

Program/target Technologies in Water Use Management in a River Basin

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Water/economic and ecological situation in the small and medium-sized Russian rivers' basins is very often characterized by scarcity of water resources, ineffective system of waste water treatment, and high degree pollution of water bodies with their catchments. This requires development of measures aimed at attainment of sustainable water use in a river basin in order to provide effective water use today and preserve natural resources potential for future generations.

In compliance with the Water Code of the Russian Federation it is contemplated to solve today these tasks in connection with development of Schemes of Water Bodies Integrated Use and Protection (SKIOVO) of the RF. Development of the Scheme is based on the same principles of sustainable water use that form a foundation of the Plan for River Basin Management contained in EU Water Framework Directive. These are the basin approach, minimization of adverse impacts upon water bodies, charges for water use, staged and well-grounded measures, transparency, and community involvement (Slide 2)

However, the framework document adopted by nowadays and designed to guide the SKIOVO development is mainly meant for major and medium-sized rivers. The resulted methodological vacuum is being successfully filled with the Program-target technology in water-use management in a river basin.

Alteration of the essence, composition and content of the problems connected with water resources use and protection has resulted in the necessity to improve the management process as a program-target technology of optimal water use planning in a river basin. (Slide 3)

Target programs (TP) have become a form of program-target method implementation. These programs are an address document agreed in terms of resources, actors and deadlines of implementation of a set of social/economic, production and other measures aimed at solution of an economic problem with the most effective ways within the set terms.

Conceptual provisions of this technology are based on the content of the Water Strategy of the Russian Federation and comprise the following:

recovery of water bodies natural mechanism of self-purification and water resources reproduction is strategically important for life support of population;

prolonged sustainability of river basins is possible only on the basis of taking into consideration the system integrity of all the components of the basin social/ecological/economic system;

water bodies protection involves a set of preventive, organizational, surveillance/prohibition, and engineering measures;

different ecological situation within a river basin requires flexible policy in setting norms of water/economic activities;

the system of water/economic monitoring as an integrated organizational/engineering system is an informational basis for the program development;

water/economic system development parameters and composition of measures for attainment of the preset targets are to be determined on the basis of the developed economic/mathematical model of the basin water/economic system;

the financial model for implementation of water/economic activities in the basin comprises the system of the charged water use, economic incentives (penalties, set-offs, incentive credits, etc.), and elements of water/economic insurance.

An example of program-target approach application is the Management Plan for the basin of the Tuzlov small river, Rostov Oblast.

The Tuzlov River basin is a part of the Don catchment area (Slide 4)

The river catchment area is located on the territories of six administrative subdivisions of Rostov Oblast. (Slide 5)

There are different kinds of water use in the basin: domestic-drinking, industrial and agricultural, irrigation, fishery. (Slide 6)

Water quality in the river refers to the class of “dirty”. The main pollutants are sulphates, nitrates, copper, magnesium, and iron. (Slide 7)

At the first stage of the Management Plan development an integrated survey of the river basin natural/engineering system has been carried out. The principal problems of the basin have been identified by the results of this analysis. Data of the field survey, all available and published materials have been used:

Analysis of the integrated survey outcomes has enabled to identify the following main problems of the Tuzlov River basin (Slide 8)

On the basis of the analysis outcomes the permissible anthropogenic load on water bodies is to be determined: permissible volumes of water flow withdrawal by individual reaches and by the river basin as a whole, permissible levels of water pollution with individual pollutants, total limiting load upon water bodies from all pollutant sources. (Slide 9)

If current anthropogenic load upon water bodies considerably exceeds the permissible load and cannot be reduced to the limiting load in the nearest future, the objectives for water use, water quality and water bodies conditions are to be developed. Objectives are intermediate between the current and limiting loads. They are designed for stage-by-stage reaching of the limiting loads that are the ultimate goal of water resources management.

Objectives as a rule are divided into groups. (Slide 10)

The first group includes the volume of permissible at this stage flow withdrawal, limits of water use, norms of water consumption, etc.

The second group includes indicators for different types of water use (drinking and technical water, irrigation, recreation, etc.), for concrete water bodies, and transboundary reaches.

Norms of discharges take into account technical possibilities of their attainment and application of the best available technologies.

The objectives of the fourth group are meant for preservation of functional integrity of aquatic ecosystems.

The objectives are to be identified on the basis of current and prospective water use structure, forecast of the industry and agriculture development, and social/economic factors. They are to be reached over the preset period of time as a result of fulfillment of water/economic and water/protective measures that could be carried out in the given economic situation.

To reach the Plan's objectives and to settle the preset tasks water/economic and water/protective measures for each type of water use, basin measures on the river basin water resources restoration, protection and management are to be developed. The Management Plan embraces all measures aimed at water resources restoration and protection, as well as at

attainment of sustainable water use in the river basin. The list of the priority measures, however, should be composed.

The above listed problems in the Tuzlov River basin have enabled to develop a set of measures on improvement of ecological situation in the basin (Slide 11).

Group I. Increase of the beds carrying capacity.

(Slide 12) Group II. Reduction of the water adverse impact risk as a result of accidents at water work facilities.

(Slide 13) Group III. Rehabilitation of water bodies.

In order to enhance the planning, water bodies management, and control over the project realization effectiveness the analytical GIS of the project has been developed.

The GIS comprises the programs that allow to form analytical materials and provide graphic and table information.

A plan of priority measures has been developed as a result of analysis of information depicted at the GIS subject layers. The given layer shows location of the facilities where priority measures are planned to be taken. (Slide 14).

The priority measures are subject to more detailed elaboration and are being presented as investment and institutional projects. All priority measures are to be divided into groups depending on the goals at reaching of which they are aimed.

Assessment of the projects' advantages (effectiveness) assumes determination of economic, ecological, and social effects.

The issued materials of the Management Plan have passed all stages of agreement and state examination according the standing regulations. Now it is being actively implemented by the Rostov Oblast Administration.

Slide 1

Russian Research Institute for Integrated Water Management and Protection

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Slide 2 – a picture without text

Slide 3

Specific features of the program-target technology Особенности программно-целевой
ТЕХНОЛОГИИ

- system approach, solution of integrated problems, and departure from branch-oriented planning;
- availability of resources at the stage of planning;
- integration of target water/economic and water/protective programs into the programs of the basin social/economic development;
- possibility of stage-by-stage attainment of the goals.

Slide 4

Catchment area: 4680 km²,

including 92.7 % of the area on the territory of the RF,

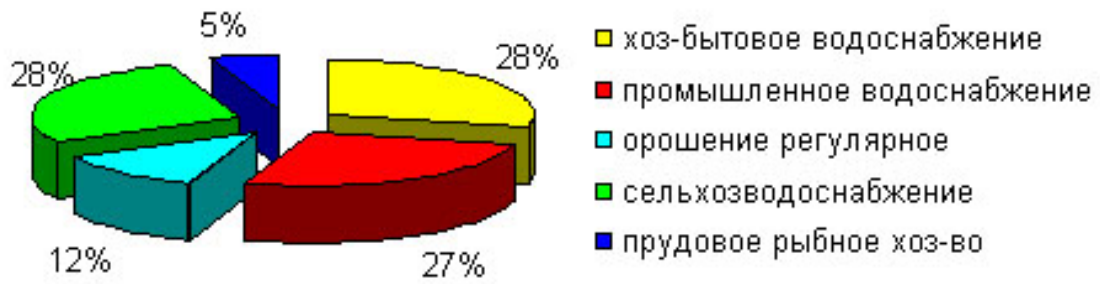
7.3 % of the area on the territory of Ukraine.

Discharge volume 50 %, - 148 million m³,

95 % - 54 million m³

Slide 5

The structure of water intake in the Tuzlov River basin.



Domestic water supply

Industrial water supply

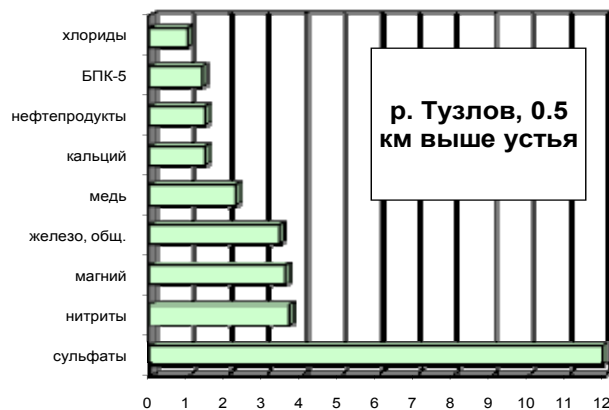
Regular irrigation

Agricultural water supply

Pond fishery

Slide 6

Presence of pollutants (in MPC fractions).



The Tuzlov River, 0.5 km upstream of the estuary

Chlorides

BOD-5

Oil products

Calcium

Copper

Total iron

Magnesium

Nitrites

Sulphates

Slide 7

Problems of the Tuzlov River basin

- low carrying capacity of the bed due to silting of many reaches and narrowing of many reaches with bridges and water work facilities;
- territories inundation due to floods and rains;
- presence of reservoirs;
- old water work facilities at ponds and reservoirs,
- ecologically dangerous ponds;
- high risk of hydrodynamic accidents;
- no owners of a great number of ponds;
- no maintenance service at ponds and reservoirs;
- multi-branch water use;
- pollution supply with waste waters;
- absence of water-protective zones.

Slide 8 (a picture without text)

Slide 9

Objectives

- water use objectives;
- water quality objectives;
- provisional regional norms of pollutants discharge with waste waters;
- ecological objectives.

Slide 10

Program measures

Group I. Increase of the beds carrying capacity.

- cleaning of the silted portions of the beds;
- liquidation of old bridge piers and abutments that narrow the beds.

Group II. Decrease of waters adverse impact as a result of accidents at water work facilities.

- major repairs, reconstruction of water work facilities with unsatisfactory and hazardous level of safety;
- liquidation of the ponds that are out of use, or ponds that have no owners;
- liquidation of the closed water bodies in front of the road embankments;
- repair, reconstruction, and elimination of motor road bridges (crossings), pedestrian bridges (crossings) in order to increase water carrying capacity of the bed in the facilities' reaches.

Group III. Rehabilitation of water bodies.

- reconstruction and liquidation of ecologically hazardous ponds and storage reservoirs;
- repair and reconstruction of waste water treatment facilities for industrial enterprises and mines;
- development of the water qualitative and quantitative indicators monitoring system, improvement of discharge forecasts' reliability.

Slide 11

The Tuzlov River basin GIS structure.

Slide 12

An example of the "Priority Measures" subject layer.

