Informational report
on the activities of the National Committee of the Republic of Kazakhstan under UNESCO International Hydrological Programme in 2004-2005

During the period under consideration the National IHP RK Committee did the following works:

• In the framework of the UNESCO programme "Participation Programme" the National Committee completed researches on the project 00KZ 11105 "***Estimation of snow-ice resources of the Ili river basin and renewable aqueous resources of the Chinese part of this basin".***

As a result of investigations the characteristics of territorial distribution of snow resources in the above basin were determined and renewable water resources of the Chinese part of the Ili river were first estimated. The results of investigations may be used to solve the problems of interstate usage of water resources of transboundary basin of the Ili river and to improve the system of water resources management.

• Researches in the framework of the programme **"Global international waters assessment"-GIWA– Subregion -24 Aral Sea basin"** were completed**.** Researches in the framework of this programme were carried out for three years; their objective was to use a standard method to evaluate contemporary and forecasted situation in 65 transboundary world basins and to develop recommendations on water resources management and development of ecological situation in transboundary areas. The researches in the framework of GIWA programme in Central Asia were carried out on the territory of the Aral sea basin. The works were done under the auspice of the National IHP Committee RK on the base of the Institute of Geography. The researches on the GIWA programme included evaluation of the situation development in different spheres – from estimation of the natural resources potential of the region to estimation of the consequences of man-induced activities on the environment, tendencies and perspectives of development of socio-economic situation in the countries of the region.

According to the estimations of GIWA experts the most important problem in the Central Asian region is the problem of water. Even now resources of surface waters of the Amudarya and Syrdarya are used as much as 150 and 110%, respectively, and the countries manage to avoid dramatic crisis in the water sector only due to repeated usage of return and discharge waters. On a whole, in spite of the efforts of the governments of the regional countries and international community the situation in the region, largely in the field of water resources usage, remains complicated, it has clearly pronounced tendencies to aggravation and bears a threat of not only crises in economic-social sphere but also threat to regional security.

The situation is complicated by unfavorable prognoses according to which due to global warming water resources of the main watershed basins of Central Asia may reduce by 20-40% as early as in the near future.

One of the main reasons for this situation is insufficient attraction of scientific potential of the regional countries to the solution of all complex of regional and national problems and insufficient attention to scientific researches, primarily estimations of the conditions in the runoff formation zone, tendencies and perspectives of climatically-driven changes in water resources and improvement of water resources management at all levels – from local to regional. Final report on the GIWA programme was published in November 2005*(UNEP, 2005. Severskiy I.V., Chervanyov I.,Ponomarenko Y., Novikova N.M., Miagkov S.V., Rautalahti E. and D. Daler. Aral Sea, GIWA Regional assessment 24. University of Kalmar, Kalmar, Sweden. 2005. 87 p.).*

In the framework of the fundamental research programme the Institute of Geography, MES RK, carried out researches on three themes directly corresponding to the targets of the UNESCO Hydrological Programme. They included:

1. Development of geographical base for integrated water resources management in natural-economic systems of transboundary drainless basins on the principles of sustainable development. The results of investigations:

- development of principally new integral criteria of estimation of hydroecological disturbances and risk in natural-anthropogenic systems. These criteria were used to estimate current hydroecological state of 8 basin natural-anthropogenic systems in Kazakhstan;
- estimation of the efficiency of deep counter-regulation of the runoff in the Aral-Syrdarya natural-anthropogenic system in terms of reduction of winter and summer risks in hydrological regime in Kazakhstani part of the basin.

2. Studying of dynamics of surface water resources taking into account man-induced and climatic factors as the base of hydroecological safety of the Republic of Kazakhstan. Creation of hydrological base of river water resources management in Central and Eastern Kazakhstan. In the process of investigations the scientists:

• estimated water resources of the rivers: the upstream flow of the Irtysh (on the territory of Kazakhstan), the upstream flow of the Esil river, the Nura, Sarysu and Torgay, estimated tendencies of minimal and maximal flow of the major rivers of Eastern and Central Kazakhstan;
• compiled databank for types of elementary circulation processes and estimated the role of atmosphere circulation in the dynamics of climate variations in Central Asia taking into account elementary circulation processes.

3. Studying of contemporary and prognosis dynamics of glaciosphere of Southeastern Kazakhstan mountains as the base for probable climatically-driven changes in renewable water resources in the foreseeable future.

It was established that:

• in spite of year-to-year variations norms of annual and seasonal sums of precipitations and maximal snow reserves in the runoff formation area remained unchanged over the last 50 years;
• in spite of considerable shrinking of glacier areas the river flow characteristics including flow distribution within a year and renewable water resources on the territory of Southeastern Kazakhstan did not change considerably over the last 50 years.

The results that we have obtained enable us to state that:

- widely spread opinion that the rates of contemporary and forecasted climate warming are very high is exaggerated. The main source of erroneous estimates is insufficient account of the influence of anthropogenically-changed landscapes and urbanized areas on the formation of the fields of climate characteristics;
- glaciation of Southeastern Kazakhstan mountains and adjacent mountain areas of Central Asia during the second half of the XX-th century decreased at the rate of 0.8% per year for the glaciation area and about 1.0% for the ice volume. The degradation was especially intensive in the mid-1970s – the rate of reduction of the glaciation area on the northern slope of the Zailiyskiy Alatau in the period from 1975 to 1979, on the average, was 1.27% per year. However, later, in the period from 1979 to 1990, it reduced to 0.94% per year and then reached 0.89% during the next decade. The field data show that during the last 20 years the rates of reduction of glaciers area in the Gissaro-Altai basins decreased two times as compared to the rates typical of the previous 20-year period. This glaciations dynamics is likely to be characteristic of all Central Asian region;
- on the contrary to the expectations the process of glacier flow reduction caused by the reduction of the glaciers area prevailed over the process its increase caused by more intensive

melting due to climate warming. As a result the percentage of glacier flow in the total annual flow was continuously reducing during the last decades;

- the results of investigations make it possible to assume that even in the conditions of continuing degradation of glaciation, the renewable water resources of the main watershed basins of Central Asia will not change dramatically during the next decades and will remain more or less stable. This conclusion is important from practical point of view, because in perspective planning of water sector development it enables to base on the current water resources not being afraid of their considerable reduction (by 20-40% according to the forecasts) due to global climate warming.

• According to the results of the first regional meeting EDUCARAL the Institute of Hydrology and Hydrophysics, MES RK, developed the main priorities of IHP activities for 2004.

According to this plan the content and the structure of the monograph on the results of studying of ground water resources of the Aral sea region, its preparation for publishing and publishing were discussed. The monograph (V.V. Veselov, V.Yu. Panichkin. “Geoinformational mathematical modeling of hydrogeological conditions of Eastern Aral region”, Almaty, p. 428) was published in June, 2004.

Methodological aids on usage of modern information technologies in hydrogeological investigations (by the results of modeling of the aRal sea basin ground waters) were developed and presented in the INTERNET on UNESCO server http://www.aralmodel.unesco.kz .

At the beginning of 2005 the monograph “Hydrogeology of Kazakhstan” by V.V. Veselov and Zh.S. Sydykov, Almaty, p. 484 was published in Kazakh, Russian and English languages. The monograph considers physical-geographical and geological conditions of ground water formation and distribution, gives substantiation of natural and explored reserves and their usage, presents results of geoinformational and mathematical modeling of all large hydrogeological regions, industrial areas, irrigated areas and mineral deposits.

In the framework of Participation Programme works to support and improve national information network on water problems of the Aral sea region and other regions with tense water balance in Kazakhstan were fulfilled.

The scientists of the institute prepared and published in the INTERNET (address: http://www.water.unesco.kz) information about ground waters of Eastern part of the Aral sea region, Kazakhstani part of the Caspian sea coast and Ili-Balkhash region (the main water problems, the state, usage and protection of ground waters from overusage and contamination) and methodological materials on the usage of modern computer technologies for solution of water problems in Kazakhstan.

In the frames of the Republican programme of fundamental research “Fundamental principles of balanced usage of surface and ground waters and sustainable functioning of natural-anthropogenic systems of the Republic of Kazakhstan” the Institute of Hydrogeology and Hydrophysics, MES RK, completed works under the project “Development of theoretical base and experimental justification of uniting of mathematical models and geoinformation systems”.

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