

UKRAINE
NATIONAL SUMMARY REPORT
IDNDR

SECTION A. AREA OF ACTIVITY

3. Widespread dangerous phenomena

Type 1	Location 2	Effect on population 3
Heavy rain	Ukrainian Carpa- thians, Crimean mountains	Flooding of built-up areas, enterprises; washing away and damage of farm crops; flash flooding of rivers
Large hail- stones	Whole country	Loss of farm crops and vege- table gardens; damage to buildings
Intense heat	Steppe zone	Adverse impact on economic activities; droughts; crop damage; forest fires
Hot dry winds, droughts	Steppe and eastern forest steppe	Suppression and destruction of plant life; increased water demand; lower yields
Hurricanes, squalls, whirlwinds	Much of the country	Widespread power cuts in built-up areas; destruction of buildings; economic dis- ruption; loss of life
Severe dust storms	South-east of steppe zone	Flattening and destruction of crops; power failures; considerable environmental damage
Dense fogs	South-east of steppe zone	Disruption and stoppage of transport
Severe snowstorms	South-east of steppe zone	Disruption and stoppage of all forms of transport
Heavy snowfalls	Ukrainian Carpathians	Disruption of transport
Severe black ice	Steppe zone	Widespread breakage of power lines; blackout of built-up areas

1	2	3
Severe frost	Northern Polesye (forest and marshes), forest steppe zone	Overexpenditure of fuel and energy resources; lower industrial efficiency; widespread illness
Flash floods, spring floods	River basins	Flooding of built-up areas and huge areas of crops; wash-out of roads; destruction of bridges
Avalanches	Ukrainian Carpathians, Crimean mountains	Destruction of buildings and roads; loss of life
Low water levels	Rivers	Navigation and water supply problems
Strong winds, whirlwinds, heavy precipitation, icing of vessels, heavy seas, fogs	Black and Azov seas, coastal zone, ports, moorings	Stoppage of navigation; shipping accidents; loss of life
Heavy precipitation, blizzards, black ice	Coastal zone, ports, moorings	Stoppage of normal operations
Heavy seas	Black and Azov seas	Stoppage of navigation; destruction of moorings, on-shore facilities and built-up areas; shipping accidents; loss of life
Dangerous rise/fall in water levels	Ports, moorings	Flooding of port facilities and built-up areas; unloading of deep-draught vessels; closure of ports

4. Recent/latest natural disasters (1991-1993)

Type	Location	Effect on population	Rouble losses
1	2	3	4
Heavy rain in Carpathians causing flash floods, August 1991	Cisearpathia	Five people killed, six missing; destruction of houses; flooding of villages, towns and farm land	300 million
Heavy rain, September 1991	Crimea	Flooding of houses and streets	1 million
Heavy snowfall, blizzards, strong winds, December 1991	Steppe zone	Stoppage of transport; power cuts; damage to power lines	3 million
Heavy snowfall, blizzards, hurricanes, February 1992	Steppe zone	Damage to housing, industrial buildings and power lines; disruption of transport	Not known
Hurricanes, May 1992	Eastern Ukraine	Destruction of power and communication lines; damage to buildings and farm land; disruption of transport; widespread power cuts in built-up areas	Not known
Heavy rain, flash floods, November 1992	Ukrainian Carpathians	Flooding of villages and towns; destruction of roads and bridges; two deaths	5 billion
Heavy rain with sleet, hurricanes, September 1992	Western Polesye and forest steppe	Much damage to power and communication lines; disruption of transport; six deaths	400 million
Squalls, hurricane, August 1992	Northern Polesye	Damage to buildings; blow-down of forests; power cuts	40 million

1	2	3	4
Hurricanes, accretion of wet snow, November 1992	Steppe zone, eastern forest steppe	Widespread destruction of communication and power lines; power cuts in built-up areas; two deaths	2.5 billion
Torrential rain, squalls, hail, May 1993	Steppe zone	Loss of crops; damage to communication and power lines; destruction of houses	Not known
Torrential rain, squalls, hail, June 1993	Various parts of country	Loss of crops; injuries to people	Not known
Persistent heavy rain, flash floods, July 1993	Polesye and western forest steppe	Flooding and damage to farm land and built-up areas; destruction of roads and bridges; partial flooding of Chernobyl NPP zone with high concentrations of radionuclides in soil; threat of degradation of water quality in Pripyat and Dnieper rivers	Over 30 billion
Severe storm, 14-16 November 1992	South coast of Crimea	Washing-away of Crimean beaches; sinking of several vessels in port of Yalta; heavy seas rising to dangerous water levels on N-E coast of Sea of Azov; flooding of built-up areas (700 houses); destruction of onshore facilities (dikes, railways); flooding of power lines; one death	2.5 billion in Crimea
Storm surges, 15 November 1992	N-E coast of Sea of Azov	Flooding of built-up areas, fishing installations, buildings, enterprises; record maximum for whole observation period at Yeisk; dozens of vessels damaged; ports closed for four days; four persons killed, several missing	1.5 billion

Drop in water level, 10-12 November 1993

N-E coast of Sea of Azov

Record minimum for all years of observation; grounding of vessels in shallows; underloading of vessels; ports closed; fishing operations suspended

6. Assistance to other countries in natural disaster reduction

The following are the main forms of assistance:

- Provision under bilateral agreements of prompt storm warnings concerning dangerous hydrometeorological phenomena moving towards neighbouring States;

- Transmission to neighbouring countries of warnings of dangerous weather conditions, as well as forecasts and warnings of dangerous rises in water levels in frontier rivers;

- Exchange of models for assessment and forecasting of dangerous hydrometeorological phenomena, joint research on the formation of flash floods in mountain regions, and development of automated forecasting systems under the International Hydrological Programme;

- Provision of multi-year data on the development of dangerous phenomena in the territory of Ukraine for study by scientific institutions of other countries.

7. International assistance needed for natural disaster reduction

Because of the difficult economic situation the Ukrainian Government is unable to make hard currency available to modernize the hydrometeorological observation network and install the latest forecasting systems. Owing to the low technical capacity of the hydrometeorological service there occur cases of poor quality and breaks in the flow of storm warnings produced for international use, as well as cases of inaccurate forecasting.

The system for the reception, collection, processing and transmission of emergency hydrometeorological information requires modernization.

The Ukrainian service has submitted a request to the World Meteorological Organization (WMO) for technical assistance under the Voluntary Assistance Programme, which will speed up considerably the issue of warnings of possible natural

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disasters and also improve the fulfillment of Ukraine's obligations under the World Weather Watch (WWW).

If aerological observations are to continue at the nine stations, it is essential to have a minimum of one year's supply of aerological expendables (sondes, casings, power elements), as well as provision over the year of five "Vaisala" aerological sets (to replace the obsolete 1966 equipment still in use) and nine electrolytic hydrogen gas generators to replace worn-out equipment.

The shortage of electroconductive paper makes it impossible for the regional forecasting centres to produce the necessary synoptic material for timely forecasting of dangerous weather conditions. As a temporary expedient it is essential to provide 14,000 rolls electroconductive paper and then, over one or two years, to install new technical means of transmitting synoptic and other cartographic forecasting products using a microcomputer telecommunication system.

In order to produce numerical weather forecasts and process, transmit and store data, it is essential to establish an extensive microcomputer system compatible with the telecommunication system mentioned above.

It is essential to automate meteorological and hydrological observations in order to reduce the time-lag between the taking of observations in inaccessible mountain regions, as well as in the zone of radioactive contamination, and their processing and the release of weather warnings. It is a matter of urgency as a first step to equip Ukraine's hydrometeorological network with 15-20 automatic stations and a similar number of automated hydrological posts.

All this equipment and technology will lay the basis for modernization of the entire hydrometeorological service.

SECTION B. STRATEGY AND TACTICS

2. Existing national programmes for natural disaster reduction

The "Comprehensive Long-term Programme of Measures to Combat Flash Floods in Ukraine" (at approval stage).

Implementation period: up to 2000.

Organizations involved: State Water Resources Committee of Ukraine (Gosvodkhoz), State Hydrometeorological Committee of Ukraine (Goskomgidromet), and others.

Executing organs: production structure of Gosvodkhoz and Goskomgidromet, with the technical support of their scientific research and design institutes.

Programme funding: the State budget.

4. Completed and current activities for natural disaster reduction

(b) Monitoring, forecasting, and issue of warnings

Project title: Climate Programme of Ukraine (a draft programme is under preparation and is currently being considered by government organs).

Status: National State programme.

Participating domestic and foreign organizations:

1. State Hydrometeorological Committee
2. Ministry of Environmental Protection
3. State Water Resources Committee
4. Ministry of Agriculture and Food
5. Ministry of Power and Electricity Supply.
6. Academy of Sciences of Ukraine
7. Academy of Agrarian Sciences of Ukraine
8. Countries members of the International Hydrometeorology Council
9. World Meteorological Organization

Project expenditure: 900 million roubles a year for the period 1994-2003 (August 1993 prices).

Sources of funding:

1. The State budget
2. New project (innovation) funds
3. Financial support of international organizations

Executing organs:

Lead organization - State Hydrometeorological Committee of Ukraine.

Address: Goskomgidromet

Phone: 226 33 66 and 221 93 33; Fax: 229 49 07

SECTION C: MUTUAL COOPERATION

1. Publications relating to IDNDR

1. "Features of the 1972 Drought in Ukraine", ed. K.T. Logvinov, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1973.

and 1
2. "Medium-sized Whirlwinds and Squalls", E.N. Budilina, L.Z. Prokh, A.I. Sintovsky, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1976.

3. "Climate and Dangerous Hydrometeorological Phenomena of the Crimea", eds. K.T. Logvinov and M.B. Barabash, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1982.

4. "Dangerous Weather Conditions in Ukraine", K.T. Logvinov, V.N. Babichenko and M.Y. Kulakovskaya, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1972.

5. "Dangerous Hydrometeorological Phenomena in the Ukrainian Carpathians", K.T. Logvinov, A.N. Rayevsky and M.M. Aizenberg, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1973.

6. "Dangerous Weather Conditions in Ukraine and Moldavia", ed. V.N. Babichenko, Ukrainian Hydrometeorological Scientific Research Institute of Goskomgidromet, Gidrometeoizdat, 1991.

2. IDNDR: meetings and conferences held or planned

Date	Place	Organizer	National and international attendance
1. 25-30 Sept. 1989	Sofia	Hydromet Institute of Bulgarian Academy of Sciences	XIV International Conference on the Meteorology of the Carpathians
2. 14-16 May 1990	Odessa	Ukrainian Academy of Sciences, Geographical Society of Ukraine	VI Congress of Geographical Society of Ukraine
3. 16-21 Sept. 1991	Uzhgorod	USSR Goskomgidromet	XV International Conference on the Meteorology of the Carpathians
4. 1989	Kiev	Goskomgidromet of Ukraine, Ukrainian Hydromet Scientific Research Inst.	XVI Conference of Danube countries on hydrometeorological forecasting under IHP
5. 1991	Yaremcha, Ivano-Frankovsk region	Ukrainian Hydromet Scientific Research Inst.	Conference of representatives of CIS on avalanche precautions

countries

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3. Current and planned partnerships and cooperation with other countries in connection with IDNDR

1. Bilateral collaboration on hydrometeorology with Romania, Moldova, Hungary, Slovakia, Poland, Belarus and Russia.
2. Fifth session, in Kiev in spring 1994, of the International Hydrometeorology Council of the countries of the former USSR.

NATIONAL REPORT OF UKRAINE

for the review of IDNDR and the
World Conference on Natural Disaster Reduction (1994)

SECTION I. ASSESSMENT OF RISK ZONES, CLASSIFICATION
OF DANGEROUS PHENOMENA, AND DEGREE OF VULNERABILITY

Ukraine occupies territory with complicated physical and geographical conditions. The special characteristics of its location and atmospheric processes, its mountain ranges and uplands, and its proximity to warm seas are what produces the great variety in its climatic conditions: from abundant moisture in the western Polesye (forest and marshes) to the droughts in the southern steppe zone. The south coast of the Crimea, the Ukrainian Carpathians and the Crimean mountains have quite distinct climatic conditions. The interaction of all these factors can create dangerous and very dangerous weather conditions. In some cases these conditions can be disastrous and cause considerable damage to the national economy and the population. Total losses can amount to tens or even hundreds of millions of roubles.

The very dangerous phenomena usually form part of a complex system, which greatly intensifies their adverse impact. For example, torrential rain can be accompanied by thunderstorms, hail and storm-force winds; blizzards by snowfall and strong winds; dust storms by reduced visibility and strong winds; etc.

Every year (with 70-100% probability) Ukraine experiences very dangerous weather conditions. The commonest are heavy rain, snowfall, black ice and fogs. The rarest (once every two or three years) are dust storms and heavy build-ups of black ice.

The area most seriously affected by very dangerous weather conditions is the steppe, with typical warm-season conditions (intense heat, dust storms, hot dry winds, forest fires) and cold-season ones (severe frosts and black ice).

The most typical conditions in the Ukrainian Carpathians are heavy rain, which causes mudslides and rainwater torrents, hail, strong winds, fogs, blizzards and heavy snowfall. Dangerous weather conditions occur least often in the western Polesye. Dangerous weather conditions rarely occur on the coasts of the Black and Azov seas, owing to the marine influence on the adjoining land.

Heavy rain

The commonest dangerous weather condition in Ukraine is heavy rain. It occurs annually over very large areas. It occurs with greatest frequency (in 95 out of 100 years) in the Ukrainian Carpathians and the Crimean mountains. Heavy rain falls less commonly (75-80%) on the Podolsk uplands and the Donetsk ridge, and in the rest of the country in 50-75% of years.

Hail

In the warm season heavy rain is accompanied by hail, which increases the damage, especially on farm land. Hail has a very patchy distribution in Ukraine. It occurs annually in the Ukrainian Carpathians and the Crimean mountains and their foothills. Here large hailstones occur in 30-40 out of 100 years. The most severe hail damage is found in rugged terrain (the Volyn, Podolsk, Dnieper and Azov uplands and the Donetsk ridge). In the lowlands hail occurs in 50-70% of years; large hailstones have the same incidence (50% and higher) and are commonest in this region. Hail rarely occurs in the steppe zone.

Intense heat

In the warm season the conditions are often created for dangerous and extremely dangerous high air temperatures (intense heat) which in most cases has an adverse impact on the activities of many branches of the national economy. Intense heat with little or no precipitation facilitates the formation of drought conditions whose most serious impact is on the viability of farm crops.

Intense heat occurs annually in the steppe zone (98-100% probability) with maximum air temperatures of 30°C and higher; in 60-80% of cases temperatures can reach 35°C and higher, and very occasionally (once every 50-100 years) air temperatures of 45°C and higher occur. Exceptions in this region are the coasts of the Black and Azov seas, where the incidence of high temperatures is somewhat lower owing to the tempering influence of the sea.

In the eastern Polesye and forest steppe an air temperature of 30°C and higher has a 90-95% probability, and 35°C and higher a 20-30% probability.

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The western Polesye is least subject to conditions producing dangerously high temperatures. Here temperatures of 30°C and higher have a probability of 75-100%, and temperatures of 35°C and higher 10-15%, i.e. they occur once every six to ten years. A marked exception is the mountain regions of the Ukrainian Carpathians, where intense heat has not been recorded.

Hot dry winds

Intense hot dry winds occur annually in Ukraine. The most seriously affected area is the steppe zone (70-80% of years). These winds blow in the southern and eastern parts of the forest steppe zone in 50-60% of years. On the coasts of the Black and Azov seas, thanks to the sea breezes, they occur very rarely (10% of years). They hardly ever occur in the Polesye and western forest steppe zone (5% probability).

Droughts

Generally speaking, during the growing season droughts occur most commonly (50-60% of years) in the extreme south of the steppe zone, where their incidence is 30-50%. In the Polesye and forest steppe zone the incidence of droughts falls to 5%. In the western Polesye and forest steppe zone droughts occur only rarely (once every 20-30 years). In most cases (50%) droughts are local in extent. They rarely (2%) affect larger areas (30-50%) of the country.

Forest fires

In the warm season the persistence of high temperatures over long periods in conjunction with lack of rainfall can cause forest fires, which occur in various regions of Ukraine almost every year (70% probability). The creation of fire-risk conditions is commonest in the steppe zone. In the eastern and central Polesye and forest steppe zone fires occur much less often (25% probability), for here the precipitation is higher and the temperatures are lower. In the western Polesye fire risks occur once every 20 years (5% probability). Weather conditions likely to produce forest fires did not occur in the decade of the 1980s.

Considerable damage is caused by winds of more than 25 meters per second, squalls and whirlwinds:

Winds of more than 25 m/s

Such winds occur almost every year over much of the country (70% probability). They are commonest in the Ukrainian Carpathians, Crimean mountains and Donetsk ridge. Winds of more than 30 m/s occur less often (13% probability).

Squalls

Squalls may blow up in any part of the region, but with no particular regularity in their geographical distribution. However, they occur most commonly (once every 3-5 years) in the steppe and forest steppe zones and in the central and western regions of the Polesye. In the rest of the country they are possible in one year out ten.

Whirlwinds

The conditions for the creation of whirlwinds are rarely found in Ukraine. Thirty-four have been recorded in the last 20 years. Risk of whirlwinds usually occurs in the warm half of the year. Whirlwinds are commonest in the steppe zone and the central Polesye, where they occur in one year out of five (20% probability). They are less frequent in the rest of the country (10% probability), i.e. once in 10 years.

Dust storms

Dust storms are caused by a strong wind blowing over parched soil and shifting a large volume of dust or sand. The nature of the subsoil (structure and moisture content, vegetation cover, and orthography) has a considerable influence on the formation of dust storms.

Dust storms occur every year in Ukraine (100% probability) in one region or another. They are classified as very dangerous in only 50% of cases. The conditions for the creation of dust storms occur most frequently in the steppe zone. They very rarely occur in the western Polesye and forest steppe zone or on the coasts of the Black and Azov seas. Dust storms have not been recorded in the Ukrainian Carpathians.

Dense fogs, blizzards, snowfall, severe black ice, and composite black-ice deposits are common in the cold season, occurring almost every year (80-90% of years):

Dense fogs

In Ukraine dense fogs show great variability in time and extent. They occur most frequently (100% probability) in the rugged regions of the Ukrainian Carpathians and Crimean mountains. Here every fog can be classified as severe. Fogs occur frequently (70-80% probability) on the southern windward slopes of the Donetsk ridge and the Azov, Volyn, Podolsk and Dnieper uplands. In the Polesye, Transcarpathia and the southern part of the steppe zone fog formation rarely develops very far, so that dense fogs are very uncommon in this region.

Severe blizzards

Severe blizzards occur almost every year (95% probability)

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in one region of Ukraine or another. They are commonest (over 50% probability) in the Ukrainian Carpathians and Crimean mountains. Such blizzards have a high incidence (30-40% probability) on the Donetsk ridge. Over the larger part of the lowlands severe blizzards occur in 20-40% of years.

Heavy snowfall

The Ukrainian Carpathians are the region with the highest incidence of heavy snowfall (60-80%). Such snowfall occurs less frequently (40-50%) in the central parts of the forest steppe and steppe zones; in the south-west steppe the incidence is 30-35% of years, and in the extreme north-west 10%.

Heavy snowfall can imply various amounts of precipitation. Most frequently (70%) the deposits are in the 20-20 mm range. For most of the country the heaviest deposits are in the 40-70 mm range. In the Ukrainian Carpathians and in a few other places they reach 100 mm and more.

Severe black ice

The regions with the highest risk of black ice (40-50%) are the Crimean mountains, the Donetsk ridge and the central parts of the forest steppe and steppe. In the eastern forest steppe severe black ice can be expected in 20-30% of years. In the north-east forest steppe and the south of the steppe zone dangerous black ice occurs in 20% of years. In the rest of the country its incidence is under 10%.

Composite deposits with a thickness of 35 mm and more:

Composite deposits are found mostly in the Crimean mountains, where they are formed almost every year. They are less common (30%) in the east and west of the forest-steppe zone. In the southern parts of the forest steppe such deposits have a probability of 10% and less.

Severe frost

Severe frosts (-30°C and lower) occur in Ukraine in the colder months, and their persistence over long periods, in conjunction with other meteorological phenomena, creates unfavourable conditions and has a negative effect on many branches of the national economy and vital human activities.

Dangerous temperatures occur most commonly in the east and north-east and in the high parts of the Ukrainian Carpathians. Here the probability of air temperatures of -30°C and lower is 20-25%, and of temperatures of -35°C and lower it is 5%. Over most of the country low air temperatures (-30°C and lower) have a probability of 5-10%, and very low temperatures (-35°C and lower) only 1-2% probability. In the steppe zone an air

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temperature of -25°C or lower is regarded as dangerous and occurs once every 20-30 years, while temperatures of -30°C and lower occur only once in 100 years.

Common natural hazards in the rivers of Ukraine are flooding resulting from high water levels in spring and flash floods, the formation of huge ice-jams, destructive avalanches and mudslides, low water levels and rivers running dry.

Over a large area of Ukraine (Carpathian region, Crimea) the rivers are very prone to flash-flooding, with an average of six to seven flash floods a year. They can occur at any time of the year and often have disastrous consequences, causing widespread damage and loss of life. In mountain rivers (Dniester, Tisa, Prut, rivers of the Crimea) flash floods can form very quickly (a few hours to 2-3 days), and this places a high premium on speed and accuracy of forecasting and the issue of warnings. In the last 30-40 years disastrous flash floods were recorded in the Carpathians and the Crimea in 1957, 1969, 1970, 1973, 1975, 1976, 1977, 1979, 1980, 1981, 1992 and 1993. A good example of a flash flood is the one caused by snow and rain in the rivers of the Carpathian region (Uzh, Tisa) in November 1992, affecting many of the region's built-up areas, including the administrative capital Uzhgorod, and causing loss of life. Such floods occur once in 5-10 years.

Water levels during the spring thaw rise more slowly in lowland rivers, but the risk of damage lasts longer. Disastrous flooding occurred in the Dnieper and its tributaries in 1931, 1964, 1970 and 1979. Spring flooding causing damage to various enterprises can occur once in 5-10 years, and extremely high water levels, as in 1931, once in 300 years.

Low water levels, which have a negative impact on navigation, water supply, electricity production, and cleanliness of rivers, occur in the basins of the big rivers (Dnieper, Pripyat, Desna) once in 20-25 years, and the steppe zone and the Crimea once in 3-10 years.

Every year the mountain regions experience mudslides and avalanches which often cause loss of life.

In the Azov-Black Sea basin extremely destructive autumn cyclones occur once in 7-10 years. A particular feature of these cyclones is that they pass over the basin during the autumn cooling, when the water temperature remains relatively high for some time. In their characteristics, provenance and consequences they are akin to tropical hurricanes. Over the last 10 years wave heights of 4-6 meters have been recorded in some places on up to 3-6 occasions. In the Sea of Azov the heavy seas are often accompanied by storm surges which exacerbate the damage considerably.

IV. THE NATURAL DISASTER WARNING SYSTEM

The system for observation of dangerous hydrometeorological phenomena

In Ukraine the State hydrometeorological observation system consists of 203 fixed ground stations and 479 posts recording observations of dangerous hydrometeorological phenomena.

The hydrometeorological stations can be grouped according to the main types of observation:

- Meteorological: 123
- Aviation meteorological: 35
- Agrometeorological: 4
- Aerological: 9
- Marine hydrometeorological: 14
- Hydrological: 4
- Lake: 8
- Water balance: 2
- Mudslide: 2
- Avalanche: 2

The hydrometeorological posts are divided into:

- Meteorological: 17
- Hydrological; 373
- Lake: 60
- Marine hydrological; 18
- Agrometeorological: 11

The forecasting system

Forecasts and warnings of dangerous conditions are produced on both a national and a regional basis. The Ukrainian Hydrometeorological Centre in Kiev is the main source of forecasts and warnings for the whole country and it coordinates the activities of the other forecasting agencies.

The forecasting of dangerous conditions in maritime waters is the responsibility of the Black and Azov Seas Hydrometeorological Centre in Odessa and the Mariopol and Sevastopol hydrometeorological office.

Forecasts of weather conditions for the administrative regions are produced by the regional hydrometeorological centres and the aviation meteorology stations.

The production of forecasts and warnings of dangerous conditions on the Dnieper reservoirs is the responsibility of the specialized Svetlovodsk hydrometeorological observatory, and on the Danube river it is the responsibility of the Danube hydrometeorological observatory.

Short-term forecasts and warnings of flash floods on the rivers of Ukraine are produced, for their respective zones, by the Ukrainian Hydrometeorology Centre and by the Transcarpathian, Lvov, Chernovits and Kharkhov regional centres, the Hydrometeorology Centre of the Black and Azov Seas, the Crimean Republic centre, and the Danube observatory.

Forecasts of weather conditions constituting a threat to aviation are produced by a network of aviation meteorology stations. The Ukrainian Aviation Meteorology Centre is the main administrative body for coordination of these activities.

The system for forecasting dangerous conditions on land has a total of 30 forecasting agencies.

The following are the main materials used in the production of forecasts and warnings:

- Observation data (routine and emergency) from 185 stations and more than 400 hydrological posts in Ukraine;
- Synoptic data from more than 1,000 meteorological stations in the northern hemisphere received through the State telecommunication network from the International Meteorology Centre (IMC), Moscow;
- Radiosonde atmosphere data from 400 stations in Europe, Asia, America and Africa;
- Actual and projected synoptic maps received from IMC, Moscow;
- The products of numerical methods of weather forecasting using the GRID code received from the forecasting centres in Washington, Bracknell, Offenbach, Reading and Moscow;
- Data from the NOAH, METEOR and METEOSAT meteorological satellites;
- Data from radar observations of cloud cover from 35 radar stations in Ukraine, Russia, Moldova, Georgia, Armenia, Azerbaijan and Belarus;
- Data from weather ships in the Azov-Black Sea basin;
- Hydrological data from neighbouring countries and most countries of Europe;
- Annular and microannular synoptic maps compiled at the national centre in Kiev;
- The results of short-term numerical forecasts of baric fields and meteorological conditions using a regional model, received at the national centre.

logical

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[see attached note]

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The necessary information is transmitted to the forecasting agencies of Goskomgidromet of Ukraine by fax, telephone, telegraph and radio.

An array of various statistical, synoptical-statistical, numerical and other methods is used to verify the forecasts and warnings.

In order to coordinate the activities of experts working in the forecasting agencies and main forecasting centres, provision is made for the concordance of all forecasts and warnings of weather conditions.

The production and issue of forecasts and warnings are governed by the Decree on dangerous hydrometeorological phenomena, the Instructions on the terminology and evaluation of forecasts and warnings, the Operational Procedures to be followed by experts in the event of the imminence or development of dangerous hydrometeorological phenomena, and the Criteria of dangerous hydrometeorological phenomena (see annex).

The natural disaster warning system

A warning system has been established in order to provide early notice of bad weather conditions and prevent damage. This system has several levels:

1. The population;
2. The organs of State power and of Government;
3. Enterprises and organizations whose operations are most seriously affected by bad weather conditions.

Information and warnings are conveyed to the population through the mass information media, and when a significant part of the population is threatened, through the civil defence communication channels of Ukraine as well.

The system provides for the transmission of warnings through the civil defence channels to the administrative units of Ukraine (the regions for example) and to individual settlements.

The organs of State power and of Government are kept informed by the operational units of Goskomgidromet both directly and through the civil defence channels and the commissions on emergency situations.

The main means of transmitting warnings - by telephone to government and civil defence bodies - uses direct telephone lines. Kiev, the capital of Ukraine, uses an automated warning transmission system which can notify all the municipal administrative services and the city's main enterprises and

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organizations within 3-5 minutes.

At the regional level, 185 meteorological stations are involved in the transmission of storm warnings.

Operational problems of the observation,
forecasting and warning system

As a result of the formation of independent States in the territory of the former USSR and the establishment of their national hydrometeorological services, problems have arisen with the technical capacity of the observation systems and with the administrative management of the various forms of observation.

This has happened because the manufacture of hydrometeorological apparatus and equipment was located mainly in Russian territory, where it has remained, together with the main scientific observation management centres and the computer processing and data storage facilities. Accordingly, Goskomgidromet of Ukraine has to acquire most of the necessary equipment and any new software with foreign currency, which is in very short supply.

At present we are forced to concentrate our resources on the most important areas of activity in order to preserve the observation network necessary for forecasting dangerous hydrometeorological phenomena. For example, the network of aerological stations, which in 1993 introduced one-off expendable sondes, is now in a difficult position..

There is no reserve of equipment - thermometers, barometers, hygrometers, pluviographs, etc. We have no spare parts for repair of automatic recorders, electrical meteorological instruments, meteorological radar sets, etc.

The observation network's lack of automated meteorological stations and hydrological posts and of reliable radio links to inaccessible (mountain) observation points causes considerable difficulties. This is why it is such a problem to transmit information in good time as dangerous conditions are building up.

Difficulties arise in the forecasting of dangerous conditions with regard to providing the forecasting centres with synoptic and aerosynoptic products, for the means of transmission are obsolete and there is a lack of expendable items (such as xerographic paper).

electroconductive

Annex

CRITERIA
of dangerous hydrometeorological
phenomena for Ukraine

Meteorological phenomena

- Winds (including squalls and whirlwinds) with a maximum speed of 25 m/s; in the Carpathian and Crimean mountains 40 m/s and higher;
- Very heavy rain, very heavy sleet (rain and snow), with precipitation of 50 mm or more over 12 hours or less; in mountain areas 30 mm or more over 12 hours or less;
- Very heavy snowfall, with precipitation of 20 mm or more over 12 hours or less;
- Heavy hail, with a stone diameter of 20 mm or more;
- Severe blizzards over 12 hours or more with a wind speed of 15 m/s or more;
- Severe dust or sand storms, with a wind speed of 15 m/s or more over 12 hours or more;
- Severe black ice, with a thickness of 20 mm or more;
- Heavy build-ups of black ice, with a thickness of 35 mm or more;
- Heavy accretions of wet snow, with a thickness of 35 mm or more;
- Dense fogs, with visibility of less than 100 m over 12 hours or more;
- Frosts, with the air (surface) temperature falling below 0°C during the growing season;
- Severe frosts of -30°C and lower in the southern and south-eastern regions of Ukraine; -35°C in the rest of the country;
- Extreme forest fire risk, with a fire-risk indicator of more than 10,000°C;
- Hot dry wind, persistence of high temperatures (over

2.2

25°C) for 3-5 days with a wind speed of over 5 m/s and low (30% and lower in daytime) relative air humidity during the period of sprouting, formation and ripening of grain.

Hydrological phenomena

- High water levels during the spring thaw, flash floods caused by rain, ice-jams, storm surges, rapid rise of reservoir levels, with risk of flooding of parts of towns and other built-up areas, roads, railways, farm land, etc.;

- Low water levels in rivers and reservoirs (below the design levels in water-containment installations or navigation levels on rivers for a period of more than 10 days);

- Water shortage during the period of lowest water levels, with cessation of flow for more than a month once in 10 years; volumes of spring water in Ukraine's main rivers (Dnieper, Dniester, N. Donets, S. Bug) at 95% or higher, which may impair the operation of the water resources network, the public water supply, agriculture and industry;

- Early ice floes in autumn and freezing of navigable rivers, occurring no more frequently than once in 10 years;

- Mudslides and avalanches;

- Strong winds on the Dnieper reservoirs (producing wave heights of 3 m or more).

Marine phenomena

- Rapid and very rapid icing of vessels (0.7-1.4 cm/h);

- Heavy seas, with wave heights of 3.5 m or more on the Sea of Azov and 4 m or more on the Black Sea;

- High or low sea levels, as defined in the current Composite List of changes in water levels at the hydrometeorological stations and posts in the Azov-Black Sea basin, which are regarded as dangerous or very dangerous for the national economy;

- Strong currents creating risk of accidents;

- Ice formation and freezing of rivers early in the season once in 10 years;

- Intensive formation of ice floes and build-up of ice pressure threatening the safety of shipping, sea ports and other coastal facilities.