ABSTRACT
doctoral dissertation for the degree of Doctor of Philosophy (PhD)
within the educational program «8D04203 – Jurisprudence»
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on the topic «Legal Regulation of Digitalization in the Sphere of Environmental Protection»

General Overview of the Dissertation

The dissertation is devoted to the examination of legal aspects of environmental protection in the Republic of Kazakhstan in the context of the digital transformation of contemporary society. The study examines theoretical and applied issues related to the use of digital technologies within the ecological management system, and analyzes their impact on the development and enhancement of environmental legislation.

The dissertation presents a comprehensive investigation of the digitalization processes in contemporary society, elucidating the essence of the concepts of 'digitalization,' 'digital transformation,' 'digital society,' and 'digital technologies.' Significant attention is devoted to the issues of developing digital legislation in the Republic of Kazakhstan, as well as to defining the place and role of digital law within the framework of modern legal systems. The author put forward a proprietary framework of digital law and examined its interaction and relationship with environmental law.

The study analyzes the mechanism of state environmental governance in the Republic of Kazakhstan, elucidating its organizational, functional, and legal characteristics. Particular attention is given to the examination of the legal foundations for the application of digital technologies and artificial intelligence systems in the field of environmental protection, as well as their importance for enhancing the effectiveness of state environmental governance bodies.

The dissertation research also examines international experience in the legal regulation of the use of digital technologies in environmental protection, including the practices of the European Union, the United States of America, and several Asian countries. Based on the conducted comparative legal analysis, proposals and recommendations have been formulated for the enhancement of the environmental and digital legislation of the Republic of Kazakhstan.

Relevance of the research topic.

The relevance of this dissertation research is driven by the rapid development of digital technologies and their widespread adoption across all areas of public life. Today, economic, political, and legal processes are largely linked to the use of digital solutions, which significantly transform the operations of government institutions and management mechanisms.

In the Republic of Kazakhstan, digitalization is recognized as one of the key priorities of state policy. Following the initiative of the President of the Republic of Kazakhstan, several strategic programs are being carried out to promote digital transformation, modernize the national economy, enhance the efficiency of government administration, and develop the social sector.

A key milestone in establishing national digital legislation was the adoption of the Digital Code of the Republic of Kazakhstan on January 9, 2026, which consolidated legal regulations concerning the use of digital technologies. The adoption of this regulatory act marks the establishment of a new legal framework that influences the regulation of social relations across various sectors, including environmental law.

Modern environmental activities in the Republic of Kazakhstan increasingly employ digital technologies, various information systems, software platforms, and artificial intelligence–based solutions. These tools are used in environmental monitoring, controlling the use of natural resources, processing and managing environmental information, as well as facilitating interaction among government agencies, natural resource users, and the public.

Digital tools are integrated into the electronic government management system, including the information resources of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, which operate within the framework of the "Digital Government" system. Their use helps increase the efficiency of environmental management and provides wider access for citizens to environmental information.

At the same time, the development of digital technologies in the environmental protection sector is accompanied by a number of legal and organizational challenges. Current environmental legislation does not fully regulate the rules and conditions for the use of digital technologies in environmental activities. Similar gaps can be found in several sectoral natural resource laws.

At the same time, digital legislation still insufficiently addresses the environmental aspects of applying digital technologies, including the impact of electronic devices, information and communication systems, and artificial intelligence technologies on the environment.

The scientific and theoretical issues concerning the relationship between digital and environmental law, the establishment of the legal status of digital technologies in environmental activities, as well as the delineation of the authority of government bodies in digital ecology, remain highly relevant.

These factors create a clear need for a comprehensive scientific investigation into the legal aspects of environmental protection amid digitalization. The importance of this topic lies in its contribution to the advancement of legal science, the refinement of environmental legislation, and the improvement of the effectiveness of state environmental governance.

The purpose and objectives of the dissertation research.

The aim of the dissertation research is a comprehensive examination of current environmental and digital legislation, along with the practice of applying digital technologies in environmental protection, in order to develop scientifically grounded theoretical conclusions and practical recommendations aimed at enhancing the governmental legal framework for environmental management.

To achieve the stated aim, the dissertation formulates and addresses **the following tasks**:

– to analyze the theoretical foundations and legal nature of the processes of digitizing social relations;

– to define the concept of digital law and determine its place within the legal system of the Republic of Kazakhstan;

– to identify the features of interaction and the relationship between environmental and digital law norms;

– to examine the current mechanism of state environmental management and identify issues in its functioning;

– to review the legal framework for the use of digital technologies in environmental management;

– to study issues related to ensuring digital and environmental rights of citizens;

– to analyze foreign experience in the legal regulation of the application of digital technologies in environmental protection;

– to formulate proposals and recommendations for the further improvement of the environmental and digital legislation of the Republic of Kazakhstan.

Object and Subject of Research.

The object of this dissertation research is the social relations in the field of environmental protection that are formed and develop in the context of the use of digital technologies.

The subject of this study is the norms of environmental and digital legislation that regulate the activities of government authorities, as well as the legal mechanisms of state governance in the field of environmental protection.

Methodological foundation of the study.

The methodological foundation of this dissertation is comprised of a set of general scientific and specialized legal methods of research. During the study, formal-legal, historical-legal, and comparative-legal methods were applied, along with other scientific approaches commonly used in legal research. Their application enabled a comprehensive analysis of the legal aspects of digitalizing the environmental management system, identified existing challenges in legal regulation, and outlined key directions for improving the current legislation.

The scientific novelty of this dissertation lies in the comprehensive analysis of legal issues concerning environmental protection amid the development of digital technologies. This work establishes theoretical approaches to the formation of digital law within the contemporary legal system of the Republic of Kazakhstan, highlights its interaction with environmental law, and proposes directions to enhance the government mechanism of environmental management through the use of digital technologies.

The theoretical significance of the study lies in advancing scientific understanding of digital law, refining its content, and identifying the characteristics of its relationship with environmental law.

The practical significance of the work resides in developing proposals and recommendations aimed at improving the environmental and digital legislation of the Republic of Kazakhstan, as well as enhancing the effectiveness of the state environmental management system.

The research conducted on the theoretical and practical aspects of environmental protection law in the Republic of Kazakhstan amid digitalization has allowed for the formulation and submission of the following scientific theses, **conclusions, and results**:

1. At the present stage, the Republic of Kazakhstan has implemented an extensive array of state programs, strategic concepts, and normative legal acts aimed at regulating the use of digital technologies in the socio-economic and socio-political spheres. The process of developing the legal framework for digitalization went through several sequential stages and is now systematically consolidated and codified through the adoption of the Digital Code of the Republic of Kazakhstan. This allows us to draw the conclusion that a new branch of legislation—digital legislation—is emerging within the national legal system.

Digital legislation refers to the body of normative legal acts that regulate social relations involving the collection, storage, processing, search, transmission, and provision of information through specialized technical devices and communication networks operating on the basis of digital technologies.

2. At present, the legal system of the Republic of Kazakhstan has developed a relatively stable and coherent group of social relations that constitute an independent subject of legal regulation — digital legal relations. These relations are characterized by specific features of legal regulation, including a distinct method of legal influence, a defined set of legal sources, and a hierarchically organized system of normative acts. The presence of these features indicates the emergence of an independent legal institution — digital law.

Considering that the object of digital legal relations is information presented in digital form, digital law can be defined as a legal institution within the structure of the comprehensive field of information law. It comprises a set of legal norms regulating social relations arising during the collection, processing, accumulation, storage, search, dissemination, and use of information expressed in digital form and transmitted through information and communication systems and networks.

3. Analysis of current environmental practices shows widespread use of digital technologies to solve environmental protection challenges. This lays the groundwork for integrating digital law standards into environmental legislation to ensure effective regulation of the corresponding legal relations. At the same time, issues arise regarding the negative environmental impact of digital technologies, such as the generation of electronic waste, high and repeated electricity consumption, as well as climate change caused by the intensification of the greenhouse effect.

These circumstances highlight the need to incorporate environmental regulations into digital legislation and to apply the principles of environmental law in the regulation of digital legal relationships. The relationship between environmental and digital law is reflected in their interdependence and mechanisms of mutual regulation.

4. The existing system of state legal regulation of environmental protection in the Republic of Kazakhstan is characterized by elements of structural and normative deficiencies. The adoption of digital technologies can substantially increase the

operational effectiveness of environmental management authorities. Modernization of the system is proposed in the following directions:

- enhancement of legislative regulation concerning the powers of executive authorities with general competence in the ecological sphere, aligning them with the requirements of environmental legislation;

- the organizational and functional integration of the activities of various ministries responsible for managing the protection and sustainable use of natural resources within a unified state authority;

- the digitization of environmental protection management functions, including environmental monitoring, maintaining the environmental cadastre, conducting environmental impact assessments, regulating the right to use natural resources, and pollution control;

- the development and adoption of regulatory legal acts governing the digitalization of functions and methods of state environmental management.

5. The first step in digitizing the environmental protection system in the Republic of Kazakhstan should be the development and implementation of the 'Unified Digital Environmental Platform' under the Ministry of Ecology and Natural Resources. Unlike the ministry's existing digital systems, which regulate individual processes such as monitoring, expertise, and control, this platform envisions the creation of a unified digital solution. It enables the collection, processing, systematization, aggregation, and storage of large volumes of environmental data, serving as the foundation for carrying out management functions in environmental governance.

6. The digitalization of public administration in environmental protection is significantly transforming the forms and methods of work of public environmental organizations, encouraging civic environmental activism, and offering new technical opportunities to implement and safeguard digital environmental rights. Active citizen participation can be facilitated by expanding access to environmental information through the development and operation of the digital platform, the Unified Information System for Protecting Citizens' Environmental Rights.

7. A comparative analysis of international experience in environmental protection under digitalization, conducted using examples from several developed countries, revealed significant differences in approaches to legal regulation. The development level of environmental and digital legislation, its legal forms and content, as well as institutional support, vary across different legal systems.

Particular attention should be given to the positive experience of the United States of America, several Asian countries, and especially the member states of the European Union. This experience was made possible by the transformation of state environmental agencies' operations, including the migration of their functions and key environmental management institutions into the digital realm through the use of artificial intelligence technologies.

An example of successful European practice is the adoption of comprehensive regulatory frameworks that integrate environmental and digital regulation aspects.

Validation of research findings.

The research findings were validated through the applicant’s publications and presented as scientific reports and presentations at international and national conferences and seminars focused on ecology and digitalization, including: 'First Academic Hearings on the Draft Law of the Republic of Kazakhstan "On Artificial Intelligence"' (Almaty, 2025) and 'Contemporary Challenges and Prospects for the Development of Environmental Legislation in the Context of Digital Transformation' (Almaty, 2025). The scientific results were also presented at a seminar during an internship at Tallinn University of Technology (Estonia, 2025).

The doctoral candidate was a member of a scientific group within the framework of mega-grant BR 21882302 'Kazakhstani Society in the Context of Digital Transformation: Prospects and Risks.' The recommendations developed were utilized in preparing the project titled 'Concept for Enhancing Efficiency and Building a Digital Trust Environment in Modern Kazakhstan for 2025–2030.'

The doctoral candidate took part in a working group meeting of the Mazhilis of the Parliament of the Republic of Kazakhstan during the discussion and preparation of the draft Digital Code of the Republic of Kazakhstan, where he received valuable recommendations that were incorporated into his publications and scientific reports.

Completeness of the publication of dissertation materials in print. The scientific results of the dissertation candidate are presented in 5 author publications, including: 1 article in an international journal indexed in the Scopus database; 3 articles in scientific journals recommended by the Committee for Quality Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan; and a section in the collective monograph 'Digital Society and Law' (Almaty, 2024).