

Current legal issues of digitalization of environmental protection: a view from Russia

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Abstract

The article deals with the generally accepted category of digitalization with respect to the goals and objectives of legal protection of the environment. In terms of the Russian legislation and the scientific doctrine, it is proved that public authorities pay the main attention to economic and technological aspects of digitalization, which does not meet the basic environmental needs of the modern state and society. The authors propose a classification of the main digitalization areas of environmental protection, including the industry, agriculture, transport, waste management, organization of environmental monitoring, etc. They note that, despite all its obvious advantages, digitalization also poses a particular threat to the environment, which requires a range of preventive measures. Since national legal systems pay now insufficient attention to the regulation of the use of digital technologies in the area of environmental protection, the authors propose a range of measures to develop the national environmental legislation.

Keywords: digitalization, climate, ecology, transport, power industry

Introduction

Globalization and technology development processes now lead to the transition of various educational, industrial, medical, agricultural and other processes to the internet. This directly affects the prospects of environmental protection in terms of the establishment of remote means controlling emissions of enterprises, use of digital technologies for the monitoring of environmental protection, etc.

The development of digital technologies is closely related also to the implementation of modern concepts of interaction between man and nature, including the concept of a „green” economy and the concept of sustainable development. The achievement of the Sustainable Development Goals (SDGs) set

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by the United Nations in 2015 will be hardly possible without the development of digital technologies improving the environmental protection of the climate and the effectiveness of the protection of the environment of cities. The development of digital technologies in the field of environmental protection was significantly affected by the coronavirus pandemic that paralyzed the work of many industrial enterprises (which led to the reduction of emissions and discharges and the improvement of the state of the environment) and raised new questions about the need to decrease human impact on nature.

In these conditions, the role of (both international and national) law as the main regulator of social relations increases since it bears all the burden of practical implementation of principles and recommendations adopted by the United Nations. There is again the question discussed for a long time and related to the provision of nature protection technologies and equipment by developed countries to developing countries, and this issue has not been fully resolved yet. In Russia, the role of law now comes down primarily to the settlement of certain issues in the field of the digitalization of the economy (contract law, digitalization of agriculture), as well as the digitalization of management, education and some other areas of life. In addition, digitalization, in its turn, also affects the ideas about law; it undergoes changes in form, content, system, structure and its mechanism of action.

In this regard, it is necessary to study the measures which will enable such digital technologies as artificial intelligence, 5G, cloud and edge computing, as well as the internet of things, to accelerate and maximize the possibilities of the state and law in the fight against climate change and for nature protection. At the same time, the idealization of digital technologies as a means of nature protection should be avoided. Digital technologies themselves are not necessarily good or bad but they can have both a direct and indirect impact on the state of the environment, which especially manifests itself within the framework of new approaches to biodiversity conservation, development of renewable energy and in the field of disaster management.

Based on the foregoing, in the first part of the article, we will study the concept „digitalization” itself, which is mentioned in a number of international and national legal acts, and consider its scope and significance for legal protection of the environment. In the second part of this article, we will provide an overview of doctrine views on the main areas of digitalization, including in the field of environmental protection. In the third part of this article, we will propose a classification of the main areas of digitalization of environmental protection and, in addition, we will try to show both its positive aspects and negative (adverse) effects. Finally, in the fourth part of this article, we will study the practical situation in the field of digitalization of environmental protection in Russia, its main trends and prospects.

1. Concept „digitalization”, its scope and significance for legal protection of the environment

There is no generally accepted definition of digitalization in modern science. Some authors believe that digitalization is a trend of effective world development that meets particular requirements – it covers business, the production process, the scientific sector, the social sphere and the ordinary life of citizens, and it is also accompanied by the effective use of its results, which are available not only to experts, but also to ordinary citizens (Bessonov, 2019, p. 778). Other authors pay attention to the fact that digitalization is a „process of transformation of areas of the socio-economic structure and social life with the purpose of using the current level of the world informatization as effectively as possible” (Simenko and Chausova, 2020, p. 34). A third group of scholars note that „digitalization is a process which involves the use of digital technologies and digitized data to transform business processes, business models and business operations” (Kudryavtseva and Kozhina, 2021, p. 150). A number of other definitions of digitalization, which are quite similar in the meaning, are proposed (Cherevko and Shepelev, 2019, p. 135). From this brief overview, it follows that Russian researchers place the main emphasis on informational and socio-economic aspects of digitalization, which is also confirmed by the position of the Russian state adopting special legal acts regulating primarily these issues.

Meanwhile, we think that the term „digitalization” must be understood in a broader context. This comprehensive category covers many legal, economic, management and informational processes aimed at improving both the efficiency of addressing global (including environmental) challenges and the living conditions of people. Further we will use this term in this sense.

The emergence of the term „digitalization” and the first regulations governing its certain manifestations caused the discussion about the role of law in its development. In fact, the modern growth of information volumes, development of information arrays and databases in the economic, environmental, social and other areas of people's life inevitably raises the question of the peculiarities of legal regulation of this new reality.

At the same time, law is not only a means for regulating the information relations in society but also an object of their impact, undergoing changes of its own form, content, and structure under the influence of digitalization. New legal technologies emerge and develop – legal experiment, legal monitoring, digital registration of certain legal facts (electronic employment record book, the Unified State Register of Rights to Immovable Property), regulatory impact assessment, and a number of other technologies (Khabrieva, 2018, p. 88). The emergence of legal reference systems, which include texts of regulations and materials of judicial practice is very important for the digitalization of law in many countries. In this

regard, it is necessary to mention the „intersection points” of environmental law and digitalization:

1) In the modern world, there is a process of digitalization of subjects of law, which manifests itself in their increasing presence in cyberspace as well as in identification problems (Talapina, 2018, pp. 7-8). The latter aspect becomes more and more urgent every year (even out of the context of the coronavirus pandemic, which made many aspects of interaction between citizens and authorities move online), in particular, within the regulation of electronic inquiries on environmental issues sent by citizens to authorities, the development of new technologies for obtaining complete, reliable and timely environmental information, participation of the public in the process of making environmentally significant decisions (regulated in detail by the 1998 Aarhus Convention), and in the long run, with the development of digital technologies, also within the participation in electronic court sessions, including those concerning protection of environmental rights of citizens. Therefore, the problem of appropriate identification of the subject is directly connected with the exercise and protection of human rights. To resolve this problem, many countries make particular efforts, which can be defined as a strategy for e-government development (Pavlenko, 2012, pp. 552-555; Magomedov and Ivanov, 2020, pp. 316-319; Sulimin, 2020, p. 89). In particular, within the settlement of this issue, Russia has adjusted the system of interagency electronic interaction, created multifunctional centres facilitating document circulation, so we can observe the development of basic state information resources, provision of common services, for example, identification and authentication (Kartskhiya, 2018, p. 37).

2) The emergence of new threats. Ideas of security (including environmental one), the main methods and means to ensure it gradually change in the digital era. For example, modification of environmental terrorism threats appears inevitable since, for instance, for an accident at a nuclear power plant now it is not necessary to place a bomb under it – it is possible to make interruptions or even initiate accidents at any technologically hazardous facilities by means of cyberattacks. In its turn, this gives rise to the need for all countries to build a new system of environmental security elements resulting from the threats in the digital era.

3) The development of the system of online shops not only makes life of citizens more comfortable but also encourages the development of the sector of environmentally friendly goods and services. In particular, it is more profitable for farmers to sell their organic products directly to citizens, avoiding large supermarket chains aimed at wholesale purchase of large consignments of goods from regular suppliers.

4) Along with the development of trade, digital technologies make it possible to enhance activities related to agreements also in all other areas, including agreement relations in the field of environmental protection. In particular, this expands the possibilities for electronic the conclusion of „environmental

agreements” – for removal of waste, ecotourism, environmental insurance, etc. (Zlobin, 2011; Malysenko, 2004).

5) Digital technologies can change the operation of the bank sector of the economy, which will lead to the emergence of the „green bank” phenomenon. By means of digital technologies, banks can reduce the risks of providing loans for projects that pollute the environment. They can be interested also in the prospects of financing environmentally friendly production, the use of renewable energy sources, etc., which can be of benefit not only to the bank itself but also to society and the environment (Bespalov and Antonenko, 2019, p. 146). The need to develop digital technologies is noted not only in Russia. For example, to measure the level of achieved digitalization in a country, the European Commission developed the Digital Economy and Society Index that summarizes indicators related to the digital performance and digital competitiveness of the EU member states. It is compounded of a set of indicators related to the digital policy mix, which some authors have compared with some other global approaches like the Global Entrepreneurship Index (Ordieres-Meré *et al.*, 2020).

The foregoing raises the question of whether there is any general classification of forms and types of digitalization, and what place the environmental digitalization has in it. An attempt to answer the issue has already been made in the scientific literature. Kartschiya (2019) suggests classifying the online platforms according to their functional purpose: performing electronic commerce; rendering services (for example, passenger transportation); ensuring the operation of automated enterprises and other autonomous technological platforms (smart city, smart home, smart enterprise, etc.); servicing certain types of business, financial and stock exchange transactions; ensuring the provision of state services in digital electronic form.

It appears that all specified five online platforms can be used for environmental protection; however, in our view, the second, third and fifth online platforms from the list above are of greater importance. Further, we will focus on the main areas and possibilities to use them for the legal protection of the environment.

2. Doctrinal studies of digitalization in the field of legal protection of the environment: trends and prospects

The general theory of digitalization and the peculiarities of its interaction with the law have been widely studied in legal science. For example, Khabrieva (2018) considers the process of mutual influence of law and digitalization processes, the emergence of new classifications of legal arrays and new technologies of legal regulation in the digital era. Kartschiya (2018) analysed the main areas of law and law enforcement digitalization in Russia, pointing out the achievements of the Russian state in the processes of the management digitalization. A number of definitions of digitalization was proposed, an interesting emphasis was placed on the economic sector (Pilgun *et al.*, 2018). Bespalov and Antonenko (2019) considered

the prospects of digitalization for the development of the „green bank” financing nature protection measures. The works of Pavlenko (2012) on the issues of e-government development were quite useful for this study. Nevertheless, despite the very detailed study of the interrelation between law and digitalization, no specific manifestations or prospects of digitalization in the area of nature protection have been identified in the Russian legal science. Such studies have been conducted in other countries; however, we observe a rather local range of selected subjects.

For example, Hall (2019) distinguished six ways to digitalize the environmental protection in Africa. In their turn, Ordieres-Meré, Remón, Rubio (2020) carried out a study of the prospects of sustainable development under the circumstances where digital transformation is used in one organization (in the context of manufacturing and service industries). Dallemand (2020) studied the main ways to enhance transport logistics in terms of reducing the negative impact on the environment. Kunkel and Matthes (2020) established that, as information and communication technology is used more widely in industrial production, the risks and possibilities of these technologies to ensure environmental sustainability become increasingly important. Giesler (2018) made a promising contribution to the study of agriculture digitalization. Arts *et al.* (2015) conducted an interesting study of the digitalization possibilities related to mass involvement of citizens in nature protection activities, and Ringenson *et al.* (2018) examined the main areas of digitalization in the municipality in the context of the „smart city”.

The Russian contribution to the study of local types and forms of digitalization of nature protection processes can be demonstrated by the works of Subrakova (2019), who analysed the peculiarities of using digital technologies for population in the field of waste management, as well as in the works by Bobylev *et al.* (2018), who made a substantial contribution to the consideration of the digitalization possibilities for organization of environmental monitoring. This list can be continued; however, it appears possible to draw a conclusion that there have not been any systematic analysis or classification of legal forms of the use of digital technologies in the field of environmental protection. The interrelation between the Sustainable Development Goals (SDGs) and the goals and objectives of digitalization has not been studied either. Nevertheless, considerable progress has already been achieved in analysing the role and significance of digitalization in the life of society and the role of law in its regulation, as well as in studying the issues of exercise and protection of human rights in modern digital reality.

Therefore, this article makes its contribution to the scientific discussion ongoing in Russia and other countries for many years already and it studies the mutual impact of both digitalization processes on law and the reciprocal influence of law on the digitalization development processes. For the first time, the authors not only summarized the positive impact of digital technology on environmental protection procedures but also showed the negative side effects of digitalization on the state of ecological systems. Considering that the implementation of

environmental legal rules is impossible without the participation of the state and civil society (citizens, public environmental associations), the authors suggest introducing a number of changes to the Russian environmental legislation which increases the efficiency of applying digital technology in the area of nature protection (in case these changes are used by the legislator).

3. Classification of the main areas of legal regulation of digitalization of environmental protection

Let us consider the main issues associated with the classification of the areas of the legal regulation of environmental protection.

3.1. Positive contribution of digital technologies to environment protection

In the Russian legal science, there is now no classification of the main areas of the digitalization of environmental protection. Nevertheless, we can mention the increasing application of digital technologies to the „classical” areas of environmental protection (their use in the state environmental supervision, monitoring, etc.) as well as new prospects of digitalization with respect to environmental threats that have emerged in the era of globalization (the use of digital technologies to calculate climate change models, etc.).

Let us consider the latter group of digitalization options in detail:

1) The digitalization of agricultural production. Digital technologies, including the internet, artificial intelligence, digital services and applications can significantly change agriculture, make it more sustainable (Giesler, 2018), and contribute to food security on a global scale. The digitalization of agriculture reduces the need for manual labour and makes it possible to use drones and robots for agrarian production more widely. Satellite data improve the quality of monitoring of agricultural land and water sources, digital logistics expedites the delivery of agricultural products to stores and directly to consumers. In its turn, the growth of agricultural technological effectiveness improves the quality of public administration, expands not only the control over farmers but also the list of state services for agricultural producers.

2) The digitalization of transport logistics. The implementation of this strategy improves the management of transport flows, which will lead to a decreased number of traffic jams and expedite the delivery of goods to consumers. This will save transport costs and reduce the volume of exhaust emissions into the atmosphere. Such digital platforms for automotive transport (for example, Uber) are being introduced already, and this will have an even more perceptible effect since the use of big data for the organization of carriage will reduce the waiting time at ports and CO₂ emissions (Dallemand, 2020). However, the full-fledged implementation of this strategy requires state support and subsidies.

3) The energy sector is potentially the most promising for the introduction of digital technologies since this will improve the energy efficiency and the distribution of the produced electric power among consumers (Zavoronkova and Shpakovsky, 2019, p. 58; Khuzmiev, 2018, pp. 135-150; Kozlov, 2018, pp. 31-40). The oil and gas industry have been using digital technologies for a long time, especially in the extractive industry, and there is still significant potential for their digitalization with the purpose of further expanding operations. Widespread use of digital technologies could decrease production costs between 10% and 20%, including through advanced processing of seismic data the use of sensors, and enhanced reservoir modelling. Technically recoverable oil and gas resources could be boosted by around 5% globally, with the greatest gains expected in shale gas. In the coal industry, digital technologies are used increasingly often in geological modelling, optimization of control processes, automation, predictive maintenance, as well as to enhance workers' health and safety. The use of unmanned aerial vehicles for cheap monitoring of thousands of kilometres of power lines in uneven terrain should be pointed out as well.¹ Therefore, we can state that the demand for electricity in all countries will continue to grow every year since the number of production facilities, cities and electric vehicles grows as well. There is also more energy produced from renewable sources, including wind or sun, which requires new management decisions making energy markets more stable. This requires further development of the power industry digitalization as well as the correction of the national energy and environmental legislation.

4) Digitalization and climate. The introduction of digital technologies and climate protection issues are the two most prominent features of the modern era. Undoubtedly, the development of digital technologies will make it possible to forecast the dynamics of global climate change and will lead to production modernization. The latter will ensure the growth of the number of electric cars and then electric planes and ships, which will reduce oil consumption and create the prerequisites for the transition of most countries to green economy standards. The development of hydrogen engines will have even a greater importance, which will lead to further reduction of greenhouse gas emissions. The 2015 Paris Climate Agreement was aimed at achieving these goals and it set the objective of reducing greenhouse gas emissions. Its implementation will not allow average annual temperatures to grow above 2°C (as compared to the pre-industrial level) and in theory, it will limit this growth to 1.5°C. The achievement of these indices will require a well-coordinated policy of developed and developing countries in reducing the carbon footprint in the industry, transport, agriculture, etc. In addition, researchers increasingly often note that the information and communication technology itself poses a threat in terms of greenhouse gas emissions (Hilty and Bieser, 2017, p. 6).

¹ Digitalization and Energy. International Energy Agency. Secure. Sustainable. Together (2017) (retrieved from <https://www.iea.org/reports/digitalisation-and-energy>).

5) Digitalization and circular economy. „Circular economy” is a very broad and ambiguous term, which is often given different meanings by representatives of various scientific schools. The main content of this concept is prevention of waste production due to the use of digital technologies in particular, as well as the introduction of new technologies for its processing and utilization. Today’s introduction of „circular economy” standards is impeded by a range of objective and subjective factors (Webster, 2013). The former factors include geographical dispersion of chains of raw material supplies to waste treatment plants as well as technological problems. Some of them can be resolved due to the use of digital technologies. For example, machine-to-machine data communication and data analysis enable companies to coordinate the supply and demand for insufficiently used assets and products. 3D printing creates opportunities for the production of biodegradable materials, which will facilitate the transition from the current linear economic model to a more responsible one. In addition to this, digitalization within the circular economy will make it possible to repair rather than to throw away damaged goods, while artificial intelligence can accelerate the development of new foods free of hazardous chemicals and materials, and optimize the infrastructure to ensure a „circular flow” of goods. In other words, digital technologies can facilitate the economy growth and promote the efficiency of the use of resources while reducing waste. At the same time, we should note that the production and use of digital equipment and infrastructure will require a huge number of non-renewable natural resources. Their extraction and transformation into electronic components are sources with significant impact on the environment, followed by pollution at the end of the service life. Though digital technologies can help other sectors of the economy to mitigate their negative impact on the state of the environment, the issue of reducing the impact of the digital sector itself on nature is still to be discussed.

At the moment, the dominant segment of waste digitalization is the development of cloud software and interfaces (over 95%), but the share of smart systems for collection (smart containers), transportation (smart collectors), as well as intelligent systems for waste treatment and utilization gradually grows. Thanks to the online map developed by Greenpeace for Russia, volunteers from 60 cities added waste collection points, thus helping many people to drop off waste for recycling (Subrakova, 2019, pp. 319-320).

We should note the installation of special sensors on the waste containers in Finland, which indicate that the containers are full, among the best-known practical examples of the implementation of digital technologies in the field of waste management (Zherebtsova, 2019, p. 459). In the latter case, we observe a local sector of application of digital technologies, and this trend manifests itself not only in Europe but also in other parts of the planet. For example, on the African continent, a company known as Mr. Green Africa uses a mobile application to buy waste from informal waste pickers and then processes recyclables into valuable raw materials and delivers it back into plastic manufacturers’ supply chain. Not only does it help

boost recycling, but also brings positive social benefits. The creation of mobile applications that inform citizens of the price policy of supermarkets is not less interesting. This promotes the sales of food which would otherwise be expired and would be thrown away². The accomplishment of the objectives of digitalization of waste management processes will require a well-designed state financial policy, including the improvement of state support for representatives of this sector, application of a reduced rate of VAT (as well as of other taxes and fees for environmental entrepreneurs) to their activities, the development of a system of preferential „green” loans, new forms of state-private partnerships in the field of nature protection, etc. The implementation of these measures with the use of digital technologies will not only make it possible to extend the period of use of consumer goods and industrial equipment but will also lead to the development of the sector of environmental services and creation of new jobs.

6) The use of digital technologies in environmental monitoring. Digital technologies, in particular, using space-based satellite surveillance systems, can be used to prevent natural disasters, control and prevent forest fires and pollution of water bodies (for example, as a result of oil pipeline accidents), control marine poaching, the radiation situation, etc. According to the data of current studies, by 2030, automated unmanned devices will take samples and analyse them using molecular technology, and chemical sensors will perform automated pollution monitoring even in the most remote locations. However, for these plans to be successful, it is necessary to ensure effective interaction between states and exchange in environmental information, which today is often hampered by political conflicts between countries. Nevertheless, Russia has managed to organize a space monitoring system, its data are compared with the results of observations from the ground stations, which provides more accurate information about the occurring ecological processes (Bobylev *et al.*, 2018, p. 149).

7) Blockchain technology can increase the efficiency of environmental protection. Blockchain is a revolutionary technology that improves technologies for recording information and exchanging data between their storages. Blockchain technology can contribute to the achievement of the Sustainable Development Goals (SDGs) from different perspectives such as support of the implementation of a sustainable supply chain, improvement of energy efficiency and promotion of the creation of safe and secure smart cities. Blockchain has no negative impact on the environment; however, it can allow decentralized management of natural resources and energy. In particular, with the use of this technology, it is possible to combat excessive fishing by tracing various supply chains.

² Hall, M. (2019), Six ways digitalization is helping Africa’s environment (retrieved from <https://www.dw.com/en/six-ways-digitalization-is-helping-africas-environment/a-48231433>).

3.2. Negative influence of digitalization on natural processes

Along with various advantages, digitalization also involves a number of real or potential threats to the environment. First, indirect pollution is caused by the mass use of the internet requiring permanent expansion of electricity production. In its turn, the growth of electricity generation prevents any cessation of the operation of coal and other environmentally hazardous energy facilities.

Second, the use of computers and other digital devices gave rise to the environmental problem of „digital e-waste” related to the peculiarities of the disposal of these technical devices. Currently, only 20 percent of this waste is recycled, while 80 percent ends up in dumps. The latter situation is most common in developing countries, and the use of child labour in the recycling of such waste often leads to serious health consequences for young people (Kunkel and Matthes, 2020, p. 319). The issue of digital waste recycling itself consists in the technical complexity of the extraction of useful substances (especially rare earth elements) from this waste. The widespread adoption of these modern technologies in developing countries would, on the one hand, decrease mining and, on the other hand, reduce the pollution of soil, forests, water, and other components of the environment.

Third, there are reasons to believe that new 5G networks can have a negative impact on citizens' health. This position of scientists was reflected in the appeal to the EU signed by a group of 268 (as of December 2019) scientists and doctors concerned about the impact of radio-frequency radiation (5G APPEAL, 2017). They noted this threat because of the higher frequency wavelengths being used in the 5G roll-out at high densities in urban areas. Another factor of the environmental impact, frequently ignored, is the proliferation of satellites in space. Far too often, space is seen as having no relevance for environmental matters (rather like the oceans were once considered), but in reality, space pollution is of very important significance, especially because nobody knows the extent to which rocket launches and space debris affect the Earth's atmosphere.

Fourth, there is a potential threat that as digital technologies are introduced in environmental protection, individual companies can have a monopoly on their ability to process big data on the environment. This can lead to abuse, for example, by providing information not for free but for money. This requires preliminary discussion of guarantees against growing prices for such services. The problem of concentration of environmental information with the use of digital technologies, which is not less important, consists in the threat related to confidentiality (disclosure) of the collected data. Finally, considering that the data collected by means of digital platforms originate from different sources, the issue of the assessment of such environmental materials remains relevant.

It remains to add that even seemingly positive digital technologies can be used against nature under particular circumstances. For example, camera traps and unmanned aerial vehicles can be used not only to observe animals but also for illegal

hunting, while in the marine environment such technologies as echo sounders and GPS contribute to intensive fishing and depletion of marine resources. There are potential risks for nature when data sets become the target of hackers (for example, poachers using visualization devices connected to the network to search for rare animals in real time). Prevention of such risks should be discussed separately.

4. Modern stage of digitalization of environmental protection in Russia: trends and prospects

The use of digital technology for nature protection purposes has its specific features in every country. As we do not have the possibility to talk about all countries, we will pay attention to the issues of the digitalization of environmental protection in Russia which have much in common with the trends emerging in other countries of the post-Soviet space.

4.1. Current state of the legal regulation of the digitalization of environmental protection in the Russian Federation

The term „digitalization” is not used in the Russian environmental legislation; however, the concept „automation”³ of various production processes, including the use of digital technologies of the internet, has become quite common. Such „environmental automation” in a legal sense can be considered in two aspects. First, a number of requirements for automation of different procedures are of a framework nature and regulated by the basic environmental law – the Federal Law „On Environmental Protection” of January 10, 2002. For example, according to art. 17 of this Law, the state support of nature protection activities of economic entities is provided when they install automated systems and laboratories to control the composition, volume or mass of waste water, pollutants and the volume or mass of their emissions in the air, to monitor the state of the environment, including components of the natural environment.

Moreover, the Law stipulates (art. 69) that the comparability of the data contained in the state register of facilities having a negative impact on the environment and their automated processing are ensured by using codes of the facilities having a negative impact on the environment, identification numbers of taxpayers, all-Russian classifiers of technical, economic, and social information. The program for industrial environmental control for the 1st category (the most environmentally hazardous) facilities additionally contains the program for the

³ In the use of modern information technologies in scientific doctrine, there are usually three stages: automation, informatization and digitalization. Thus, the Russian environmental legislation regulates in detail only the first stage-the automation of production processes.

creation of the automatic control system or the data about the availability of the automatic control system for their operation (art. 67).

Second, certain procedures for production process control automation are stipulated by the environmental laws regulating certain types of environmentally hazardous activity. For example, Art. 21 of Federal Law No. 170-FZ of November 21, 1995 (revised on April 30, 2021) „On the Use of Nuclear Energy” stipulates the maintenance of the unified state automated system for radiation monitoring in the territory of the Russian Federation; Art. 50.6 of the Forest Code of the Russian Federation regulates the maintenance of the Unified State Automated Information System for Accounting of Timber and Transactions Therewith; Art. 24.3 of Federal Law No. 89-FZ of June 24, 1998 (revised on July 2, 2021) „On Production and Consumption Waste” mentions the Unified State Information System for the Accounting of Waste from the Use of Goods. This list can be continued.

Considering that Russia is a federal state, constituent entities of the Russian Federation have the right to adopt their own regulations on issues of joint jurisdiction of the Russian Federation and constituent entities of the Russian Federation, which also include environmental issues. However, according to our data, only one constituent entity of the Russian Federation, the Republic of Sakha (Yakutia), has adopted program regulations dedicated to the digitalization of environmental protection. For example, according to the Decree of the Head of the Republic of Sakha (Yakutia) No. 2 of September 27, 2018, the Government of the Republic shall develop, in particular, a plan of measures for the digitalization of the nature protection industry, the introduction of the regional state information system of nature management and the environmental protection of the Republic of Sakha (Yakutia), including remote radiation monitoring and the open web portal of Ecological Passport of the Republic of Sakha (Yakutia).

Other resources, including those not mentioned in acts of the environmental legislation, can be used for environmental protection along with direct legislative regulations on the use of digital technologies. We should point out at least two of such not directly expressed digital ways to consider the public opinion: first, „Russian public initiative” – a website designed for public petitions suggesting draft laws related to any socially significant issues. Second, the web portal of Active Citizen, where Moscow residents participate in discussion and voting on relevant issues of urban life, also including environmental protection issues (greening of courtyards, improvement of areas, etc.).

As an example of the digitalization of the activity of state authorities, we can mention the website of the Ministry of Natural Resources and Environment of the Russian Federation, which contains official documents, data about activities that are carried out, coordinating and advisory bodies, etc.

From the brief overview of the Russian environmental legislation, it follows that there is no consistent strategy (program) in the field of environmental protection digitalization (in contrast to digitalization of economy) in Russia. Nevertheless, in a

number of federal environmental laws, we observe certain manifestations of digitalization related to the introduction of environmentally significant registers and automation of the control over production processes aimed at preventing the negative impact on the state of the environment. Moreover, at least one of constituent entities of the Russian Federation (the Republic of Sakha) has taken measures for developing its own strategy for the digitalization of the environment, which does not contradict the Constitution of the Russian Federation and the current federal legislation.

Analysing the existing situation, it is impossible not to draw analogies with the implementation of the concept of sustainable development in Russia (Bogolyubov, 2019, pp. 49-55). There is no clear plan of action with respect thereto in Russia; however, we can find dozens of manifestations of this concept in diverse legal acts aimed at searching for the balance of economic, environmental, and social interests of citizens, business, and the state. In the field of the digitalization of the environment, we observe the same trend, and it is possible to overcome them only together.

At the national level, it is necessary to adopt a plan (concept) of Russia's transition to sustainable development, specifying the criteria and indicators for this process. In a similar way, it is necessary to adopt the national program „Digitalization of the Environment”, similar to the already adopted program for the digitalization of economy. Only the creation of a step-by-step plan of action will stop the existing random movement in both directions. In addition, we should note that the efforts are now required also at the international level. In our view, there is a need to organize a new UN conference on the issues of sustainable development and digitalization of environmental protection, for example in 2022, in continuation of the similar UN conferences of 1992, 2012 (Rio de Janeiro) and 2002 (Johannesburg). The central theme of this summit should be the development of responses of the international community to the main environmental challenges of the globalization era with suggestions of digital technologies that meet the objectives of today.

4.2. Constructive proposals for the introduction of changes to Russian environmental legislation aimed at developing the digitalization of environmental protection

Along with the preparation of framework political legal acts containing plans and programs in the area of the digitalization of environmental protection, we suggest introducing a number of specific changes promoting the achievement of this goal to Russian environmental legislation.

First, in our view, it is necessary to make the following amendments to the Federal Law „On Environmental Protection”:

- to supplement Article 1 of the Law, which includes a list of the main terms, with the following definition: „environmental digitalization is the use of digital technologies to improve the quality of environmental protection management,

- interaction of state authorities and civil society for the purpose of ensuring a favourable environmental quality”;
- to supplement Article 5 of the Law, which is dedicated to the powers of state authorities of the Russian Federation in the field of environmental protection, with the following power: „preparation and approval of federal plans and programs for the use of digital technology for the purposes of environmental protection”;
 - to supplement Article 17, which is dedicated to state support measures for economic or other activities carried out to protect the environment, with the following area of the state support: „assistance in the development and introduction of the digital technology aimed at reducing the negative impact on the environment”;
 - to supplement paragraph 4 of Article 63.1 of the Law, which regulates the powers of federal authorities in the area of the creation of the Unified System of State Environmental Monitoring, with the following subparagraph: „development of proposals on the use of digital technology for the search, collection, processing and analysis of information about the state of the environment, for the purposes of developing digital models recording the consequences of the negative impact of natural and anthropogenic factors on the state of the environment, including modelling potentially possible climate change”;
 - to supplement paragraph 2 of Article 70 of the Law, which contains a list of the goals of scientific studies in the area of environmental protection, with a subparagraph reading as follows: „development and creation of digital technology in the area of environmental protection and rational use of natural resources”;
 - to supplement Article 73 of the Law, which is dedicated to the training of managers of organizations and experts in the area of environmental protection and environmental security, with paragraph 3 reading as follows: „3. In the training of managers of organizations and experts in the area of environmental protection, the educational organizations are obliged to include information about the use of digital technology in the area of environmental protection in their curriculums and programs”;
 - to supplement paragraph 2 of Article 10 of Federal Law No. 280-FZ of August 3, 2018 „On Organic Products and on Amendments to Certain Legislative Acts of the Russian Federation”, dedicated to informational and methodological support in the field of production of organic products, with subparagraph 3 reading as follows: „3) the development of the project of the „digital passport” for organic products, containing data about the time, place of production of the organic products, use of fertilizers, consumer complaints about the quality of the products of agricultural producers confirmed by court decisions that have come into legal force”;
 - to supplement Article 5 of Federal Law No. 89-FZ of June 24, 1998 „On Production and Consumption Waste”, which defines a list of the powers of the Russian Federation in the area of waste management, with a subparagraph reading

as follows: „development of plans and programs for the introduction of digital technology in the area of production and consumption waste management for the purposes of gradual transition to integrated recycling and reduction of waste”.

The implementation of these provisions will provide legal conditions for further development and introduction of digital nature protection technology.

Conclusions

At the moment, at the international and national levels, there are enough program documents dedicated to digitalization; however, they mainly relate to economic or technological issues. However, before the pandemic it was obvious that the international community should focus its attention on the issues of citizens' life and health, while environmental aspects occupy one of the most important places in their settlement. It is digitalization that provides the international community in general and national governments in particular with the unique possibility to move forward in addressing global issues regarding environmental protection. Due to digital technologies, humanity has the possibility to reach a new level of quality of environmental monitoring, energy management, and coordination of activities to reduce the risk of climate change. Due to the digitalization of technological and management processes, there is a better change chance to resolve a range of social and economic problems mentioned in the SDGs, which were forgotten by the world community during the coronavirus pandemic. However, settlement of economic problems that worsened during the pandemic can lead to extremely negative consequences without consideration of social and environmental aspects.

Despite the obvious advantages of the use of digital technologies in the field of nature protection (decrease in hydrocarbon consumption and greenhouse gas emissions, reduction of waste, development of the system of monitoring, improvement of the comfort of the urban environment), it is necessary to also take into account the side (negative) effects of the development of digital technologies, to get ready for them in advance and take preventive measures.

In this case, legal regulation of the digitalization of environmental protection has dramatically more potential and importance, and it requires both enshrining of new terminology related to „environmental digitalization” and clear rules for the areas and procedures for its use at national level, as well as the introduction of the corresponding amendments to the national environmental legislation (for example, dedicating to it a relevant section or chapter in the Environmental Code or another basic national environmental law).

With respect to the Russian Federation, the authors suggest making a number of amendments to the Federal Law „on Environmental Protection”, as well as to a number of other environmental laws – Federal Law No. 280-FZ of August 3, 2018 „on Organic Products and on Amendments to Certain Legislative Acts of the Russian Federation” and Federal Law No. 89-FZ of June 24, 1998 „on Production and

Consumption Waste”, which will make it possible to create an appropriate legal framework for the introduction of digital technology in environmental protection.

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