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ANALYSIS

Municipal Solid Waste Management in Russia: Protest, Policy, and Politics

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Abstract

Russia has a garbage problem. Poor management of Municipal Solid Waste (MSW) has led to significant and sustained public protests in recent years in response to the expansion of landfill sites, poor environmental quality, and public health concerns. This article examines current policy reforms in the MSW sphere that have emerged in response to the crisis: the so-called "rubbish reforms." It argues that despite strong policy activity, the scope of the reforms is limited and focused on attracting private-sector investment rather than addressing broader issues around recycling and sustainable consumption. The implementation of these policies also raises serious concerns about both the capacity of regional governments to enact reforms and the transparency of decision-making.

Introduction

More than almost any other environmental issue in recent decades, the issue of municipal solid waste (MSW) has attracted significant public attention. The scale of the problem and its visibility have led to sustained public protests. These have emerged in response to a range of concerns, including: poor environmental quality at existing landfill sites and the impact on surrounding areas; public health risks; illegal dumping; proposals to create new landfill sites and incinerators; and the trucking-in of waste from big cities, particularly Moscow.

The purpose of this article is to provide an assessment of key policy developments in Russia's MSW management sphere. It first provides a brief overview of the waste management issue and the public protests that have occurred with considerable frequency in recent years. This is followed by an evaluation of government policy responses. Finally, the article considers some of the huge challenges associated with addressing this issue effectively.

The Issue of MSW in Russia

MSW (*tvyordye bytovye otkhody,* or TBO, also known as *tvyordye kommunal'nye otkhody*, or TKO) refers to the waste generated by households. This is distinct from the waste produced as a result of industrial activity. Industrial waste remains a huge problem in Russia, as clearly demonstrated by the recent disasters in Norilsk and Usolye-Sibirskoye, but it is beyond the scope of this analysis.

MSW is a serious and growing problem in Russia, which produces around 70 million tons of rubbish annually. To put this in comparative perspective, a 2018 World Bank report estimates that Russia produces approximately 1.13kg of MSW per capita per day, well above the global average of 0.74kg per capita per day. It is worth noting, however, that this is still below European levels, although the amount of MSW generated in Russia is increasing.

This problem is compounded by very low levels of recycling and waste recovery. A 2019 report by the International Finance Corporation, for example, reports that only 5–7% of MSW is recycled, with over 90% going to landfill and unauthorized dumps. In contrast, the average waste recovery rate for EU Member States is approximately 60% of MSW.

The problem is particularly acute in Russia's largest city, Moscow. With a population over 12 million, the capital produces vast amounts of waste each year. A report by Greenpeace Russia, for example, calculates that in 2015 Moscow and the Moscow Oblast produced over 11 million tons of municipal solid waste, amounting to 20% of the total rubbish produced in Russia that year. Of this, 90% went to landfill sites and 6% was incinerated, while just 4% was recycled. The huge volume of rubbish being sent from Moscow to landfill sites in the surrounding region was the impetus for a number of protests.

The "Rubbish Crisis" and the "Rubbish Riots"

The growing crisis around urban waste and its management has led to public protests in recent years. These protests, known as the "rubbish riots" (*Musornye Bunty*), were grassroots and highly localized. They began in 2017, peaked in March and April 2018, and continued on into 2019. Protests were seen in numerous towns and cities across Russia, including the Moscow Region, Krasnoyarsk, Omsk, Arkhangelsk, and Nizhny Novgorod. They attracted considerable media attention and saw a few immediate successes, such as the removal of the head of Volokolamsk district and the immediate closure of the Kuchino dump in the Moscow region following a local resident's complaint during Putin's annual

Direct Line in 2017. They also prompted larger-scale policy change, dubbed the "rubbish reforms," which are discussed below.

It is worth emphasizing that threats were made against individual activists; protestors often met with harassment, violent dispersal by the police, and even, in some instances, detention. However, the protests were for the most part de-politicized and not linked to broader criticisms of the regime. As a result, they were more tolerated than other large-scale protests in Russia in recent years have been. The MSW issue has in some ways been co-opted by the state and the protests neutralized politically, as demonstrated by the attention given to the issue. For example, Putin has spoken on numerous occasions of the need to improve waste management in Russia, while pro-Kremlin groups like the All-Russia People's Front (*Obshcherossiiskii narodnyi front*, ONF) have been publicly tasked with helping to address the issue.

Current Policy on MSW

Legislation dealing with MSW centers on Federal Law No. 89 'On Production and Consumption Waste' (hereafter, the Law on Waste). The law, passed in 1998, establishes the basic principles of waste management in Russia. It emphasizes the protection of human health, the need to maintain the environment in a favorable condition, the need to reduce waste, and the use of the latest low-waste and zero-waste technologies.

The Law on Waste establishes the powers and responsibilities of the different levels of government. It requires the federal government to implement a unified state policy on waste and establish rules and standards to ensure the safe management of waste. Regional authorities are responsible for developing and implementing regional waste management programs, as well as contributing to the design and implementation of federal-level programs and conducting environmental monitoring. Local authorities, meanwhile, are tasked with the collection and removal of MSW.

In other words, while the federal government sets the broad policy framework for MSW, regional and local governments play a central role in the management and implementation of MSW policies and are responsible for a range of key activities, including recycling and selecting waste operators, in addition to oversight and compliance activities. The result is a highly complex system in which a range of government actors operate at different levels.

Institutional responsibility for overseeing MSW at the federal level lies primarily with the Ministry for Natural Resources and Ecology (MNR) and its subordinate body, Rosprirodnadzor, which holds responsibility for the management and implementation of environmental policy.

The "Rubbish Reforms"

In response to the crisis, there has been considerable policy activity in the MSW sphere in recent years. These developments are broadly termed the "rubbish reforms" (*musornaia reforma*). These reforms, which address a series of related issues, aim to: reduce the number of landfill sites across Russia; prevent illegal landfills and clear existing dumping sites; and increase the processing of waste.

The central element of the rubbish reforms is part of the National Project on Ecology. Approved in 2018, one of the national project's eleven priority areas is a federal project specifically targeting the MSW issue: "an Integrated System for Municipal Solid Waste Management." This project has a budget of 296.2 billion rubles and is due to be completed by the end of 2024. The overarching goal of the project is to recycle 36% of the country's MSW by 2024.

The focus of the federal project has been the creation of a public company tasked with building a unified, Russia-wide system for dealing with MSW. On January 14, 2019, Putin signed an executive order creating the Russian Environmental Operator (REO). This body has an extensive set of responsibilities: it is tasked with legislative and regulatory development, as well as overseeing the implementation of MSW policy across Russia. It is further charged with creating a recycling system and trying to create a market for private investment in MSW by providing co-financing. The REO oversees the development and approval of waste management plans for all constituent members of the Russian Federation, with the regions responsible for the implementation of these plans. The body is currently headed by Il'ya Gudkov, who was appointed in January 2020 after the previous director general, Denis Bustaev, was dismissed by Medvedev before the end of his tenure. The body is overseen by the MNR.

A related federal project, known as "Clean Country," has a budget of 124.2 billion rubles and aims to eliminate unauthorized landfills across Russia. Its goal is to eliminate at least 191 unauthorized landfill sites by 2024 and clean up a further 75 sites considered dangerous by 2021. It also hopes to create a system that would enable the regional authorities to identify and eliminate illegal landfill sites in the future.

There have been numerous amendments to the Law on Waste over the two decades since it was first passed and it is widely regarded as being out of date. In recent years, there have been a number of important additions made in response to the rubbish crisis. A particularly important one, which aimed to consolidate the MSW industry by creating large regional operators to replace the large number of existing companies, came into force in January 2019. Under this amendment, regional oper-

ators are to be selected on a competitive basis and are to be responsible for the collection, transportation, and disposal of MSW. All regions were obliged to switch by January 2019, although exemptions were made for Moscow, St. Petersburg, and Sevastopol to delay their reforms until 2022.

MSW Policy Outcomes

In terms of policy outcomes, there have been some successes. It has been reported, for example, that of the 39 landfills in the Moscow Region, 28 had been closed by the end of 2019, with the remaining 11 to close by 2021. There have also been apparent victories for protestors, including the suspension of construction of the Shiyes landfill site in the Arkhangelsk region, which was a major focus of the rubbish riots in 2018. While the outcome of this and many other cases remains uncertain, particularly at the present time, the protests at the very least ensured that the issue was well and truly on the government's policy agenda and prompted serious talk of waste management reform. However, big questions remain, with the issue of MSW highlighting several key challenges for environmental policymaking in Russia more broadly.

First and foremost, the focus has been very much on market-based solutions to the MSW crisis. Part of the REO's role, for example, is to attract private-sector investment in MSW and participate in the establishment of public-private partnerships (PPPs). MSW management is framed as an issue of business or private-sector reform and around the need to create an industry that is attractive for business investment. This is reflected in the REO's key objectives and the two federal projects. In this way, the federal projects correspond to the overall focus of the national projects, which emphasize private investment and industry contributions. What this ultimately means, however, is that the scope of reforms is quite limited. While fundamental waste management reform is clearly necessary, very little attention has been paid to reducing the amount of waste produced in Russia. Nor has there been any real attempt to distinguish between different types of MSW, such as food waste or plastics, and develop targeted strategies for each one.

While this is certainly still an evolving policy area, there are some discouraging signs. A recent article in *Kommersant*, for example, notes that REO's current plans prioritize the creation of new landfill sites and incinerators, which goes against the original aims of the rubbish reforms. In line with the focus on technological improvements and market-based solutions, the emphasis of the garbage reforms is very much on improving landfill and incineration, rather than on recycling and sustainable consumption.

NGOs such as Greenpeace Russia, Separate Collection (*Razdel'nyi sbor*), and No.More.Rubbish (*Musora.Bol'she.Net*) have been more active in this policy space, focusing on issues like recycling and the circular economy. However, policymaking on MSW in Russia offers few opportunities for NGOs and citizens to participate, thereby limiting their ability to shape the policy debate. This is not unique to the MSW sector, but is rather true of a range of environmental policy issues in Russia.

One of the more promising policy developments in recent years that offers some hope of a more comprehensive approach to waste has been the introduction of the concept of Extended Producer Responsibility (EPR) into Russian legislation. EPR is a policy approach that argues that manufacturers or importers should bear some of the responsibility for the environmental costs associated with their products. In relation to waste, this means that the manufacturer assumes some responsibility for the disposal or recycling of their product, or else pays an environmental fee.

However, EPR is still in its infancy in Russia. Amendments were introduced to the Law on Waste in 2015 and followed up with subsequent additions. EPR reforms were supposed to be in place in 2020 but have since been delayed until 2021. Although the MNR claims that this delay is simply due to the difficult economic conditions occasioned by the pandemic, the proposed reforms met with significant resistance from some areas of the business community given the potentially large costs involved for them. This remains an issue to watch in the future.

There have also been serious issues associated with the implementation of the MSW policy reform agenda. Policy implementation and enforcement is a challenge in Russia, and the MSW sphere is no exception. Many problems have arisen in relation to the regional operators, and there appear to be few mechanisms for effective oversight of regional and local officials in selecting companies. There are also reports of corruption, with one investigation suggesting that a company linked to the Rotenbergs—close contacts of Putin—has been awarded lucrative contracts for waste management and recycling, as have people with ties to the regional authorities. In other instances, contracts have been awarded to regional operators without competitive tender processes or to companies with no previous waste management experience.

With regional operators having reportedly violated fee agreements, not met deadlines, and refused to remove waste from smaller settlements in rural areas where collection is not profitable, there are certainly questions about how to ensure that regional operators are fulfilling their obligations. In April 2020, the government was forced to step in and provide financial support to keep

regional operators afloat as they struggled to cope with the recent increase in waste as a result of the COVID-19 crisis. Furthermore, federal bodies responsible for oversight do not necessarily have the capacity or financial resources to enforce regulations and monitor operators; the financial capacity of individual regions is also likely to have a significant impact on policy outcomes.

Conclusions

Overall, while the MSW sphere has seen considerable policy activity, sparked by the widespread, spontaneous, and grassroots protests that have emerged in recent years, there are serious issues with the design and implementation of the reform agenda. Despite promising signs, such as the recognition of the EPR principle in Russian legislation and the creation of a dedicated body to oversee MSW, the reforms do not go far enough in addressing the underlying issues around sustainable consumption, nor do they overcome the broader challenges facing environmental policy in Russia, particularly those around implementation. The MSW issue also highlights some underlying tensions in the relationship between the federal government and the regions in the environmental sphere. Policy reforms have led to a centralization of policymaking through the development of Russia-wide reforms and a resulting consolidation of the sector via the creation of large regional operators. At the same time, however, the responsibility for policy implementation remains decentralized, continuing to be delegated to regional governments. This means that the results of the reforms are likely to be uneven, dependent as they are on the capacity and resources available to each regional government.

At the same time, however, these are now federal policy reforms. There is a strong risk, therefore, that any policy failure would be associated with those at the top. Many of the protests that emerged around MSW already had a distinct anti-Moscow element to them, emerging as they did as a reaction to the transfer of waste from the city to the surrounding regions. It will be fascinating to see how these issues play out in the future.

Finally, the impact of COVID-19 on policy development in Russia should not be underestimated. We have already seen delays in several environmental policy areas, including the MSW sphere, with industry lobbying hard for concessions and a reduction in penalties for environmental violations to help them weather the economic impact of the crisis. It is highly likely that the environmental governance and reform agenda will not be the government's main priority in the post-pandemic recovery.

About the Author

Dr. Ellie Martus is Lecturer in Public Policy in the School of Government and International Relations at Griffith University, Australia. She is the author of *Russian Environmental Politics: State, Industry and Policymaking* (Routledge, 2018), in addition to a number of articles on Russian climate and environmental policymaking. Ellie's article, co-authored with Fengshi Wu, comparing the politics of waste management in Russia and China was recently published in *Environmental Politics* (https://doi.org/10.1080/09644016.2020.1816367).

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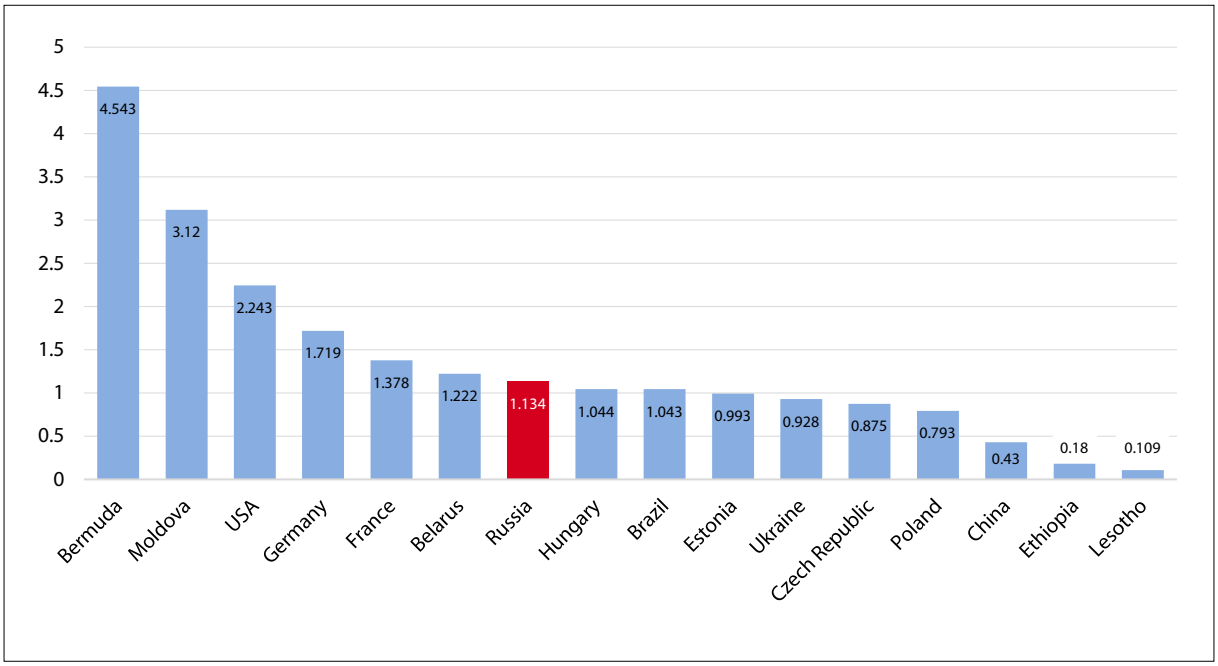
STATISTICS

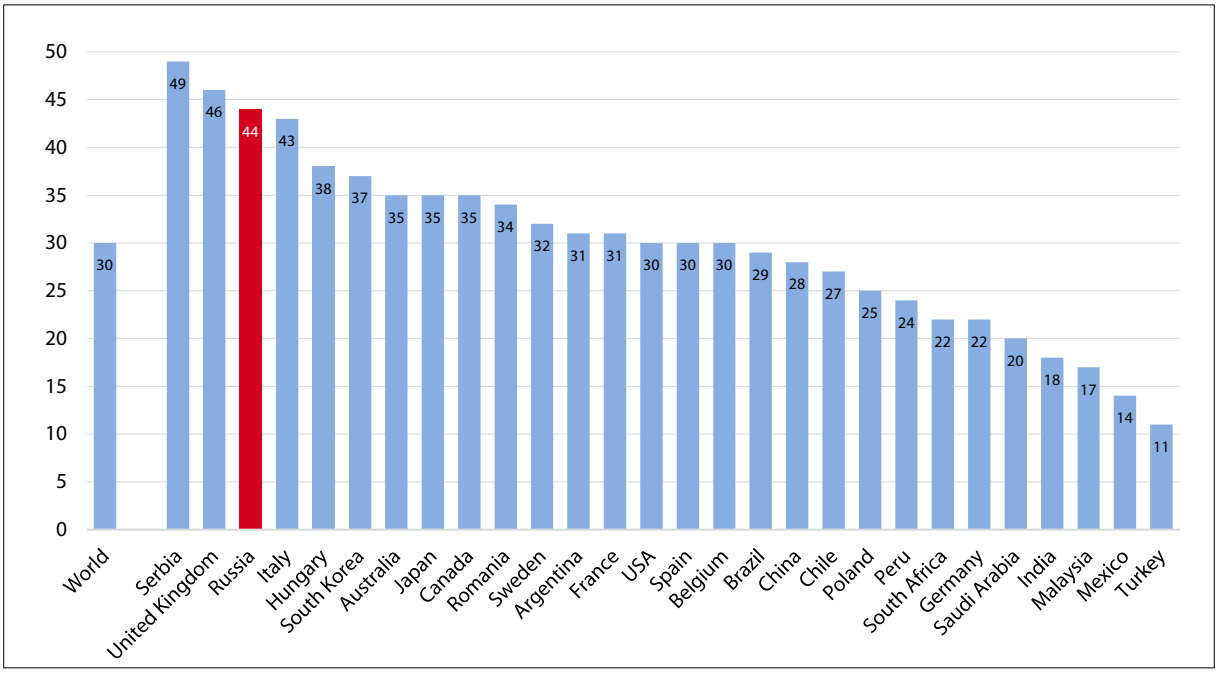
Solid Waste

Figure 1: Waste Generation Rates: Russia in Comparison to Selected Countries, 2016, kg/capita/day



Source: Kaza, Silpa, Yao, Lisa, Bhada-Tata, Perinaz und Van Woerden, Frank: What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. World Bank, 2018; http://datatopics.worldbank.org/what-a-waste/

Figure 2: In Your View, What Are the Three Most Important Environmental Issues Facing [COUNTRY] today? That Is, the Top Environmental Issues You Feel Should Receive the Greatest Attention from Your Local Leaders? Percentage of Respondents Who Saw "*Dealing with Waste*" as One of These Issues



Source: representative poll by IPSOS vom 23. März bis 6. April 2018; https://www.ipsos.com/sites/default/files/Global_Views_on_the_Environment.pdf

ANALYSIS

All Fall Down? Urban Infrastructure and Permafrost in the Russian Arctic

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Abstract

Soviet policy for settling the Russian North led to extensive in-migration in the 1960s–1980s, resulting in massive population growth and a staggering pace of urbanization in the Soviet Arctic. Multistory houses, road networks, and other infrastructure were built, transforming pristine tundra into anthropogenic and urban landscapes. The Soviet emphasis on developing Russia's Arctic regions, despite the cost and difficulty of doing so, has left a problematic legacy for modern Russia. One of the common problems shared by many Soviet-era urban communities is the debilitated state of infrastructure built on permafrost. This article provides a brief overview of the challenges associated with urban development in permafrost regions in an attempt to identify major causes of present-day infrastructure problems in the communities of the Russian North.

Introduction

Planned socio-economic development during the Soviet period promoted migration into the Arctic and workforce consolidation in urbanized settlements to support the mineral extraction and transportation industries. These policies resulted in a high rate of urbanization in the Soviet Arctic. The harsh environmental conditions presented significant and rather unique challenges to urban development. Specifically, the presence of permafrost, which underlies approximately 66% of Russian territory, limited the applicability of standard construction practices and demanded innovative engineering solutions. Despite significant advances in permafrost engineering, pronounced permafrost degradation was evident in many northern communities by the 1980s and accelerated rapidly starting in the 1990s, resulting in the widespread deformation of buildings. As such, the Soviet emphasis on developing Russia's Arctic regions, despite the cost and difficulty of doing so, has left a problematic legacy for modern Russia. This paper provides a brief overview of the challenges associated with urban development in permafrost regions in an attempt to explain the debilitated state of infrastructure in many Russian Arctic cities.

Permafrost

Permafrost is defined as ground that remains at a temperature below 0° C for at least two consecutive years. The term permafrost is applied without regard to material composition and is based exclusively on the thermal regime of the ground. Despite this simple definition, the processes involved in the formation, maintenance, and degradation of permafrost are rather complex. Although ground temperature is ultimately determined by climatic conditions, the presence or absence of permafrost is strongly influenced by many local factors that influence the heat exchange between the atmosphere and the ground. For example, natural covers such as snow and vegetation tend to serve as insulators, preventing the ground from warming during the summer and/or from cooling during the winter. The ability of the ground to retain moisture and to conduct heat influences the thickness and temperature of permafrost. Depending on climatic, surface, and subsurface conditions, the permafrost layer can be as thin as a few centimeters and as thick as 1.5 kilometers and persist for anywhere from a few years to millennia.

Although the presence of ice is not a criterion in the definition of permafrost, ground ice is responsible for many of the distinctive features and problems in permafrost regions. If their thermal stability is preserved, frozen ice-bonded sediments have the capacity to carry a substantial load imposed by human structures. However, the melting of ground ice due to an increase in heat propagation into subsurface ice-reach permafrost layers results in soil consolidations and significant surface deformations. This can happen in response to climatic warming and/or any surface disturbance associated with human activity. The stability of all types of human infrastructure built on permafrost relies on maintaining the thermal regime of the ice-rich frozen sediments. All in all, permafrost presents a distinctive, highly challenging suite of engineering problems even under stable climatic conditions.

Development in Russian Permafrost Regions

The first written accounts of perennially frozen ground appeared in the seventeenth century, when Russian traders began exploring remote areas of Siberia and

established several outposts in regions underlain by permafrost. However, significant economic development in Russian permafrost regions began at the turn of the twentieth century, with the construction of the Trans-Siberian Railroad. During the construction of the "Great Siberia Railroad," which was completed in 1916, Russian engineers were faced with significant permafrost-related problems. For example, almost immediately after construction, structures and railroad beds were subjected to significant deformations due to changes in the thermal regime of the underlying ice-rich permafrost. Over the subsequent century, several sections of the Trans-Siberian Railroad would require continuous rebuilding and stabilization to ensure normal operation.

As the twentieth century went on, Russians gained valuable experience that resulted in the gradual evolution of permafrost construction methods. A major breakthrough came in the 1950s and is associated with the implementation of another colossal infrastructure project in permafrost regions, namely the development of the Mining and Metallurgy Complex and the city of Norilsk on the Tymur Peninsula in the far north of Central Siberia. There, civil engineer Mikhail Kim perfected a design that required "pile foundations" for permafrost construction. The pile foundation consists of several rows of 8 m–16 m reinforced concrete piles frozen into the permafrost and a set of concrete beams laid on top of the foundation piles at 1.2–1.8 m above the ground. Such a foundation puts a layer of air between the ground and the building, effectively decoupling the heat generated by the structure from the frozen ground and thus preventing the warming of ice-rich permafrost. The ability of pile foundations to support the structural load of the building (bearing capacity) is contingent on the temperature-dependent freezing bond between the piles and the permafrost: the lower the temperature of the permafrost, the higher the bearing capacity of the pile foundation. However, this was believed not to be a problem, since pile foundations can cause a reduction in permafrost temperatures underneath buildings due to the ventilation of the space between the structure and the ground, the absence of snow cover, and the shading of the ground beneath the structure. As a result, this method was considered to be effective even in areas characterized by ice-rich permafrost that was approaching the melting point. But most importantly, Kim's foundation could be built relatively cheaply and very quickly compared to other alternatives. Moreover, Kim's innovation coincided with the development of the manufacture of prefabricated concrete building elements, which could be quickly assembled on a pile foundation to construct large multistory housing, social, cultural, or industrial facilities. As a result, the rate of construction of new residential buildings in Norilsk increased from 5 per year in the 1950s to approximately 18–20 per year from the 1960s to the late 1980s. Construction on piles was considered to be a major engineering achievement, prompting the Soviet media to proclaim that the "Permafrost is Conquered."

Following the Norilsk experiment, pile foundations quickly proliferated throughout the vast Eurasian permafrost regions, contributing greatly to the acceleration of urban and industrial development in the Soviet Arctic. More than 75% of structures in Russian permafrost regions are constructed on pile foundations.

It should be noted that pile foundations are also prevalent in permafrost construction in North America. However, the developments there are dwarfed by those in the Russian Arctic. Northern communities in Alaska and Canada consist predominantly of small wooden or composite structures, whereas in Russia large 5- to 12-story concrete or masonry buildings are the norm even for small, isolated Arctic towns.

Warming and Degradation of Urban Permafrost

Despite the proclaimed victory over permafrost, reports of structural deformations of buildings caused by permafrost warming started to appear within 10–15 years of initial construction—and these have only multiplied with time. As early as 1969 and 1971, collapses of concrete buildings in the large East Siberian city of Yakutsk were attributed to the reduced bearing capacity of pile foundations due to permafrost warming. A detailed analysis of city infrastructure following these accidents revealed that approximately 100 masonry structures erected on pile foundations in Yakutsk had deformations.

In Norilsk, a two-story restaurant collapsed in 1976, killing 12 people and injuring 30. This disaster was attributed to the poor quality of the specific structure. However, in the 1980s more than 30 large residential buildings in different parts of the city developed significant deformations and had to be demolished. According to temperature monitoring under the residential buildings in Norilsk, permafrost degradation affected 39 buildings in 1989, 145 in 1995, and 393 in 2000.

By the mid-1990s it had become apparent that there were widespread problems with the stability of infrastructure built on permafrost. Infrastructure surveys conducted in the late 1990s in several Russian cities built on permafrost found that between 10% and 80% of urban infrastructure was in a potentially dangerous state. The rate of permafrost-related damage to infrastructure has only accelerated over the past two decades: in the 2000s just 10% of Norilsk infrastructure was in a critical state due to permafrost-related deformations, but this figure had increased to more than 30% by the mid-2010s, not counting the large number of structures

that were demolished due to their potentially dangerous condition. The problem of infrastructure stability on permafrost received global attention in the summer of 2020 when an oil storage tank in Norilsk collapsed due to its pile foundation's loss of bearing capacity, spilling 21,000 tons of diesel fuel into nearby streams and lakes.

Causes of Permafrost-Related Infrastructure Problems in Russian Arctic Communities

Although there is a tendency to attribute permafrost-related reductions in infrastructure stability solely to climate-induced environmental changes, the problem appears to be more complex. The unprecedented rate of air temperature increases throughout the circumpolar Arctic over the last decades is responsible for permafrost warming and degradation. This explains the broad pattern of declining infrastructural stability. However, human and socio-economic factors need to be considered to explain the state of permafrost infrastructure at the local level.

The planning of Arctic cities—including the arrangement of streets and squares, the density of buildings, the location and size of vegetated surfaces, and the type of pavement, among other features—was guided primarily by aesthetic and/or functionality concerns. The primary concession to the presence of permafrost was the use of permafrost-specific engineering designs for infrastructure. However, the complex interactions between different components of the urban landscape and their combined effects on permafrost temperature were never fully considered. For example, during the development of Northern cities, it was generally assumed that storm drainage was not necessary due to the cold temperatures and low level of precipitation associated with the Arctic climate. However, despite low precipitation, snow cover can pile up on city blocks due to altered wind patterns and plowing. Snow piles significantly restrict permafrost cooling in winter and result in meltwater accumulation in depressions formed by the foundation piles. Both factors contribute to permafrost warming and are considered to be major causes of the structural deformation of buildings. Moreover, many normal city activities—such as the construction and maintenance of roads, buildings, and utility lines; the planting and removal of vegetation; and changes in traffic patterns—can heavily impact the mechanical and thermal properties of the frozen ground, negatively affecting the bearing capacity of foundations. Even urban and industrial pollution can greatly affect infrastructure stability, thanks to soil salinization and the related depression of the freezing point and intensification of the chemical distraction of foundation piles. As a result, it is extremely difficult to maintain the thermal regime of permafrost in a highly complex and constantly evolving urban environment, even if all infrastructure is engineered and built properly.

Moreover, the rapid urban development of the Russian Arctic was, in many cases, achieved at the expense of construction quality. The majority of residential buildings erected after 1960 were made of prefabricated concrete panels. The building design and manufacturing process were very similar to those adopted throughout the Soviet Union, without regard for the extreme Northern climate. For example, the reinforced concrete widely used for foundation piles was highly subject to rapid distortions in the Arctic. Moreover, engineers assumed just a 5%–35% decrease in the bearing capacity of the foundation over the lifespan of a building, which rarely exceeded 30 years. Significant variation in permafrost temperature related to both anthropogenic and climatic factors can, however, result in far greater reductions in the bearing capacity, while the exploitation of structures well beyond their operational limit can promote infrastructure failure.

The socio-economic crisis that occurred after the collapse of the Soviet Union in the 1990s had a significant impact on urban permafrost in many Russian cities. As the Soviet political and economic systems crumbled, so too did the support for vulnerable industries and cities. In many Russian Arctic communities, this period was characterized by the termination of construction and development, a reduction in the amount and quality of infrastructure maintenance, and the out-migration of the labor force. Rapid market reforms resulted in the privatization of major city functions such as the maintenance of buildings, roads, and utility lines; snow removal; and permafrost monitoring. A large number of private contractors provided services of unequal quality and without any consideration for permafrost. Many operational practices that had been aimed at stabilizing the ground's thermal regime were neglected. Such socio-economic factors have greatly contributed to the deterioration of the aging urban infrastructure throughout the Russian Arctic, causing further permafrost warming, which has, in turn, affected the structural stability of buildings. Such negative feedback has been further amplified by the acceleration of changes in climatic conditions.

Conclusion

The climatic change observed in the Russian Arctic and Sub-Arctic regions is characterized by an increase in temperature and precipitation. Although such changes can have a pronounced effect on permafrost, the observed climatic signal cannot fully explain the rate of permafrost warming and degradation in many Russian communities. However, climate-induced permafrost changes have put additional stress on aging city infrastructure,

the stability of which had already been substantially weakened by technogenic and socio-economic factors. The relative importance of climatic impacts on infrastructure stability is certain to increase.

Although a range of engineering solutions are available to mitigate the negative impacts of permafrost changes on infrastructure, their cost is prohibitive for city-wide applications in many economically vulnerable Russian municipalities. The uncertainty of high-resolution projections of climate change further complicates the problem of developing adequate and cost-effective adaptation and mitigation strategies. It seems that the problem of infrastructure stability on permafrost is recognized at the highest federal level of the Russian government. For example, permafrost degradation and its effect on infrastructure were identified as a matter of national security in the "Russian Strategy of the Development of the Arctic Zone and the Provision of National Security until 2020" issued in 2013 and then again in the "National Climate Change Adaptation Plan" approved by the Russian government in December 2019. However, given current Russian geopolitical priorities and economic problems, it is highly uncertain whether recognition of the problem will actually lead to action.

About the Author

Dr. Nikolay I. Shiklomanov is a Professor of Geography at The George Washington University in Washington, DC, USA. His main area of research is the effect of climate change on permafrost-affected environments. Recently, Prof. Shiklomanov has been actively involved in international and interdisciplinary studies of Arctic urban sustainability.

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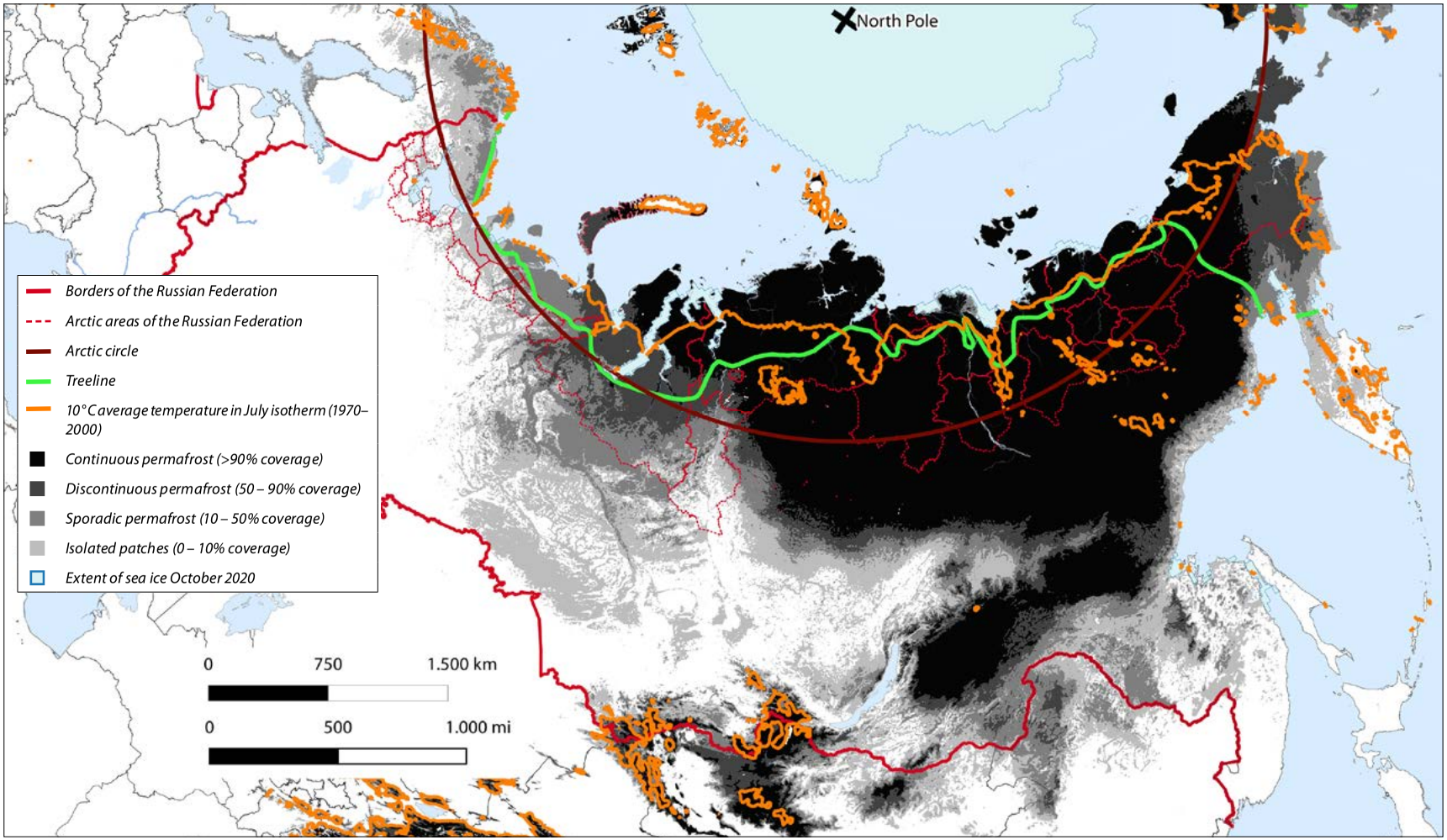
- Shiklomanov, N.I. 2005, From exploration to systematic investigation: Development of geocryology in 19th- and early 20th-century Russia. *Physical Geography*, 26 (4), pp. 249–263

Potential Consequences of the Reduction of Permafrost Coverage in Russia

Figure 1: Extent of Permafrost Coverage, Russian Federation



Sources: Map created in QGIS by the Research Centre for East European Studies, with geodata from Openstreetmap (https://www.openstreetmap.org); Arctic circle: Esri; Treeline: Brown, J., O. Ferrians, J. A. Heginbottom, and E. Melnikov. 2002. Circum-Arctic Map of Permafrost and Ground-Ice Conditions, Version 2. [Treeline]. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. doi: https://doi.org/10.7265/skbg-kf16 [accessed 28 October 2020]; 10°C average temperature in July isotherm: Fick, S.E. and R.J. Hijmans, 2017. WorldClim 2: new 1km spatial resolution climate surfaces for global land areas. International Journal of Climatology 37 (12): 4302-4315 [accessed 23 December 2020], permafrost coverage: Obu, Jaroslav; Westermann, Sebastian; Kääb, Andreas; Bartsch, Annett (2018): Ground Temperature Map, 2000–2016, Northern Hemisphere Permafrost. Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, PANGAEA, https://doi.org/10.1594/PANGAEA.888600; extent of sea ice October 2020: Fetterer, F., K. Knowles, W. N. Meier, M. Savoie, and A. K. Windnagel. 2017, updated daily. Sea Ice Index, Version 3. [extent_N_202010_polygon_v3.0]. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. doi: https://doi.org/10.7265/N5K072F8. [accessed 1 November 2020].

Figure 2a: Possible Reduction of Distribution of Permafrost Areas According to Various IPCC Representative Concentration Pathways 2041–2060

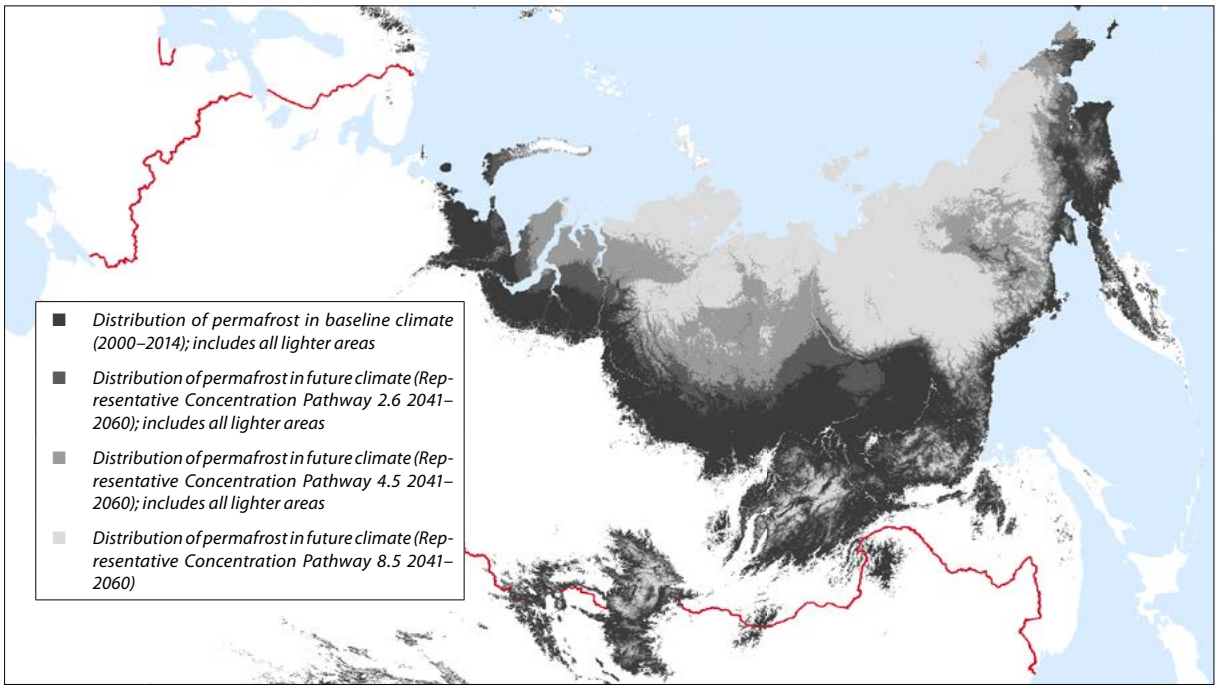
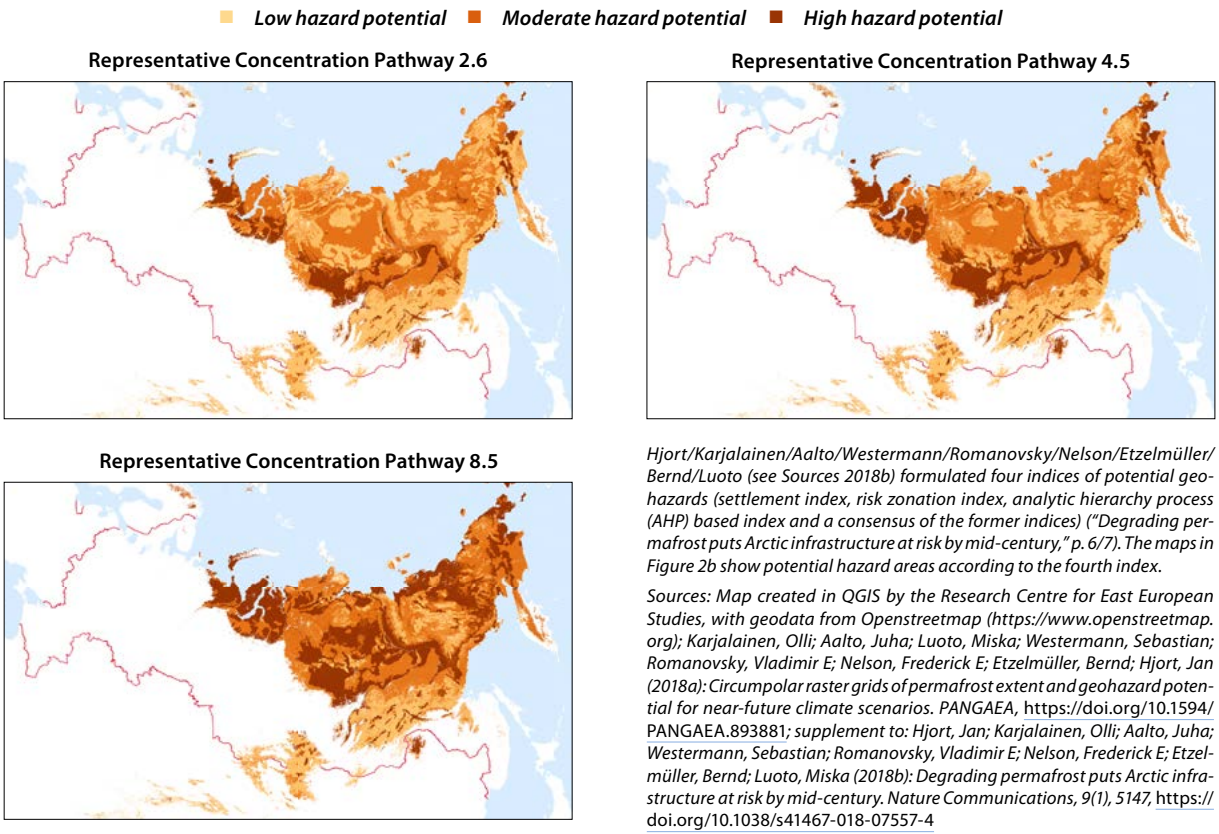


Figure 2b: Infrastructure Hazard Map of Permafrost Areas (Consensus of Three Indices of Potential Geohazards) According to Various IPCC Representative Concentration Pathways 2041–2060



Hjort/Karjalainen/Aalto/Westermann/Romanovsky/Nelson/Etzelmüller/Bernd/Luoto (see Sources 2018b) formulated four indices of potential geohazards (settlement index, risk zonation index, analytic hierarchy process (AHP) based index and a consensus of the former indices) ("Degrading permafrost puts Arctic infrastructure at risk by mid-century," p. 6/7). The maps in Figure 2b show potential hazard areas according to the fourth index.

Sources: Map created in QGIS by the Research Centre for East European Studies, with geodata from Openstreetmap (https://www.openstreetmap.org); Karjalainen, Olli; Aalto, Juha; Luoto, Miska; Westermann, Sebastian; Romanovsky, Vladimir E; Nelson, Frederick E; Etzelmüller, Bernd; Hjort, Jan (2018a): Circumpolar raster grids of permafrost extent and geohazard potential for near-future climate scenarios. PANGAEA, https://doi.org/10.1594/PANGAEA.893881*; supplement to: Hjort, Jan; Karjalainen, Olli; Aalto, Juha; Westermann, Sebastian; Romanovsky, Vladimir E; Nelson, Frederick E; Etzelmüller, Bernd; Luoto, Miska (2018b): Degrading permafrost puts Arctic infrastructure at risk by mid-century. Nature Communications, 9(1), 5147,* https://doi.org/10.1038/s41467-018-07557-4

COMMENTARY

Environmental Activism in Russia

Elizabeth Plantan (Stetson University, Florida, USA)

DOI: 10.3929/ethz-b-000458206

Over the last few years, there has been a noticeable increase in environmental activism in Russia. From protests against landfills and trash incineration plants to local movements against the development of sacred natural monuments, Russian citizens across the country are mobilizing to protect their backyards. But underlying the recent examples that dot the headlines is a long history of environmental activism in post-Soviet Russia.

In the 1990s, while most Russians were struggling with the political and economic turmoil around them, environmental activists were beginning to formalize as non-governmental organizations (NGOs). Many of these first environmental NGOs were founded by people who had been active participants in the late-Soviet environmental movement or who had worked in the Soviet environmental bureaucracy. These early groups were largely financed by grants from international donors who were funding Russia's fledging civil society with a view to supporting the larger goal of democratization.

During this period, formal environmental organizations were founded not only in major cities like Moscow and St. Petersburg, but also across Russia's regions. Strong regional environmental NGOs began to appear in cities like Irkutsk, Nizhny Novgorod, Novosibirsk, Murmansk, and Arkhangelsk. These organizations work in diverse areas ranging from environmental law and justice to recycling and trash clean-up to wildlife conservation. Some of them have also engaged directly in mass mobilization campaigns, including high-profile cases like Baikal Environmental Wave's involvement in a 2006 campaign against the Eastern Siberia-Pacific Ocean (ESPO) oil pipeline or a 2010 campaign against the Baikalsk Pulp and Paper Mill (BPPM).

Over the last few years, however, Russian environmental NGOs have felt the atmosphere for their work change considerably. The 2012 law on "foreign agents," which stigmatizes and penalizes domestic NGOs that receive foreign funding and engage in vaguely-defined "political activity," cast a chill over the third sector in Russia. Furthermore, according to data that I have collected from the Russian Ministry of Justice, environmental NGOs have been the second most targeted group under the "foreign agent" law after rights organizations. While not all ENGOs have been labeled "foreign agents," many of Russia's strongest regional environmental organizations have encountered consequences from the law, including fines for violating the law, reduced international funding, and increased administrative burden.

As a result of the "foreign agent" law, some domestic ENGOs are now pivoting away from foreign funding and toward domestic sources. Some environmental organizations—often those that are deemed comparatively less "political"—have enjoyed increasing access to government grants and other opportunities for civil society development. In contrast to Baikal Environmental Wave, which was labeled a "foreign agent," another environmental NGO in the same city, Great Baikal Trail, has won several presidential grants for its work building a system of trails for eco-tourism around Lake Baikal and beyond.

Still, the "foreign agent" law and decreased reliance on foreign funding has significantly reduced incentives for environmental organizations to formalize as NGOs. In fact, many environmental groups originally registered with the Russian Ministry of Justice as formal legal entities in order to receive foreign grants. Now that the "foreign agent" law has made foreign funding a potential liability, many groups are de-registering and remaining informal.

Other grassroots environmental activists have internalized similar lessons, citing policies like the "foreign agent" law as reasons not to formally register as NGOs. The grassroots environmental movements that have proliferated across Russia are in many cases explicitly remaining informal to reduce the number of institutional or legal mechanisms that the state can use to shut down their activities. Furthermore, some of these activists have started to run in local elections as candidates affiliated with opposition parties like Yabloko or PARNAS. Yet environmental activists often run not to win, but to attract attention to their cause and to use the legal protections accorded to election campaigning in order to hold rallies. Although running in local elections could be a win-win for political parties and environmentalists, the decision can distract from the environmental campaign's main goals and create divisions between supporters, some of whom may think the movement should remain squarely apolitical.

These two trends—the proliferation of informal environmental movements and environmentalists' participation in formal party politics—have also raised the stakes for state actors, compelling them to respond. Instead of ignoring environmental claims, many local or regional

officials have acquiesced to protestors' demands. Plans to send Moscow's trash to a landfill in Shiyes, in the northern region of Arkhangelsk, were recently cancelled after sustained public opposition that culminated in one of the movement's leaders attempting to run for regional governor. In September, activists in Bashkortostan were able to stop a potential mining project at sacred Kushtau Hill and secure its status as a specially protected natural area. There, too, local environmental activists had tried to run as candidates in local elections.

Of course, the authorities could renege on their promises—as we saw in the case of the highway through Khimki Forest in 2010—but environmentalists still see that their efforts can make a difference, which emboldens first-time activists. Some environmental activists in local NIMBY movements have been transformed by that experience into full-time activists. Even though the Khimki Forest defenders ultimately lost, many of the core activists have remained involved in local politics and have started to "coach" other grassroots environmental movements around Moscow.

Environmental activists' potential to bring about change is not lost on the regime. The use of the "foreign agents" law to crack down on "troublesome" environmental NGOs is but one example. In 2019, the Federation Council's internal affairs report specifically named "pseudo-environmental" groups as a threat to national security. And considering the mass mobilizational potential of the late-Soviet anti-nuclear movement, perhaps the authorities have reason to be concerned.

Environmental issues often go hand-in-hand with issues of corruption in Russia. It is not uncommon for Russian environmental activists to uncover local, regional, or even national corruption in the environmentally-unfriendly projects or illegal construction plans that they oppose. In the late 1980s, the post-Chernobyl environmental movement provided opportunities for nationalist mass mobilization that hastened the Soviet collapse. It is possible that some environmental movements could provide a similar boost to anti-corruption or anti-systemic mobilization in modern-day Russia.

About the Author

Elizabeth Plantan is an assistant professor at Stetson University. Her current book project compares environmental activism in China and Russia. Recently, her work comparing NGO laws in China and Russia appeared as a chapter in *Citizens & the State in Authoritarian Regimes*, an edited volume published by Oxford University Press in 2020. She is currently working on a new project on environmental activism and party politics in Russia.

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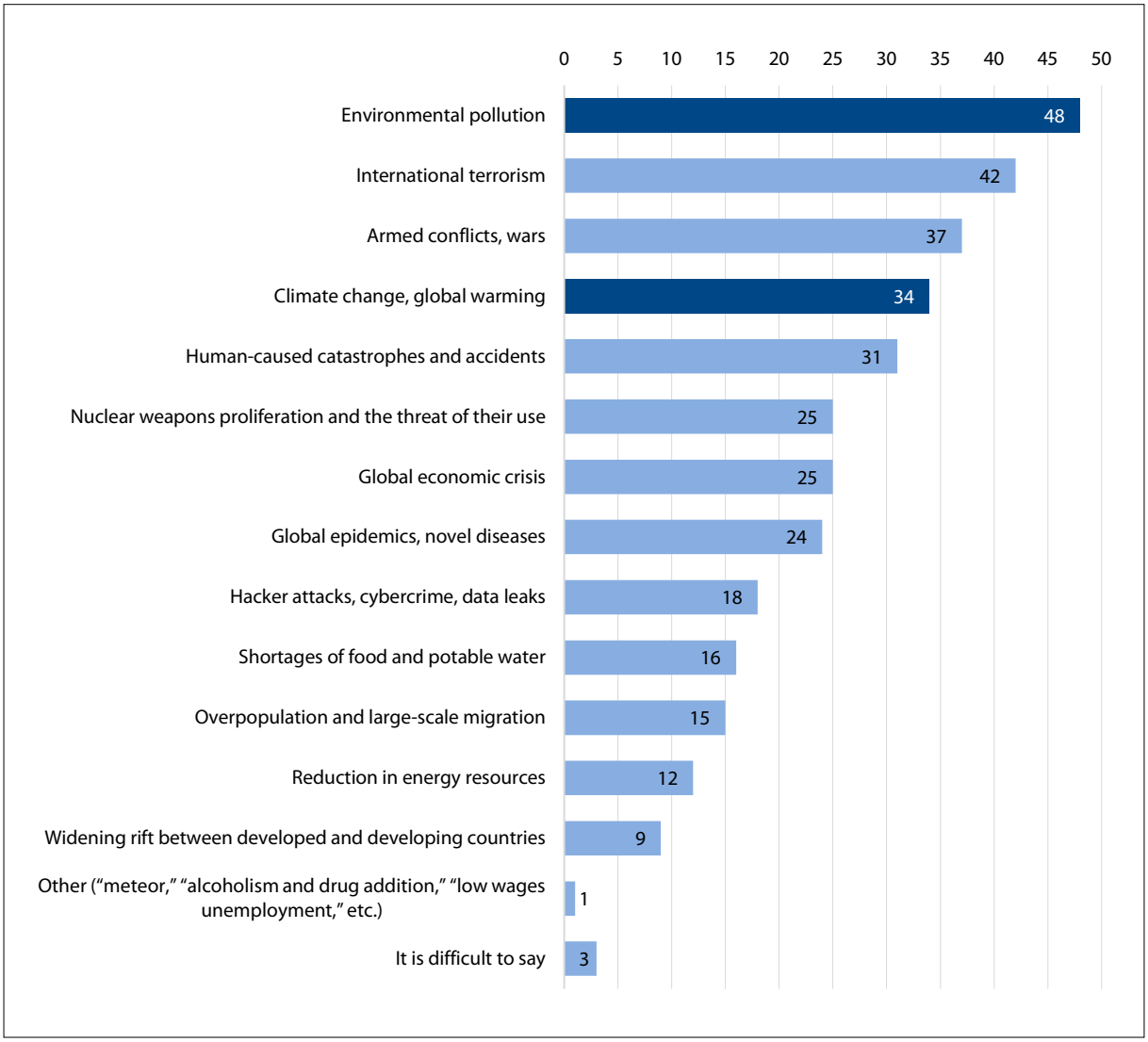
OPINION POLL

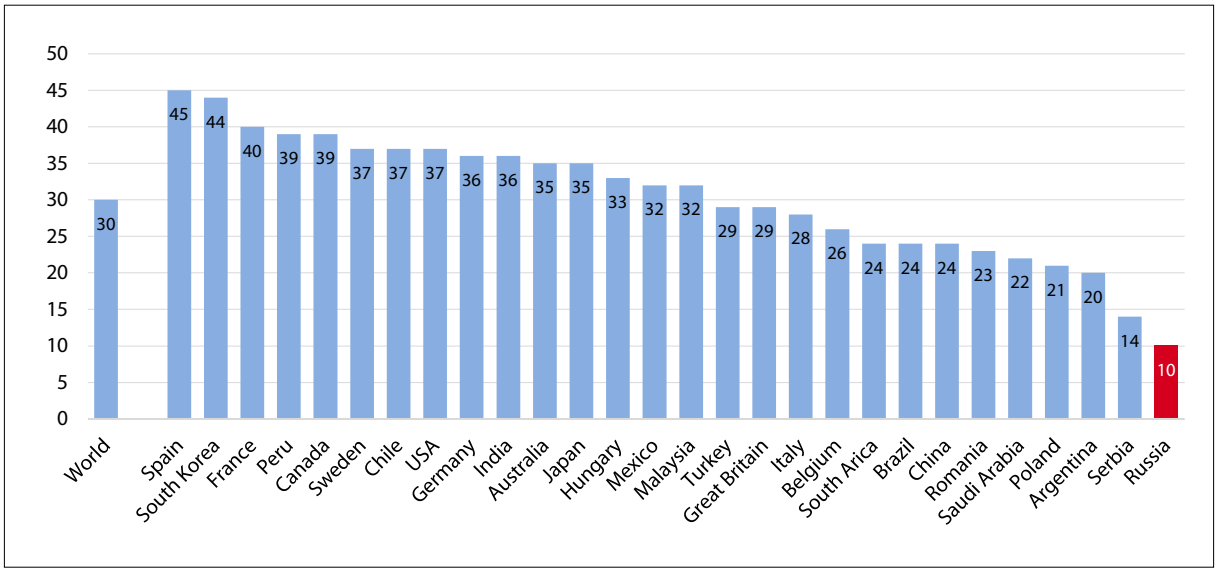
Environment and Climate Change

Figure 1: Russian Public Opinion: In Your Opinion, Which of the Following Global Threats Facing Humanity in the 21st Century Are the Most Dangerous? (respondents were presented with a card with a list of answers from which they could choose more than one answer and/or write in their own; answers ranked in descending order according to December 2019)



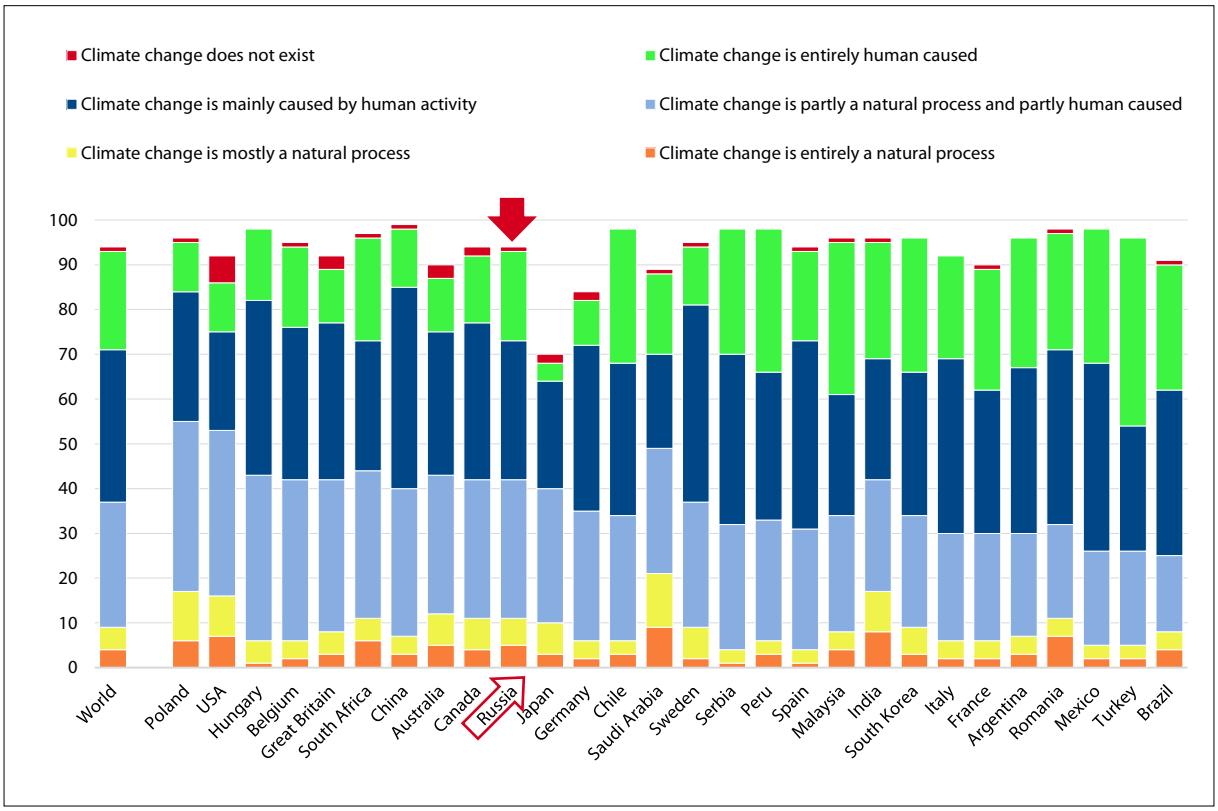
Source: representative opinion poll by Levada-Center 12–18 December 2019, published 23 January 2020 (in Russian) and 18 February 2020 (in English); https://www.levada.ru/en/2020/02/18/environmental-problems/

Figure 2: **Global Warming Or Climate Change Is a Top Three Environmental Issue: In Your View, What Are the Three Most Important Environmental Issues Facing [COUNTRY] Today? That Is, The Top Environmental Issues You Feel Should Receive the Greatest Attention from Your Local Leaders? – Percent of Respondents Who Agree That Global Warming Is a Top Three Environmental Issue %**



Source: representative opinion poll by IPSOS 23 March – 6 April 2018; https://www.ipsos.com/sites/default/files/Global_Views_on_the_Environment.pdf

Figure 3: **Thinking About the Causes of Climate Change, Which, If Any, of the Following Best Describes Your Opinion?, %**



The figures on which this chart is based are in Table 1 overleaf; answers "don't know/no answer" have not been included in this chart and the table overleaf.

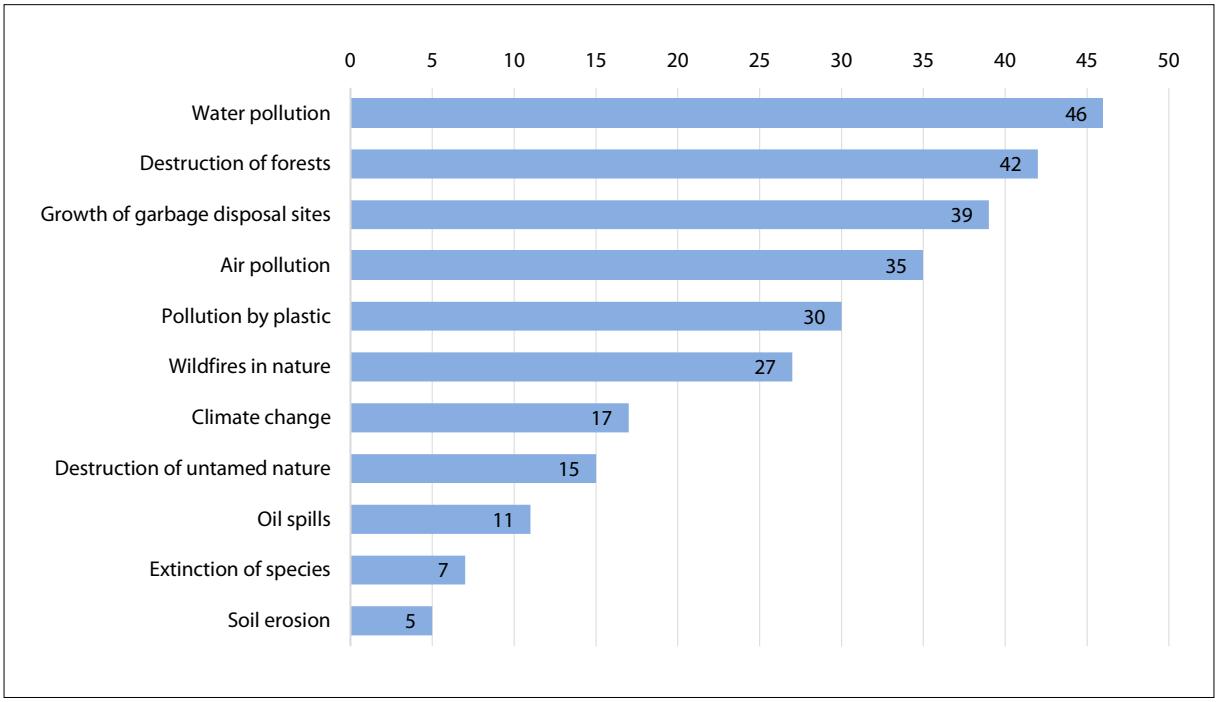
Source: representative opinion poll by IPSOS 23 March – 6 April 2018; https://www.ipsos.com/sites/default/files/Global_Views_on_the_Environment.pdf

Table 1: Thinking About the Causes of Climate Change, Which, If Any, of the Following Best Describes Your Opinion?, %

	Climate change is entirely a natural process	Climate change is mostly a natural process	Climate change is partly a natural process and partly human caused	Climate change is mainly caused by human activity	Climate change is entirely human caused	Climate change does not exist
World	4	5	28	34	22	1
Poland	6	11	38	29	11	1
USA	7	9	37	22	11	6
Hungary	1	5	37	39	16	0
Belgium	2	4	36	34	18	1
Great Britain	3	5	34	35	12	3
South Africa	6	5	33	29	23	1
China	3	4	33	45	13	1
Australia	5	7	31	32	12	3
Canada	4	7	31	35	15	2
Russia	5	6	31	31	20	1
Japan	3	7	30	24	4	2
Germany	2	4	29	37	10	2
Chile	3	3	28	34	30	0
Saudi Arabia	9	12	28	21	18	1
Sweden	2	7	28	44	13	1
Serbia	1	3	28	38	28	0
Peru	3	3	27	33	32	0
Spain	1	3	27	42	20	1
Malaysia	4	4	26	27	34	1
India	8	9	25	27	26	1
South Korea	3	6	25	32	30	0
Italy	2	4	24	39	23	0
France	2	4	24	32	27	1
Argentina	3	4	23	37	29	0
Romania	7	4	21	39	26	1
Mexico	2	3	21	42	30	0
Turkey	2	3	21	28	42	0
Brazil	4	4	17	37	28	1

Source: representative opinion poll by IPSOS 23 March – 6 April 2018; https://www.ipsos.com/sites/default/files/Global_Views_on_the_Environment.pdf

Figure 4: Russian Public Opinion: What Are, In Your Opinion, at the Moment the Most Urgent Ecological Problems for Russia, Which Require the Most Attention by the Authorities?, %



Source: representative opinion poll from December 2019 by Romir on behalf of Greenpeace, published in extracts in Davydova, Angelina: "Veryat li rossiyane v klimaticheskiy krisis?" [Do citizens of the Russian Federation believe that there is a climate crisis?], 2020; https://climate.greenpeace.ru/veryat-li-rossiyane-v-climaticheskiy/. *The poll data were kindly made available to Russland-Analysen, the German-language sister publication of the Russian Analytical Digest.*

Figure 5: Russian Public Opinion: Causes of Climate Change: When You Think About the Causes of Climate Change, Which of the Following Opinions Describes Your View Best of All?, %

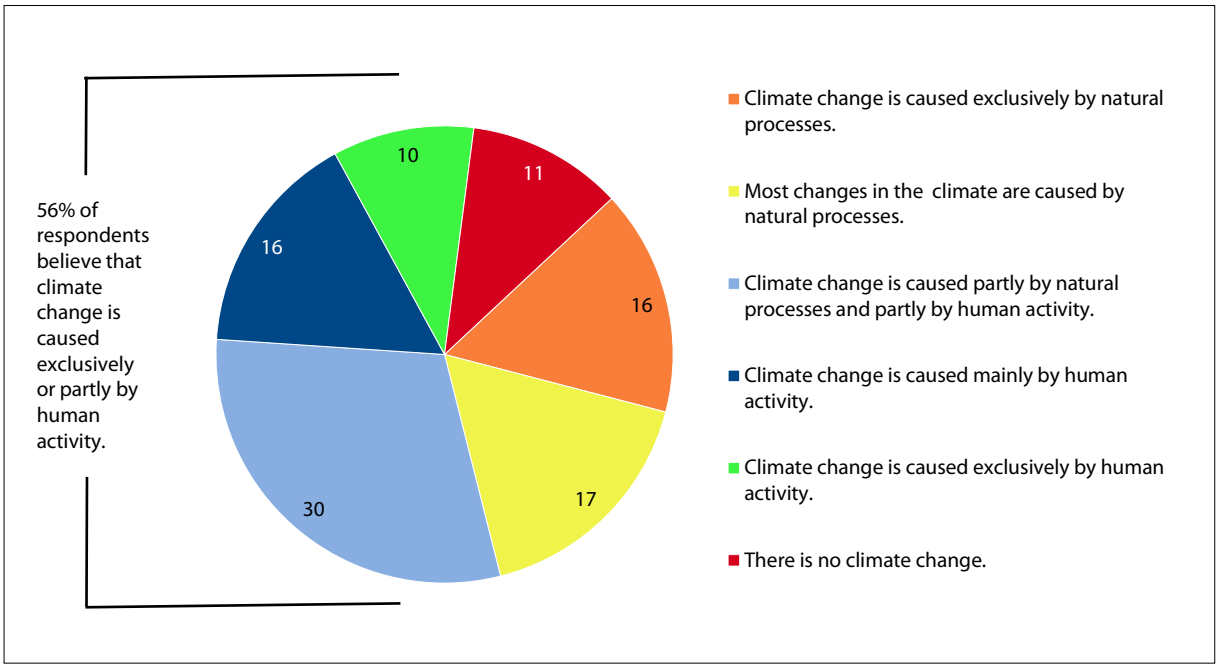


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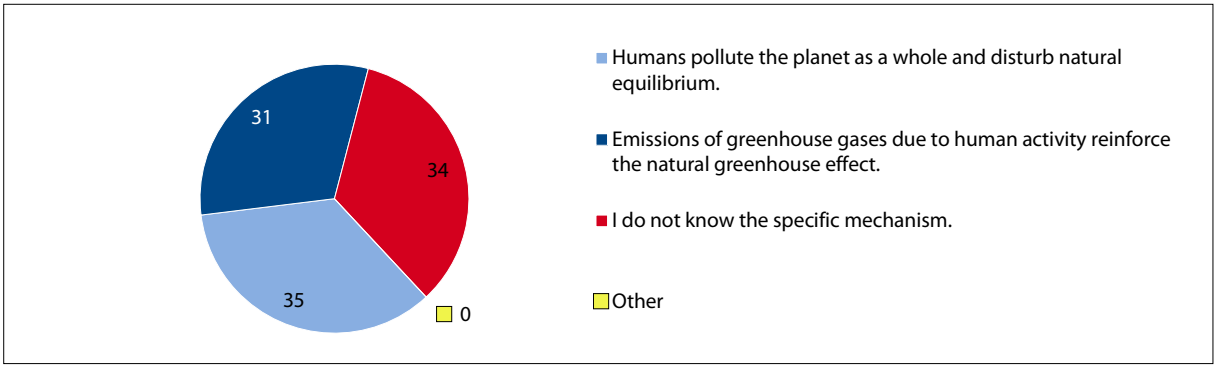
Figure 6: Russian Public Opinion: How Exactly Does Human Activity Cause Climate Change?, %



Source: representative opinion poll from December 2019 by Romir on behalf of Greenpeace, published in extracts in Davydova, Angelina: "Veryat li rossiyane v klimaticheskiy krisis?" [Do citizens of the Russian Federation believe that there is a climate crisis?], 2020; https://climate.greenpeace.ru/veryat-li-rossiyane-v-climaticheskiy/. *The poll data were kindly made available to Russland-Analysen, the German-language sister publication of the Russian Analytical Digest.*

Figure 7: Russian Public Opinion: Reasons for Climate Change: In Your Opinion, Which of the Following Causes Climate Change?, %

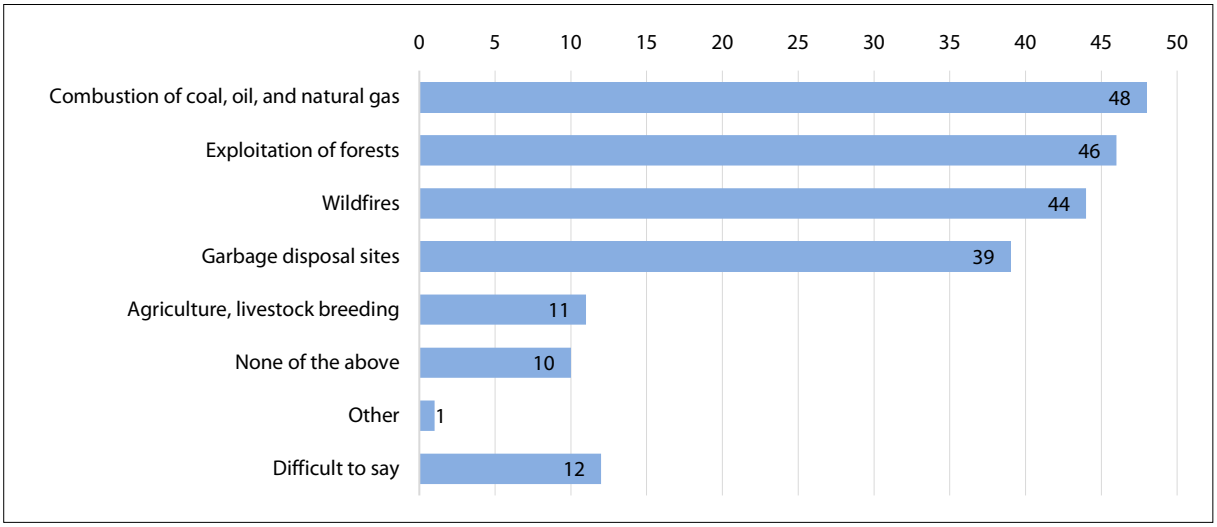


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Figure 8: Russian Public Opinion: Do You Think That Everybody Can Influence Climate Change … (%)

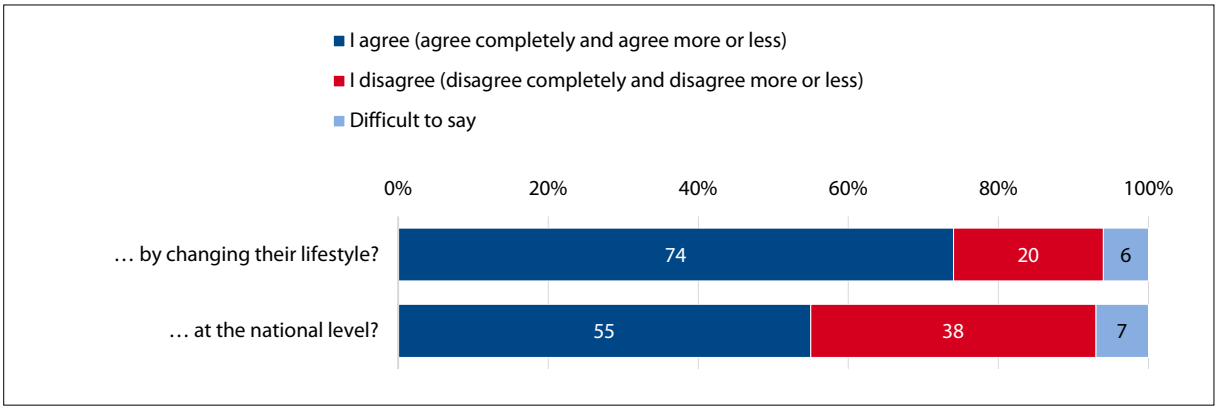

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Figure 9: Russian Public Opinion: What Are You Willing To Do To Combat Climate Change?, %

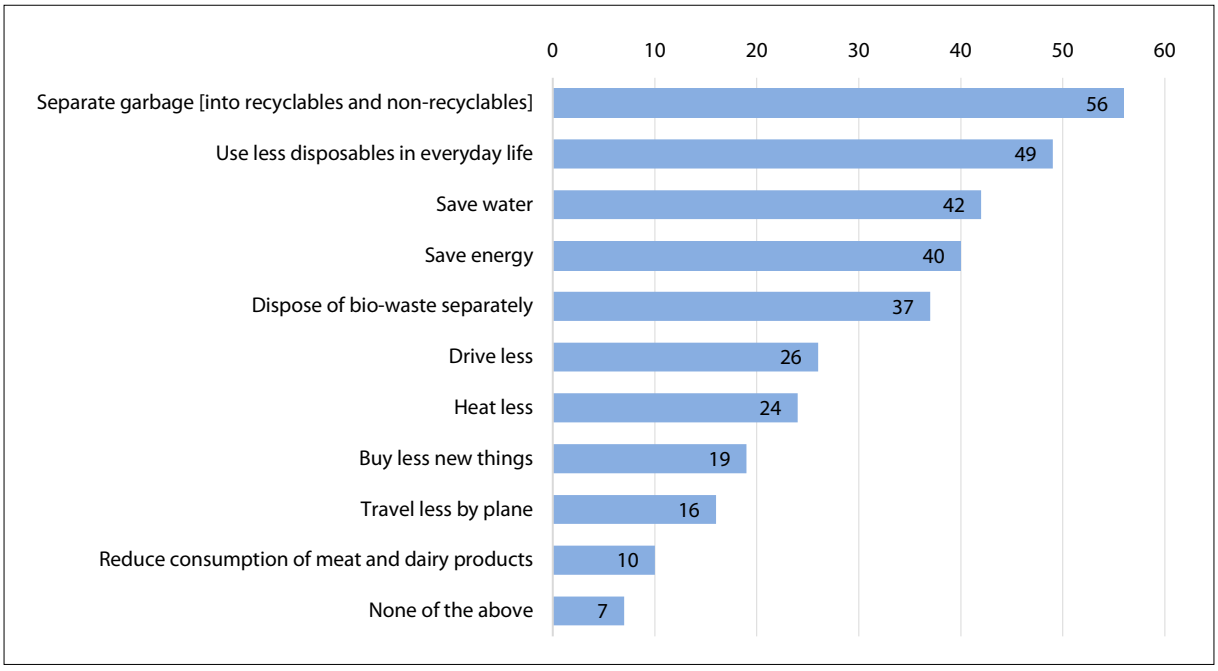

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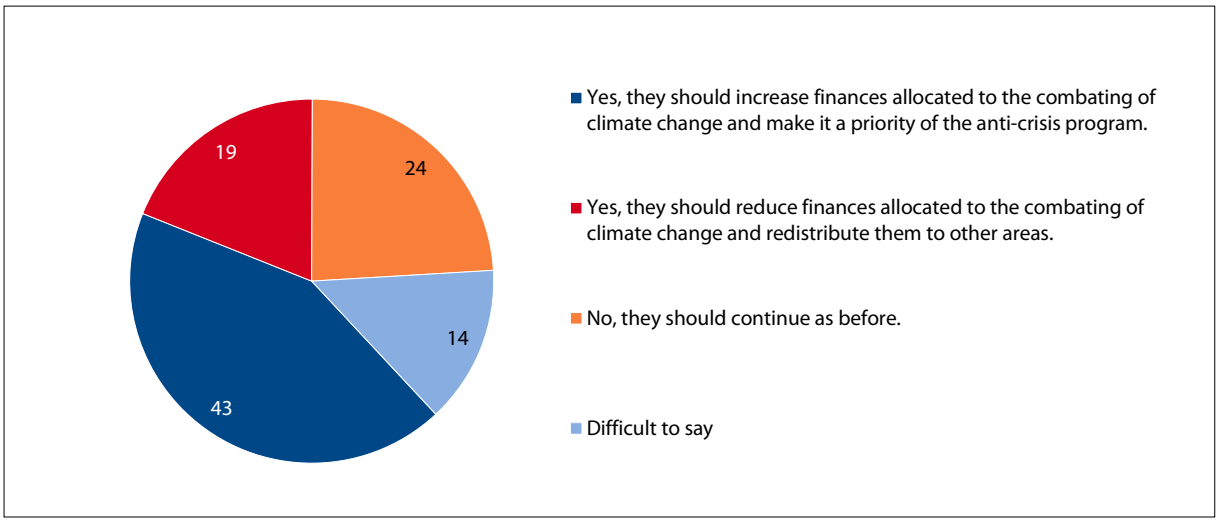
Figure 10: Russian Public Opinion: Should the Russian Authorities Change Their Climate Policy During/After the COVID Pandemic?, %



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