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Legal Basis for the Protection of the Environment from Waste Pollution in Urban Agglomerations

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Abstract

Solid waste management is an important issue that concerns everyone. If waste is not collected properly and disposed of in an uncontrolled manner, it can lead to air, water and soil pollution, which threatens our health. It is established that over the course of a generation, the volume of municipal waste will increase by two thirds, and the cost of recycling will almost double. People in less developed countries, especially in poor urban areas of such countries, experience most serious negative impact from waste that is not collected and cleaned properly. Accompanied by the recycling cost growth, the global trend of increasing the volume of municipal waste requires the adoption of a set of measures aimed at introducing a closed-loop economic model in which waste generation and economic development are not linked. Governments, communities, and industrial enterprises are increasingly recognizing the potential of initiatives to create waste-free industries, increase waste management efficiency, and improve regeneration systems. The purpose of work was to assess degree of elaboration of legal measures for organization of solid waste management in different countries. The article examines the current state of the legal foundations of the waste management system in urban agglomerations of Russia and globally. Improving the collection, recycling and other forms of rational waste management remains an important, high-priority task. It is established that the improvement of legal regulation will create opportunities for the implementation of the "zero waste" approach, while improving the management of the waste sector in order to prevent significant environmental pollution, greenhouse gas emissions and negative effects on human health.

Keywords: solid waste management, urban agglomerations, environmental protection, legal measures.

Full length article **Corresponding Author*, e-mail: *lisina_nl@mail.ru (N.L.), pavvm2000@mail.ru (S.I.)* Doi # https://doi.org/10.62877/21-IJCBS-24-26-20-21

1. Introduction

In 2016, cities produced more than 2 billion tons of solid waste globally. That is, every day every person on the planet left more than 0.7 kg of waste. According to the World Bank [1], Europe and Central Asia, East Asia and the Pacific region account for 43%, South Asia – 17%, North America – 14% of the global waste volume. The regions of North Africa, sub-Saharan Africa and the Middle East produce the least amount of waste, the combined share of which does not exceed 15% of the total waste production in the world. The study [1] showed that by 2050, 3.4 billion tons of waste per year will be generated globally, which is significantly more compared to the present. The Global Solid Waste Management Review until 2050, which collects extensive data on solid waste at the national and urban levels, provides estimates and forecasts of waste generation volumes up to 2030 and up to 2050. In addition to main indicators (from waste generation to disposal), report provides information on expenses, revenues and tariffs for waste management; special waste; regulations; public relations; administrative and operational models; informal sector. According to authors of study, people in less developed countries, especially in poor urban areas of such countries, experience most serious negative impact from waste that is not collected and cleaned properly. According to researchers, more than 90% of solid waste in those countries is disposed of in uncontrolled and dangerous ways for environment and people.

At same time, waste accumulations there often serve as a breeding ground for diseases, they are also an

additional factor of climate change and, finally, encourage urban crime [2]. Cities contribute the most to climate change. According to the United Nations Human Settlements Programme, cities consume 78% of world's energy and produce more than 60% of greenhouse gas emissions. At same time, they occupy less than 2% of the Earth's surface [3]. The huge population density and the use of fossil fuels make urban populations extremely vulnerable to the effects of climate change. The problem is aggravated by the reduction of green areas [4]. According to the report of the Intergovernmental Panel on Climate Change, limiting global warming to 1.5°C "will require rapid and large-scale changes in the use of energy, land, urban and infrastructure facilities (including transport and buildings) and industrial systems" [5]. Another problem is that, according to the forecasts of the United Nations report, by 2050, 2.5 billion more people will live in cities, and almost 90% of them will live in cities in Asia and Africa [6]. It is estimated that more than half of the projected global population growth by 2050 will be concentrated in eight countries: Democratic Republic of Congo, Egypt, Ethiopia, India, Nigeria, Pakistan, the Philippines, and the United Republic of Tanzania [7]. The purpose of work was to assess degree of elaboration of legal measures for organization of solid waste management in different countries.

2. Methods

2.1. Objects of research

The research objects were the social relations in the field of environmental protection that arise during the management of municipal waste, their impact on society, the environment and the global economy.

2.2. Research methods

General theoretical basis of research dialectical and systematic approaches to understanding legal phenomena. General scientific methods used (analysis and synthesis, method of generalization, comparative historical method) and private scientific method of legal science – formal legal.

3. Results and discussion

Published jointly with the International Solid Waste Association (ISWA), report provides updated information (starting in 2018) on global waste generation, waste cost, and waste management. The analysis used life cycle assessments, which help study global benefits or losses if nothing is changed, take intermediate measures, or completely switch to a waste-free society and a closed-loop economic model. The report also assesses three potential scenarios for municipal waste generation and management and analyzes their impact on society, environment, and global economy. In addition, it presents potential strategies for reducing waste and improving its management by following waste hierarchy, which will help treat all waste as valuable resources. In particular, it predicted that volume of solid waste generation will increase from 2.1 billion tons in 2023 to 3.8 billion tons by 2050. If to take into account hidden costs associated with environmental pollution, poor health and climate change due to improper waste disposal practices, by 2050 global annual costs could almost double to 640.3 billion US dollars [8].

The simulation results presented in report show that bringing waste under control through waste prevention and management measures can limit net annual costs to $270.2 billion by 2050. However, forecasts show that a closed-loop economic model in which waste generation and economic growth not linked through introduction of waste prevention methods [9], a sustainable business model and complete waste management can actually lead to a total net profit of 108.5 billion US dollars per year. It is necessary to start acting now in order to avoid a bad scenario. The report contains recommendations and suggests steps for multinational development banks, national governments, municipalities, manufacturers and retailers, waste management sector, as well as for citizens. Solid waste management is a topic should concern everyone: with careless collection and uncontrolled disposal, air, soil and water pollution occurs, threatening our health; increase in volume of waste produced daily in cities requires allocation of increasingly tangible budgetary funds from local authorities; inaction in field of waste recycling leads to pollution of oceans, threatening their ecosystem [10].

3.1. The relationship between urban waste pollution and urbanization is a global practice

According to calculations [7], in 2020, the global volume of solid household waste generation amounted to 2.1 billion tons/year. As a result of the combination of economic growth and population growth, it is projected to increase by 56% by 2050 to 3.8 billion tons/year unless urgent measures are taken (Figure 1). Figure 2 shows three scenarios of projected global waste generation. The first is based on a modern waste management model, the second provides for increased control of waste generation, and the third is the introduction of a closed–loop economy, which will require the separation of economic growth from resource use, while government policies and actions of producers must be fully coordinated. Investments in waste recycling should be even more significant, as global waste recycling capacity will increase threefold – from about 400 million tons in 2020 to more than 1.2 billion tons in 2050.

To implement closed-loop economy scenario (bringing waste generation to the level of 2020), regions such as North America, Australia, and New Zealand, as well as most of Europe, will need to drastically reduce resource-intensive consumption and waste generation. In other regions where accelerating economic growth, urbanization and industrialization are expected, maintaining current level of waste generation will also require significant waste prevention measures. There is a positive correlation between rate of waste generation and urbanization. According to scientists, in 2050, 80% of all municipal solid waste will be produced in cities, while share of rural areas is expected to decrease to 20%. This means that amount of waste per capita per year in rural areas expected to be 50% lower than in urban areas. In general, level of waste generation in rural areas per capita is significantly lower than in cities, due to their lower purchasing power. However, in high-income countries, these differences b/w urban and rural areas decrease over time [11].

3.2. Legal measures to protect the environment from waste pollution in urban agglomerations of the Russian Federation

The need to protect the environment from production and consumption waste and to improve the

system of waste disposal has been repeatedly indicated for many years in strategic documents of the Russian Federation [12]. Organizational, legal and sanitary measures to protect the urban environment from waste pollution are most developed legal instruments at present [4]. However, most of them are aimed at ensuring the safe management of waste rather than reducing amount of waste sent for recycling, storage and disposal. The latter, for example, include restrictions and prohibitions on waste to be disposed of [13], legal measures aimed at implementing principle of "extended responsibility" [14], activities for separate collection of municipal solid waste. In accordance with paragraph 1 of Article 44 of the Federal Law "On Environmental Protection", the placement of new settlements and their development carried out in accordance with requirements in field of environmental protection, including requirements for ensuring safe management of production and consumption waste [15].

The specified requirements of the federal law do not apply to existing cities, while the provisions of article 51 of the Federal Law "On Environmental Protection" do apply. Article 51 of the said federal law contains, on the one hand, general requirements in the field of waste management, while on the other hand, it establishes a special ban on the placement of waste of hazard classes I - IV and radioactive waste in territories adjacent to urban and rural settlements, in forest parks, resorts, health and recreation areas, on animal migration routes, near spawning grounds and in other places where a danger to the environment, natural ecological systems and human health may be created. The federal laws "On Production and Consumption Waste", "On Sanitary and Epidemiological Welfare of the Population", as well as subordinate legal acts adopted in the development of their provisions including federal regulatory documents, also those included in the national standardization system, occupy a central place in the legal regulation of relations on protection of urban environment from waste pollution [16-22].

The main requirements for conditions and methods of collection, accumulation, transportation, processing, recycling, neutralization, disposal of industrial and consumer waste in cities, provided for by the Federal Law "On Sanitary and Epidemiological Welfare of the Population", are their safety for the health of the population and its habitat, that is, the environment in city. The requirements of specified federal law on safe management of production and consumption waste in settlements, cleaning of populated areas, as well as sanitary protection of soils in them specified in sanitary and epidemiological rules and norms [23], hygienic standards, veterinary and sanitary rules, methodological guidelines, methodological recommendations. Returning to the measures in the field of waste management provided for by the Federal Law "On Production and Consumption Waste", let's note a number of other features of the legal regulation of waste management, including municipal solid waste (MSW) in relation to conditions of the city. Thus, as the initial stage of waste life cycle, the accumulation of MSW is of great importance for ensuring safe waste management in city. Therefore, the legislation imposes a number of requirements for the arrangement of places of MSW accumulation with the possibility of separate storage of household waste by types of waste, waste groups, groups of homogeneous waste, that is, separate accumulation. Local governments are responsible for determining the layout of places (sites) for the accumulation of MSW and maintaining a register of places (sites) for the accumulation of MSW in accordance with established sanitary rules and regulations, as well as rules for the arrangement of places (sites) for the accumulation of solid municipal waste and maintaining their register" [24]. As follows from Article 13 of the Federal Law "On Production and Consumption Waste" and the Rules for the Arrangement of MSW accumulation sites, arrangement of MSW accumulation sites refers to measures for the improvement of the city territory. In accordance with Article 6 of the Federal Law "On Production and Consumption Waste", powers of subjects of Russian Federation include the establishment of standards for accumulation of MSW, which are determined based on data on waste mass and volume.

The standard is expressed in quantitative terms of mass and volume per unit of account, respectively, which is determined for each category of objects. It is permissible to differentiate standards depending on municipalities in the subject of the Russian Federation, categories of consumers, categories of objects where waste is generated, types and groups of waste. Thus, in each subject of the Russian Federation, the standard for the accumulation of MSW, including separate waste accumulation, is set independently. The change in the approach to the treatment of MSW being the most significant and relevant direction for urban areas, entrusted the adoption of fundamental decisions to subjects of the Russian Federation. In subjects of Russian Federation, the main documents for planning and organizing waste management, including municipal waste, are recognized as the regional waste management program and the territorial waste management scheme. The first document defines goals, objectives, measures in field of waste management and sources of their financing.

While the second one contains a direct description of the system of organization and implementation of activities for collection, transportation, processing, disposal, neutralization, placement of waste generated on the territory of that subject of the Russian Federation and (or) coming from other subjects of the Russian Federation. In other words, if the regional program is an action plan, then the schemes are the basis and guide to action. The analysis of legislation in the field of production and consumption waste management showed how actively subjects of Russian Federation involved in solving waste pollution problems in cities and how they empower local administrations to ensure safe handling of MSW. However, the effectiveness of implementation of tasks set in field of waste management in the Russian Federation depends on a number of factors (environmental, economic, social, etc.), which must be taken into account when exercising powers of state authorities and local governments, as well as when improving legal regulation of relations on protecting urban environment from waste pollution. Thus, there's a need for a significant number of legal acts aimed at implementation of tasks in following areas:

- creation of innovative industry in field of production and consumption (MSW) waste management, taking into account need for a unified system of waste collection and processing, reclamation of disturbed lands;

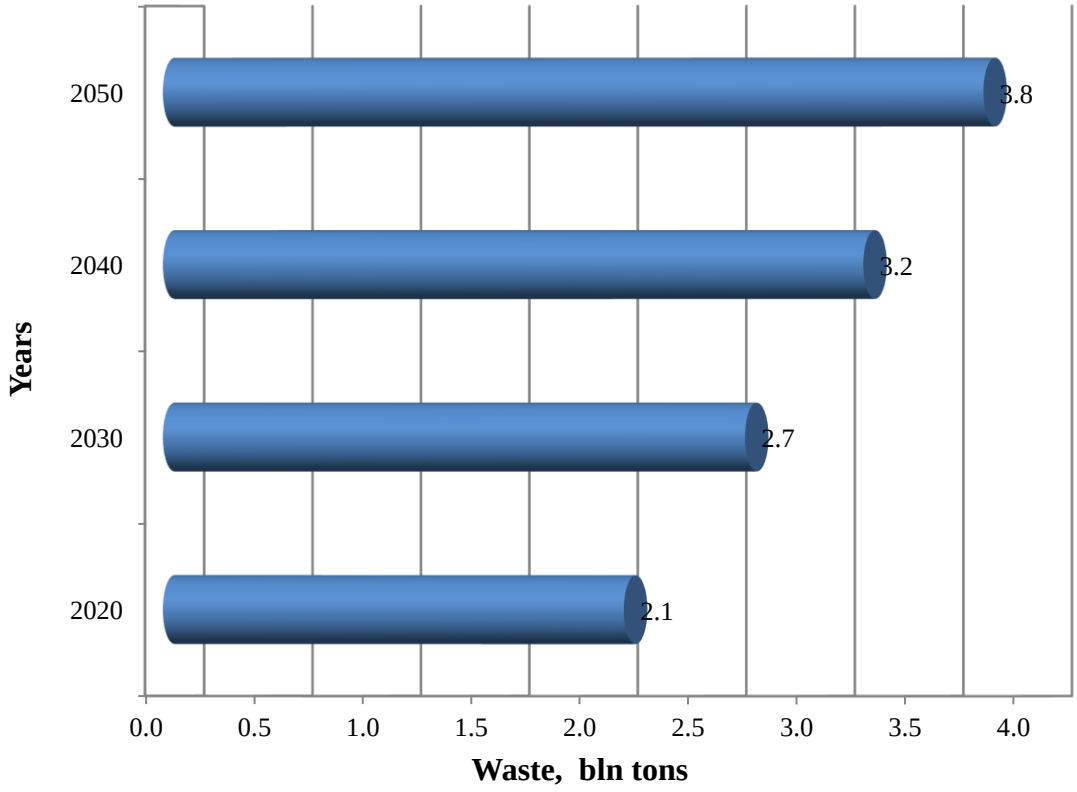

Figure 1. Dynamics of global solid waste generation up to 2050. *Source:* Predicted data [7].

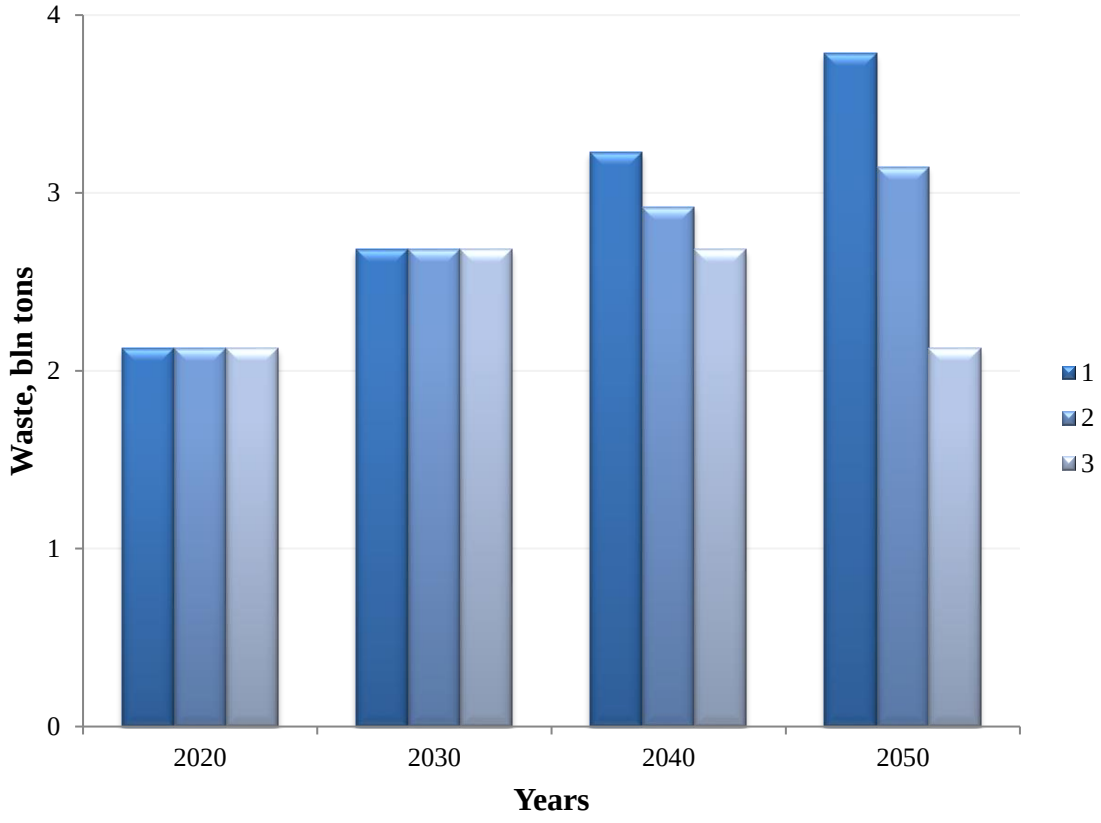

Figure 2. The dynamics of global solid waste generation up to 2050: 1 – forecast with a conventional waste management regime; 2 – forecast with a controlled waste management regime; 3 – forecast within a closed-loop economy. *Source:* Predicted data [7].

- Development of the "extended responsibility" principle, strengthening of legal liability measures for violation of legal requirements in the designated area;
- development of economic and legal mechanisms (state support for environmentally oriented participants in economic and other activities, targeted spending of environmental and other fees and payments, co-financing of waste management measures, establishment of the economic interest of legal entities in separate waste collection, etc.);
- Clarification of the powers of local governments in the field of MSW management and urban landscaping with the development of preventive activities;
- strengthening the role of municipal and public control in the field of waste management;
- Taking into account the natural features of the subjects of the Russian Federation, the territories of cities, state of urban environment as a whole and its components, anthropogenic load on environment and its components, taking into account population, etc. when making management decisions in field of waste management;
- Formation of ecological and cultural behavior of the population and entities engaged in economic and other activities in the field of waste management.

Currently, the Federal project "Clean Country" is being implemented within the framework of the state program of the Russian Federation "Environmental Protection" [25] and the national project "Ecology". Due to elimination of 191 unauthorized landfills within boundaries of cities (from 2 hectares to 74 hectares), quality of the life of more than 20 million people twill improve [26].

4. Conclusions

According to the conclusions of a new report by the United Nations Environment Programme (UNEP) [27], over the course of a generation, the volume of municipal waste will increase by two thirds, and the cost of recycling will almost double, so only a drastic reduction in waste generation will ensure a livable and affordable future. It is urgently necessary to separate waste generation from economic growth and switch to waste-free methods and a closed-loop economic model. Improving the collection, recycling and other forms of rational waste management remains an important, high-priority task.

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