



## **Hydroecological situation assessment in Southern Aral Sea Region, Central Asia according to last 15 years ecotoxicological data**

B. Karimov (1), H. Blanchoud (2), M. Kurambaeva (1), N. Mullaboev (1), M. Teil (2) and Elena Ginatullina (2)

1. Institute of Water Problems of Uzbekistan Academy of Sciences, F. Khohaeva street 25A, Tashkent 700000 GSP Uzbekistan ([Karimov@avhsociety.uz](mailto:Karimov@avhsociety.uz); Phone: 0099871-1691270; Fax: 0099871-1691270)
2. Laboratory of Hydrology and Environment, University of Pierre et Marie Curie, BC105, 4, place Jussieu, 75252 Paris cedex 5

Due to the fact that in Central Asia the irrigation activities are directed mainly to the growing of cotton, the production of meat and fish still been widely neglected (Karimov, 1995; Karimov and Lieth, 2004). It is worth noting that the irrigated area mainly used for cotton growing in the Aral Sea basin was two million hectares in 1900, 3,2 in 1913, 4,3 in 1933 and about eight million in the 1990s. Within the Syrdarya River Basin main cotton growing areas are situated in the upper and middle reach. Amudarya River waters are used for cotton culture within its whole length. Fore countries of the region: Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan are involved in cotton agriculture.

It is well known that cotton agriculture requires use of large assortment and quantity of different hazardous chemicals. Huge quantities of pesticides was used on cotton plantations and in orchards in the region during second half of last century, which lead to their high concentrations in soils, from which the agrochemicals were washed away into rivers. The hydroecosystems of both of Khorezm region and Karakalpakstan republic of Uzbekistan and Tashaus region of Turkmenistan, which all are taking water from the lower Amudarya River, have been exposed to high doses of agrochemicals for over 40 years. It is expected that the same agrochemicals will be concentrated in the compartment fish. The worst concentrations expected in the fish in terminal water

bodies, which are maintained by collector-drainage waters from irrigated fields. The situation is known to be critical especially on the lower Amudarya Reach, where only in agriculture about 20 various pesticides are used in 2002, including carbophos, Bi-58, basagran, etc.

Regular large-scale an “ecosystem level” ecological and toxicological investigations on quality of water and various abiotic and biotic components of natural ecosystems of the Amudarya River delta were for the first time initiated by group of scientists of the Central Asian scientific research institute of Irrigation (SANIIRI) in 1987. One of the primary goals of the research, where one of the authors participated, was the investigation of the ecological and toxicological situation in lakes and residual reservoirs in the Amudarya Delta region that had not been covered within the network of OGSNK (Nation-wide service of supervision and the control over a condition of the surrounding natural environment). For some years we received a unique data set (Karimov, Borodin, 1990, Karimov, 1995, et. al.), giving detailed information on the level of pollution of various components of water ecosystems. This research was continued later within the framework of «UNESCO Aral Sea Project» during 1992-1996 (Borodin, Karimov, et al., 1998). However, after the end of the mentioned projects the study of ecological and toxicological parameters of water ecosystems in the delta and their influences on aquatic organisms have been practically stopped; first of all for the lack of financing. At the same time it is necessary to take into account the missing relevance of the data for modern hydroecological situation

because of the change of environmental conditions.

Since 2002 we resumed such investigations within the present, INTAS 1039 Project. The main objectives of the investigations were: to investigate hydrochemical parameters and biocide pollution rate of water, bottom sediments, plants and main commercial fish species and evaluation of modern environmental conditions and ecotoxicological situation, to compare obtained results with retrospective and to enter obtained data into the data bank on hydrology, hydrochemistry and hydroecotoxicology for the Amudarya Delta Region with further integration into GIS.

The results of conducted hydro-ecotoxicological investigations allow us to conclude that the present concentrations of most environmentally dangerous pollutants such as chlor-organic pesticides in main ecosystem components: water, bottom sediments, plants and fish are sharply declined and near to the detection limits or not detectable. Thus, the epoch of high pollution risk of aquatic ecosystems in the Delta Region of Amudarya River with chlor-organic biocides of agricultural origin (until the beginning of 1990-s) is probably ended. It can be explained by decrease of the volumes of used pesticides since 1980-s more than 10 times. However, this reduction does not

come from any ecological concern or reasonable behavior of agriculturists, but rather financial and penury reasons.

Based on stated fact present hydroecological situation in the Region may be estimated as favorable for terrestrial and aquatic ecosystems and wildlife conservation. Ecosystems in the delta region underlie high variability. Their hydrochemical regime is directly dependent on the level and stability of river flow. So, in the future water quantity and flow regime are often more important than water quality. The main principle of integrated water resources management (IWRM): all users of water in the drainage basin are closely interrelated, should be realized more effectively not only in the lower reach of Amudarya River, but also within the whole river basin. We emphasize that because water quantity and quality requirements of lake and river fisheries and fish-farming still often neglected in water plans in basin States. Further investigations on ecotoxicological assessments should be minimized and carried out according to the special needs, e.g. they should include used presently new pesticides and industrial biocides. Main scientific investigations and financial resources should be directed to the conservation of biodiversity and bioproductivity, development of ecologically sound agricultural technologies and aquaculture systems.