

## INTEGRATED MANAGEMENT WATER SYSTEM IN THE BASIN "LADOGA LAKE—NEVA RIVER—NEVA BAY".

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The project is carried for the benefit of the authorities which control and regulate the activities in water system. The project is supported by the agreement of cooperation between St Petersburg and Holland (PSO program).

Economic activity in the water system "Ladoga-Neva-Neva Bay" is continually increasing, thanks to the intensification of the trade relations between Russia (St Petersburg) and Europe under the new economic conditions. But this growth is so quick that the management system of these activities is lagging behind.

The aim of the project is the implementation of the integrated water management system for the sustainable development and utilization of the Neva-Ladoga water system.

On the present phase of the project the scientific methodology for such system is likely to be developed, taking into account international knowledge and experience. The practical realization of this project falls into the task of authorities. For this purpose, beside the elaboration of the integrated management system concept, clear and tactful coordination between the russian interested organizations and practical support of the project implementation are needed, taking into account local experience and available technical means.

Some principles of the project activities organization are suggested and discussed in the present report.

Big experience in organization of such activities has been gained in St Petersburg in the framework of the interdisciplinary state ordered projects. The first projects to be mentioned are - "Forecasting and decision-making system for the rehabilitation of environmental situation in the water system "Ladoga-Neva-Neva Bay" ("Neva Bay" project) and "Elaboration of the integrated ecoinformation system of the big city (case-study: St Petersburg)". During the execution of these projects the cooperation of the leading scientists and experts from different institutions was organized on the basis of St Petersburg Scientific Center of Russian Academy of Sciences. The knowledge relevant to the implementation of the water management system "Ladoga-Neva-Neva Bay" was combined.

In particular, the main purpose of the "Neva Bay" project was creation of the constantly developing analytical software for the testing and forecasting the industrial activity in the region; and working out the structure, composition and methods of the monitoring system. The function of this system is based on the identification of the factors, which influence the quality of Ladoga lake, Neva river and Neva Bay waters; on public health safety under any of the possible natural conditions and permissible industrial development.

The following results of the projects were reached:

- elaboration of the expert-information system for the forecasting of environmental situation in Neva Bay basin;
- creation of the operational ecoinformation computer complex for the implementation of integrated water management system "Ladoga-Neva-Neva Bay".

The results of those projects are analyzed in this report in the context of the present project tasks.

The analysis of the concept scheme of the integrated water resources management is given, this scheme can be formed for the water system "Ladoga-Neva-Neva Bay". Considering the fact that many authorities and institutions contribute to this system, the key part of the integrated water management system becomes the network computer center (integrated water management computer center - ICC) which users would be all organizations with management functions in the water system "Ladoga-Neva-Neva Bay".

ICC should provide different users (directly or through distant terminal) by necessary documents and if requested - ask information from the monitoring stations belonging to authorities which manage activities in the water system "Ladoga-Neva-Neva Bay". In the emergency situations ICC (through computer conference) can support quick connection for the joint discussions and effective decision making.

ICC should provide the storage, distributed access, collection and analysis of the information on the current and future state of the water system "Ladoga-Neva-Neva Bay", it should be an instrument for the effective joint substantiation and control of the management decisions in three main tasks of "Ladoga-Neva-Neva Bay" water management system:

- strategic planning of the industrial activity, its environmental-economic assessment and making recommendations on legislation improvement;
- current management and dispatching of the industrial activity and its consequences;
- emergency response planning and management.

To reach the above mentioned tasks the following software on the network ICC would be installed, certified and prepared for the unified use:

1. Hydrodynamic models of the water system "Ladoga-Neva-Neva Bay" (including 3-dimensional hydrodynamic model which imitates the consequences of the industrial activity and forecasts the appropriate changes a) on the water surface; b) in the water depth; c) in the bottom sediments. Models to assess the economic efficiency and environmental risk of the projected and current industrial activity. Hydrobiological models to assess and forecast the environmental situation in the water system.

2. Distributed database and knowledge base with a network distant address access, which is agreed upon by the data owners.

3. The means of analysis, visualization and recording the management documents which are the kind of network management geoinformation system.

For the pilot testing of the integrated water management system of "Ladoga-Neva-Neva Bay" it would be practical to use as an instrument the integrated ecoinformation system of the big city.

This system is realized in the framework of the cooperation agreement V.Chernomyrdin-A.Gore as a basis for the modern environmental management

systems development and is installed in the Scientific-Research Center for Ecological Safety of Russian Academy of Sciences (SPb SRCES). It consists of superserver, network of high-capacity working stations and terminals, software - Arcinfo (full configuration) and Oracle, altogether it allows to solve above mentioned tasks on the high professional level.

Organization of the planning and the management of economic activities in "Ladoga-Neva-Neva Bay" system according to the environmental safety criteria can be shown on the example of the computer regional management prototype, worked out by the order of St Petersburg Administration (authors: V.V.Menshutkin, O.N.Makarov), the ideology of it is used in the integrated ecoinformation system for the big city. Besides, it includes 3-dimensional hydrodynamic model of Neva Bay and the Finnish Gulf (until the section Helsinki-Tallinn) which was worked out in the Institute of oceanology (author: I.A.Neelov) in the framework of "Neva Bay" federal project. Remote sensing data are analyzed together with the models in unified information environment. The modeling tasks of the sedimentation processes and the processes of the surface pollutants distribution, ice and snow dynamic are solved.

3-dimensional hydrodynamic model of Ladoga lake (author: L.A.Ruhovetz) can be operated here, along with expert-information system to forecast the environmental situations in "Ladoga-Neva-Neva Bay" system and other software which were created by the specialists from different St Petersburg institutions in the framework of the state-ordered projects.

Altogether it forms the continually renewed basis on the condition of the "Ladoga-Neva-Neva Bay" system.

Different relevant organizations with management functions (for example to from the database "Ladoga-Neva-Neva Bay") can work directly on the existing computer complex or on distance (by means of Internet, telephone, modem and radiomodem). Usual PC can serve as terminals during the work in this system.