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"St. Petersburg's Action Plan for Climate Change Adaptation in the Urban Environment Management"

Ivan Serebritsky
Deputy Head, Committee for Nature Use, Environmental Protection and Ecological Safety,
City of St. Petersburg

Issues related to climate change have been on the agenda of the states all over the world for more than 45 years, since the Stockholm Conference in June 1972. During that time, we have made a great progress in understanding of the need for actions to reduce dangerous trends of anthropogenic and natural character. Those actions were integrated in many agreements, memoranda, agendas and action plans. We managed to identify the priority directions of activities and key points of impact, that would reduce the threat we face.

However, before the Paris Conference of 2015, climate change issues were considered first of all as problems of national and state scale. In this connection, the goals and objectives in action plans were identified for countries. But we do realize that, for example, greenhouse gas emissions and emission quotas at the national level are constructed of small local bricks - each specific pipe or production site, industrial zone, each ship, diesel locomotive, automobile, city, region.

Therefore, to achieve the goals at national level, consistent actions at lower levels of the state hierarchy are needed. Actions to develop adaptation measures in order to reduce the burden on natural systems and on the planet as a whole in the condition of climate change are implemented continuously.

If we look at municipal adaptation plans, we would see a tendency to correlate between international agreements and action plans in a particular city, which, in my opinion, is not correct. Thus, in the plans developed before 2008-2010, the measures taken in cities are aimed at reduction of greenhouse gas emissions from local sources.

In later period of 2011-2015 the focus clearly shifted towards the development of adaptation measures targeting the manifestations of climate change that exert maximum impact on a particular municipality. At the same time measures are still implemented to minimize the causes of climate change, which have impacts at national and global levels, and this is much more correct.

After all, not each municipality makes a considerable contribution to the national amount of greenhouse gases, but each of them faces the effects of changing the temperature background. The climate change impacts are different in different regions. Some municipalities suffer of droughts, extreme air temperatures which result in fires. Others face disastrous amounts of rainfalls and, as a result, flooding of huge areas. Somewhere the damage is caused by destructive atmospheric phenomena such as typhoons.

In December 2009, the Russian Federation adopted the Climate Doctrine, which became the basis of the state policy regarding the climate change. The Cimate Doctrine determined the need for the use of information, regulatory, legal, economic and other instruments, as well as the need to develop climate change adaptation and mitigation measures in the process of medium-term and long-term planning at all levels of public governance.

St. Petersburg, being a city, is not a municipal entity. St. Petersburg is one of three cities in Russia with the status of a subject of the Russian Federation (85 subjects in the Russian Federation). In a way this status means more favorable conditions for a city, because it allows to develop its own legislation, including environmental legal documents, which supplement and specify federal regulations; to form the local budget; to establish an efficient cooperation between public authorities. The latter is very important in the condition of uncertainty of legal basis in respects of the distribution of powers and responsibilities in the field of climate change adaptation measures.

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Starting from 2002, St. Petersburg develops and adopts the city's Policy in the field of environmental protection and ensuring environmental safety – the Environmental Policy. The current version of the Environmental Policy was adopted in 2013 for the period until 2030.

An important postulate of the Environmental Policy is the establishment of the "Climate Strategy of St. Petersburg for the period up to 2030" - a basic document for the strategic planning of St. Petersburg development in the context of observed and forecasted climate changes. The Climate Strategy defines a set of interrelated adaptation measures for the municipal economy, city infrastructure, ecosystems and public health in St. Petersburg.

The draft Climate Strategy has been developed and is currently being integrated into one of the three strategic city documents: "Strategy of Social and Economic Development of St. Petersburg for the period until 2030". After that document is updated, relevant amendments will be integrated into two other strategic documents of the city: "Master Plan of St. Petersburg" responsible for territorial development, and the "State Programme of St. Petersburg", which determines the financial component of the city of planning.

The most important global, issue of influence on climate change remains the issue of the impact of greenhouse gases. In 2015, the contribution of St. Petersburg to the total emissions of the Russian Federation was 1.23%, which is not much for the second largest city in the country with a developed industry. This fact has reasonable explanations. Since 1996, St. Petersburg has systematically implemented a whole range of measures aimed at reduction of emissions of pollutants, including greenhouse gases, into the atmosphere. Many relevant programmes were implemented by both the City Government and energy and heat generating companies, whose contribution to the generation of greenhouse gases amounts to 93.59%. As a result of this activities, as of September 1, 2017, out of 689 boiler houses operating in St. Petersburg, 644 were converted to gas fuel (93%), 32 are working on coal (5%), 6 on diesel fuel (0.8%) and 7 on fuel oil (1 %). Thus, the contribution of the city's heat and power facilities to the air pollution by greenhouse gases has been is minimized as much as possible.

At the same time, the results of a joint research conducted by St. Petersburg and Finnish experts in the framework of international cooperation during the development of the Climate Strategy of St. Petersburg in the period from 2010 to 2014, showed the importance of the negative impact of water on the urban environment. This is caused by the proximity of the Baltic Sea, a big number of inland water resources, a complex geological and hydrogeological status of St. Petersburg. There are 391 waterways (rivers, streams and canals) and 641 water bodies (lakes, ponds, watered quarries, reservoirs). The total length of the coast of the Neva Bay of the Gulf of Finland in the Baltic Sea within the boundaries of St. Petersburg is 150 km.

Due to increased air temperature in cold season, increased amount of precipitation, and increased frequency of thawing, a further shift in time of formation and destruction of a stable snow cover in the territory of St. Petersburg, a decrease in height of the snow cover, an increase in water equivalence of snow cover are forecasted.

Frequent changes of Arctic cold air masses by warm Atlantic air in the autumn and winter season, as well as increased air temperature, will contribute to a change in the nature of the ice generation process and its duration. The duration of the ice season in the Gulf of Finland by the end of the 21st century may be reduced by 2 months.

Thus, a trend is observed and forecasted of raising the number and intensity of hazardous natural phenomena in the region. Among the hydrological phenomena, the most dangerous are wind-driven oscillations and ice-jams. At the same time, the increase of the total number of floods by more than 40% is predicted, with an increase of the number of dangerous floods by 30%.

In addition, for St. Petersburg the threat of more intense development of dangerous geological processes and phenomena was revealed: first of all, abrasion of coasts and flooding of the territory by ground waters.

The results of research activities and field studies in recent years showed a negative and irreversible dynamics of changes in the state of the coastal zone. First of all, the destruction processes are becoming more intensive, which is caused by the following phenomena:

• Global warming. It caused an increased frequency of storms, the sea level and ice cover variations, which strengthened the impact on the coastal zone. The predicted rise of the sea level will increase this impact several times;

• Increasing technogenic load: development of underwater quarries, removal of sand for construction needs etc. This significantly disturbs the natural balance of sediments, causing its shortage in the coastal line, and often leads to complete replacement of the normal beach composition by moraine and boulder benches;

• Random coast protection operations, which are designed and implemented without consideration for the general coastal situation. While solving a local problem, these activities cause deterioration of the coastal zone as a whole.

Unfortunately, the existing coast protection practices are outdated and inefficient. The modern international and domestic experiences of coast protection measures show that the coast erosion processes can be controlled through timely managerial and engineering decisions.

To address this problem, a draft Concept for the coast protection in the eastern part of the Gulf of Finland and water bodies of St. Petersburg was developed in St. Petersburg. The "Master Plan of the Coast Protection of St. Petersburg" was developed. The implementation of the "Master Plan" will ensure the safety of the city in climate change conditions, preserve favorite recreation places for the residents.

To conclude my presentation I would like to say a few words about the measures planned by St. Petersburg today in order to reduce the negative impact of climate-related processes on the city's engineering infrastructure.

By the end of 2017, St. Petersburg plans to develop the Concept of Adaptive Water Management, which would support the implementation of the following climate change adaptation activities:

1) Raising awareness of residents and decision-makers on the climate change and its impacts:

• Improvement of scientific and methodological support for climate change impact monitoring. Monitoring of dangerous natural phenomena:

• Further development of intersectoral, interagency, interregional and international interaction on Climate Policy issues;

• Organization of information campaigns dedicated to the climate change issues;

• Open access and dissemination of updated climate information, and information on planned and implements Climate Strategy activities.

2) Improvement of legal regulation and public management in the field of minimizing and preventing of regional climate risks:

• Improvement of existing and development of new laws and regulations in the field of design and operation of buildings and facilities. Development of regional construction standards;

• Consideration of the climate-related factors in the development and updating of document in urban planning, land use and socio-economic development of the region;

• Development of the system for insurance against weather and climate risks.

3) Development of the region's adaptation potential, taking into account the resource availability:

• Assessment of the resource availability for each sector of the municipal economy in the region;

• Development of maps of vulnerability to climate changes of individual objects and areas of St. Petersburg;

• Development of land use zoning approaches in order to regulate the land use on the areas of climate-related risks;

• Assessment of potential damage to urban infrastructure, ecosystems and people caused by climate change impacts in St. Petersburg;

• Economic evaluation of the effectiveness of adaptation measures in St. Petersburg.

4) Development and integration of up-to-date tools for managing regional climate risks:

• Improving of the coastal protection methods in St. Petersburg;

• Ensuring the safety of hydraulic facilities in St. Petersburg;

• Improvement of the warning system and response measures on the basis of modelling of the climate risks development;

• Adaptation of urban facilities operation taking into account their vulnerability to climate risks;

• Adaptation of principles of design and construction of buildings and facilities to climate change conditions.

The implementation of the Concept of Adaptive Management of Water Resources and Sewerage Systems of St. Petersburg will allow:

- To develop recommendations on adaptation of St. Petersburg's water resources to climate change conditions;
- To develop recommendations on adaptation of St. Petersburg sewerage system to climate change conditions;
- To generate principles of establishment of an integrated management system for water resources and sewerage systems in St. Petersburg.

The time coverage of the activities of the Concept is until the year 2050.