HOW TO BRING SAFE DRINKING WATER TO EACH FAMILY?
RUSSIAN VISION AND FRAMEWORK FOR ACTIONS

In compliance with the Constitution of the Russian Federation, the Water Code and the Law for Drinking Water, citizens of the Russian Federation have the state guarantee of the priority provision with drinking water of standard quality for the drinking purposes, sanitation and health protection.

THE ISSUES AND TRENDS FORMED IN THE PAST

Russia is marked by quite high level of population water and sewerage supply (see Table 1.). Almost all cities and the most of urban-type communities are provided with centralized water supply and sewerage systems. However, the problem of centralized water supply and sewerage network arrangement still exists in rural area.

Domestic water use increased in 1.2 times in 1996 compared to 1980. The consumption growth falls on eighties conditioned by urban and especially rural water use improvement. The share of rural communities provided with centralized water supply has increased from 2% up to 23% during last 15 years. The progress is obvious. Although, about 16 mil. rural people are not rendered the centralized housing services. Rural communities usually use ground water supply (87% of the total water supply). Some areas use not local water (around 140 thousands m² a day).

In nineties, water use in domestic sector stabilized at 14 cubic km. a year going with population lowering at 500 thousands people (See Fig. 1). The average use per capita is equal to 270...
In 1997, the total water consumption totaled 14331 mil. cubic m. The recycling water share made up 6%. About 11030 mil. cubic m. of drinking water has been used for public supply, 1502 mil. cubic m. - for industrial needs, 109 mil. cubic m. - for irrigation. Water losses in water supply networks caused by pipes corrosion and wear were equal to 5 thousands cubic m.; more than 20% of losses are leaks in pipelines located inside block buildings and houses.

From the other side, water supply per capita is equal to 500 liters a day in some big cities and agglomerations. Such high consumption is conditioned by wasteful water use, considerable losses during transportation and drinking quality water use by industry. About 40% of drinking quality water are used by the industrial sector.

About 25% of water losses during transportation are caused by water-pipelines wear and outdated valves. Recyclable water use makes only about 6.2%.

Outdated water supply networks and enormous volumes of water losses in distribution system, «symbolic» water charges and lack of consumer water-meters resulting wasteful domestic water use. Minds of Russian people grown up in the country reach with water resources have never been engaged with thoughts of water saving necessity.

Surface water is the main sources of drinking water supply (about 68% of domestic withdrawal). About 90% of surface and 30% ground water withdrawn are specially treated, but due to increased water pollution, with new kinds of pollutants as well (heavy metals, pesticides, halogen-containing compounds, phenols and formaldehydes), the applied technologies of water treatment are not sufficient. Besides, wear of pipelines cause deterioration of drinking water quality supplied to the users (the water is contaminated in the pipelines).

Drinking water quality is turning out to be a key issue. About 50% of Russia’s population use bad quality drinking water. In a result, there are a growing number of chronic diseases and water-born diseases as well.

**Opportunities of various regions to improve the drinking water quality are different.** Local budget funds in agglomerations and business centers allow keeping the situation under control, preventing epidemics, however their opportunities are not enough for safe drinking water supply. Anyway, big cities are more or less capable to finance water supply plants and modernization of
distribution networks. Budgets of small towns and villages are not able to allocate funds even for purchase of necessary disinfectants and other reagents for drinking water treatment. Inadequate capacities of chlorine dosing systems cause penetration of surplus quantity of chlorine into the drinking water. Thus drinking water may contain chlorinating minor products impacting on health.

**Water-Related Diseases**

Microbiological and chemical pollution of the drinking water may cause various diseases. Microbiological agents are the cause of a number of acute and chronic diseases (see Table 2.). Although, it is difficult to determine the ration of infection diseases related to contaminated drinking water or infected food consumption. More than 1 mil. of intestinal infections, more than 100 cases of dysentery, salmonella, typhoid and virus hepatitis A type are registered every year.

| Table 2. Number of Cases of Infection diseases (th. people) |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Intestinal infections | 1313.0         | 1730.0         | 936.3          | 1104.6         | 789.4          | 687.8          | 746.8          | 770.6          | 668.0          | 638.8          |
| Typhoid          | 8.2            | 5.9            | 3.6            | 2.6            | 0.9            | 0.5            | 0.9            | 0.5            | 0.4            | 0.4            |
| Salmonella       | 22.5           | 36.0           | 58.9           | 35.1           | 104.2          | 118.6          | 101.2          | 103.1          | 86.0           | 65.3           |
| Diphtheria       | 0.6            | 0.1            | 0.2            | 1.2            | 1.2            | 3.8            | 15.2           | 39.7           | 35.6           | 13.7           |
| Hepatitis        | 154            | 258.9          | 353            | 324.7          | 335.4          | 202.0          | 198.4          | 209.0          | 247.5          | 197.0          |

References: State Committee for Statistics of the Russian Federation

About 100 of collective cases of water-based intestinal infections are marked annually. During 1993-1997 period, 30 thousands people suffered during the intestinal infections outbreaks.

Infections caused by contaminated water (dysentery, typhoid and virus hepatitis A type) have been gradually decreasing during 1995-1998. However, the regions with high level of surface water microbial pollution (the northern regions of Russia, the Northern Osetia, Sakhalin oblast, Tiva Republic) are marked with significant prevalence of intestinal diseases, if compared to the average rate throughout the country.

Infection diseases in Russia are monitored quite well, but things are running not so hopeful if to speak of diagnostics of lambiosus and cryptosporidiosis. Annually, more than 120 thousands people are infected by lambiosus, and what’s more most of the infected are children under 14 (75%) and the level of labiosus infectioning is rather stable. Besides way, no one can be sure that these data reflects factual trends of this disease.

Diagnostics of other parasite decease cryptosporidiosis is very poorly developed in Russia. This disease progresses like gastroenteritis. Cryptospondidium bacteria are not monitored in the surroundings and cryptosporidiosis infectioning rate is not processed statistically.
The state sanitary and epidemiological surveillance service is not capable to collect and process data on drinking water quality and detect pollutants efficiently due to a lack of funding and technology available. The especially hazardous pollutants may be contained in drinking water are carcinogenic chlorine organic substances and heavy metals. Increasing pollution of drinking water with carcinogenic chlorine organic substances containing in is caused both by surface water sources contamination with chlorine containing wastewater coming from paper and pulp factories, ferrous metallurgy and chemical enterprises; and by gaps of drinking water chlorinating system in water treatment plants. All this leads to the destruction of the people reproductive health and development of some forms of malignant neoplasm.

Drinking water in many Russian regions is characterized with naturally increased content of iron and fluoride. Prolong consumption of drinking water containing more than 1.0 mg of iron may cause dryness, peeling and irritation of skin; prolong fluoride containing drinking water consumption may cause teeth diseases and other affections of motor-supporting organs (fluorosis). In soviet times, cities were provided with special installations for water deprivation of iron and fluorine, but due to a lack of fund they practically do not operate.

High content of chlorides and sulfates (5 maximum allowable limits) in drinking water causes increased sick rate of gallstone and urine-stone diseases, heart problems.

The dramatic area is the northwest of Russia typical for surface water containing big amount of natural organic substances. In waterworks, such water is treated with chlorine; this process is followed by formation of carcinogenic trigalomethanes, which may cause malignant neoplasm. Increased content of chlorine organic substances impact on reproductive health, spontaneous abortions growth in particular. American researchers admit possibility of chlorine organic substances to cause urinary bladder and thick column cancer, however there are no proofs for the present.

The other actual danger for health is penetration of pollutants to water supply systems. At the end of 90s, more than 40% of operational water supply and sewerage systems are outdated and require replacing. The large pipe breaks, shutting off and accidents in the water distribution and sewerage pipelines take place resulting not only water losses and stoppage in water supply, but also danger for people health\(^1\).

Rural area mostly suffers from drinking water contamination with agricultural toxic chemicals. Store houses of agricultural companies keep rather toxic chemicals which can penetrate

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\(^1\) For example, in Yaroslavl oblast, about 2 thousands emergency situations in water distribution networks are marked annually. The latest years are known for large-scale accidents causing drinking water contamination with phenols in Ufa and Khotkovo town (Moscow oblast). High content of dioxins is detected in drinking water in Chelyabinsk.
to the water supply source in case of unsatisfactory storage conditions (river banks erosion as it happened in Siberia). The strict control over such especially hazardous sites is required.

Lack of funds for water supply and sewerage networks rehabilitation, as well as surface and ground water contamination caused by technogenic disasters result in worse provision with drinking water and deterioration of its quality. Large-scale accidents cause surface and groundwater sources contamination. The most unfavorable are the regions including chlorine chemistry industrial enterprises – the cities of Dzerzhinsk, Chapaevsk, Volgograd, Usolie-Sibirsky, Ufa, Sterlitamak, Kirovochepetsk, etc, besides, such kind of enterprises in these cities use mercury as well\(^2\).

**Wastewater**

Domestic sewage made 52% of total polluted water discharges in 1997. Wastewater treatment capacity is 56.1 mil. m\(^3\) per day. About 18.4 mil. m\(^3\) of discharges go through sewerage systems annually, 79.8% of which are treated. About 33% of discharges meet the established standards. About 60% of sewerage capacities are overloaded, 38% of sewerage facilities are being exploited during 25-30 years and require reconstruction. Approximately 9 mil. m\(^3\) per day of additional capacities are required. Besides, 14% of cities, 35% of urban-type communities and 146 thousands rural communities are not provided with the centralized sewerage system.

Around 70% of industrial enterprises discharge wastewater (not primary treated as a rule) into municipal sewerage system. Industrial wastewater contains heavy metals, toxic pollutants. Industrial discharges make it impossible to use sewerage sludge in agriculture and to utilize it. Wastewater gives about 80% of sludge annually, only 3% of produced sludge is treated.

**Urbanized Territories**

Drinking water quality is the sharpest problem in the urbanized territories. Notwithstanding all cities are provided with centralized water supply system, the problem’s complexity relates increased pollution of water sources (with heavy metals salts in particular), aggravating condition of water supply and sewerage networks. In a number of regions (Kemerovo, Vladivostok agglomerations) the water consumption per capita is 30% lower than among the country, due to limited capacities of waterworks.

Floods are one of the most widespread environmental risks in Russia. About 70% of 1092 Russian cities were flooded. Flooding results increase of seismic vulnerability, ground water contamination with heavy metals, oil products, chlorides, sulfur compounds, radio-nuclides. Technogenic flooding is dangerous for it's hidden nature, flooding development provokes landslides emergencies.

\(^2\) For instance, accidental discharge of mercury containing wastewater in Volgograd caused mercury content in bottom sediments along hundreds of kilometers of Volga flow up to its delta, where the sturgeons were also contaminated. This contamination consequences are
Water And Recreational Areas.

Russia is reached by the areas attractive for the organizing recreation services. The Central and the Northern Caucasus economic areas of Russia have high recreational potential. Natural areas attractive for recreation are situated in Kirovskaya, Saratovskaya, Krasnodarskaya, Rostovskaya, Moscow and Saint Petersburg agglomerations. New recreation zones are being created in Toulskaya, Samarskaya, Yaroslavskaya, Kostromskaya, and Vladimirskaya oblasts. However, the trend for Russia’s surface water pollution, including small rivers and lakes, downs the attractiveness of the recreation zones.

Therefore, key challenges Russia faced on the threshold of new millenium:

- Growing drinking water scarcity in some regions;
- Drinking water quality worsening followed by infection and chronic diseases arising;
- Inefficient domestic water use;
- Drinking water use in industry and for irrigation purposes;
- Growing amount of drinking water losses during transportation and in the result of facilities wear;
- Increasing number of emergencies in water supply and sewerage networks;
- Outdated water supply networks and pollutants penetration;
- Rapid growth of surface and ground water supply sources contamination;
- Lack of drinking water sources sanitary zones protection;
- Inadequate services charging;
- Values system and ethics presuming wasteful and irresponsible water use.

RUSSIAN VISION: WATER FOR PEOPLE

The Objectives:

⇒ By 2025, every human being will have guaranteed equitable access to save and sufficient water resources meet their needs and rights, in ways that ensure the maintenance of the integrity of freshwater ecosystem;
⇒ Drinking water supply in radioactive contamination zones;
⇒ Availability of emergency water supply;
⇒ By 2010, to provide effective water use at household and decrease water consumption from 260 liters per capita a day (1999) to 200 liters per capita a day;
⇒ By 2010, to provide better access of rural population to save drinking water: to increase water consumption from 93 liter per capita a day to 127 liters per capita a day;
⇒ The improvement of drinking water quality in urban and in rural areas;

Vision gives us hope that Russian population, each citizen of the country will be supplied with good quality of drinking water being safe for health, and adequate sanitation. Water-born diseases are gradually disappearing.

The potable water supply is raised to the national policy priorities. Standards of drinking water quality are legally regulated. Political institutions have learned to cooperate and elaborated coordinated actions. Policy accountability and transparency, as well as all stakeholders and local communities’ involvement into decision-making and management have become a norm of life. New political culture and ethics, new management system have become a basis for effective water use.

Considerable part of raising problems is tackled at the local level by local communities working in close cooperation with local authorities and NGOs. This partnership allows avoiding conflicts and effective tackling the problems, applying traditional experience and integrating it with advanced knowledge and technologies.

Having changed their ideology, women bring up new generation from the point of view of efficient and proper water use. Ideology of wastefulness has been replaced by ideology of economy and responsibility.

Population shall pay full cost of water supply and sewerage services but flexible tariffs allow protecting people with low incomes. Population has free access to any information concerning water quality and the way it is distributed. Internet and NGOs play a special role in this respect. The population is consulted by means of Internet, as well as by consulting organizations set up as initiative of NGOs.

NGOs of various regions of Russia are joined into network and cooperate with particular organizations of other countries and apply the obtained knowledge and experience in Russia.

Private sector has considerably increased the investments into water supply and sewerage services, but its activity is subordinated to the Government and water users. Partnership between private and public sector, private sector and water users make it possible to improve services and simultaneously secure families with low incomes.

**FRAMEWORK FOR ACTIONS**

The potable water supply is raised to the national policy priorities. The Law for Drinking Water has been adopted; and the federal program for the improvement of drinking water supply and water quality as well has been elaborated. However the issue is too complicated and requires support and
incentives not only at the regional and federal levels. This is a problem of values and ethic norm change, thus the local actions elaboration is put into the foreground.

Creation Of Environmentally Educated And Responsible Community At The Local Level.

Raising of responsibility of local communities and population, environmentally educated and responsible society are the strategic direction in terms of better drinking water supply, improvement of its quality and saving actions. It is one of the most complicated tasks in Russia. Though Russia has no problems regarding illiteracy and its population is highly educated, Russian mentality doesn’t concern issues of water saving and responsible water use. The local communities have also lost traditions of jointly agreed decisions making. Besides, the population is not informed on their rights and the way of rights application. Thus, the immediate task is local leaders and population training.

The training system should focus on the environmental culture raising, population rights, management issues, as well as items regarding the best world experience and possible ways of local communities contribution to water management and local water-related problems solution. Local authorities need to be trained in terms of services rendering and water sector management.

Local authorities should be accountable to local communities. In addition, local authorities should be in dialog with population on how to tackle the problems available. Such kind of dialogs promotes the outlining of problems tackling ways, tacking into account various interests, possibly making compromises, conflicts settlement and social instability and will finally develop into the partnership. This allows applying traditional experience and knowledge and combines them with the advanced knowledge and technologies and obtaining the best results.

A very significant problem of Russia is the wasteful domestic water use. Russia doesn’t encounter problems related to women participation in management bodies or women’s salary discrimination, but women are exactly those who waste domestic water. This issue can not be addressed without economic tools application. But the economic tolls should go with women’s altitude to water changes. This problem is likely to be solved by Women Movement, Environmental Movement, through mass media. The principle significance of this issue lays in the fact that women

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<td>- local leaders and population training;</td>
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<td>- partnership between local communities and authorities;</td>
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<td>- setting up of retraining and educational courses for local authorities;</td>
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<td>- training of population on careful water handling;</td>
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<td>- educational system for women in terms of their rights and responsibility;</td>
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<td>- local communities support in decision making process at the local level;</td>
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<td>- accountability of local authorities to local communities;</td>
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<td>- involvement of local communities into the decision making;</td>
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<td>- precise determination of local communities role and responsibilities during decision making at the local level;</td>
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<td>- application of traditional experience supplementing it with advanced knowledge;</td>
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<td>- participation of small ethnic communities in the decision making, application of their experience and preservation of indigenous surrounding.</td>
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should not only change their philosophy concerning water, but also grow up a new generation with the understanding of water resources safety importance.

Children in Russia are taught hygienic norms from the cradle; this doesn’t regard water-related issue unfortunately. Problem of careful water handling is not concerned either in schools or at home.

Improving Institutions And Collaboration
Management and institutional upgrading is a key issue and a pledge of success.

Two immediate steps should be made on the way of drinking water saving and responsible use: installation of water-meters for each family and pricing policy changing. In present, each family pays not for used water volumes but for established norms per each family member. This situation can not stimulate domestic water saving. Besides, water charges are still minor both for rich people and for the middle class.

Pricing policy should be changed towards gradual increasing of charges until they cover all capital, operational, maintenance and environmental costs. In this case, population with low incomes should be protected by means of subsidies or structured tariffs.

Water fees should proceed from its quality. Increasing of charges for nonportable and hazardous for health water can cause social instability. Water fees increase should coexist with transition to new standards. Many users are ready to pay for better quality water.

Consulting of water users is necessary measure. Consultations provided can contain information of drinking water standards, tariffs, and water companies incomes. This is expected to prevent social instability during transition to new water fees.

Sewerage system in Russia requires considerable investments. Involvement of the private sector investments is practically an only option to improve sewerage services. Two issues should be taken into consideration in this context: (1) legally supported state regulating; (2) transparency and accountability of private sector policy before the water users. Legislative and regulative base for private companies' interaction with the state and water users, provisioning rights and obligations of all parties, should be elaborated.
Drinking water supply priority should be legally fixed. This is particularly important for water-stressed regions.

Law-Making And Enforcement Tools

Democratization and decentralization, private sector development, transition to the marked-based economy requires the elaboration of the adequate regulative and legislative framework.

The Water Code of the Russian Federation and the Drinking Water Law are one of the first water-related legislative documents in Russia. The Drinking Water Law regulates relations in the field of drinking water supply and envisages guarantees for water supply in the compliance with the fixed quality standards, in emergency situations as well. The Law foresees the drinking water standards occasional revision, protection of drinking water sources, reduction of drinking water use in industrial sector, liability of water supply companies for damage caused to health by bad quality water provision, priority use of ground water for drinking purposes. The accountable and chargeable drinking water supply is legally considered as the major principles. The above mentioned documents are fundamental documents constituting a minimum of legislative and regulative base for water sector management.

The following regulations should be adopted urgently due to improve management and drinking water quality: The Sanitary Rules and Norms for the Ground Water Contamination Prevention; Methodological Documents Concerning Recreational Water Use; Methodology of Health Risk Assessment in Terms of Nonportable Water Consumption.

The Federal Program For Drinking Water Supply

Federal Program for Drinking Water Supply has been elaborated in order to address the very significant problem in Russia. This program envisages a set of actions for rural and urban population provision with safe drinking water, including:

- Construction and rehabilitation of water supply networks, water treatment plants;
- Improvement of sanitary protection zones conditions;
- Construction and rehabilitation of new drinking water reservoirs with total area of 2.9 cubic km.;
- Protection and rehabilitation of water basins-sources of drinking water;
- Introduction of new technologies for physical-chemical and biological water treatment, including application of membrane technologies, technologies of ozoning and coal filters sorbtion;
Wider use of ground water for drinking purposes and elaboration legislative framework directed to ground water exhaustion and contamination prevention;

Elaboration actions for ground drinking water supply for population in emergency cases;

Potable water supply in radioactive contamination zones;

Upgrading of water treatment facilities.

Taking into account the priority of ground water use for drinking purposes, it is expediently: to make the inventory; to form database; to obtain information concerning environmental, sanitary and hygienic parameters; to upgrade water intake wells, pumping equipment, control and measurement devices design.

The actions laid down in the Program are to be implemented in several steps, according to economic resources available and the priority of particular issue. Reconstruction and technical renovation of water treatment plants is expected to begin in water stressed regions, like republics of Dagestan, Kalmikiya, Karelia, Ingoushetiya, Karchaevo-Cherkessia, Altay kray and some other.

The actions elaborated for rural water supply upgrading envisage water use volumes increase up to 127 liter per capita a day by 2010.

It is planned to begin preferential construction of the centralized water supply systems in Bashkortostan, Kabardino-Balkaria and Karachaevo-Cherkessia republics, in Altay, Krasnodar, Stavropol krays, in Astrakhan, Volgograd, Kourgan, Leningrad, Rostov, Ryazan and Saratov oblasts. Rural areas, which are proposed to the centralized water supply systems construction, will also be provided with sewerage systems equipped with adequate treatment facilities.

The Program implementation will allow considerable improving drinking water supply in cities and rural areas, as well as upgrading drinking water quality.

Drinking Water And Natural Disasters And Conflicts

Drinking water supply sources can be put out of operation in the result of natural and technogenic disasters, as well as acts of terrorism. Thus, population protection from natural and technogenic emergencies is an immediate task of the state.

In present, activity on accidents and disasters effects elimination should be accompanied by activities on risk minimization and natural and technogenic emergencies consequences mitigation. Management of risk minimization and natural and technogenic emergencies consequences mitigation is based on automated information-managerial system developed by the Ministry for Emergency Situations. A strategic direction of the further
evolvement of this system is novel information technology application, monitoring system development, ensuring of forecasting reliability.

The Drinking Water Law legally guarantees drinking water supply in emergency conditions. The Federal Program for Drinking Water Supply in Russia envisions implementation of actions for emergency water supply from ground water sources. This is primary concern big cities and particular regions supplied from surface water sources. Thus, a basis for legal and regulative protection of population in emergency situations is formed.

ON THE PLACE OF CONCLUSIONS

The Russian Water Vision and the Framework for Actions gives us a hope that it will come time when Russian population, each citizen of the country will be supplied with good quality of drinking water being safe for health, and adequate sanitation

A key objective of Russian Water Vision is the issue’s concern and awareness of all stakeholders, NGOs, local communities, authorities and population with the increasing water crisis; investigation of potential ways of crisis development and actions to be taken in favor of sustainable development ensuring.

Russian Water Vision is a practical picture of future we see to create. This document is devoted to authorities, NGO, local communities and population. This is a tool for decision-makers and professionals providing a set of practical steps to ensure water sector sustainable development. This also is a Manual for local communities and population making it possible to initiate actions and movement for improving conditions and changing trends.

Russian Water Vision is an agenda for everybody and is likely to be a trigger for Blue Water Movement in the new millenium.

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