Abstract. The paper presents the contents of the unprecedented Atlas of natural and technological hazards and risks of emergencies in the Russian Federation. The Atlas published in 2005 was worked out at the Institute of Geography of the Russian Academy of Sciences together with the Ministry of Emergencies of the Russian Federation, and other organizations and institutions of Russia.

Threats of disasters and technological catastrophes have become the corporal part of human life on the Earth for a long time. The population of our planet is growing year by year, and people more often encounter the most hazardous natural processes and phenomena while they settle new territories with less favorable living conditions. As the human civilization advances, the influence of technological factors on nature and population increases, resulting in higher risks of natural and technological accidents and catastrophes which have regional, national, and global effects.

Practically the whole spectrum of hazardous natural processes and phenomena that occur on the Earth – earthquakes, tsunami, landfalls, mudflows, avalanches, floods, flaws, hurricanes, typhoons, nail-damages, tornadoes, disastrous rainstorms and thunderstorms, heavy snowstorms and snowfalls, etc. – is characteristic of the territory of Russia with its various geological and climatic conditions. On the average up to 800 sheer technological as well as nature-influenced technological emergencies occur in the Russian Federation annually. Hazardous natural processes and phenomena, technological catastrophes in the territory of Russia as well as a monitoring system to prevent and eliminate them are depicted in a new atlas published in Russia in 2005.

The Atlas of natural and technological hazards and risks of emergencies in the Russian Federation was worked out at the Institute of Geography of the Russian Academy of Sciences together with the Ministry of Emergencies of the Russian Federation, the Moscow M.V. Lomonosov State University, the Institute of Geocoeology of the Russian Academy of Sciences, the O.Yu. Schmid Institute of Physics of the Earth of the Russian Academy of Sciences, and other organizations and institutions of Russia. The Atlas is a fundamental complex cartography work, which give an integral idea of distribution, conditions, and "strength" of natural and technological hazards and risks, of their connection with natural and socio-economic situation in the country and its regions. It is made as an integrated set of scientifically processed and interrelated spatial and temporal information on the federal level used by the services of the Ministry of Emergencies of the Russian Federation of all levels as well as by other services and local executive bodies of the Russian Federation to analyze and forecast natural and technological emergencies.

Diversified information of the whole country and its separate parts is concentrated in the Atlas; it presents this information in a classified, well-ordered, comparable and well visible form so acting as an important data bank, an instrument of scientific and applied research and a means of obtaining new knowledge, practical study, and management.

The Atlas of natural and technological hazards and risks of emergencies in the territory of the Russian Federation is a new original cartography work having no equivalents in the world as far as subject contents and the territory coverage are concerned.
For the first time the data about the hazards and risks given in the Atlas allow to represent their range and level in relation to individual entities of the Russian Federation, the elements of the social and economic structure of the country, cities and towns, etc.; the data also allow to evaluate the probability and the character of possible emergencies, to compare regions in terms of these parameters, and to establish programs of detailed research of different kinds of hazards and risks.

The Atlas consists of seven parts: 1) Natural disasters and technological catastrophes: the current state and the ways to solve problems; 2) Susceptibility of the population and the social and economic facilities of Russia to the emergency influence; 3) The organization of prevention and elimination of emergency effects; 4) Natural hazards and risks; 5) Technological hazards and risks; 6) Climatic hazards and risks for agriculture; 7) Biological and social hazards.

The Introduction to the Atlas contains a review article dedicated to the 15th anniversary of the Ministry of Emergencies of the Russian Federation, where along with the characteristics of the main natural and technological hazards and risks in the Russian Federation and the world the main stages of activities of the Ministry of Emergencies of the Russian Federation and its structure are described. It also contains the maps of Russia's administrative and federal structure and a physical map of Russia.

The first part contains the map "Natural disasters and technological catastrophes on the Earth" which represents the problem of natural disasters and catastrophes globally in the 20th and 21st centuries including Russia.

The second part includes the maps representing the distribution of population in our country, gross regional product and its ratio to the average annual number of emergencies as well as the vulnerability of the entities of the Russian Federation to natural and technological sources of emergencies. More than half of the population of Russia lives under conditions of high risks caused by the threat of different kinds of emergencies. Population number and density serve as assessment criteria for general probability of emergencies, social danger of emergencies, damage of emergencies inflicted on the population itself and on places of its settlement and activities. Evaluation of vulnerability of economical facilities to damaging effects in emergencies is considered as a probabilistic forecast of possible damages to facilities expressed in relative physical and economical indices of general losses. The rate of vulnerability depends on intensity and duration of influence of damaging effects as well as on the ability of facilities to withstand these influences. The damages caused by the death and injury of people, destruction of buildings, facilities, infrastructure, cultural values, property, and disturbance of business are determined on the basis of vulnerability.

The third part represents in details the integrated state system of prevention and elimination of emergencies, created to forecast, prevent, and eliminate the effects of emergencies in our country. It unites administrative bodies, means and forces of the federal executive authorities, the executive authorities of the entities of the Russian Federation, the local authorities and organizations whose competence includes the solution of problems concerning the protection of population and territories from emergencies. This part contains information on command authorities and military units of the Ministry of Emergencies of the Russian Federation, the State Fire Protection Service, the State Inspection of Small Vessels and "GOAKVASPAS", search and rescue units of Russia, the Russian net of monitoring and laboratory control, and international activities of the Ministry of Emergencies of the Russian Federation.

The fourth part is the largest. It includes the characteristics of natural hazards and risks in the territory of the Russian Federation where more than 30 kinds of dangerous natural phenomena occur. Earthquakes, floods, droughts, forest fires, and severe frosts have the heaviest effects. The seismic areas, where about one third of the population lives, occupy one fifth of the territory. Floods exceed all other natural hazards in terms of the affected area and inflicted material damage. Floods endanger the total area of 400,000 km² where more than 4,600,000 people live. Periodical droughts mainly affect the Volga region and Northern Caucasus, where they occur every two or three years. As a rule they are accompanied by large fires inflicting enormous damage, especially in Siberia and the Far East. In winter severe frosts cause failures of heating systems in many parts of the country. The main population losses in Russia are caused by floods (30% of all victims), landslides and landslips (21%), hurricanes (14%).

This part contains maps, characterizing hazards and risks of earthquakes and tsunamis, volcano eruptions, sinkholes, subsidence of loess, abrasion of sea and reservoir banks, gully erosion, landslides, mudflows, cryogenic processes, floods, storm surges, hydrological processes in river beds, changes in ground water level, pressure and air temperature fluctuations, strong winds, snowstorms, heavy rains and snowfalls, ice-slick and rime, thunderstorms and hail-damage, avalanches, extremely low and extremely high air temperatures, fogs, forest and peat fires.

The fifth part deals with the mapping of technological hazards and risks. The number and scale of consequences of accidents and technological catastrophes become more and more dangerous for the population, environment, and economy of the country. The risk of technological emergencies is growing. The emergencies connected with dangerous
nuclear and radiation facilities, nuclear materials, radioactive substances and wastes, sources of ionizing radiation constitute one of the most serious threats to the national security and social and economic development of the country due to their especially destructive and long-lasting negative consequences. Chemically hazardous facilities which process, obtain, or store chemically dangerous substances (such as chlorine, ammonia, ethylene oxide, and carbons manufactured by cracking) are of great danger. Many of potentially dangerous facilities of the fuel and energy complex (power industry, petroleum and gas extraction and processing industries, pipeline systems, coal industry) have spent 75-90% of their specified service life, and this increases the risk of emergencies at them. Accidents in mines due to explosions of methane, coal dust, self-ignition, rock and coal falls and collapses lead to hard consequences including death of people. Among all sources of danger connected with motor transport, road accidents – such as runs-over of pedestrians and collisions of vehicles the number of which increases from year to year – pose the most threat. For example 35,602 persons died in road accidents in 2003. Fires in economic facilities and dwelling-houses cause death and injures of people and property destruction. Most of the technological emergencies in the country are connected with them. 19,275 persons died in fires in 2003. Great damage is inflicted by accidents in systems of public utilities due to disturbances of heat and energy supply and worn-out equipment. Accidents in heating systems in cold weather periods lead to a lot of emergencies.

The sixth part contains the maps showing agrometeorological phenomena which are the most dangerous for agriculture – dust storms, droughts, severe frosts leading to the winterkilling of crops, light frosts, damping-off and damping-out of plants, crusted snow on ground. Dust storms inflict great damage on agriculture causing the destruction of soil cover, transfer of nutrients, damage of crop plants, soil impoverishment, and yield reduction. Droughts result in crop losses, reduction in fertility and gross yield of grain-crops. Winter crops in the territory of this country are mainly destroyed by frost. Damping-off, damping-out, and crusted snow on ground cause their death to a lesser extent. Air and surface light frosts creating unfavorable conditions for plant growing and development threaten crop plants in spring and autumn, they restrict the use of climatic resources of the vegetation period in agriculture. For evaluation of the agricultural potential of the environment in terms of climatic resources this part of the atlas has a map of agrometeorological conditions characterizing the conditions of heat and moisture supply, wintering of plants, conditions of field work, and unfavorable agrometeorological phenomena.

The last, seventh part is devoted to mapping of biological and social hazards and risks in the Russian federation: the most dangerous diseases of people, such as HIV, hemorrhagic fever with renal failure, brucellosis, viral hepatitis, leptospirosis, salmonellosis, active tuberculosis, tularemia, spring and summer tick encephalitis, malaria, etc. Among the most dangerous diseases of domestic animals which periodically occur in our country the following ones are shown in the maps: foot-and-mouth disease, tuberculosis and brucellosis of cattle, classical swine fever, small cattle pox, among the most dangerous pests – locusts, shield-backed bug Eurygaster integriceps, and diamond spot pearl (beet moth).

The chronology of emergencies in the Russian Federation in the years 1991-2004 closes the atlas.

The majority of the atlas maps are made in the scales of 1:15,000,000 and 1:30,000,000. The atlas is illustrated by photos and tables, has extensive explanatory texts to the maps and atlas parts. Format of the atlas is 290 x 390 mm. The preparation to the publication of the Atlas is made by Publishing and Producing Center "Design. Information. Cartography" (Moscow).

The Atlas is published under the general editorship of S.K. Shoygu (Minister of Emergencies of the Russian Federation), the chief editor is V.R. Bolov (Ministry of Emergencies of the Russian Federation), the managing editor is N.N. Komedchikov (Institute of Geography of the Russian Academy of Sciences), the editor-cartographer is N.B. Trokhina (Publishing and Producing Center "Design. Information. Cartography", Ltd.)

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