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LEGAL PROTECTION OF ECOSYSTEMS AT INTERNATIONAL AND NATIONAL LEVEL: CONTEMPORARY TRENDS

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CONCEPTUAL REFERENCES OF RESEARCH

The topicality and importance of the research topic. In the last 50 years, ecosystems have undergone faster changes than in any other comparative period in the official history of mankind. This phenomenon has been caused by the need to meet the exponential demands of food, water, textiles and fuel, which affects the biorhythm of the diversity of life on earth. At the same time, population growth over the last 50 years has highlighted additional pressure from consumer demand on existing resources. This observation has catalyzed an increase in public interest in maintaining the balance *of natural ecosystems* and the development of the environmental protection mechanism. Thus, the national authorities introduce institutional and normative changes in the tangential directions of environmental protection in order to facilitate the proper management of natural resources, being impressive both national and international efforts. As environmental issues go beyond national scope, environmental law has now become an international priority recognized by most states. The need to analyze the subject of legal protection of the environment through the prism of interdisciplinarity consists in the development of the subject on several levels. First of all, environmental protection is increasingly becoming an area of intervention that goes beyond the national perimeter. Secondly, the coherence of the elaboration of legal norms in this field also requires an understanding of the components that, when analyzed separately, are subject to technical evaluation with the help of real sciences. Nature and biodiversity have become increasingly important factors in economic development planning and policy-making at all levels: international and national.

Degree of study of the research topic. The current research studies both the complexity of the interdisciplinary connections for the observance of the coherence of framing the natural reality in the legal norms of environmental protection, and the degree of connection of the norms at several levels of application. Thus, the literature consulted is uniformly distributed on the 3 levels of research: international and national, examining the global context of formulating environmental policies recommended to actors participating in international cooperation, measures recognized by regional communities and the implementation mechanism adopted at national level.

The aim of the research is to carry out a complex and in-depth research on the protection of natural ecosystems, through the prism of the international and national normative framework, with elucidation of shortcomings in the field and elaboration of theoretical arguments and practical recommendations for protection and conservation of natural ecosystems.

The objectives of the research are the following:

1. Scientific examination of the development of the concept of ecosystem and presentation of the ideological evolution of the ecological movement;
2. Identifying the international and national legal context in which the field of environmental protection is anchored;
3. Analysis of the flexibility of the national and international legal framework for regulating forestry, land and aquatic elements as component parts of the natural ecosystem;
4. Studying the flexibility of the regulatory framework in implementing innovative concepts of natural ecosystem management;

5. Research on international cooperation and disputes on the implementation of projects with a direct impact on the environment;

6. Investigating the scientific rationale for climate change reflected in public policy documents as a strategic basis for the development of international environmental law;

7. Assessment of regulatory inconsistencies in the execution of national commitments in the field of environmental protection.

The research hypothesis of the investigation formulated with the presentation of the similarity of legal contexts at different levels is *the presumption that the development of the legal framework for the protection of natural ecosystems is directly contingent on the interdisciplinary cohesion of recommendations at international and national level.*

Thus, the current research consists in reaffirming the need for interdisciplinary consolidation at international and national level. As natural ecosystems are complex concepts that require technical arguments to legally substantiate its protection mechanism, in the verification of the relationships mentioned in the hypothesis, the correspondence is analyzed:

1. Between the social sciences and the real sciences;

2. Between international environmental law and other branches of law;

The evolution of jurisprudence is a complex phenomenon, and the practice of borrowing legal norms from other branches is not a new practice. Over the centuries, the habits of traders have undergone major transformations, changing into transnational laws, then into common domestic law and then generating international treaties in the field of trade, evolving into commercial law as a branch of law. In the face of the consequences of globalization, a number of areas are affected, such as intellectual property, competition policy, the business sector, public health and criminal law.

3. Between different sub-areas of international environmental law for their aggregation in the normative synergy necessary for the systemic approach of protection of ecological processes pursued in nature.

The generality of the hypothesis is ensured by the global coverage of the international and regional legal framework of the regulations of the European Union, which presents differences in the results presented only in the context of the analysis of another domestic regulatory framework. The research approach can be reproduced starting from the national legislation of another state (changing the variable for the national level), but the results obtained in the analysis of the legal regulation of natural ecosystems will present sufficient similarities to validate the scientific character of current research.

Synthesis of the research methodology and justification of the chosen research methods. The main research method approached in current research is theoretical research through the classical method (descriptive method, comparative method, deduction, historical method, causal analysis) through the prism of interdisciplinarity. The metaheuristic research method studies the mechanism of emergence and institutionalization of the need to protect biological biodiversity in its entire habitat, and the progress of ecological movements in their transition to international agreements. The analysis of the specialized literature as well as the investigation of the problem approached in *historical* aspect, allows the investigation of the development process of the ecological movement, the delimitation of the factors that influenced the consolidation of the protection institution of natural ecosystems and the identification of the arguments. the system of national normative acts. The *descriptive* method was also used here,

which also allowed the characterization of the context that facilitated the development of legal concepts on environmental protection, as well as the legal regulations of social movements that formed the basis of the contemporary narrative and the direction of evolution of international environmental law. in the future and the stated action plans to facilitate adaptability to climate change. The *comparative* analysis of the international and national legislative framework in the field of environmental protection highlights the cooperation process as well as the impediments in the implementation of the proposed objectives at all levels.

Summary of the thesis chapters, focusing on the investigations carried out and their need to achieve the purpose and objectives of the research. The doctoral thesis is structured in the following sections: Introduction, Basic Chapters (4), Conclusions and recommendations, Bibliography (324 titles), respectively Annexes (14). The volume of the basic text of the thesis is 162 pages.

The study consists of four chapters that set out through different perspectives the issue of legal protection of natural ecosystems. In the **Introduction** section, the topicality of the research topic and its scientific novelty are indicated. Also here are presented the purpose, objectives, hypotheses, the methodology adopted in the current research as well as a summary of the content of the chapters of the doctoral thesis.

Chapter 1 entitled EVOLUTION AND STRENGTHENING OF THE CONCEPT OF "ECOSYSTEM" presents in the first sub-chapter "*1.4. The development of the concept of ecosystem*" begins with the examination of the wording of the term "ecosystem" and the sub-chapter "*1.2. Literature review in the field of legal protection of natural ecosystems"* presents the main conventions that establish the commitments of states to international actors through the prism of national and international researchers. It also describes the process of developing the concept of ecosystem in the field of legal sciences and responds to the object of historical investigation of the context for the formulation of environmental institutions. Here are the doctrines of the schools of thought that have intensified the ecological movements in the regulation of social relations. Paragraph "*1.3. The normative basis of environmental protection at international and national level"* continues the description of the normative framework and points out the main legal instruments in which the tendency to regulate the protection of natural ecosystems is rooted, as well as the types of ecosystems recognized by the legislator of the Republic of Moldova. At the same time, the points of intersection between environmental law and other branches of law at national level are presented for the subsequent extrapolation of reasoning to other levels.

Chapter 2 and Chapter 3 examine in detail the legal protection of the constituent elements of the ecosystem concept. Thus, Chapter 2 entitled LEGAL REGULATION AT INTERNATIONAL AND NATIONAL LEVEL OF FOREST RESOURCES - COMPONENTS OF NATURAL ECOSYSTEMS presents the international framework for the protection of forest resources in the paragraph "*2.1. International legal protection of forest and land resources*", and the national regulations on measures for the protection of forest elements in the ecosystem, the national framework for forest management and management of plant resources in the perimeter of the Republic of Moldova are analyzed in paragraph "*2.2. Incursions into national regulations on the protection of forest resources in natural ecosystems* " At the same time, in order to achieve the objective of disciplinary integration in the analysis of the current study, an innovative concept was presented which by its essence takes into account the natural dynamics

of complex biological systems such as natural ecosystems - paragraph "*2.3. Protection of natural ecosystems through the prism of the concept of Permaculture*".

Chapter 3 entitled FORMS OF LEGAL PROTECTION OF AQUATIC RESOURCES - COMPONENTS OF NATURAL ECOSYSTEMS examines regulations for the protection of aquatic resources in natural ecosystems. As aquatic resources are a key element in achieving ecological dynamics in natural ecosystems, paragraph "*3.1. The international framework for the protection of aquatic resources*" presented the legal nuances for different categories of aquatic resources, as well as the normative basis for supporting the development of the concept of wetland at the international level. Paragraph "*3.2. National legislation on the management of aquatic resources"* describes the national framework for the management of surface water bodies as well as the quality requirements for them, and the paragraph "*3.3. Case study: the wetland of international importance "Lower Dniester* ", presents the interconnectedness between international provisions and the national mechanism for implementing measures to protect a natural ecosystem through the prism of the Ramsar Convention.

Chapter 4 entitled LEGISLATIVE AND INSTITUTIONAL INCONVENIENCES IN THE MANAGEMENT OF NATURAL RESOURCES AT INTERNATIONAL AND NATIONAL LEVEL exposes through the sub-chapter "*4.1. Positioning of international institutions in regulating environmental relations"* two contemporary issues in the legal interpretation of proposed policies: the legitimacy of catalyzing international influence on the national framework and the collision of environmental protection interests with regulating activities that meet the objective of socio-economic development. Sub-chapter " *4.2. Procedural impediments to cooperation between international and national actors in the field of enforcement of international environmental law*" proposes to examine the Gabcikovo-Nagymaros case and other international disputes over the implementation of projects with a direct impact on the environment. Sub-chapter "*4.3. Particularities in the implementation of innovative solutions for the management of natural ecosystems in the normative framework*" presents three topics that highlight minor gaps in the legal narrative: the types of uncertainty that may arise in the implementation of innovative environmental projects, the institution of environmental impact assessment and inconsistency strategic directions for public policy development. The last topic is analyzed from the operational perspective in the sub-chapter "*4.4. The logistical flexibility of the development of environmental strategies*" and the logistical discrepancy of the national strategies in the field of environmental protection crystallized the proposal to introduce amendments to the regulation for the elaboration of public policy documents.

In the section GENERAL CONCLUSIONS AND RECOMMENDATIONS are systematized the results of the analysis performed in achieving the established objectives, being presented theoretical generalizations that can expand the research perspectives of the scientific problem addressed. Recommendations are also proposed to change the national legal framework, as well as proposals to develop the concept of natural ecosystem in the light of international environmental law.

CONTENT OF THE DOCTORAL THESIS

Chapter 1 „Evolution and consolidation of the concept of ecosystem” confirms the scientific basis of both the evolution of the basic concepts needed to conduct the study and the process of developing the regulatory framework in which they are included.

The term ecosystem was first proposed in 1935 by ecologist Sir Arthur George Tansley and introduced into academia later in 1945 by American ecologist Raymond Lindeman, in order to describe a limited space in which living beings and organisms interact with inanimate matter. a high level of interdependence to form an environmental unit[1]. Etymologically, the word ecosystem derives from the root *system* coupled with the prefix equivalent to the Greek word *oikos* – „house”. Tansley took a reductionist approach, based on individual unity of species, observing the pattern of interaction between representatives of individual species as an inevitable phenomenon of flora communication. In his view, the coupling between biological and physical processes was an imperative for the description of *an ecological system*, and it could not exclude the elements of these sciences under the argument of non-tangentiality. On the European continent, the interpretation of the term *ecosystem* often overlaps with discussions about biodiversity conservation, so *biodiversity* and *ecosystem services* develop as two complementary terms.[2] In European Union legislation, the term ecosystem is mainly used in contexts where it is necessary to capitalize the administrative component in regulating environmental law.[3] Initiatives such as the Millennium Ecosystem Assessment, a program promoted by the United Nations (2005), emphasize the interdependence between ecological and social systems, thus recognizing by international entities that healthy social systems require healthy ecosystems, as only a win-win approach to conservation nature can also support the development of human well-being. Therefore, today the term ecosystem as a convention involves several elements and describes a wider range of sciences than in its original version - from "man" as an external promoter of change, to "man" as an inherent component of the holistic interactive environmental system. Although the concept of ecological networks is not new and they have developed over the decades in different regions with tangent of natural resources, over-use of land and environmental pollution processes have accentuated the imperative to recognize nature as an inviolable value with own identity. One of the main factors for the development of ecological networks is the continuous decline of biodiversity in Europe, the quality of natural habitats in the spectrum compared to a century ago, and the increasing fragmentation of management of available resources. Awareness of the fragmentation of natural parks and the uncoordinated distribution of ecological areas has boosted the consolidation of their protection interests by ensuring socio-legal institutionalization. According to the legislation of the Republic of Moldova, the law on the fund of natural areas protected by the state, no. 1538 of 25.02.1998, the ecosystem is defined as follows: *Ecosystem - dynamic complex of*

[1] WILLIS, A. J. *The ecosystem: an evolving concept viewed historically.* Functional Ecology by British Ecological Society, vol.11(2), p.268-271, 1997.

[2] BERKES, F., COLDING, J., FOLKE, C. *Rediscovery of Traditional Ecological Knowledge as Adaptive Management.* Ecological Applications, *10*(5), 1251–1262, 2000.

[3] BROWER, R., BRANDER, L., KUIK, O., PAPYRAKIS, E., BATEMAN, I. *A synthesis of approaches to assess and value ecosystem services in the EU in the context of TEEB.* VU University Amsterdam, 2013.

associations of plants, animals, fungi and microorganisms, as well as all abiotic environmental factors, whose interaction is an integrated functional unit.[4]

Research on the subject of environmental protection has gained increasing interest in recent decades, and this is due to awareness of the importance of natural resources in human life and the need to fit the regulatory framework of *ecology* as a component of social life without clear limitations in the domestic regime.

International environmental law has been analyzed by both *national* and *international*[5] specialists - either with an emphasis on the global nature of environmental objectives[6], or by examining the state of implementation of environmental measures at regional level[7]. At the same time, the complexity of the issue, often required a focus not only on the scope of regulation of environmental law, but also a sectioning of the analysis by sub-domain of environmental law or the category of natural resources: aquatic resources[8], forest resources[9], biodiversity[10], energy[11], the interdependence between carbon emissions and climate, etc.

It should be noted that, although the literature is rich in the analysis of environmental protection rules by category, few examine the concept of *ecosystem*.

In the Republic of Moldova researchers such as Zamfir N.[12], Ceban C.[13], Trombiţki I.[14], Zamfir P.[15], Iordanov R.[16], Rotaru A.[17], Chirtoacă N.[18], Suceveanu N. and others, approach this

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[4] Law on the fund of natural areas protected by the state: no. 1538 of February 25, 1998. In: Official Journal of the Republic of Moldova, 1998, no. 66-68, art. 442.

[5] BODANSKY, D., BRUNEE, J., HEY, J. International environmental law. In: *The Oxford Handbook of International Environmental Law* [online]. Oxford Printing Press, Chapter 2, 2007.

[6] YANG, T., PERCIVAL, R. V. *The emergence of global environmental law.* Santa Clara University School of Law, Ecology L.Q. 36-615, 2009.

[7] BENNETT, G. *Guidelines on the application of existing international instruments in developing the Pan-European Ecological Network.* Nature and Environment, Council of Europe Publishing, no. 124, 2002. ISBN 92-871-4935-6.

[8] ZAMFIR, N. *Problems in guaranteeing the right to safe water–the case of irrigation in agriculture using groundwater*. In: EU Integration and Management of the Dniester River Basin. p. 90-94. 2020.

[9] BOTNARI, F., MIRON, A., GALUPA, D., PLATON, I., ROTARU, P., TALMACI, I., LOZAN, A., GRUBII, G., BALAN, M., ȘPITOC, L. *Raport privind starea sectorului forestier din Republica Moldova perioada 2006-2010.* Agenția Moldsilva, Chișinău, 2011. ISBN 978-9975-4298-4-9.

[10] CHANDRA, A. IDRISOVA, A. *Convention on Biological Diversity: a review of national challenges and opportunities for implementation*. Biodiversity and Conservation, 20(14) 3295-3316, 2011.

[11] RASHAD, S. M., HAMMAD, F. H., Nuclear power and the environment: comparative assessment of environmental and health impacts of electricity-generating systems. *Applied Energy*, 65.1(4) 211-229, 2000.

[12] ZAMFIR, N. *Analiza juridică a impactului proiectului de extindere hidroenergetică asupra ecosistemului transfrontalier Nistrean*. In: Integrare prin cercetare și inovare, p. 25-29, 2018.

[13] CEBAN, C., BURIAN, A. *Dezvoltarea economică durabilă şi protecţia mediului înconjurîtor: Probleme globale ale umanităţii.* Revista Moldovenească de Drept Internaţional şi Relaţii Internaţionale, 15-18, 2008.

[14] MELIAN, R., BUJAC, V., LAZAR, T., TROMBIȚKI, I., STRACHE, K. *Ghid, îndrumar metodologic pentru gestionarea bazinelor râurilor mici și mijlocii*, Eco-tiras, Apele Moldovei, Elan Poligraf, Chișinău, 2018. ISBN 978-9975-66-614-5.

[15] ZAMFIR, P. *Dezvoltarea durabilă prin asigurarea securităţii ecologice*. Revista Naţională de Drept, 109, p.10-12 68-70, 2009.

[16] IORDANOV, I. R. *Fundamentarea ştiinţifică şi reglementarea normativă a drepturilor ecologice ale omului în Republica Moldova*. Teză de doctor în drept. Chişinău, 36, 2007.

[17] ROTARU, A. *Probleme ale dezvoltării legislației ecologice a Republicii Moldova la etapa actuală*. Teză de doctor în drept. Chișinău, 2012.

[18] CHIRTOACĂ, N. *Evoluția procesului de legiferare internațională în cadrul uniunii europene: supranaționalitatea în dreptul organizațiilor internaționale*. Revista Moldovenească de Drept Internaţional şi Relaţii Internaţionale, *30*(4), p.25-41, 2013.

subject through the adjustment of the domestic normative framework in the direction of satisfying the international objectives regarding the environment and climate, at the same time capitalizing on the national interest regarding the management of natural resources. Internationally, the analysis of the classification of the activity destined to the protection of the environment in the normative framework, is a subject approached in a complex way by the profile researchers since the last century: Carson R.[19], Hays S.P.[20], Weiss E.B.[21], Bodansky D.[22], Raustiala K.[23], Braat LC, Groot, R.[24], Yang T. et al.

The ecological movement can be categorized depending on the directions of industrial development in terms of *economic* interest, *geographical* emphasis and *geopolitical* factor in international negotiations, the evolution of the development of public administration institutions, as well as many other categories, in terms of *intellectual* foundation, thinking ecological is classified into the following two camps: *the anthropocentric school* and *the biocentric school*. ***The school of anthropocentric thinking*** aims to focus attention on man as a central element for which environmental factors must be adapted to ensure the quality of human life. ***The school of biocentric thinking*** aims to focus attention on man as one of the elements of nature and not as its central point, and the fundamental principle of this school is the interdependence between the man and the ecosystem.[25]

Thus, the legitimacy of the issues addressed by environmental movements proliferated in the 1970s, the need to include nominations in election campaigns and candidacies representative of these interests. These parties were conceived as a new type of political entity that would bring direct influence and access to governance to environmental movements through unanimously recognized procedural mechanisms. The largest green party is the Green Party, also known as *the greens* founded in 1980, which, although not yet successful in the federal elections, is secured with seats in parliament and even covers a wide representation in several regions. In the early 1990s, environmentalism became a global trend with a resounding voice for non-governmental organizations such as Greenpeace and the Wildfire Fund to establish an international presence based in several countries in order to coordinate information and advocacy campaigns for its objectives. in the whole world. Therefore, today the environmental movement has achieved its goal of influencing the international policy agenda, as the variety of agreements, treaties and commitments adopted between states has increased and exceeded the point of forming a rigid mechanism of self-assessment, supervision and monitoring of implementation.

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[19] CARSON, Rachel. Silent spring (1962). In: *The Future of Nature*. Yale University Press, p. 195-204, 2013.

[20] HAYS, S. *Three decated of environmental politics, in government and environmental politics*. În: LACEY, M. Government and environmental politics: essays on historical developments since World War Two. Woodrow Wilson Center Press, 1989. p.325.

[21] WEISS, E. B. *International Environmental Law: Contemporary Issues and the Emergence of a New World Order*. Geo. LJ, 81(675), 1992.

[22] BODANSKY, D., BRUNEE, J., HEY, J. International environmental law. În: *The Oxford Handbook of International Environmental Law* [online]. Oxford Printing Press, Chapter 2, 2007.

[23] RAUSTIALA, K. *The participatory revolution in international environmental law*. Harvard Environmental Law Review, vol. 537, 1997.

[24] BRAAT, L. C., GROOT, R. *The ecosystem services agenda: bridging the worlds of natural science and economics, conservation and development, and public and private public*. Ecosystem Services, vol. 1(1), 4-15, 2012.

[25] LOVELOCK, James. *Gaia: A new look at life on earth*. Oxford Paperbacks, 2000.

environmental protection policies.[26] The initial concerns for environmental conservation and pollution were complemented by addressing the environmental consequences of economic practices such as tourism, trade, financial investment and other industries, these trends of integrating environmental interests in decision-making processes are still rising.

During its development, it has known environmental law critics that were rooted in the spectrum of opposing ideas, from the insufficiency of institutional changes to the exaggerated attention on the targeted issue. Thus, it can be deduced that international environmental law is forced to answer 2 questions simultaneously:

1. *Readjustment of existing instruments (either by consolidation or reform)* and
2. *Creating new, more complex, innovative and sufficient tools, structures and institutions that would make progress in addressing the transformative demands of climate change.*

The development of international environmental law has its roots in the overlapping of factors of different categories.[27] The category of "international interests" is illustrated by several phenomenon, which occur in parallel, and has strengthened the promotion of environmental components in institutional development, some of which are:

1. *Adoption in the national normative regime of the institution of environmental impact assessment as a tool to monitor compliance with ecological indicators*[28], and
2. *Increasing the level of involvement of civil society participants in the consultation, development and implementation of environmental standards.*[29]

Just as nature and economics have an influence on social dynamics, an understanding of real phenomena and technical aspects related to the sustainable use of resources is necessary to develop the social sciences in support of physical reality. Ecosystems reflect the relationship between all participants in the area: people as individuals, subjects who exercise their duties in the functionality of the institution that represents it, and the elements of nature - each with its role and practical impact on the ecological dynamics of the natural circuit. Aquatic resources are divided into drinking water, surface water and regulations are different depending on their destination, also water bodies can be lakes, rivers, natural or artificial pools, springs and others, and each element belonging to one of these categories has a methodological specific that differentiates its management needs. Accordingly, forest resources have forests, which are also a separate organism. At the same time, green spaces, plant resources and a wide variety of flora species are indispensable components of a rich natural ecosystem. The needs of each individual element must be analyzed from the perspective of compatibility with the objective of achieving symbiosis with other natural elements in the same ecosystem and the technical recommendations assigned to them.

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[26] GAUNA, E. *Environmental Law, Civil Rights and Sustainability: Three Frameworks for Environmental Justice.* Journal Environmental and Sustainability Law, vol. 4(34), 2012.

[27] BODANSKY, D., BRUNEE, J., HEY, J. International environmental law. În: *The Oxford Handbook of International Environmental Law* [online]. Oxford Printing Press, Chapter 2, 2007 [citat 02.09.2020]. Disponibil: DOI 10.1093/oxfordhb/9780199552153.013.0002

[28] Law on environmental impact assessment: no. 86 of May 29, 2014. In: Official Journal of the Republic of Moldova, 2014, no. 174-177, art. 393.

[29] TARLOCK, A. D. *The role of non-governmental organizations in the development of international environmental law.* Chicago-Kent College of Law Review, vol. 68(1), 1992.

The process of awareness of man's position in nature has generated the development of environmental movements in society. The arguments invoked by the followers of these movements, contained a sufficiently clear and balanced reasoning to succeed in intensifying the coverage of the proposed ideology. Both the positioning of man as a central element of nature and the perception that man is a component of the chain of natural dynamics and not its central point - were two orientations that did not contradict the purpose required by the followers of these visions, namely a great attention to the human-nature relationship. The success of these visions created the need to include them not only in the informal space of communication between community members, but also in the normative framework for regulating relations between members of society. Thus, environmentally oriented organizations have gained more weight in decision-making processes at all levels. The scientific study of the field of environmental protection has also known a catalytic interest at both international and national level. Therefore, the legal development of environmental protection has also developed multidimensional. In the global context, the general framework was established that crystallizes the narrative of climate change in strategic terms, among the main instruments on which the international model of measures is based today are: the United Nations Framework Convention on Climate Change, which allowed the development of the Kyoto Protocol, a more democratic version of what was to become the Paris Agreement. At the regional level, each category of natural resource was analyzed from the perspective of mutual benefit. The ESPOO Convention is a relevant example in this respect, as it is a tool that ensures the fairness of all parties in implementing a project with a direct impact on the environment or in managing a natural resource with a transboundary nature, such as water - a signatory party to the convention must takes into account the impact on the environment not only in the perimeter of its territory, but also the impact on the environment of the neighboring state. International objectives are also reflected in the national context through public policy documents, and based on the agreements to which the Republic of Moldova is a party, it is committed to harmonizing its regulatory framework to require the same quality standards that are recognized both regionally and international. In conclusion, we can deduce that, although each of these 3 levels of regulation are independent and reflects the full spectrum of legal needs (strategic objectives, rules, instruments, standards, implementation mechanism), their share differs. We consider that, at national level, the legal instrument and the mechanism for implementing the norms of environmental law according to the provisions of public international law are well defined; at regional level, the general legal framework in which these instruments are developed is recommended; and at the global level, the global strategic objectives are set, which are subsequently adopted, without negotiations, in the main public policy documents of first national interest.

Chapter 2 „Legal regulation at international and national level of forest resources as a component of natural ecosystems” highlighted the importance of forest elements in maintaining the natural balance of the ecosystem. Although this research focuses on natural ecosystems, the analysis of the concept of *permaculture* outlined a potential solution in the category of agricultural ecosystems to reduce the gap between the result of the implementation of regulations governing agricultural activity and environmental protection. Thus, instead of proposing the institutionalization of permaculture, being fully aware of the limits of such a suggestion, we propose importing the benefits of permaculture within the existing legal

framework, thus emphasizing the intention of the legislator, also known by environmental recovery programs currently implemented by the executive.

Internationally, the priority of afforestation projects is reflected in SDG no. 15 „*life on earth*" which provides for the protection, management and promotion of the sustainable use of terrestrial ecosystems, sustainable forest management, combating desertification, etc. In this regard, the United Nations REDD + program has become a key platform for supporting *nature-based solutions* and increasing ambitions for nationally determined contributions, which represent the five-year commitments made by each state under the Paris Agreement.

The main directions of environmental policies in the field of forest management are combating desertification, converging biodiversity and reducing the impact on climate change. The United Nations Conference on Environment and Development (UNCED), also known as the Rio de Janeiro Earth Summit, or the Rio Conference in June 1992, was created in response to Member States to cooperate internationally in resolving the complications of the war. cold. The main achievements of the Rio Earth Summit in June 1992 are the efforts that have given rise to the crystallization of several policy instruments, such as Agenda 21 (the United Nations Plan of Action for Achieving Global Sustainable Development Goals). Another United Nations instrument for this sector is the Forum on Forests (UNFF), which was founded in 2000 by the United Nations Economic and Social Council (ECOSOC - one of the 6 main organs of the UN) as an intergovernmental panel. with a view to promoting "sustainable *management, conservation and development of all forest types and strengthening long-term political commitment to this end* " based on the Forest Principles and the Rio Declaration[30]. The CPF Forest Collaborative Partnership, on the recommendation of ECOSOC, includes members such as: the Center for International Forestry Research (CIFOR); Food and Agriculture Organization of the United Nations (FAO); International Tropical Timber Organization (ITTO); International Union for Conservation of Nature (IUCN); International Union of Forestry Research Organizations (IUFRO); Secretariat of the Convention on Biological Diversity (CBD Secretariat); Global Environment Facility (GEF) Secretariat; Secretariat of the United Nations Convention to Combat Desertification (UNCCD); United Nations Convention on Climate Change (UNFCCC); United Nations Development Program (UNDP); United Nations Environment Program (UNEP); World Agroforestry Center, etc., and compared to these organizations listed above, UNFF has not been vocal enough in promoting its objectives, however one of its achievements is the adoption in collaboration with UNFCCC, UNCCD, CBD and others of the Strategic Plan United Nations Forestry (UNSPF) 2017-2030.[31]

At regional level, special importance is given to trade in timber by category of forest element, its provenance, harvesting and transportation being strictly regulated by European Union directives. The importance of sustainable management of forest resources can be understood by presenting the example of the International Union of Forestry Research Organizations which was founded in 1892, preceding the success of ecological movements, and the International Union for Conservation of Nature, founded in 1948 from ecological

[30] MATOS, C. L., AFSARMANESH, H. *Roots of Collaboration: Nature-Inspired Solutions for Collaborative Networks*. Institute of Electrical and Electronics Engineers Access, vol. 6, 2018.

[31] CHOI, E., KIM, R., KIM, M. *Trends and Implication of International Discussion on Forest Sector: Focusing on United Nations Forum on Forests*. Journal of Korean Society of Forest Science, 107.4. 325-335, 2018.

movements. the first working committee dedicated to ecosystem management. European Union legislation directly or tangentially targeting the forestry sector is also extensive:

1. *Directive on measures to protect against harmful organisms and to protect against their spread - 2000/29 / EC.* This directive is closer to phytosanitary legislation, but also provides for rules on the protection of flora, plants and health certification in this regard. As a matter of priority, it should be noted that in EU legislation this directive expressly includes legal definitions for terms such as *plants, plantations, plant products, harmful organisms, protected area,* etc.
2. *Directive on the conservation of natural habitats, of flora and fauna - 85/337 / EC.*
3. *Directive on the marketing of forest reproductive material - 99/105 / EC.* This directive provides an integration between the definition and taxonomy of planting material.
4. *Environmental Liability Directive for the Prevention and Remediation of Environmental Damage - 2004/35 / EC.* Through this directive, the European Union intends to reduce damage to the environment and species in natural habitats, and as this directive covers the field of "environmental liability", the principle underlying it is "the polluter pays" and the implementation of the directive is ensured by the bodies. recognized by the European Commission. Here is the definition *of environmental damage.*
5. *European Union Regulation on wood (EUTR) no. 99/2010/2010* - part of the Action Plan to the Law on Implementation, Management and Trade in Wood, etc.

At the national level, one of the major problems affecting both agricultural productivity and land geo-ecosystems is insufficient attention to forest protection strips associated with agricultural land. The de facto image of land cultivation activities shows us that farmers in the Republic of Moldova do not take into account the importance of protection zones. This situation may be the result of (a) non-compliance with the rules on the management of protection strips, (b) the vague regulation of this element of the ecosystem, which results in farmers dodging or neglecting protection strips. In the Republic of Moldova, the status of legal entity has some categories of natural areas protected by the state such as *scientific reserves, national parks, biosphere reserves, dendrological gardens* and *zoos* (Law no. 1538 of 25.02.1998, art. 19).[32] Although they contain rich elements of forest resources, legal protection is provided even by utilitarian categories, the forest fund thus comprising a broader category of regulation. The legislator of the Republic of Moldova distinguishes between notions such as *forest stock, forest, forest vegetation,* and *forest resources*. Thus, according to the Forestry Code, art. 2, the **forest stock** includes all forests without delimitation of the owners of the property right and the form of management, as well as all the lands destined for afforestation, reforestation, those affected to the forest management as well as the non-productive ones but which are included in the land cadaster. In order to describe the **forest** convention, and to understand which category of forest resources the rules that include the phrase “forest” refer to, the legislator introduced the territorial quantitative parameter. Respectively, *are considered forests, lands covered with forest vegetation with an area of over 0.25 hectares.*[33] National technical rules for forest management also provide for their division according to functional groups (protection of water, soil and land,

[32] Law on the fund of natural areas protected by the state: no. 1538 of February 25, 1998. In: Official Journal of the Republic of Moldova, 1998, no. 66-68, art. 442

[33] Forestry Code of the Republic of Moldova: no. 887 of June 21, 1996. In: Official Journal of the Republic of Moldova, 1997, no. 4-5, art. 36.

recreation, etc.), and whereas *forest curtains*, botanical, zoological and dendrological gardens are not included in the category of forest fund (Forest Code, Article 5), these green spaces are considered to be part of the **vegetation outside the forest stock**. **Forest resources** represent the wood mass of forests and forest vegetation, as well as other forest products, which are divided into: *wood products (wood* mass and the results of main and secondary cuts of hygiene and care) and *non-wood* products *(*forest by-products). Thus, the care of the forests is carried out on the basis of the forest arrangements, and in order to carry out cutting works, only the care works are allowed, taking into account the productivity of the tree, the composition, the age of exploitability and the necessity of the respective activity.[34]

The national authority empowered to administer the state policies of the Republic of Moldova in the field of forestry is Moldsilva Agency. It actively participates not only in the infrastructure works with which it is empowered (as the „forest" is a clear element of hard infrastructure and not a software component), but also in the development, consultation and / or promotion of national forestry policies and strategies (updating the National Strategy for Sustainable Development) as well as ensuring compliance with the regulatory framework in this regard (certification of forests, their products, sectoral reconstruction of the forest fund and the execution of tree hygiene works). Another pivotal institution for forestry in the Republic of Moldova is the Institute of Forestry Research and Management (ICAS). ICAS manages international forest management projects, coordinates the EUFROGEN program (*European Forest Genetic Resources Program, 1994*) in the Republic of Moldova - collaboration program for conservation, sustainable use of forest elements and coordination of information on kinetic genetic materials between European countries. The advantage of Moldova's participation in the EUFROGEN program through the representation of ICAS is the recognition of Moldova in the pan-European network for monitoring sustainable development and access to the EUFGIS portal (European Information System on Forest Genetic Resources).

In the Moldova 2030 Strategy, the state authorities aim to achieve the goal of transforming the Republic of Moldova into a state „*where people will want to live and see opportunities for individual development*", this homo-centric vision being taken over and adjusted with the Agenda of Global Development 2030, being also coordinated with the requirements of the Association Agreement between the Republic of Moldova. With reference to forest fund management, in the 2030 strategy for Moldova, the aim is to increase the forested area (forests and forest vegetation) to 13.8%, and erosion is identified as one of the main factors leading to soil degradation and vegetation quality. The legislator assured that the Republic of Moldova will follow a trajectory that ensures the implementation of efforts in order to maintain natural resources and energy elements through Law no. 1041 of 15.06.2000 regarding the amelioration by afforestation of degraded lands[35], but only after 16 years, the executive issued the Government Decision for the approval of the Regulation on the manner of carrying out afforestation works on degraded lands (both public property UTA and private property) no. 1186

[34] Government Decision for the approval of the normative acts aiming at the management of the forest management: no. 740 of June 17, 2003. In: Official Journal of the Republic of Moldova, 2003, no. 126-131, art. 778.

[35] Law for the improvement by afforestation of degraded lands: no. 1041 of June 15, 2000. In: Official Journal of the Republic of Moldova, 2000, no. 141-143, art. 1015.

of 28.10.2016, which provided for the elaboration of technical documentation for the works in question.[36]

Here one can make a nuance between:

1. *Afforestation of public degraded lands;*
2. *Afforestation of private degraded lands;*
3. *Reforestation.*

To carry out the afforestation project, the land is subject to assessment of the de facto state of vegetation by institutions affiliated to the Academy of Sciences, and based on the findings, a set of species is recommended to re-balance the biodiversity ecosystem in the region on the selected land, and the Institute of Forestry Research and Management (ICAS) or the Moldsilva Agency carries out forestry design coordinating the works with the environmental authorities (at the same time, taking into account the existing risks such as fires, droughts, animal grazing, etc.).[37]

Although the strips and protection zones for surface water bodies are expressly regulated (Government Decision no. 728 of 08.09.2014) and have appropriate sanctions provided by the Contravention Code (art. 109 of the Contravention Code), the strips of protection of agricultural lands are not regulated in an equivalent way. We mention that the forest curtains *for the protection of agricultural lands are not part of the category of green spaces*, but of the category of vegetation outside them (Law no. 591 *on green spaces of urban and rural localities* of 23.09.1999). Contravention Code of the Republic of Moldova provides for the sanctioning of illegal cutting of trees and shrubs in green spaces (art. 122, p.2), unauthorized mowing and grazing in forest curtains (art. 127, p.1), violation of sanitary norms in green spaces (art.136), the destruction or damage of the green space as a result of the fire or the negligent attitude towards the fire (art.137, p.2), but these provisions regarding the vegetal resources, can refer by interpretation to the curtains of land protection for agricultural purposes, and there are prohibitive rules that prohibit conduct. Device rules in this regard can be identified in the state register of normative acts - for example, according to the Land Code, landowners must *protect land from erosion by creating a system of forest curtains for protection and grassing* (art.79), but this provision does not clearly explain the need to plant protection strips for agricultural land where they are not de facto, and to take care of measures for sectors where they exist.

In the last three decades, permaculture has grown at the same time as agroecology, displaying overlapping concerns as it develops different constituencies. Permaculture shares with the discipline of agroecology an emphasis on the differentiation between ecology and agricultural production, but also a similarity with agroforestry. The European Union has a tendency to support the organic approach in the practice of agricultural activity, either by supporting the concept of *organic farming* or by highlighting the difference between organic products and those obtained by applying synthetic fertilizers.

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[36] Government Decision for the approval of the Regulation on carrying out the afforestation works of the degraded lands of public administrative-territorial property and of the degraded lands of private property: no. 1186 of October 28, 2016. In: Official Journal of the Republic of Moldova, 2016, no. 379-386, art. 1283.

[37] BOTNARI, F., MIRON, A., GALUPA, D., PLATON, I., ROTARU, P., TALMACI, I., LOZAN, A., GRUBII, G., BALAN, M., ŞPITOC, L. *Raport privind starea sectorului forestier din Republica Moldova perioada 2006-2010.* Agenția Moldsilva, Chișinău, 2011. ISBN 978-9975-4298-4-9.

The concept of *permaculture* involves the *management of the land in the direction of satisfying the synergy between human activity and nature through conscious design and the natural maintenance of production ecosystems.*[38] By implementing the concept of permaculture, a harmonious integration between landscape, people and agricultural products (fruits, vegetables, water) is achieved. One of the differentiating elements that are characteristic to permaculture is the encouragement for the non-use of external chemical stimulation to remove pests, but to ensure a natural cycle in the ecosystem that rebalances the nutritional dynamics. In a natural ecosystem, which permaculture represents, there are several species of organisms at the trophic level and their genetic diversity is greater than in the system of a classic agricultural project. Managed agroecosystems have a lower diversity of species, contain fewer predatory and parasitic species and small genetic diversity within a species is not necessarily advantageous. The fewer trophic interactions are recorded, the fewer species that reduce the pest population exist, and this impedes agricultural yield and quality. Moreover, low genetic diversity in agricultural species makes the agricultural system more vulnerable to pests than in natural ecosystems. Trees and vegetation is connected by an underground network, which strengthens the concept of living natural ecosystem and improves the concentration of nutrients that help the development of plant tissues and stimulate plant growth.

In the opinion of the European Economic and Social Committee (EESC) on 'Promoting short and alternative food supply chains in the European Union: the role of agroecology', Opinion 2019/01463 353/11 of 24.01.2019, the EESC expressly states that organic farming is a successful model, and permaculture as a practice of conservation of natural resources, must be capitalized and promoted. And in March 2020, the European Parliament addressed a question to the Commission on no-till tillage practices. This question refers to the European Green Pact and highlights the advantages of the „no-till" approach, characterizing it as regenerative.

The relationship between the study of permaculture and forestry raises interesting questions, the arguments in favor of the first concept being similar to those invoked by international bodies in the field of environmental protection and the legislator of the Republic of Moldova, for conducting sustainable development and afforestation programs.[39] It is found that forests provide a large proportion of rainfall, and even if the estimate of rainfall reduction in the case of felling trees is up to 30%, observations show that a land with felled forest has a decrease in rainfall by over 86%, the rain being only a limited category of the total factors that contribute to the formation of precipitation.[40] Therefore, the process of desertification by reducing the percentage of afforestation is scientifically accepted.

Chapter 3 „Mechanisms for the legal protection of aquatic resources as components of natural ecosystems" presents schematically the diversity of categories in the sub-domain of aquatic resources, with the necessary rules for each level: international and national. At the same time, there is a category of protected natural area where the aquatic component is central, and the

[38] BANE, P. HOLMGREN, D. *The Permaculture Handbook: Garden Farming for Town and Country.* New Society Publishers, 2012. ISBN: 978-0865-7166-6-7.

[39] Law for the improvement by afforestation of degraded lands: no. 1041 of June 15, 2000. In: Official Journal of the Republic of Moldova, 2000, no. 141-143, art. 1015.

[40] SHEIL. D., MURDIYARSO. D. *How Forests Attract Rain: An Examination of a New Hypothesis*. *BioScience*, v. 59(4), p.341-347, 2009.

importance of the area is internationally recognized. Thus, Chapter 3 begins with the description of the international framework for the protection of wetlands of international importance, offering a description of the management mechanism at the national level of such an example registered in the Republic of Moldova.

One of the natural ways to purify water is wetlands. Although the first aspect of wetlands is the image of a muddy, grassy and lifeless area, in reality, wetlands are full of diversity and play an important role in maintaining the balance of the ecosystem, providing habitat for several categories of small animals and a variety wide range of insects, gases and reptilian species.

As mentioned in the introduction, healthy ecosystems provide a variety of goods and services critical to human life and our development as a species. such as air and water purification, detoxification and decomposition of waste, renewal of soil fertility, climate regulation, mitigation of droughts and floods, pest control and pollinating vegetation - all these are the basis of human society. Wetlands in this context have a direct impact on water retention services, and the natural process of water filtration and water quality assurance in the ecosystem cannot be understood without acknowledging that deforestation in river basins leads to degradation of water purification services.[41] These two basic functions of wetlands - water purification and carbon sequestration - are a valuable example of this area for the environment, and the causal interdependence between biodiversity and the water cycle - an example of the harmony of natural ecosystems. The Ramsar Convention on Wetlands of International Importance, also known as the Ramsar Convention, is an international agreement to promote the conservation and rational use of the wetland. The Ramsar Convention, named after the Iranian city where the convention was signed in 1971, now has more than 168 member countries as contracting parties and more than 2,100 officially recognized targets on the wetland list, covering a total of more than 208 million hectares. Governments joining the Convention are willing to make a commitment to stop this process of eradicating wetlands. In this respect, the first obligation of the Contracting Parties - the States acceding to the Convention - is to propose at least one wetland for inclusion in the Ramsar list on which the rules of the Convention apply. Although in this Convention, the expression *de jure* given to recognized and listed areas is „of international importance", it is not mandatory for these wetlands to contain an element of foreignness in order to be examined for incorporation under the auspices of Ramsar.

The Lower Dniester case study is an example of a fusion of international and national norms, as it presents the management of a state-protected natural area but which at the same time represents a point of international importance recognized by a recognized Convention of more than 168 state. This wetland also confirmed the multilateral impact of the quality of aquatic resources: impact on the self-purification capacity of resources, carbon sequestration, highlighting the tourist potential, etc., and highlighted a new field of research - ecosystem services. *The district of the Dniester River basin* belongs to the most important water artery of the Republic of Moldova - river Dniester, which has a total length of 1350 km from the starting point outside the country, and the length transited through the Republic of Moldova is 636 km, of which 142 km are of a cross-border nature (Moldova-Ukraine border). The Dniester River is the main source of water supply of Moldova because it represents over 40% of the amount of

[41] Ramsar Convention Manual - a guide to the convention wetlands: 6th edition (Ramsar, Iran, 1971). Ramsar Convention Secretariat, Gland, Switzerland. 2013.

water consumed by the citizens of the Republic of Moldova and over 83% of the resources of exploitation of drinking water of the country. Wetlands operate on the basis of the Management Plan approved by the Board of Directors, which is an advisory body whose purpose is to manage the area and protect its biodiversity. The Board of Directors of the Ramsar Zone „Lower Dniester" was launched in 2018, with a composition of 22 members, for a period of 2 years, following consultations with representatives of local public authorities in the region.[42] The management plan approved at the meeting refers to the importance and prospective objectives of the area management, and through the strategic objectives of conservation, ecological reconstruction of defined sectors and protection of unforeseen meadows - are also the commitments made by localities that balance the territories on which is located this area. One of the ambitious objectives of the project to restore the ecological balance in the wetland „Lower Dniester" is the creation of the national park „Lower Dniester". The foundation of a National Park is made by Parliament Decision (art. 12, Law no. 1538), by the Government's proposal to address the central authority for the environment (art. 14, on, Law no. 1538).[43] Must be reminded that in the classification of natural objects and complexes, the national park is delimited in accordance with the classification of the International Union for Conservation of Nature (IUCN), while the wetland of international importance does not fall under the IUCN classification. Thus, the nuance of the status of the area would increase the prospect of both the funding needed to take the measures recommended by experts and their successful implementation to increase the ecological and strategic value of the "Lower Dniester" area nationally and internationally.

The European Union has two key legal instruments for the protection and management of water resources through an integrated approach based on the concept of ecosystem - the Water Framework Directive and the Marine Strategy Framework Directive. While the Water Framework Directive sets the framework for regulating the sustainable use of aquatic resources as a whole, the Marine Strategy Framework Directive crystallizes the effort to coordinate strategic environmental policies, defining the principles of planning and managing areas of interest for Member States through the regulation on integrated coastal zone management. As the European Union's 2030 Biodiversity Goal aims to expand morning areas for conservation and protection, the European Commission's first report to the European Parliament on the implementation of the Marine Strategy Framework Directive (COM 259/2020 of 25.06.2020) expressly recognizes *the holistic vision and approach of the strategy based on the ecosystem, the ecosystem approach* being thus becoming an operational principle for the management of the entire maritime environment of the European Union. Although the subject of drinking water quality is sensitive enough to avoid contradictions, we consider it necessary to analyze the drinking water quality directive not from the perspective of "requirements of maximum permissible concentrations for public health safety" but from the perspective of imperative introduction of minimum requirements that could not fully reflect the reality, circumstances or interest of a Member State. For example, the directive stipulates that the supply of contaminated water will be prohibited or restricted in consumption, but the classification provided for „water

[42] KAZANȚEVA, O., JOSAN, L., BARCARI, I., MĂRGINEANU, G. *Serviciile ecosistemice ale Zonei Ramsar „Nistrul de Jos"*, BIOTICA, 2021.

[43] Law on the fund of state protected natural areas: no. 1538 of February 25, 1998. In: Official Journal of the Republic of Moldova, 1998, no. 66-68, art. 442.

which may constitute a potential danger to human health" (Directive 98/83/EC, art. 8 p.3) is vague, flexible and independent of the decision of the national authorities, which warns of the existence of a strategic vulnerability of the Member States.

An interesting comparison between the approach of the legislator of the Republic of Moldova and the international literature is that, while internationally wetlands are attributed to *water*, in the Republic of Moldova, the legal regulation of wetlands is attributed to the *field of natural areas protected by the state* (Law No. 1538 of 25.02.1998 on the fund of natural areas protected by the state). We consider both variants correct and well positioned if, the connection between these two domains is ensured not only in tangential form but rather by a constant symbiosis. In many cases (both nationally and internationally), policies and decisions do not sufficiently take into account the interconnection and interdependence of wetlands with other elements, including those that seem to be at a distance from the impact of each other.

A necessary moment to be mentioned is that, however, the law on the fund of natural areas protected by the state no. 1538/1998, recognizes only wetlands of international importance (art. 82), which is declared as such in accordance with the decision of the General Secretariat of the Ramsar Convention.[44]

According to the international classification, water can be attributed to one of these 4 categories:

1. *Surface* water – „standing water and running water on the surface of the soil„ Water Law of the Republic of Moldova no. 272/2011[45], and according to the Water Framework Directive 2000/60/EC these are „inland waters with the exception of groundwater, transitional waters, coastal waters and the chemical status for which territorial waters are to be included". Here it can be seen a more detailed nuance than in the national law, with the European Union providing a distinct definition for the term „surface water", „inland water" and „transitional water";

2. *Groundwater* – „water that is below the soil surface in the saturation zone and in direct contact with the soil and subsoil" Water Law no. 272/2011 of the Republic of Moldova - an adjustment identical to the explanation in the European Union Framework Directive (2000/60/EC);

3. *Wastewater* – „water that comes from domestic, economic and social activities, and that contains pollutants or impurities that alter its initial physical, chemical and bacteriological properties" Water Law no. 272/2011 of the Republic of Moldova. The European Union is developing its wastewater regulation tools, nuanced both the source of pollution and the final destination of wastewater. Thus, notions such as „urban wastewater", „domestic wastewater", „industrial wastewater" and „water reuse" are implicitly differentiated, which implicitly refers to wastewater. The term „water reuse" is recently introduced by the European Parliament's Regulation on minimum requirements for water reuse, EU 2020/741 of 25.05.2020, in order to promote innovative wastewater reuse techniques in activities such as irrigation (agriculture) in projects greening of urban areas (creation of gardens for growing vegetables in urban centers by reusing wastewater). Here, the European authorities refer to the United Nations Goal 12 on sustainable consumption and production and the United Nations 2030 Agenda. The Republic of Moldova is not technically equipped with a wastewater treatment and redistribution system that

[44] Ramsar Convention Manual - a guide to the convention wetlands: 6th edition (Ramsar, Iran, 1971). Ramsar Convention Secretariat, Gland, Switzerland. 2013.

[45] Water law: no. 272 of December 23, 2011. In: Official Journal of the Republic of Moldova, 2012, no. 81, art. 264.

would correspond to the presented initiative. A separate directive is also provided for the protection of waters against pollution caused by nitrates from agricultural sources.

4. *Rainwater - the* legislator does not provide a definition or regulation for this water resource.

According to the calculations of the water resources potential, the Republic of Moldova is one of the countries with poor water resources.[46] As the Republic of Moldova has no connection and passage to the seas and/or oceans, the water bodies regulated by the legislature are rivers, ponds, lakes, springs, groundwater and other aquatic objects on the territory of the country. The organic law in the field of protection of aquatic resources that regulates the norms of water use management is the Law on water no. 272 of 23.12.2011.

Natural ecosystems require maintaining the balance of aquatic resources and do not provide for the consumption of water by humans from these reserves (as water extraction is an inherent component of urban ecosystems or irrigation of crops planted in agricultural ecosystems). If the land of the forest fund can be both public and private property, for aquatic resources the concept of property has a more interesting interpretation. As ***water is a national heritage***, it cannot be included in the same category as commercial products that are the subject of contracts for ownership. Thus, *water is exclusively part of the public domain of the state* (art. 4, p.3), but the land under the water of a pond can also be part of the category of private property (art. 4, p.5). In this way, the legislator distinguishes between water and soil - aquatic resources and land resources, each with its own regime. Before examining how to regulate water resources in their natural state (rehabilitated or created), it is necessary to understand how the legislator interprets its regime of use, therefore, the legislation of the Republic of Moldova provides for 2 types of use:

1. *General use - The general use* or *total use of water* (Law on water no. 272 from 23.12.2011, art. 22) involves internal water consumption and household needs, watering domestic animals, garden irrigation and for emergencies such as fires.

2. *Special use - The special use of water* involves the consumption of water through activities such as extracting water from underground sources for use in technical, industrial and agro-industrial purposes, using water for irrigation plantation for commercial purposes, using water to produce energy, for land use and exploitation docks, and the commercial exploitation of recreation points on national beaches.

The general use of water must also be ensured subject to the existence of the environmental permit for the special use of water, access to these sources being an obligation for the permit holder. Thus, if water is considered a good, then the property right belongs exclusively to the state, the right of administration is regulated by law, and the right of use is expressly bifurcated into general use and special use for which separate rules are provided. Analyzing the parameters set out in the quality requirements for different categories of water, there is a coincidence between the requirements for drinking water and groundwater, or this overlap, although it has legal protection from the legislator of the Republic of Moldova, still requires an additional explanation from specialists. Regarding the water quality parameters, the

[46] MELIAN, R., BUJAC, V., LAZAR, T., TROMBIȚKI, I., STRACHE, K. *Ghid, îndrumar metodologic pentru gestionarea bazinelor râurilor mici și mijlocii*, Eco-tiras, Apele Moldovei, Elan Poligraf, Chișinău, 2018. ISBN 978-9975-66-614-5.

legislator provides 3 categories of regulation: drinking water quality, wastewater quality and surface water quality.

The arguments for regulating the drinking water quality are well-known, the guidelines in this regard aim to ensure that all citizens of a state have access to safe drinking water as it is estimated that over three quarters of the world's diseases have at least one of the triggers - low water quality. Providing the population with safe drinking water is a standard practice in most industrialized countries, as access to safe drinking water is recognized as a fundamental human right, and at the same time, a basic preventive measure to reduce cases of disease. These guidelines and regulations on drinking water quality are based on current scientific research with results of health effects, implications and operational considerations.[47] The technical capacities of the water treatment and filtration station (intended for human consumption) are clearly specified and limited, and in order to maintain the balance of the properties of aquatic resources and the water cycle in nature, the legislator regulates wastewater. In this sense, the Government Decision no. 802 from 09.10.2013 approves the Regulation on the conditions of wastewater discharge into water bodies, specifying which specific substances are introduced into surface waters providing the optimal and permissible characteristics for the indicators concerned (transparency, dissolved oxygen, acidity, biochemical consumption of oxygen, permanganate oxidability, bichromate oxidability, total hardness, carbon dioxide, hydrogen sulfide and nitrates).

An interesting trend is the regulation of wastewater not only in the technical aspect of its transportation and treatment in collection and treatment plants, but also from the perspective of a potential reuse according to the principle of the circular economy. Thus, in 2020, the Parliament of the European Union and the Council adopted a regulation (2020/741) on minimum requirements for water reuse, the purpose of which is to ensure the quality of wastewater which is redirected for agricultural irrigation based on the reasoning of consumption pressure. on clean water. We believe that this regulatory approach is a transitional step to facilitate restrictions on groundwater and surface water consumption in certain categories of activities, under the auspices of freshwater resources, and if this position is confirmed, on the one hand we will seek to strengthen the concept ecosystem in international environmental law, but on the other hand it can also create dissensions in the field of human rights protection.

Water quality is determined not only by the chemical factors in its composition, but also by physical and bacteriological parameters. In order for the water to be considered satisfactory, its ecological and chemical status must be labeled as „*good condition*" - the variations between the indicators of the items examined and those in the list of average values associated with that type must be small. The results of the elements must also be in equilibrium when examining the integrated result. Thus, according to the Water Framework Directive (WFD) 2000/60/EC, water falls into 5 quality categories (the Water Law of the Republic of Moldova refers in the preamble to this directive, which denotes national legislative harmonization according to international methodological standards). The institutions responsible for collecting, analyzing and synthesizing information on the quality and condition of water bodies are distributed among various agents (state institutions, national agencies, etc.), therefore requests for relevant

[47] ZAMFIR, N. *Problems in guaranteeing the right to safe water–the case of irrigation in agriculture using groundwater*. In: EU Integration and Management of the Dniester River Basin. p. 90-94. 2020.

information may be addressed to different legal entities. The institutions responsible for collecting, analyzing and synthesizing information on the quality and condition of water bodies are distributed among various agents (state institutions, national agencies, etc.), therefore requests for appropriate information can be addressed to different legal entities.

The school of anthropocentric thinking presents natural resources as necessary elements to ensure human comfort, but for the category of aquatic resources, even from the position of everyday consumerism, imperative rigors of protection and conservation are established. Sustainable Development Objective no. 6 of the United Nations *„clean water and sanitation for all"* recognizes the undeniable value of water and draws attention to the mechanism of implementation of projects with a direct impact on aquatic resources. At national level, water is also recognized as *a national heritage site*, and therefore has a more advanced protection mechanism than other categories of natural resources. Both in the European Union Framework Directive and in national legislation (which partially reflects the provisions of the European Union), the categories of water (surface, underground, drinking, used) are delimited and each category is regulated in detail.

Chapter 4 "Legislative and institutional inconsistencies in the management of natural resources at international and national level" examines the legitimacy and position of international institutions in regulating environmental relations, as well as procedural impediments to cooperation between international and national actors in the field of international environmental law. Without a firm basis for legitimacy, Member States may be reluctant to delegate to the international environmental institutions the decision-making power they claim as a premise for its work. But given the weight of international authorities, the question of legitimacy will still be assessed as a fundamental issue. Recommendations are usually made on amending the national legislation of the Member States, which they are free to accept or reject.

The Paris Agreement was ratified by the Republic of Moldova in 2017. The Republic of Moldova recognized the danger of climate change, the need for environmental protection, the importance of food security, ensuring the integrity of ecosystems and the desire to implement sustainable practices in tackling climate change. By ratifying this agreement, the Republic of Moldova has not committed itself to introducing the new instrument to regulate the financial activity of citizens Carbon Credit Card - the credit card that allows holders to account for their carbon emissions associated with purchases and „limits the climate impact of their expenses" implies blocking the card if the carbon indicator threshold set by the bank's algorithm has been reached. Although this instrument is not openly presented in international discussions such as the Conference of the Parties (COP), it is covered on the official website of the United Nations Framework Convention on Climate Change (UNFCCC) which is the official organizer of the Conference of the Parties (where the Paris Agreement was negotiated in 2015). This example is relevant in presenting why in the analysis of the legitimacy of the positioning of international institutions in the regulation of environmental relations, the analysis only of the constitution of the institutions concerned is insufficient and sometimes even erroneous. Here we also consider it is appropriate to discuss the specific consent of the Member States.

In some cases, it can be deduced that majority acceptance or general consent can create a basis for legitimizing an institution that issues unpopular decisions, such a mechanism is accepted by the community even if decision-making results do not always have popular support,

and such examples are easily observed. throughout history, the most prominent being the EU agreements and the United Nations treaties. Thus, „consent" undergoes a transformation in its normative interpretation. Distinguish between *specific consent* and *general consent*; the general consent involves several aspects regarding the transfer of power and autonomy, as the general consent also implies a higher risk because the state does not know what are the specific constraints/restrictive measures to which it will be committed to submit.[48] Therefore, general consent has become a concept that has more meaning in modern politics than it had at the beginning of its use as an argument for institutional developments, for example, the "general consent" argument is the continuous consent that validates government authorities through the process. democratic declaration - electoral elections. Although, this analytical approach may also have a contradictory, well-argued reaction, which draws attention to the distinction between the legislative and executive branches, therefore the interdependence and independence of institutions in these 2 categories, draws attention to the question of interference attributions, and implicitly, inconsistencies are highlighted in the argumentation of the premise that a legislative measure (elections) is relevant (or valid as an argument) in illustrating the consent to the activity of the executive institutions.

The so-called constitutionalization of environmental regulations, by creating the treaty regime, an important feature of international environmental law, allows a more flexible response to complex environmental issues. Legal innovations in law-making techniques indicate a shift from traditional concepts of international law based on agreement and state sovereignty. International institutions and non-governmental actors have a much more important role than before in the decision-making process on environmental issues. For example, the assessment of scientific and technological knowledge turns the implementation process into an object of negotiation. In addition, the delegation of decision-making power to international administrative bodies may also unbalance the representation of the interests of States - which, in fact, has been the basis of international law. Occasionally, standards are developed by private actors or semi-private entities with minimal state involvement (a relevant example to illustrate the spectrum of actors is the involvement of companies in the telecommunications and energy industry in setting radiation parameters, which to a conceptualization of the situation, denotes a much too obvious conflict of interest). These changes are said to be the result of developments in international environmental law with a view to streamlining case law, but during the relocation of (environmental) issues from *distributive management* to *direct management* of international organizations and networks or to a hybrid of pseudo-private management, questions about the responsibility and legitimacy of the drafting process are becoming increasingly pressing.

Thus, we observe 3 parallel but surprisingly contradictory phenomenon:

1. *The decline of the role and importance of the consent of a specific state in the legitimacy of international governance*[49], and
2. *The tendency to standardize national norms to the standards and templates established by international entities.*[50]

[48] GOLDSMITH, J., LEVINSON, D. *Law for States: International Law, Constitutional Law, Public Law.* Harvard Law Review, vol. 122(7), 2008.

[49] WEISS, Edith Brown. International Environmental Law: Contemporary Issues and the Emergence of a New World Order. *Geo. LJ*, 81: 675, 1992.

Which results in promoting the activity of national non-governmental entities to stimulate the execution of the trend (2) in order to meet the conditions, set by international non-governmental entities.

3. *Increasing the level of involvement of civil society participants in the consultation, development and implementation of environmental standards.*[51]

At the same time, if environmental standards are set primarily by the consent of states to an international regime rather than by domestic legislative methods, then these international entities must be subject to the same assumptions of responsibility as in the case of the national regime. Otherwise, there are several dangers:

1. *The state does not represent its people through decisions on the legitimation of international entities,* and
2. *International entities shall not be liable for inequality of benefits* (between the interests of international entities and those of legal subjects in a Member State), and
3. *The normative adjustments imposed on these states are implemented without a systemic analysis of their relevance and imperativeness*, and therefore implicitly - has the potential to reduce the efficiency of the proper functioning of the domestic regime, which is already a problem for national security.

The ecological justice framework provides a compelling moral narrative, with justice being the antidote to the technocratic method of addressing environmental issues. The objective of studying its legitimacy is to reconceptualize environmental issues as manifestations of social, economic and environmental injustice between states and also within them. And placing these questions in a historical context also requires socio-political coordination adjacent to treatment through the prism of the technological dimension and scientific innovations.[52]

The issue of legitimacy as a subject of international governance is well pronounced in the European Union, where the pressure for more consistent integration creates dissonance in the transfer of authority from the national to the European level. The diffuse concern of a „poor democracy" in the European Union's decision-making process creates delays in connecting Member States' national laws. However, strictly related to the international environmental regime, tangential institutions exercise relatively little authority, being overtaken by other institutions such as the European Court of Justice or the Council of Ministers of the European Union. Unlike the European Union, which is rapidly developing into a constitutional order, international environmental law remains more ingrained in the tradition of volunteering.

A suitable case that exemplifies environmental issues in state cooperation is the Gabcikovo-Nagymaros case. In 1977, Hungary and Czechoslovakia concluded a bilateral treaty on the construction of a hydropower complex on the Danube, on the part of the river that represents the common border between these neighboring states. The joint project was considered an "invisible joint investment" for implementation for the benefit of both parties and

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[50] Association Agreement between the Republic of Moldova, of the one part, and the European Union and the European Atomic Energy Community, of the other part: 260/4 of 30 August 2014. In: Official Journal of the European Union, 2014.

[51] TARLOCK, A. D. *The role of non-governmental organizations in the development of international environmental law.* Chicago-Kent College of Law Review, vol. 68(1), 1992.

[52] HAYS, S. Three decades of environmental politics, in government and environmental politics. În: LACEY, M. *Government and environmental politics: essays on historical developments since World War Two.* Woodrow Wilson Center Press, 1989. p.325.

involved a cross-border dam system to prevent catastrophic flooding in riparian areas that would simultaneously improve the navigability of the river, produce electricity and conserve the environment. surrounding[53]. The parties undertook to take the necessary measures to ensure uninterrupted navigability on the international canal throughout the construction of the dam. In 1989, Hungary suspended work and Slovakia insisted that Hungary fulfill its treaty obligations. Slovakia and Hungary have asked the International Court of Justice (ICJ) to rule on the confusion over the strategic correctness of the next steps in resolving the conflict between states over the issue. In its judgment of 25 September 1997, the International Court of Justice called on both parties to continue negotiations in good faith to ensure that the objectives of the 1977 treaty were achieved, but Slovakia asked the Court to record the suspension of proceedings in 2017 and close the case, and Hungary did not oppose Slovakia's decision to end negotiations on a project to build the Gabcikovo-Nagymaros dam. States are obliged to resolve their disputes by peaceful means with a wide range of diplomatic and legal instruments for their settlement. Disputes over infrastructure elements are a significant category of international disputes in the aquatic field, but it is not unique. Another relevant example that should highlight the relevance of environmental issues to the field of international law is the case set out in the advisory opinion of the International Court of Justice on the legality of the use of nuclear weapons by a state in an armed conflict (1994). Although the uncertainty regarding the specific ban on the use of nuclear weapons was raised, in 2021 the UN Treaty on the Prohibition of Nuclear Weapons entered into force. Another moment that requires increased sensitivity is the regulation of the use of environmental modification tools. The European Parliament's report, presented in 1999, expressly acknowledged the danger of chemical weapons, so-called "non-lethal" weapons, technology influencing weather conditions and other elements of increased interest in international security from the perspective of its natural ecosystems and inhabitants.

The Intergovernmental Panel on Climate Change (IPCC) is an example of an institution whose legitimacy has aroused suspicion as its original composition did not cover the developing states. Other discussions on the legitimacy of IPCC reports stem from the lack of scientific consensus on the causes and direction of climate change. In the academic space, the tendency to contradict the general narrative presented by IPCC and environmental institutions in this sense is increasingly outlined, invoking the lack of rigor in the analysis of the complexity of the phenomenon of pollution and temperature oscillation. The new proposal for a regulation of the European Parliament and of the Council establishing a framework for achieving climate neutrality and amending the Regulation of the European Climate Law (EU 2018/1999), approved on 18.03.2020 Brussels, refers to the IPCC report in the wording The „*Special Report of the Intergovernmental Panel on Climate Change on the Impact of Global Warming*", and conflicting research, such as Professor Zharkova V. and others, states that cooling from 2030 for the next few decades. While in the panel of the COP26 Conference of the Parties organized by the United Nations (2021) with the meeting of world leaders, reference is made to *global warming* and *anthropogenic activity,* scientific articles examining the phenomenon of the *„great solar minimum"* and *solar activity* remain unexamined in policy documents. public. The existence of climate change is an axiom demonstrated by both boards, but the existence of a

[53] SZABÓ, M. Gabcíkovo-Nagymaros Dispute: Implementation of the ICJ Judgment. *Environmental Policy and Law*, 39(2) 97, 2009.

scientific consensus on the cause and direction of climate change is a statement that does not correspond to reality. If the action plans are based on pillars that do not start from the natural reality of climatic phenomena, then the result obtained can be, delicately speaking, the opposite of the result to which the team aspires.

Millennial climate change dependent on astronomical factors and the legislative framework of the Republic of Moldova for environmental protection are apparently different topics, but before examining the spectrum of public policies and regulations in this regard, we consider it necessary to explain the rationale for initiatives as well as the scientific narrative on which the legal changes that go beyond the current horizon are based. The ideological platform on which environmental policies, international agreements and global awareness-raising campaigns are argued today are aimed at a formulation that could essentially not correspond to the big picture, even if for this relatively short period of several decades, the arguments put forward contain the plausibility necessary for the autonomous perception of the sustainability of the concept of environmental protection.

The elaboration of an environmental governance mechanism has allowed the impregnation of the environmental impact assessment tool in the institutional development of several states and in the crystallization of the formation of the national environmental authorities. In the Republic of Moldova, before importing the institution *of environmental impact assessment* (EIA), *the* institution that met the same objectives and was positioned both in the field of law and in the practicality of implementation, in similar positions, is *ecological expertise*. Today, ecological expertise and environmental impact assessment are two separate institutions, but their history has common roots. Until 2014, before formulating Law no. 86 regarding the environmental impact assessment of 29.05.2014, the legislative act that we know today as Law no. 851 regarding the ecological expertise from 29.05.1996, had a different title and structure, so until 2014 law no. 851 was formulated „on ecological expertise and environmental impact assessment", from 2015 it remains only „on ecological expertise". Thus, from the analysis of legislative changes over the years, it is understood that the legislator decoupled the element of environmental impact assessment from ecological expertise, this being previously a component in the documentation stage necessary for the only existing institution - expertise.

The central element from which the Republic of Moldova began to expand its legal framework of normative acts to implement environmental policies, was in 2003 by Law no. 29 of 13.02.2003 when the Republic of Moldova acceded to the Kyoto Protocol to the UN Framework Convention on Climate Change, thereby assuring the Parliament that the central authority in the field concerned will ensure the implementation of the provisions of the Kyoto Protocol.[54]

In implementing the commitments made by acceding to the Kyoto Protocol to the United Nations Framework Convention on Climate Change, the Government of the Republic of Moldova decides to approve the National Strategy for Adaptation to Climate Change by 2020 and the action plan for implementing the strategy. The logistical inconsistency of the elaboration of normative acts and public policies in the field of environment is also of an operational

[54] Law on the Accession of the Republic of Moldova to the Kyoto Protocol to the United Nations Framework Convention on Climate Change: no. 29 of February 13, 2003. In: Official Journal of the Republic of Moldova, 2003, no. 48, art. 193.

nature. National and regional strategies in the environmental sub-domains do not correspond chronologically. Of course, this aspect (the need to coordinate environmental objectives chronologically) is not expressly specified in the legislation of the Republic of Moldova, but the legislator indicates the need to coordinate the content of strategies. Thus, it is necessary that the National Environmental Strategy (2014-2023) be the pillar of resistance for setting the objectives, for example, of the Water Supply and Sanitation Strategy (2014-2028), and this in turn should be the basis for the Program National Fund for the implementation of the Protocol on Water and Health in the Republic of Moldova (2016-2025), which is the reference for the Medium Term Expenditure Strategy in the field of water supply and sewerage, having in force at the same time the Sectoral Strategy for Water Management (2013 -2015) for a coincidence of 1 year. Fragile systems are known to be flexible, however procedural fluctuations must be resilient to ensure a stable ground for the development of serious projects of national interest. A brief examination of these cases of uncertainty crystallizes the need to meet the basic requirements for resolving regulatory inconsistencies.

Table 1. Chronological incongruity of public policy documents in the field of environmental protection, Republic of Moldova

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
National Environmental Strategy																				
Water Supply and Sanitation Strategy																				
National program for the implementation of the Protocol on Water and Health																				
Water management and hydro-improvement development program																				
Low emission development strategy																				
"Green" economy promotion program																				
Agricultural and rural development strategy																				
Climate change adaptation strategy																				
Waste management strategy																				
Biological diversity strategy																				
Radioactive waste management strategy																				
National plan for expanding areas with forest vegetation																				
National program on the establishment of the national ecological network																				
Soil conservation and fertility enhancement program																				
Action Plan of the Staged Halogen Suppression Program																				
Viticulture and vinification restructuring program (since 2002)																				
National Integrated Plant Protection Program																				
Action plan to control and prevent the spread of ambrosia weeds (Ambrosia artemisiifolia)																				

National program for monitoring pesticide residues and nitrate content in plant-based foods																				
Energy strategy of the Republic of Moldova																				
National Energy Efficiency Program																				
National strategy for regional development																				

Solving environmental security problems in a single state can only be successful at the local level, because the negative impact on the environment cannot be limited by the clear framework of state borders. Any human impact on nature is far-reaching, beyond the borders of a particular nation or state. Continuing the premise that the main feature that determines the importance of environmental security is the transboundary nature of environmental threats, environmental security is recognized by the international community as part of a unique system of international security.

One interpretation of the risks in examining the relationship of *international cooperation in the field of environment - national security,* is the awareness of the differences in the development of these variables. The legal framework of national security has a hierarchical character where the origin of the measures is the top of the administrative apparatus with actions oriented vertically downwards, and the legal framework of environmental protection has its origins in responding to ecological devastation requiring bottom-up measures. Here the concept of security can be approached through two scenarios of evolving social needs: the scenario of a coordinated intervention to respond in an orderly manner to an exceptional natural situation, or the scenario of a need for defense to respond to a threat with the intervention of climate weapons. Both scenarios can be analyzed in further research in the field of international environmental law.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The current research analyzed the framing of the concept of ecosystem in the normative framework of international and national level by examining the specialized literature and the legal provisions in the field of environmental protection.

In the *examination of the scientific researches of the concept of ecosystem as an aspect of the field of legal protection of the environment*, the tendency to popularize the requested subject was confirmed by intensifying the number of researches in the field, first at international level, and later the trend being reflected at national level. One aspect that is worth mentioning is that this popularity is recorded for researching the impact on the categories of natural resources separately, the concept of natural ecosystem as a system for integrating elements from nature is still poorly developed. In *identifying the international and national legal context in which the field of environmental protection is anchored*, it was found that the protection norms of nature components require coordination and systemic analysis. Thus, the need to interdisciplinary consolidation of environmental norms with other norms of international law, of international environmental law as a whole with other real sciences, as well as the re-examination of the practices of implementing public policies in the international field of environment was reaffirmed.

The analysis *of the ideological evolution of the ecological movement* revealed that although environmental protection initiatives started from the reasoning of the anthropocentric vision (environment for man), they escalated into a series of measures that today can be characterized mainly as having a biocentric ideological basis. for the environment). Understanding these macro-social ideological premises allows estimating the direction of development of the normative framework of international environmental law: reducing procedural flexibilities in carrying out economic activities (the objectives of the Paris Agreement are a relevant example in this regard). *The legal development of the concept of ecosystem* was registered decades after its *scientific* popularization, and the bridge was the need to formulate the management procedure of a natural area protected by the state. Therefore, the origin of integrating ecological principles recognized by the legislature was not in the legislative initiative, but the actors' requests that have responsibility for implementing large projects with direct impact on the environment. Thus, in the Republic of Moldova, by Government Decision, 3 major categories of ecosystems are recognized: natural, agricultural and urban ecosystems. Although natural and agricultural ecosystems are provided as separate types of biological diversity systems, we believe that the differences between them deserve further analysis, as the principles of natural dynamics in forest ecosystems may be partially reflected in vegetable ecosystems, if the state strategy is to promote organic farming and alternative solutions to improve the quality of natural resources.

The analysis of the national and international legal framework for regulating forest and land elements as part of the natural ecosystem confirmed that deforestation and damage to forest resources also affect the dynamics of aquatic resources, but also the habitat needed to maintain flora and fauna biodiversity. The intensification of turbulences in the dynamics of the natural processes of the environment is also registered due to the causal relationship between the components of the ecosystem. The adverse action on a component implicitly also harms another

element inherent in the ecological balance. National technical rules for forest resources management and forest management are well developed and cover a wide range of forestry elements, and they reflect the recommendations of European Union directives on how to harvest and transport timber products. From the perspective of the implementation of afforestation programs, the access of the Republic of Moldova to international support (technical consultation, project financing) is ensured, the execution impediment being derived in the local institutional capacities. An element of tangency between forest resources and the state of natural ecosystems is the forest curtain. We consider that this category - *forest protection curtains* is an element that deserves additional attention in the regulatory framework for environmental protection.

The analysis of the national and international legal framework for the regulation of aquatic elements as part of the natural ecosystem found several shortcomings in its field of regulation at the national level. These regulatory shortcomings are explained by the complexity of international regulations that are not uniformly transposed into domestic legislation, such as management and quality parameters for wastewater. We recognize that these issues can be clarified if the technical capacity of the relevant authorities is improved. For example, the Republic of Moldova today is not technically equipped with tools to test all necessary chemical, physical and microbiological parameters (as well as to detect nanoparticles) in the laboratories of government agents (to ensure consistency in issuing permits, conducting inspections, etc.). If this technical problem is solved, the Republic of Moldova will have the capacity to complete its normative framework according to international standards. Internationally, re-establishing the dialogue between the Moldovan and Ukrainian sides on the implementation of the sustainable management of the Dniester River basin is a positive step in the functioning of international cooperation instruments on transboundary aquatic resources management and environmental impact assessment for all stakeholders.

The normative framework knows an asymmetric *flexibility* in the *implementation of innovative concepts of natural ecosystem management*. The circular economy is a concept promoted in public policy documents and mainly aims at managing natural resources and waste in order to reduce the impact of human activity on natural ecosystems. This concept involves the introduction of proposals that will change the current way of managing natural resources from a technical point of view, and any change in the technical infrastructure has direct implications on the regulations that validate this engineering innovation. The asymmetry can be registered in several scenarios such as: the collision between the practices recognized by the regulatory framework and the new ones (weed eradication and cultivation of clean plants), different regulation of the same parameter (classification of organic mercury compounds as particularly dangerous in terms of environmental protection and as a harmless substance in terms of public health), essential transformations of key notions in the general provisions (the evolution of the definition of ethyl alcohol over time has allowed the attribution of this substance to different classes of products), the rigidity of the regulatory framework for situations based on nature (NBS) could be adopted (exaggerated complexity of safety criteria that conflict with the reasoning of the label "organic") etc. Another delicate example of an innovative proposal to address climate change is the merger of credit cards with the calculation of carbon emissions - the launch of a new credit card that monitors customers' carbon footprint and reduces their costs (frame lock) when the carbon indicator set by the algorithm The bank is reaching its peak, although this initiative is at an early stage of development, it is simultaneously promoted by the

World Economic Forum and by the consultants participating in the Conference of the Parties, COP26.

As the pace of developing innovative proposals goes beyond the capacity of the legal mechanism to regulate them instantly, the introduction of a flexible framework for accepting technological uncertainty is an inevitable step in the development of jurisprudence (especially in the international field). Therefore, in the context of technological uncertainty with un-estimated implications for the environment and the socio-economic body, we consider it necessary to manually examine each innovative initiative separately, and avoid introducing methodological templates recommended by international entities.

The research of international cooperation and disputes on the implementation of projects with a direct impact on the environment has shown that, in parallel with the intensification of international cooperation, the problem of legitimacy and positioning of international actors participating in such cooperation also increases. The stated advantage of the objectives underlying the strengthening of the international partnership in the field of environmental protection is known, but the risks of these interdependencies of government cannot be ignored. As the recognition of the absolute legitimacy of international actors reconceptualizes environmental issues as social and economic manifestations, international cooperation may degenerate into an authoritarian system of international governance, where the legal instrument for resolving disputes between States Parties may depart from procedural fairness. We consider it imperative to reanalyze all international recommendations, public policies and adjust the national regulatory framework, in terms of *security and national interest* - this strategic approach may be the subject of further research in the international field of the environment.

In the same vein, it is appropriate to *investigate the scientific reasoning on climate change reflected in public policy documents as a strategic basis for the development of international environmental law*, and this objective of current research has shown the absence of scientific consensus on the cause and the direction of climate change.

Thus, the *assessment of normative inconsistencies in the execution of national commitments in the field of environmental protection* , identified the logistical impediment of coordinating national strategies, programs and action plans for sub-categories of natural resources to strengthen the basic national strategy (National Environmental Strategy): the period of validity of national strategies and programs does not coincide and they have different deadlines for their conclusion and initiation. From a structural point of view, national strategies have the necessary normative consistency to cover the spectrum of needs in the field of environmental protection (except for the intercalation with the field of nanotechnology and the administrative aspect in order to diagnose the presence of nanoparticles in the environment). Therefore, we propose recommendations to adjust the normative framework that provides for the elaboration of public policy documents.

Recommendations:

The study focused on an extremely important topic, both at the international, regional and national levels of the states. The study has evolved over the years, which largely reflects the real situation in the field. We note those challenging trends facing nations in the context of ensuring environmental protection, which, we must admit, unfortunately do not have an adequate timely response from international law. However, international law, as well as national law, is a

conservative matter, which imposes certain "restrictions" on a rapid reaction to the situation. It is for these reasons that we have focused on national recommendations.

Current research has found an inconsistency between the main national public policy documents **at the national level**, namely the chronological shift of strategies, programs and action plans, which require mutual succession to formulate its objectives. In order to streamline the coordination of efforts to implement the necessary measures for environmental protection, we recommend that the following public policy documents be prepared in a coordinated manner in terms of the deadline. Currently, the *Strategy* presents the strategic direction of the Government for a period of 6-10 years, and the *Program* for 3-5 years is derived from the strategy (according to Government Decision no. 386 of 17.06.2020). Therefore, we propose to change the formula for setting the deadline for planning public documents in a fixed model - 2030. At the same time, this change corresponds to the National Development Strategy „Moldova 2030".

1. Government Decision no. 386/2020 *on the planning, elaboration, approval, implementation, monitoring and evaluation of public policy documents* (published in the Official Gazette no. 153-158 on 26.06.2020), to be amended as follows:

1.1. Section 1. Point 7. with the following content: *"**(1)** The strategy is a public policy document that defines and plans the long-term government policy **(up to 10 years)** in one or more areas of Government activity, established according to Law no. 136/2017 regarding the Government. **(2) The strategy will be elaborated for a term until 2030"*.

1.2. Section 2. Point 9. " ***1. The** program is a medium-term public policy document **(up to 5 years)**, which derives from the strategy and, respectively, contributes to its implementation by detailing and concretizing the actions to be carried out. in a field or subdomain of activity*. ***(2) The program will be elaborated on a term no later than 2030.***"

Thus, the principle of deriving public policy documents is respected. As *the national development plan is updated annually* (p.24 Government Decision no. 386/2020), it does not require major changes. It is provided that the national plan is an action planning document for a period of 3 years, but stipulating the possibility of updating it cyclically, will allow coordinating the content of the national plan to the objectives of the new program developed after 2030. Currently, the National Environmental Strategy is foreseen until 2023, and according to our recommendations, the new Environmental Strategy of the Republic of Moldova will be developed for the period 2024-2030. The Republic of Moldova extends its legal framework for regulating relations between subjects that have an impact on the environment in their activity, and to streamline this process, the legislator proposes national strategies and programs of activities by category of natural resource and area of influence (water supply, sanitation, waste management, expansion of areas with forest vegetation, etc.). The current analysis demonstrated the chronological gap in the formulation of these strategies, which does not allow an effective symbiosis to coordinate these measures. Although this requires only an operational adjustment, its implications go beyond bureaucratic reasoning - if national strategies for separate categories of natural resources are developed in unison and linked to the National Environmental Strategy simultaneously, as well as to the country's Development Strategy, they would immediately and balanced crystallizes the requirements necessary for the development *of the natural ecosystem* of the Republic of Moldova as a complex and interconnected system of elements of nature, where interventions are harmoniously coordinated.

2. Forest curtains along roads and agricultural sectors are imperative to ensure the viability of natural ecosystems. They play an important role both in drought situations and in frosts or soil erosion. Thus, one of the factors reducing crop yields in agricultural sectors is the absence or neglect of forest curtain protection.

It is proposed to introduce additional wording and make changes in the following situations:

Law no. 1515/1993 on environmental protection (published in the Official Gazette no. 10, 1993), to be completed as follows:

1. Art. 40, to introduce the phrase „*land for agricultural use*" after listing the categories of areas for which sanctions are provided in case of damage to the forest curtains associated with them.

2. Art. 62, to introduce the phrase „*lands with agricultural destination*".

Accordingly, it is necessary to connect the rule of the Contravention Code that refers to these provisions:

Contravention Code of the Republic of Moldova no. 218/2008 (published in the Official Gazette no. 78-84), to be completed as follows: Art.127, para.1, to introduce the phrase „*including agricultural lands*".

In order to streamline the legislator's attempt to raise awareness among farmers about the need to manage and maintain forest curtains, not only related to roads and those for the protection of agricultural land, it is proposed to introduce provisions in this regard:

Law no. 276/2016 on the principles of subsidization in the development of agriculture and rural environment (published in the Official Gazette no. 67-71), to be completed as follows:

In Chapter IV, Planning and establishing subsidy support measures, Priority II. Ensuring the sustainable management of natural resources, to introduce: point ***g) stimulating investments for the restoration of forest curtains of agricultural lands***. However, it can be stated that point e) *supporting the promotion and development of organic farming* is already compatible with the primary intention and contains the essence needed to include this component in the project description in the grant applications assigned to this measure.

In Article 21 (5) (c), to be supplemented with the wording „*including ensuring the restoration of forest curtains on agricultural land*" as „*5. In order to benefit from the right to direct payments, applicants must: c) comply with the agricultural and environmental conditions,* ***including ensuring the restoration of forest curtains on agricultural land"***.

The forest elements represent an essential component of the natural ecosystems, as they become the shelter of different species of fauna, they allow the proper development of the dynamics of the other elements of the infrastructure in order to maintain the ecological balance.

4. At international or regional level, multilateral cooperation is needed, which would allow for the focus of joint efforts to achieve the objectives promoted by international agreements.

4.1. We refer to the interstate agreements that aim to ensure the objectives promoted by the states in the field of the nominated field.

4.2. We also have in mind the regulations set out in European Union regulations and directives, the implementation of which is an argument for linking European standards for non-EU states in the implementation of national policies at regional level.

Internationally, for the preparation of the next report of the Intergovernmental Panel on Climate Change (IPCC) created by the United Nations Environment Program (UNEP), we

recommend to introduce for analysis at which also participate experts from disciplines adjacent to those examined, topics such as „solar activity and climate change” and „classification of weather modification technologies and their impact on natural ecosystems”. As the results of the IPCC reports are a key contribution to international negotiations, representing a bridge between public policy and the real sciences, with a recognized international prestige and the claim of a source of information with the highest credibility index, to further validate its position in front of international actors, the conclusions they present must cover the full spectrum of factors that can influence the environment, including those that exceed taxpayers' capacities. The field of legal protection of natural ecosystems follows the strategic direction presented by contemporary trends in the field of international environmental law, which in turn is influenced by the implications of the IPCC reports.

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LIST OF PUBLISHED SCIENTIFIC PAPERS
on the topic of the doctoral thesis, author Mărgineanu Elena

1. Article in scientific journals

1.1. In journals from other databases accepted by ANACEC (with indication of the database)

1. **MĂRGINEANU, E**. *Implementation of Innovative Engineering Solutions in Moldova Through the Prism of the Existing Legal Framework*. Circular Economy and Sustainability, 1-17, 2021. DOI: 10.1007 / s43615-021-00062-9. Journal indexed in the SPINGERLINK database. https://link.springer.com/article/10.1007/s43615-021-00062-9
2. **MĂRGINEANU, E**. *Institutional adaptation in environmental domain: the case of Moldova* (Doctoral dissertation, Тернопіль: Вектор), Law Journal of National Aviation University from Kiev, 2020. ISSN: 2307-9061. UDC 340 (043.2). Journal indexed in the INDEX COPERNICUS (IC) database. https://dspace.nau.edu.ua/bitstream/NAU/41786/1/5.%20Margineanu%20Elena.%20INSTITUTIONAL%20ADAPTATION%20IN%20ENVIRONMENTAL%20DOMAIN%20THE%20CASE%20OF%20MOLDOVA..pdf
3. **MĂRGINEANU, E.** *Oscillating policy focus between agriculture and protected areas within environmental lav in Republic of Moldova*. Law Journal of National Aviation University from Kiev, 2020. ISSN: 2307-9061. UDC 340 (043.2). Journal indexed in the INDEX COPERNICUS (IC) database. https://dspace.nau.edu.ua/bitstream/NAU/46862/1/Elena%20Margineanu.pdf
4. **MĂRGINEANU, E**. *Legal protection of forest elements in natural ecosystem: classification from Republic of Moldova.* Law Journal of National Aviation University from Kiev, 2020. ISSN: 2307-9061. DOI: 10.18372 / 2307-9061.57.15037 UDC: 349.6 (045). Journal indexed in the INDEX COPERNICUS (IC) database. . http://law.nau.edu.ua/images/Nauka/Naukovij_jurnal/2020/4-57/3.pdf

1.2. In journals from the National Register of profile journals (indicating the category)

1. **MĂRGINEANU, E**, MĂRGINEANU, L**.** *Special use of water and protection of transboundary watercourses*. University Legal Studies, *41* (1-2), 53-56, 2018. ISSN: 1857-4122. UDC: 349.6. Category "B" Magazine, indexed in the INDEX COPERNICUS (IC) database, HEIN ONLINE, DOAJ. https://ibn.idsi.md/sites/default/files/imag_file/53-56_24.pdf
2. **MĂRGINEANU, E**. *Legal protection of aquatic resources in natural ecosystems of the Republic of Moldova*. University degrees, *51* (3-4), 182-199, 2020 ISSN: 1857-4122. DOI: 10.5281 / zenodo.4608340 UDC: 349.6. Magazine Category "B" indexed in the database INDEX COPERNICUS (IC) HEIN ONLINE, DOAJ. https://ibn.idsi.md/sites/default/files/imag_file/182-199.pdf

2. Articles in the works of scientific events included in the Register of materials published on the basis of scientific events organized in the Republic of Moldova

1. **MĂRGINEANU, E.** *The legitimacy of international governance, aligning the interests of environmental protection*. In: Science domestic legal in terms of values and European traditions, p. 71-75, 2018. ISBN: 978-9975-3471-1-2. UDC: 341 1/8. https://ibn.idsi.md/sites/default/files/imag_file/71-75_19.pdf
2. **MĂRGINEANU, E**. *Environmental impact assessment for small-scale intervention projects funded by EU and US donors*. Scientific Bulletin of the State University "Bogdan Petriceicu Hasdeu" from Cahul: Social Sciences, (2), 25-33, 2019. ISSN: 2345-1858. UDC: 574: 349.6. Journal indexed in the DOAJ database. https://ibn.idsi.md/sites/default/files/imag_file/25-33_2.pdf

ADNOTARE

la teza de doctorat în drept a dnei Mărgineanu Elena „**Protecția juridică a ecosistemelor la nivel internațional și național: tendințe contemporane**”, Universitatea Liberă Internațională din Moldova, Chișinău, 2022

Structura tezei: Introducere, patru capitole, concluzii generale și recomandări, bibliografie din 324 titluri, 12 anexe, 160 pagini text bază. Rezultatele obținute sunt publicate în 8 lucrări științifice.

Cuvinte-cheie: ecosistem natural, drept internațional public, drept internațional al mediului, evaluarea impactului asupra mediului, dinamica ecosistemului, politici de mediu.

Domeniul de studiu: 552.08 - Drept Internațional și European public.

Scopul lucrării. Lucrarea analizează interconectivitatea elementelor din ecosistem și protecția juridică a mediului, având ca *scop* elaborarea de recomandări privind perfecționarea cadrului normativ de reglementare a activității care vizează modificarea mediului, îmbunătățirea cadrului strategic de ancorare a politicilor naționale de mediu, și de a propune soluții practice de implementare a novațiilor științifice în domeniul protecției ecosistemelor naturale.

Obiectivele lucrării. *Obiectivele* propuse sunt analiza corepondenței nivelelor de cercetare cu cele de reglementare normativă, de identificare a legăturilor interdisciplinare între dreptul internațional al mediului, alte ramuri de drept, precum și compatibilitatea normelor de protecție a mediului per componente separate și analiza acestora prin prisma unui ecosistemu integru.

Noutatea și originalitatea temei. *Noutatea* derivă din caracterul interdisciplinar al analizei și a recomandărilor practice propuse care nu se regăsesc ca obiect de cercetare în literatura națională de specialitate. *Originalitatea* cercetării constă în combinarea metodei metaeuristice și cea transdisciplinară per elemente separate de resurse naturale și racordarea constantă a acestora la obiectul de cercetare – reglementarea juridică a ecosistemului natural.

Rezultatele obținute care contribuie la soluționarea problemei științifice. Rezultatele obținute au schițat complexitatea interdisciplinară a managementului ecosistemelor naturale prin prisma normelor juridice la nivel internațional și național. Astfel, problema încadrării juridice a protecției ecosistemelor, în cercetările ulterioare, va fi tratată simultan intradisciplinar și prin suprapunerea nivelelor de aplicare.

Semnificația teoretică. Cercetarea curentă, prin expunerea identificării unor legături interdisciplinare și de fenomene sistemice cu origine anterioară elaborării cadrului normativ curent, solicită o reevaluare strategică a recomandărilor de protecție a mediului prin prisma securității naționale.

Valoarea aplicativă a lucrării. Adoptarea recomandărilor normative propuse în secțiunea finală a cercetării, și mai ales, implementarea acestora în practică, poate avea un impact pozitiv de reechilibrare a ecosistemelor naturale în sectoarele prelucrate agricol din Republica Moldova.

Implementarea rezultatelor științifice. Rezultatele științifice au fost publicate în Republica Moldova, Ucraina, precum și prezentate la conferința „Cicluri Închise” în Elvenția, iar soluțiile de redresare ecologică identificate pe parcusul cercetării curente au dat naștere celui mai mare proiect de permacultură din țară - ceea ce reprezintă un precedent unic și necesar pentru Republica Moldova.

ANNOTATION

to the doctoral thesis in law of Ms. Mărgineanu Elena **"Legal protection of ecosystems at international and national level: contemporary trends",** International Free University of Moldova, Chisinau, 2022

Thesis structure: Introduction, four chapters, general conclusions and recommendations, bibliography of 324 titles, 12 annexes, 160 pages of basic text. The results obtained are published in 8 scientific papers.

Keywords: natural ecosystem, public international law, international environmental law, environmental impact assessment, ecosystem dynamics, environmental policies.

Field of study: 552.08 - Public International and European Law.

The purpose of the paper. The paper analyzes the interconnectivity of elements in the ecosystem and the legal protection of the environment, with the aim of developing recommendations on improving the regulatory framework for activity aimed at changing the environment, improving the strategic framework for anchoring national environmental policies, and proposing practical solutions of scientific innovations in the field of protection of natural ecosystems. **The objectives of the paper**. The proposed objectives are the analysis of the correspondence of research levels with those of normative regulation, identification of interdisciplinary links between international environmental law, other branches of law, and the compatibility of environmental protection norms by separate components and their analysis through an integrated ecosystem.

The novelty and originality of the theme. The novelty derives from the interdisciplinary nature of the analysis and the proposed practical recommendations that are not found as an object of research in the national literature. The originality of the research consists in combining the metaheuristic and the transdisciplinary method by separate elements of natural resources and their constant connection to the object of research - the legal regulation of the natural ecosystem.

The results obtained that contribute to solving the scientific problem. The results obtained outlined the interdisciplinary complexity of natural ecosystem management in terms of legal norms at international and national level. Thus, the issue of the legal framework of ecosystem protection, in subsequent research, will be addressed simultaneously intradisciplinary and by overlapping application levels.

Theoretical significance. The current research, by exposing the identification of interdisciplinary links and systemic phenomena with origin prior to the elaboration of the current normative framework, requires a strategic re-evaluation of the environmental protection recommendations through the prism of national security. **The applicative value of the paper**. The adoption of the normative recommendations proposed in the final section of the research, and especially, their implementation in practice, can have a positive impact of rebalancing the natural ecosystems in the agricultural processed sectors of the Republic of Moldova.

Implementation of scientific results. The scientific results were published in the Journals from Republic of Moldova, Ukraine, as well as presented at the "Closed Cycles" conference in Switzerland with subsequent publication in Circular Economy and Sustainability Journal, and the ecological recovery solutions identified during the current research gave rise to the largest permaculture project in the country - which is a precedent unique and necessary for the Republic of Moldova.

ELENA MĂRGINEANU

LEGAL PROTECTION OF ECOSYSTEMS AT INTERNATIONAL AND NATIONAL LEVEL: CONTEMPORARY TRENDS

SPECIALTY: 552.08 - PUBLIC INTERNATIONAL AND EUROPEAN LAW

Summary
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