

CONCEPT
for the Use of Unmanned Aerial Vehicles
for the Purposes of Disaster Risk Reduction, Prevention, and Response
to Emergency Situations in the Countries of Central Asia

The modern world cannot function without the introduction of innovative information and communication technologies, which make it possible to more effectively carry out a wide range of tasks related to the protection of the population and territories from emergencies and the safeguarding of human life and safety.

A review of advanced practices in the functioning of systems for the protection of the population and territories from natural disasters, industrial accidents, and catastrophes demonstrates that the effectiveness of disaster risk reduction and emergency response can be increased through the introduction of advanced technologies, the use of airmobile rescue assets, and the equipping of units with high-performance technical equipment.

In the 21st century, many states throughout the world are intensively developing and utilizing unmanned aviation technology. Unmanned aerial vehicles (hereinafter referred to as “UAVs”) of various purposes, aerodynamic configurations, and tactical-technical characteristics operate within the airspace of different countries. At present, the range of UAVs is extensive, and both demand and supply of the latest models continue to expand.

The success of UAV application is primarily associated with the rapid development of microprocessor computing technology, control systems, navigation, information transmission, and artificial intelligence.

Advances in this field make it possible to conduct flights in automatic mode from takeoff to landing and to perform a number of complex and specialized tasks that are often difficult or impossible for humans to accomplish directly.

A UAV system includes the UAV itself, a control station (operator console and transmitting-receiving equipment), a communication system with the UAV (direct radio communication or satellite communication), software for processing the obtained results, and additional equipment necessary for transportation or maintenance of the UAV.

At present, most structural units of the emergency authorities of the Central Asian countries are insufficiently equipped and require a substantial expansion of their UAV fleets. Each country, depending on its needs and available resources, determines the number and range of required UAVs, their type, modification, technical parameters, and configuration.

Currently, the greatest achievements in the development of UAV systems have been made by the United States, Israel, France, Germany, the United Kingdom, and China. In total, more than 30 countries worldwide are developing around 300 systems and over 70 aircraft-type, multicopter, aerostatic, tilt-rotor, and hybrid UAV models, differing in design, operating principle, takeoff and landing method, and intended purpose.

The main prerequisites for the use of UAVs for disaster risk reduction, prevention, and response to emergency situations in the countries of Central Asia are:

- the exposure of the region’s territory to virtually all types of natural, technological, environmental, and socio-biological disasters
- the presence in the countries of the region of a trend toward increasing scale of the negative consequences of natural disasters, accidents, and catastrophes, as well as growing human vulnerability to natural and technological threats, which hinders the successful implementation of sustainable development strategies, programs, and plans
- the need to improve the response speed of fire-rescue units and civil protection services during emergencies of natural, technological, and transboundary nature
- the need for rapid localization of an emergency zone or reduction of the impact of hazardous factors to the minimum possible level

- the need to ensure the safety of rescuers and affected persons during rescue and recovery operations
- the need to improve interaction between fire-rescue units and civil protection services of the Central Asian countries

The acquisition, equipping, introduction, and use of UAVs will enable management bodies, search-and-rescue, and other divisions of the emergency authorities of the Central Asian countries to:

- enhance the effectiveness of command and control over search and rescue forces and resources, as well as the localization and elimination of emergencies
- establish aerial surveying of designated areas with subsequent georeferencing of photographs, as well as video and photographic documentation of monitored objects to obtain overview and detailed images
- reduce the time required to locate persons in distress and victims and to provide assistance
- increase operational efficiency and shorten the duration of search-and-rescue operations
- reduce the number of search-and-rescue teams and other human resources involved and improve the safety of their deployment
- ensure the delivery of small-sized cargo and essential supplies to hard-to-reach areas
- improve monitoring of hazardous natural processes and phenomena and forecasting of emergencies
- provide accurate orientation, guidance, and tracking of search-and-rescue teams
- improve determination of precise coordinates and boundaries of emergency zones and search objects
- establish communication and data relay
- enhance real-time video monitoring of emergency zones
- reduce the time required for notification and information of concerned parties
- provide electronic mapping of emergency zones and creation of three-dimensional terrain models of various scales and formats
- more effectively accomplish a number of other tasks in the interests of disaster risk reduction and prevention and elimination of emergency consequences

The economic feasibility of UAV use is determined by ease of operation, the ability to take off and land on virtually any selected site, and the possibility of both manual and automatic control. Effective use of UAVs requires addressing issues related to software support, maintenance, and repair

The adoption of a set of organizational, legal, and technical measures for the development, improvement, introduction, and use of UAVs will significantly strengthen the capacity of the emergency authorities of the Central Asian countries in disaster risk reduction and in the prevention and response to emergency situations.