeting of the Conference of the Parties in 2012 [31], which can be seen as a continuation of previous acts, stresses the importance of developing, integrating and strengthening national strategies to combat IAS as part of their national policies.

The provisions of all of the above documents confirm that the international community has recognized the importance and urgency of this problem and the need for its rapid solution, which, definitely, must be reflected in the national environmental policy. Therefore, a positive step in this direction is the adoption of the Law of Ukraine “Fundamental Principles (Strategy) of the State Environmental Policy of Ukraine for the Period up to 2030” [32]. The Strategy states, in particular, that the proliferation of non-native species in natural ecosystems causes a significant imbalance in biocoenosis. Moreover, according to Goal 3 of the Strategy, the need to ensure the integration of environmental policy in decision-making on the socio-economic development of Ukraine, including the control and prevention of biological pollution is recognized. Goal 4 lists the prevention of the spread of invasive species and control the occurrence and spread of such species in natural ecosystems, including marine ones.

In addition, in 2019 the Draft of the Order of the Cabinet of Ministers of Ukraine “On Approval of National Strategy for Management of Invasive Alien Species of Flora and Fauna till 2030” was developed [33]. The aim of this issue-specific Strategy is to improve the state environmental policy in order to prevent the penetration of invasive alien species into natural ecosystems and control these processes, reduce and mitigate (minimize) the adverse impact of such species on natural ecosystems, economic activities and human health.

Notably, the preamble of the Strategy identifies climate change among the other factors that increase the rate of invasion of alien species into new areas outside their natural habitats and increase their invasive properties. However, this is the only provision related to climate change issues.

Undoubtedly, the adoption of the above-mentioned Strategy is of great importance for the formation of a proper legal mechanism in the Ukrainian legislation to regulate the spread of IAS of flora and fauna. However, the current pace of adoption is unreasonably insufficient as in May of 2019 the document was submitted for public discussion and so far the Strategy has remained as a draft.

Additionally, the Strategy should be complemented by several climate change related provisions that would establish the priority of measures to prevent IAS introduction taking into consideration the perspectives of changing climate.

In particular, Objective 2 of the Strategy ‘Improving public policy, regulatory framework and institutional capacity to prevent the intrusion, destruction, control of the introduction of such species into natural ecosystems and to mitigate (minimize) the adverse effects of IAS’ should specify climate change among other spheres where the regulatory framework shall introduce the coordinated activities for the management of executive authorities at all levels (Task 2).

Task 3 of Objective 2 implies the approval of methods for preventing introduction and control of the spread of IAS, their destruction, minimization of negative impact and mitigation of invasion’s consequences in natural and anthropogenic ecosystems as well as inclusion of such methods in regulations and methodical recommendations. Currently, two particular spheres of this inclusion are outlined: environmental impact

assessment and strategic environmental assessment. Following the climate change agenda, it would be feasible to add climate change as the third one.

Furthermore, it is reasonable to supplement the Strategy with specific provisions that should consider risk assessments of IAS with incorporation of climate change. In particular, by identifying those alien species that can have a potential threat in the future under the conditions of climate change.

It should be pointed out that in September 2021 the Cabinet of Ministers of Ukraine approved the draft Decree of the President of Ukraine “On the decision of the National Security and Defense Council of Ukraine ‘On the Strategy of Biosafety and Biological Protection’”. This decision is extremely important for a comprehensive regulation of biosafety and biological protection. In particular, solving the problem of uncontrolled spread of invasive alien species of flora and fauna that pose a threat and cause damage to the environment and other areas of economic activity. The document aims not only to create an effective national system of biological safety and biological protection of the population and the environment, but also to create a system of early response to invasive alien species of flora and fauna and rapid response to the spread of dangerous diseases [34].

Thus, it can be stated that the government is aimed at developing and adopting a National Strategy for the management of invasive alien species of flora and fauna, but additionally considers the possible negative impact of IAS in the context of biosafety. The next promising step is to take into account climate change at the legislative level as a possible cause of the problem of uncontrolled spread of IAS.

Meanwhile, climate change regulatory provisions in Ukraine are mainly based on the provisions of strategic documents, which are the Strategy of the State Environmental Policy of Ukraine for the period up to 2030 [32] and the Concept on State Climate Policy Implementation till 2030 [35].

According to the Law of Ukraine ‘On Basic Principles (Strategy) of State Environmental Policy of Ukraine until 2030’, one of the main principles of state environmental policy is the preservation of the climate system, which does not increase risks to human health and well-being and the environment. First of all, this Law is aimed at strengthening the response to the effects of climate change in the context of ensuring adequate air quality, in particular by reducing greenhouse gas emissions. However, the consequences of climate change affect many aspects of the environment, including the cause and uncontrolled spread of IAS. The Strategy does not point out the link between these two issues, addressing them separately, according to two different strategic aims. Aim 3 ‘Ensuring the integration of environmental policy in the decision-making process for socio-economic development of Ukraine’ covers climate change prevention and adaptation; Aim 4 ‘Reduction of environmental risks in order to minimize their impact on ecosystems, socio-economic development and public health’ presupposes prevention of the spread of invasive species and control of the emergence and spread of such species in natural ecosystems, including marine ones.

The Concept on State Climate Policy Implementation till 2030 states the defines the grounds to develop legislation, strategies and action plans for various areas of state policy to improve state policy on climate change in order to achieve sustainable development, create legal and institutional preconditions for a gradual transition to low-carbon development in terms of economic, energy and environmental security and improve the welfare of citizens.

Notably, the Concept on State Climate Policy Implementation states the need of preventing the spread of invasive species and controlling the occurrence and spread of such species in natural ecosystems, including marine ecosystems as one of the tasks of Objective 4 on 'Reducing environmental risks in order to minimize their impact on ecosystems, socio-economic development and public health'. This is by far the only document that recognizes the link between climate change and IAS on legislative level.

Obviously, current legal recognition of the interrelation of climate change is not sufficient for ensuring the effective protection of ecosystems and biodiversity from negative impacts of both. Consequently, it should be legislatively stated, in particular, in Law of Ukraine 'On Basic Principles (Strategy) of State Environmental Policy of Ukraine until 2030' [32], as well as in national framework law in the sphere of environmental protection 'On Environmental Protection' [36], and other special Ukrainian laws and regulations that the management of invasive species is a tool for ecosystem-based adaptation under climate change.

Conclusions. Climate change and IAS are recognized as two main threats to biodiversity. It is evidenced that IAS are the second most significant cause responsible for negative impacts on environment, economy, human health and sustainable development. Meanwhile, climate change, in addition to multiple negative consequences for the environment, is predicted to increase introduction and spread of IAS due to their high adaptability. Thus, it is obvious that climate change and IAS when combined drastically increase their adverse effects on biodiversity, which should be first and foremost addressed by the means of appropriate legal regulation.

Having studied the current national legal regulation of invasive species and climate change, it has been figured out that these two issues are addressed separately with few provisions stating their interconnection. Thus, the legal recognition of IAS and climate change interrelation as well in their integration in national legislation is required. First and foremost, it should be legislatively stated that the management of invasive species is a tool for ecosystem-based adaptation under climate change by incorporating the provisions on IAS management into the national framework law 'On Environmental protection' as well climate change policy and laws. Secondly, the development of national legislation on IAS should establish the priority of measures to prevent IAS introduction taking into consideration the perspectives of changing climate.

In particular, interrelation between climate change and IAS should be taken into account when developing an appropriate mechanism for legal regulation of the spread and number of IAS due to global anthropogenic climate change in the draft National

Strategy for Invasive Alien Flora and Fauna in Ukraine and the Law of Ukraine “On Basic Principles (Strategy) of State Environmental Policy of Ukraine until 2030”, as well as in action plans for implementation of these strategic documents, which, despite the multidisciplinary nature of these issues, will ensure the implementation of appropriate legal regulation in this area.

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Правовое регулирование инвазивных чужеродных видов в контексте изменения климата в Украине

Настоящая статья посвящена проблемам правового регулирования защиты биологического разнообразия от вредного воздействия инвазивных чужеродных видов (ИЧВ) в связи с изменением климата. Принимая во внимание тот факт, что одним из основных принципов защиты окружающей среды является сохранение пространственного и видового разнообразия, правовое понимание взаимосвязи между изменением климата и вредными биологическими воздействиями имеет большое научное и практическое значение.

Примечательно, что защита окружающей среды от неблагоприятных воздействий ИЧВ и изменения климата взаимосвязана с сохранением и устойчивым использованием биологических ресурсов, как указано в положениях Конвенции о биологическом разнообразии (Рио-де-Жанейро, 1992 г.) и протоколов к ней, а также решения. Таким образом, следует признать, что изменение климата и инвазивные чужеродные виды являются не только двумя ключевыми угрозами биоразнообразию, но и напрямую взаимосвязаны и могут действовать синергетически, оказывая дополнительное давление на сохранение и устойчивость.

Между тем, текущее правовое регулирование как изменения климата, так и ИЧВ является относительно новым для украинского законодательства, в основном это делается с помощью международно-правовых инструментов. Существующие национальные правовые акты, как правило, носят стратегический характер и решают эти вопросы по отдельности, с несколькими положениями законодательства, указывающими на их взаимосвязь.

В статье обосновывается необходимость признания и юридического определения взаимосвязи между изменением климата и инвазивными чужеродными видами. Таким образом, разработка соответствующей нормативной базы для предотвращения и контроля инвазивных чужеродных видов должна осуществляться с учетом вопросов изменения климата. В свою очередь, экологическое законодательство, в частности Закон Украины «Об охране окружающей природной среды», а также национальная политика и законы в области изменения климата должны быть дополнены положениями, включающими управление ИЧВ в качестве инструмента для снижения нагрузки на экологические услуги и повышения устойчивости экосистем.

Ключевые слова: изменение климата; инвазивные чужеродные виды; биологическое разнообразие; экологическое законодательство.

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