Environmental Management in Central Siberia (Based On Analysis of the Krasnoyarsk Territory)

N P Koptseva[1,2], **A A Sitnikova**[1]

[1] Humanitarian Institute, Siberian Federal University, Krasnoyarsk, Russia
[2] Research Department, Krasnoyarsk State Pedagogical University named after Astafiev

E-mail: decanka@mail.ru

Abstract. The article presents a structural description of the Krasnoyarsk territory's environmental management system as the territory representing Central Siberia. The study is largely based on key provisions of the "Environmental policy concept of the Krasnoyarsk Territory until the year 2030". Certain structural elements of the region's environmental management are analysed. These are nature protection activities of large industrial enterprises operating in the Krasnoyarsk Territory (United Company Rusal, Nornickel, The Mining and Chemical Combine of Rosatom, Siberian Generating Company), the transport system, and waste processing and recycling in the Krasnoyarsk Territory.

1. Introduction.

The studies in the environmental management field in Central Siberia based on the analysis of the Krasnoyarsk Territory are extremely important for a number of reasons. According to numerous statistical surveys and environmental ratings, the Krasnoyarsk Territory and its capital, the city of Krasnoyarsk, are considered as among the most environmentally unsatisfactory regions in Russia (in the "Environmental rating of 100 Russian cities according to the opinions of local residents, 2016", compiled by Domofond.ru, Krasnoyarsk takes 93rd place). The term "black sky" was introduced by mass media in Krasnoyarsk to denote the high levels of smog in the city and excessive industrial emissions of harmful substances into the air. The power stations that currently supply most of the region's energy requires the use of coal for fuel, which is extremely harmful to the body. Coal burning is the leading cause of smog that negatively affects the atmosphere, the population's health, etc. For this reason, the use of coal is rapidly declining in developed countries. In order to tackle unfavourable environmental conditions in the Krasnoyarsk Territory, the "Environmental policy concept of the Krasnoyarsk Territory until the year 2030" was adopted. It states the following: "According to the total mass of pollutant emissions from stationary sources (2,516.8 thousand tons in 2011), the Krasnoyarsk Territory ranks first among other federal subjects of the Russian Federation and it is far ahead of all other regions in terms of specific weight (average mass of emissions per source).

The territory's five largest industrial enterprises emit almost 90% (2,210 thousand tons) of total emissions from all stationary sources in the region into the atmosphere. The industrial centres of the territory, which are the cities of Krasnoyarsk, Norilsk, Achinsk, Lesosibirsk, and Minusinsk, are included in the priority list of cities in the Russian Federation with the highest level of air pollution". Western scientists became interested in social and economic environmental studies a few decades ago. In Russian Siberian studies, however, ecology has long remained a subject of natural sciences. This study aims to describe the environmental management situation in the Krasnoyarsk Territory from the

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

social and economic sciences perspective, which will help determine the prospects for studying environmental management problems within the framework of socio-economic disciplines.
The term "environmental management" was brought into scientific use roughly in the 1990s. At the present time, it's gradually establishing itself in the Russian scholarly world. For this reason, it is important to continue to study the environmental management system in various regions of Russia, in particular, in the Krasnoyarsk Territory – one of the most ecologically unfavourable regions.
The main purpose of this article is to clarify the extent and nature of all significant participants' involvement that are causing an environmental crisis in the Krasnoyarsk Territory and to identify promising areas in environmental management research in the Krasnoyarsk Territory.

2. Literature Review

Western scientists have been actively engaged in environmental management issues since the late XX century [1, 2, 3, 4, 5, 6, 7]. Nowadays, hundreds of studies are being devoted to various aspects of environmental management. Scholars attempt to assign a definition to the concept of the environmental management and determine whether it refers only to enterprise management systems or can be understood as a system for managing the relationship between the environment and society in general [8, 9]. There are also works presenting analysis of certain environmental management aspects, such as the ecological outcome of implementing the ISO 14000 standard in enterprises [10]. Some specialists focus on environmental management policies in different regions [11, 12, 13, 14, 15].
Environmental management is a scientific trend that is also under active development in Russia. Most of its publications on this topic are devoted to describing environmental management technologies undergoing large-scale production. The ecological management of socio-economic orientation (human resources management for environmental protection), however, is understudied.
Despite the fact that there are few works examining environmental management in the Krasnoyarsk Territory [16], the problem of the need to develop a special environmental policy and to introduce environmental management in the region's enterprises at the international standards level has not yet been properly addressed in existing studies.

3. Materials and methods

This research was carried out on the basis of qualitative content analysis of official websites of large industrial enterprises operating in the Krasnoyarsk Territory - RUSAL, NORNICHEL, Siberian Generation Company, Rosatom. Reports and statistics related to the activities of the largest financial and industrial groups operating in Central Siberia were analyzed.

4. Results

In the broadest sense, the notion of environmental management is regarded as management of society-based interactions and the impact society has on the environment. In this respect, one must consider diverse aspects of human interaction with the environment within the framework of environmental management: government and business organisations' environmental policy, management of both domestic and industrial waste, administrative measures for reducing harmful human impact on the environment in everyday life (use of transport, energy consumption, etc.), system methods for cleaning, maintaining, and restoring biosystems (water and land systems, animal and plant care), environmental education programmes at levels ranging from kindergarten all the way through university. In a narrower sense, environmental management is an area of enterprise management that ensures a balance between economic benefits and environmental costs. In 1996, ISO 14000 was developed, the universal international standard for environmental management. It has been revised and supplemented in accordance with the current environmental and technological situation and is now used to check the degree of environmental responsibility that large industrial enterprises have. The standard assumes continuous improvement of a particular organisation's technical equipment for the purpose of reducing its harmful effects on the environment, internal monitoring of the environmental situation, as well as external auditing of environmental indicators. It also requires enterprises to be open about their impact on the environment by publishing reports with statistical indicators, environmental policy programmes, etc. In this article, we try to provide some data on what modern

environmental management requirements, both in a broad and in a narrow sense, are being implemented in the Krasnoyarsk Territory.

To begin with, as previously noted, the environmental policy conception until the year 2030 is developed in the Krasnoyarsk Territory, which is the first important step towards effective improvement of the environment in order to cope with such current problems as climate change and harmful anthropogenic impact on the environment. According to this concept, improvement is planned of the waste management situation in the Krasnoyarsk Territory. There is not enough specialised space for municipal solid waste storage at the moment. Furthermore, there are burial places of hazardous nuclear waste that require constant improvement of its safe storage system. Nevertheless, the most necessary waste management measure for the region today is the implementation of waste recycling programmes since there is an extremely limited quantity of sorting and further waste processing points (for tires, paper, glass); the waste sorting system has not been introduced into citizens' everyday life (non-indifferent citizens must look for the waste sorting points themselves and then carry out the waste removal); there are not enough enlightening activities promoting the idea of waste sorting (environmental art festivals, public petitions). The world practice shows that the introduction of the idea of waste sorting into society requires special educational campaigns on television and in schools.

The Krasnoyarsk Territory is also among the first in Russia in terms of a harmful impact on road transport on the atmosphere. The environmental policy concept of the Krasnoyarsk Territory implies complete switching of public transport to the fuel that meets international standards Euro 5 and Euro 6 by the year 2030. However, there still remains an issue concerning the quantity of personal vehicles and the lack of alternative transportation means. The problem has been discussed year in and year out, but has not yet been solved.

One of the central issues of the environmental policy of the Krasnoyarsk Territory is the restoration of natural resources, forests, and territories inhabited by the indigenous small-numbered peoples. Large industrial enterprises that operate in areas inhabited by the indigenous small-numbered peoples bear a certain share of social responsibility for these territories. It is expected that their environmental policy entails a commitment to the "conservation and restoration of biodiversity".

The key point of this study is a qualitative content analysis of the public information of several large industrial enterprises located in the Krasnoyarsk Territory. According to the "Environmental policy concep of the Krasnoyarsk Territory until the year 2030", the organisations that bear primary responsibility for the current ecological situation in the region are such large enterprises as Rusal, Siberian Generating Company, Limited Liability Company "Krasnoyarsk Cement", Nornickel, Public Joint-stock Company "Polyus", Limited Liability Company "RN-Vankorneft", Mining and Chemical Combine, Rosatom, and others.

According to Rusal's official website, the company's environmental policy is documented in compliance with international standards and involves such aspects as risk management, conformity with the international and Russian environmental law, technological minimization of harmful anthropogenic impact on the environment, personnel training programs on environmental management, cooperation with partners in compliance with environmental standards, regular assessment of the enterprise's environmental impact (both external and internal), and public reports on the results of such assessments. The company "Rusal" is engaged in its environmental modernisation. The official website provides information on planned modernization for 2012; further information is not presented. At the moment, the official reports on environmental protection indicate that, thus far, the company only plans to move onto the international environmental management standards ISO 14000 by the year 2020. In terms of environmental management, as one of its achievements, the company publicly reports that it has managed to reduce greenhouse gas emissions by 50% since 1990. Moreover, it compensates society by implementing several social investment programs that support public initiatives to improve the local environment and allocate individual grants for the development of human capital.

Siberian Generating Company supplies the Krasnoyarsk Territory and certain other regions of Russia with heat and energy power. It produces heating by burning coal, one the most environmentally harmful fuels, and, therefore, entails the most adverse impacts on the environment. Despite the fact that the company website postulates environmentally friendly principles, there is no information on

whether the company complies with the environmental standard ISO 14000 or at least plans to move on to this standard in the foreseeable future. Siberian Generating Company receives a lot of criticism from environmental activists and citizens of Krasnoyarsk who care about this issue and is blamed for the city's "black sky". The news media have even covered some "stories" on the company, including one stating that the owner of the company, Andrei Melnichenko, is living in Monaco while residents of Krasnoyarsk breathe poisoned air because he generates heating by burning coal for the sake of cheaper production. In 2016, environmental activists of Krasnoyarsk sent a petition, signed by 1,600 people, to the Prince of Monaco asking him to forbid A. Melnichenko to reside on the territory of the state due to the crime he committed.

The environmental policy of the mining and smelting company "Norilsk Nickel" entails such an aspect as compliance with the environmental standard ISO 14001. This implies external audits of the company's activities for compliance with the international environmental protection requirements. Nornickel took 4th place (out of 33) in the environmental responsibility rankings of Russian mining companies published by the World Wide Fund for Nature (WWF). The following parameters were evaluated based on these rankings: the certified environmental management system that complies with Russian and international standards ISO 14000, the availability of documents on environmental policy, policy on cooperation with the indigenous small-numbered peoples of the North, Siberia, and the Far East; transparency in the company's environmental impact data (statistical reports), greenhouse gas emission indicators, and programs for reducing energy consumption; biodiversity conservation programs on the territory where the company operates; environmental monitoring of the contractors' activities; and environmental risk insurance.

Thus, through the example of environmental policy analysis of the three large enterprises (Rusal, Nornickel, and Siberian Generating Company), it becomes clear that there are organisations with different levels of environmental responsibility in the Krasnoyarsk Territory. Some of them meet the international environmental management standards, while others do not implement enough technologies in their activity to minimize their environmental impact.

5. Discussion and Conclusion

The following conclusions can be drawn from this study:

1) Environmental management is quite a new phenomenon for the administrative sector of the Krasnoyarsk Territory (the environmental policy concept was adopted only in 2013); therefore, many aspects of environmental policy (introducing environmental education programs, involving citizens in the processes of reducing harmful anthropogenic impact on the environment, monitoring enterprises' activities and their environmental protection strategies, etc.) are on the project development stage and are planned for implementation in the foreseeable future.

2) In order for their solution, each of the designated environmental policy problems of the Krasnoyarsk Territory requires the involvement of humanities specialists for analysing public opinion on the willingness of the population to participate in environmental protection activities, reviewing international successful practices in reducing the harmful anthropogenic impact on the environment, developing enlightening scientific projects devoted to ecological problems, etc.

Large industrial enterprises located in the Krasnoyarsk Territory bear the greatest responsibility for the deterioration of the ecological situation in the region, although they are aware of the need to comply with the international environmental management standards. Some enterprises conform to the standard ISO 14000, have a developed environmental policy concept, and provide public access to the complete data on their environmental impact. The activity of others, on the contrary, does not meet the international environmental management standard requirements at all.

6. References

[1] Bartolomeo M, Bennett M, Bouma J, Heydkamp P, James P and Wolters T 1990 Environmental management accounting in Europe: current practice and future potential *European Accounting Review* **9**(1) 31

[2] Bebbington J, Gray R 2001 An account of sustainability: failure, success and a reconceptualization *Critical perspectives on accounting* **12**(5) 557

[3] Born S, Sonzogni W 1995 Integrated environmental management: strengthening the conceptualization *Environmental management* **19**(2) 167
[4] Margerum R 1999 Integrated environmental management: the foundations for successful practice *Environmental management* **24**(2) 151
[5] Schlosser I 1990 Environmental variation, life history attributes, and community structure in stream fishes: implications for environmental management and assessment *Environmental Management* **14**(5) 621
[6] Selin S, Chevez D 1995 Developing a collaborative model for environmental planning and management *Environmental management* **19**(2) 189
[7] Pearce D, Atkinson G 1993 Capital theory and the measurement of sustainable development: an indicator of "weak" sustainability *Ecological economics* **8**(2) 103
[8] Antunes P, Santos R 1999 Integrated environmental management of the oceans *Ecological Economics* **31**(2) 215
[9] Christmann P 2000 Effects of "best practices" of environmental management on cost advantage: The role of complementary assets *Academy of Management journal* **43**(4) 663
[10] Miles M, Russell G 1997 ISO 14000 total quality environmental management: the integration of environmental marketing, total quality management, and corporate environmental policy *Journal of Quality Management* **2**(1) 151
[11] Dash S, Pradhan M 2014 Environmental Challenges, Climate Change & Development *Journal of Siberian Federal University. Humanities & Social Sciences* **7**(3) 370
[12] Fliervoet J, Geerling G, Mostert E, Smits A 2016 Analyzing collaborative governance through social network analysis: a case study of river management along the Waal River in The Netherlands *Environmental management* **57** 355
[13] Koptseva N 2014 Expert analysis of the main trends of Northern Siberia's indigenous small-numbered people's economic development *Economic Annals-XXI* **11-12** 93
[14] Koptseva N, Kirko V 2014 Specificity of ethnogeny indigenous peoples by Central Siberia in the transition from the traditional type of society to modern society *Life Sci* J **11**(7) 409
[15] Tao Y, Li F, Crittenden J, Lu Z, Sun X 2016 Environmental impacts of China's urbanization from 2000 to 2010 and management implications *Environmental management* **57**(2) 498
[16] Kobalinskii M, Sibgatulin V 2016 Environmental Economic Zoning as the Basis of the Sustainable Development of Resource Territories (Based on the Example of Krasnoyarsk Krai) *Journal of Siberian Federal University. Humanities & Social Sciences* **9**(11) 2616

Acknowledgements
The reported study was funded by Krasnoyarsk Region Science and Technology Support Fund according to the research project: « Decorative and Applied Art of Indigenous Peoples of the Krasnoyarsk Territory: Current Status, Prospects for Development.
The reported study was funded by Russian Foundation for Basic Research, Government of Krasnoyarsk Territory, Krasnoyarsk Region Science and Technology Support Fund to the research project № 17-16-24601.