

**The Programme  
of the hydrometeorological stations and posts' reconstruction for 2007-2016**

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**Agency on hydrometeorology of the Republic of Tajikistan**

## **Background**

National hydrometeorological observation and monitoring system is a complex multi-level information basis aimed at (i) systematic environmental observation conduction and study, (ii) providing the governmental bodies, national economy branches, state organizations, departments and population with the information about the current and forecasted environment condition and climate in the republic.

The structure of the national hydrometeorological observation and monitoring system consists of the observations stations and posts, hydrometeorological centers (HMC), hydrometeorological observatory, environmental monitoring centers, automated communication center, hydrometeorological data processing and storage centre.

One of the key tasks of the effective hydrometeorological information supply is to provide reliable functioning of the national and international hydrometeorological infrastructures (observation system and forecast preparation). Based on the hydrometeorological observations information weather forecasts, water content predictions and early warning information of the extreme weather events (EWE), particularly, mudflow, avalanche, heavy rainfalls, hail hit, heavy storms, etc., are developed and national hydrometeorological and environmental hand-books and annual books are issued.

The territory of Tajikistan and its population are subjected to the active natural processes adverse impacts that cause natural disasters' frequent occurrence. Annually, more than 100 extreme weather events are observed in the republic that certainly, greatly impact on the national economy where a great amount of funds are spared for their consequences' limitation.

According to the UN experts' international estimations, natural disasters cause 80% of the national economy total damage. Monitoring and EWE forecasting will reduce the scale of their adverse impact, preventing and mitigating the foreseen damage.

International expertise shows that appropriate and rational use of the hydrometeorological information increases the economy effective development, however, currently, it is not used to a full capacity.

Resources for the work effective functioning and hydrometeorological early warning system enhancement should be considered as investments and other sources

(ministries and departments of the republic that use the hydrometeorological information) are welcomed to attract their funds as well.

Providing hydrometeorological safety of the population, its ownership and the national economy branches is the main priority of the national state policy. In this, a series of the normative and legislative acts and resolutions was adopted. The Republic of Tajikistan, being the member of the World Meteorological Organization (WMO) provides the access of the international meteorological community to the national observation network data through its National Hydrometeorological Service (NHMS) and obtains the relevant information of other NHMS countries. This activity process is regulated by the 25<sup>th</sup> and 40<sup>th</sup> WMO Congress Resolutions (Kg-12). In order to develop the national hydrometeorological activity the following laws and regulations of the Republic of Tajikistan were adopted:

**The Law of the Republic of Tajikistan** “On hydrometeorological activity” #86 as of December 2, 2002;

**The resolution of the Government of the Republic of Tajikistan** “On the approval of a list of the objects that should be transferred into the concession and the objects that should not be transferred into the concession in accordance with the Government of the Republic of Tajikistan” #49 as of February 3, 2000;

**The resolution of the Government of the Republic of Tajikistan** “On the approval of the hydrometeorological network with the Intergovernmental Panel of the Commonwealth Independent States’ agreement concept” #377 as of October 1, 2002;

**The resolution of the Government of the Republic of Tajikistan** “On hydrometeorological safety of the country-members of the Commonwealth of Independent States agreement concept” #394 as of October 1, 2004;

**The resolution of the Government of the Republic of Tajikistan** “On the individual activity types licensing agreement regulation” #337 as of September, 2005.

#### **Key objectives of the NHMS:**

- Conduction of the systematic observations over the climatic system and environment impacted by natural and anthropogenic factors;
- Providing state governmental bodies, the national economy branches and the population with the current and forecasted hydrometeorological and environmental information.

Hydrometeorological activity should be implemented as follows:

- Persistency of the environmental observations at global scale;
- Comparability of the observation methods and information collection, processing, storage and circulation;
- Cooperation with the interstate and international environmental monitoring systems;
- Accessibility, reliability, efficiency and in-time providing of the current and forecasted environmental and hydrological information.

The Programme includes a series of the principal approaches and directions aimed at the development of the hydrology, meteorology, agrometeorology, aerology, actinometry, glaciology, environmental monitoring, etc. Reconstruction and equipping of the observation network should be implemented in accordance with the full work volume and capacity.

### **1. The National Hydrometeorological Service (NHMS) current state**

The NHMS should have the well-developed observation network to implement its main objectives and goals that meet the needs of the national economy promoting its sustainable development through reduction of the natural disasters hazards.

Currently, monitoring and observation network consists of 57 hydrometeorological stations (1, 2, 3 levels), in particular, there are 2 hydrometeorological centers, 1 hydrometeorological observatory, 35 meteorological stations, 5 hydrological stations, 1 aerological station, 4 specialized stations and 126 posts (hydro-meteo-agro-snow/avalanche); there are 8 benchmark stations aimed at sustainable and uninterrupted observation conduction; the data received considered of high importance as basing on them, climate change timely trends are set. Tajikistan's 14 stations and 10 hydrological posts promote the process of the global information and data exchange. However, for the time being, the national observation network state doesn't meet generally accepted requirements criteria and cannot provide the Republic's participation in the Global Observation System. Within the period of 1991-2005 the national hydrometeorological network was reduced by 20%. It is necessary to fully repair 38 hydrometeorological stations and 30 hydrometeorological posts, reconstruct 6 stations, 10 posts and 18 air pollution observation posts (APOP).

NHMS doesn't have sufficient funds to develop the functioning of the observation network system. A number of stations are closed, the work volume of the other ones is considerably reduced. Almost all of the stations are equipped with the out-of-date technical devices and new hydrometeorological equipments for the information collection, processing and circulation are not provided as the factories producing them located abroad. NHMS is lack of qualified personnel and specialists. Automated communication level of the national Agency is far behind in comparison with other countries'.

The main objective of the automated communication supply of the national observation network is to preserve the observation processes in remote regions of the Republic. However, current automated work places of the specialists engaged into the operational implementation of the observation materials and data processing can be estimated as unsatisfactory.

Main reasons of the network reconstruction needs:

- Observation network reduction due to insufficient funding;

- Unsatisfactory state of the observation network which doesn't meet internationally accepted requirement criteria;
- Transition to the modern economy conditions;
- Lack of the atmosphere remote zonding, high resolution satellite information and automated stations and posts.

On the other hand, the progress of the NHMS and its considerable contribution into the national economy sustainable development can be reached through:

- Reconstruction of the stations and posts network in accordance with internationally accepted requirement criteria;
- Sufficient funding and technical equipping;
- Preparation of high-qualified personnel and specialists;
- Sustainable regional cooperation.

Therefore, the Programme realization will potentially improve the national hydrometeorological observation network system though and promote the national economy branches sustainable development.

## **2. The Programme objective**

The programme objective is to plan definite activities and measures for effective hydrometeorological monitoring and environmental system up and development.

The Programme includes:

- Hydrometeorological network reconstruction;
- Enhancement of the hydrometeorological and services quality, implementation of the obligations in area of hydrometeorology due to international agreements and resolutions represented by the Republic of Tajikistan;
- Development of method system to predict natural disasters and extreme weather events (i.e. mudflows, avalanches, heavy rainfalls, hail-hit, floods, heavy winds, droughts, etc.);
- Improvement of the early-warning notification system;
- Improvement of the hydrometeorological information providing;
- Broadening and enlargement of the providing area;
- Improvement of the observation system, climate and climate change assessments, and integration into the Global Climate Observation System (GCOS) and Surface Land Hydrology Global Observation Network.

This can be implemented through:

1. Reconstruction and equipping of the hydrometeorological network with up-to-date technical devices and development of the complex observation system;
2. Sustainability of the national hydrometeorological observation network, in particular (i) renovation of the agrolological actinometrical observations; (ii) development of the agro meteorological observation and research of the pastures vegetation; (iii) renovation of the automated observation network in remote and

difficult-to-access regions; (iv) development of the snow and glacial observations to a full capacity.

3. Improvement of the data analysis, systematization and archiving system;
4. Application of advanced technologies and international expertise in the area of forecasting and prediction;
5. Installation and set-up of the telecommunication system that provide automated information collection, processing and circulation in-and-out of the Republic (i.e. meteorological telecommunication regional and global centers);
6. Installation and set-up of the high-resolution satellite meteorological information receipt (HRPT) to provide reliability and accuracy of the weather forecast, environmental monitoring, snow reserves state assessment, water resources and glaciers dynamics observations;
7. Raising the personnel and specialists' qualification in accordance with the modern requirements.

### **3. The Programme goals**

The Programme strategy goal is to constantly reconstruct all branches of the national hydrometeorological service of the Republic Tajikistan to a full capacity, particularly:

- Providing the governmental organizations and population with the qualitative information about current weather conditions (including extreme weather events, agriculture production and forecast of the river flow regime, environmental monitoring information, etc.);
- Providing the main national economy branches, tourism and recreation sphere, medicine field, etc. with the specialized forecast information;
- Study of the climate change adverse impacts on the national economy and natural resources;
- Providing the users with the climate and environmental information;
- Study assessment of the glaciers and mountainous outburst lakes, mudflow and avalanche hazardous regions' current state and condition.

### **4. The Programme directions**

The Programme key directions is to provide the relevant state bodies, population and national economy branches with the current and forecasted weather condition and information of the expected extreme weather events. The Programme key directions were elaborated in accordance with the following principles:

- Preservation and further development of the observation network and protected zones to receive reliable hydrometeorological information;
- Equipping of the observation network with the up-to-date technical devices and advanced technologies;
- Reconstruction of the automated stations and posts' network;
- Improvement of the early warning service system on extreme weather events occurrence;
- Improvement of the data base storage system;

- Preparation and issuing of the scientific and applied information books;
- Rising of the personnel and specialists' qualification and technical providing.

## **5. Expected outcomes**

The Programme realization will provide the observation network and monitoring system (i.e. hydrometeorological, climatic and environmental) set-up in Tajikistan in accordance with the national needs and international requirements. The Programme realization will promote the NHMS further development; the basis of the applied hydrometeorological researches in Tajikistan will be set-up. Furthermore, in accordance with the national and international hydrometeorological agreements and resolutions, the national hydrometeorological service will be able to implement the following:

- Rational implementation of the unique state policy in area of the hydrometeorological activity on the territory of Tajikistan;
- Focusing of the state information resources in area of hydrometeorology and establishment of the unique state environmental database;
- Hydrometeorological, agrometeorological and glaciological description and analysis of the various regions of the Republic;
- Conduction of the hydrometeorological researches and analysis of the environmental state (i.e. atmosphere, surface waters, soil, radiation condition, etc.) in the regions of the planned economy objects, recreation and rehabilitation zones construction;
- Analysis of the regions hazardous to the extreme weather events (mudflows, avalanches, floods, heavy winds, etc.); identification and elaboration of the preventive measures;
- Check up and in-time repair of the hydrometeorological devices and equipments;
- Itinerary analysis of the agriculture pastures and fields;
- Construction of the wide hydrometeorological observation network;
- Monitoring of the snow and glacial current resources;
- Providing the main national economy branches with the specialized information about current and expected weather conditions;
- Providing the forecasted information about the Amur-Darya river basin water flow;
- Licensing of the hydrometeorological activity in accordance with the Legislative mechanisms of the Republic Tajikistan.

## **6. The Programme realization mechanisms**

The Programme will be realized within 10 years and should be implemented through a number of organizations and technical activities support. In the Programmes frameworks it is expected to reconstruct the observation network system, fully repair the service living places of the stations, equipping them with the up-to-date technical devices, integrate the advanced methods of forecasting, develop satellite information receipt system, improve the data processing, circulation and archiving, automatize the

stations and posts, study of the snow and glacial resources and prepare the high-qualified personnel. The Programme will be implemented by the government of the Republic Tajikistan and international organizations.

## 7. Funding support

The Programme funding will be considered under:

- The State budget;
- International grants;
- WMO Voluntary Coop Programme

Moreover, funding support from the side of the Ministries and departments, organizations and other institutes (that systematically use operational and specialized information) is welcomed, if not contradicted to the legislation of the Republic Tajikistan. The executive body of the Programme implementation is the Agency on hydrometeorology in accordance with the Programme outputs (Annex I). Summary funding indicators of the Programme are identified in the table below (Annex II).

The Programme realization will stabilize the operational activity of the NHMS and enhance its technical basis.

*Table*

*The Programme funding support summary for 2007-2016  
(approximate prices as of 2006z)*

#	Outputs	Sum (Somoni, the national currency)
1	Reconstruction of the hydrometeorological observation and monitoring network system	<b>14 395 000</b>
2	Reconstruction of the environmental monitoring network system	<b>4 207 500</b>
3	Improvement of the hydrometeorological data collection, analysis and archiving system	<b>1 572 500</b>
4	Improvement of the forecast and service providing system	<b>1 350 000</b>
5	Renovation and the regular conduction of the research and expeditionary works	<b>1 060 000</b>
6	Raising the personnel and specialists' qualification	<b>900 000</b>
	<b>TOTAL:</b>	<b>23 485 000</b>

### The schedule of the Programme outputs for 2007-2016

#	Outputs	Executors	Time
<b>1</b>	<b>Reconstruction of the hydrometeorological observation and monitoring network system</b>		
1.1	Reconstruction and full repair of the service living buildings, hydrometeorological allocation places of 40 meteorological stations and 43 hydrological posts, equipping with the technical devices	Agency on hydrometeorology	2007-2016
1.2	Purchase of the meteorological, actinometrical, aerological, hydrological, agrometeorological, aviameteorological, radiometrical measurement devices and computers to provide the hydrometeorological observation network full capacity	Agency on hydrometeorology	2007-2016
1.3	Set-up of the automated working places that deal with the synopsis, satellite meteorology, hydrological forecasting, agrometeorology, actinometry, aerology, radiometeorology, climatology to analyze the hydrometeorological data	Agency on hydrometeorology	2007-2012
1.4	Reconstruction of the aerological observation in Dushanbe and Khorog	Agency on hydrometeorology	2007-2016
1.5	Reconstruction of the automated stations and posts' network in remote and difficult-to-access regions of the Republic	Agency on hydrometeorology	2007-2016
1.6	Purchase and set-up of the complex and check-up equipment and hydrological calibration gutter named after Uryvaev	Agency on hydrometeorology, Standardization agency Ministry of economy and trade	2007-2016
1.7	Completion of the administrative buildings of the NHMS construction	Agency on hydrometeorology Ministry of economy and trade	2007-2010
<b>2</b>	<b>Reconstruction of the environmental monitoring network system</b>		
2.1	Purchase of the mobile laboratories and array station on surface water and soil pollution	State Committee for environmental protection and forestry Agency on hydrometeorology	2007-2009
2.2	Equipping of the chemical laboratories with up-to-date analysis devices in Dushanbe, Kurgan-Tube, Kujand and Yavan	State Committee for environmental protection and forestry Agency on hydrometeorology	2007-2015
2.3	Set-up and up-to-date equipping of the chemical laboratory in Tursunzade	Tajik Aluminum Plant, Agency on hydrometeorology	2007-2016
2.4	Reconstruction of the observation network system over the transboundary surface waters pollution monitoring	Agency on hydrometeorology	2007-2009
2.5	Reconstruction of the observation network system over the transboundary atmospheric air pollution monitoring	Agency on hydrometeorology	2007-2011
<b>3</b>	<b>Improvement of the hydrometeorological data collection, analysis and archiving system</b>		

3.1	Set-up of the hydrometeorological data collection, processing and archiving automated system	Agency on hydrometeorology	2007-2010
3.2	Transformation of the hard copy observation data information into the electronic copy version	Agency on hydrometeorology	2007-2010
3.3	Set-up of the high-resolution satellite meteorological information receipt (HRPT) to provide reliability and accuracy of the weather forecast, environmental monitoring, snow reserves condition assessment, vegetation state and water resources and glaciers dynamic state.	Agency on hydrometeorology Astrophysics Institute of the Academy of science International organizations	2007-2013
<b>4</b>	<b>Improvement of the forecast and service providing system</b>		
4.1	Development and integration of the advanced methods of short-term, mid-term and long-term meteorological, agrometeorological, hydrological and other forecasting	Agency on hydrometeorology совместно с CIS NHMS	2007-2009
4.2	Integration of the advanced methods of the mean monthly/seasonal temperature and precipitation forecast according to the regions of the Republic	Agency on hydrometeorology in cooperation with the CIS NHMS	2007-2010
4.3	Integration of the advanced methods of the agrometeorological forecasting to identify agriculture crops vegetation	Agency on hydrometeorology Сельхоз Академия	2007-2010
4.4	Development and integration of the advanced methods of Republic's river water content through application of the mountainous snow cover data (i.e. itinerary avia-remote snow reserves measurement shooting and photographing; satellite information receipt)	Agency on hydrometeorology in cooperation with the CIS NHMS Astrophysics Institute of the Academy of science	2007-2008
4.5	Set-up of the state accounting unique system of the national water resources, their quality and use	Agency on hydrometeorology in cooperation with the Ministry of water management and melioration and State Committee for geology	2007-2016
4.6	Elaboration of the long-term hydrometeorological safety strategy of the Republic Tajikistan and improvement of the information system through reliable and accurate data providing on weather and climate change conditions on the territory of the Republic.	Agency on hydrometeorology in cooperation with the Ministry of emergency	2007-2010
4.7	Set-up of the extreme weather events database	Agency on hydrometeorology in cooperation with the Ministry of emergency	2007-2009
4.8	Improvement of the assessment methods of the weather and climate change condition (including SWE) adverse impacts on the vulnerable sectors of the national economy	Agency on hydrometeorology in cooperation with the Ministry of emergency and	2007-2009

		Academy of Science	
4.9	Identification of all climatic, agroclimatic and hydrological resources of the Republic and ways of the extreme weather events dissemination	Agency on hydrometeorology in cooperation with the Ministry of emergency	2007-2011
<b>5</b>	<b>Renovation and the regular conduction of the research and expeditionary works</b>		
5.1	Aerovisual and itinerary observations of the pasture vegetation, agriculture crops vegetation and monitoring of the mudflow and avalanche hazardous regions	Agency on hydrometeorology in cooperation with the Ministry of emergency, Ministry of agriculture and Ministry of science	2007-2016
5.2	Reconstruction of the snow and glacial resources monitoring system, enlargement of the snow observation network, providing equipment for the snow cover automated measurement; conduction of the glaciers inventory	Agency on hydrometeorology in cooperation with the Academy of science	2007-2016
5.3	Reconstruction of the observation network system of the mountainous outburst lakes	Agency on hydrometeorology, Academy of science	2007-2016
5.4	Conduction of the researches of the climate change study	Agency on hydrometeorology	2007-2016
5.5	Capacity building of the climate observation system, in particular: - Providing reliability and accuracy of the observations in accordance with the appropriate requirements; - Observations of other environmental factors that cause climate change; - Climatic data collection and the analysis system development; - Participation in GCOS and providing regular climatic data to its branch centers	Agency on hydrometeorology	2007-2016
5.6	Preparation and implementation of the greenhouse gas reduction projects	Agency on hydrometeorology Ministry of energy, Ministry of industry Ministry of economy and trade, Ministry of health Academy of science	2007-2016
5.7	Conduction of the researches in area of the renewable energy resources use in Tajikistan	Agency on hydrometeorology in cooperation with the Ministry of energy and Academy of science	2007-2016
5.8	Providing the national economy branches with the climatic data	Agency on hydrometeorology	2007-2016
<b>6</b>	<b>Raising the personnel and specialists' qualification</b>		
6.1	Raising the personnel and specialists' qualification through the training courses arranged by the WMO Regional Meteorological Training Centers (RMTC)	Agency on hydrometeorology WMO RTMC, Ministry of education	2007-2016
6.2	Training the specialists at the colleges and high schools of the CIS and foreign countries	Agency on hydrometeorology CIS NHMS, WMO Ministry of education	2007-2016

## **Acronyms**

**WMO – World Meteorological Organization**

**HMO – Hydrometeorological observatory**

**GCOS -Global Climate Observing System**

**GNLO-H - Global Net Land Observation- Hydrology**

**GTS - Global Telecommunication system**

**IHC CIS - Intergovernmental Hydrometeorological Council of Commonwealth of Independent States**

**NHMS – National Hydrometeorological Service**

**VCP - Voluntary Cooperation Programme**

**AS AP - Array station on air pollution**

**RMTC - Regional Meteorological Training Center**

**RT – Republic of Tajikistan**

**EWE – Extreme weather events**

**HC – Hydrometeorology Center**