Report

Implementation of the Technical Solutions
of Drinking Water Problems, Carried Out
Ukrainian Environmental NGO MAMA-86
In the Framework of the Pilot Projects Program
Within the Campaign “Dinking Water in Ukraine”
2001-2003

Funded by Novib-Oxfam, The Netherlands

Kyiv 2004

Report on implementation of the Pilot Projects Program on technical solutions of drinking water problems carried out by Ukrainian national environmental NGO MAMA-86 in the framework of "Drinking Water in Ukraine" campaign, 2001-2003

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Content

From the Authors

This Report represents the experience of implementation of the 11 pilot projects on technical solutions carried by the Ukrainian National Environmental NGO MAMA-86 throughout 2001-2003 under financial support of the Novib-Oxfam, The Netherlands, in the framework of "Drinking Water in Ukraine" campaign. We express our sincere gratitude to the Novib-Oxfam Fund for the given support in solving the problems of improving the Ukrainian citizens' access to safe drinking water and development of the public initiatives for democracy building in our country.

The idea of the Technical solutions Project, as well as of all the Campaign "Drinking Water in Ukraine" belongs to Anna Golubovska-Onisimova, President of MAMA-86. Preparation of the Project proposals became possible due to the consultancies and training, which were carried out by the Aquanet experts from the Netherlands for the water campaign participants in March-May 2000. The pilot projects were being developed by the regional organizations of MAMA-86 based on studies of the local problems and analysis of their own experience within the Water Campaign. The MAMA-86 Kyiv office carried out coordination work at the stages of Project proposal design and implementation.

The main goal of this publication is to present a practical experience of non-governmental organization participation in solving of the drinking water problems at local level.

The Pilot Projects were being carried out in three directions:

- efficient water consumption: water meters installation and improvement of the water consumption culture;
- drinking water in rural area;
- alternative solutions of the drinking water problems.

Analysis of each of the 11 projects is given according to the scheme: problem description, project implementation scheme and findings, conclusions and recommendations. The case studies contain data on cost of the proposed solution and actual results of pilots implementation. At the same time social effects of implementation of this program have been analyzed.

We hope that the presented knowledge and expertise will help those, who are involved in solving the drinking water problems, first of all, representatives of public organizations, local authorities and water utility/businesses, as well as other stakeholders, dealing with improvement of citizens' access to safe drinking water.

Access to Safe Drinking Water: Millennium Development Goals and Situation in Ukraine

By the end of the XX century the world community became aware that the issue of provision of the mankind with safe drinking water and sanitation is one of the urgent problems of the society development. To attract attention to solving thereof, the UN declared The International Decade of Water Supply and Sanitation (1981-1990). As a result, throughout 1990-s the sphere of water supply and sanitation considerably expanded. Particularly, according to expert assessment, in 2000 year access to water supply was provided to 620 million more persons, and to sanitation — to 453 million more than in 1990. However, this was not sufficient. According to experts' forecast, by 2030 60% of the Globe population will reside in urban areas, what can cause burst of diseases related to the lack of water supply and sanitation.

In 2000 WHO, UNICEF, WSSCC (Water Supply and Sanitation Collaborative Council) published the Report: "Global Evaluation of Water Supply and Sanitation in 2000". The Report says that out of six billion people, who currently live on the planet Earth, 1.1 billion have no access to safe drinking water, and over 2.4 billion people — to sanitation. Due to this, every year about 250 million people, mostly women and children suffer from diseases caused by low quality water supply and lack of sanitation, and over 3 million people die thereof. Intestinal infections alone take lives of more than two million children in the developing countries annually.

In 2000 the United Nations Millennium Declaration was adopted at the UN General Assembly meeting, which set the Millennium Development Goals (MDGs) approved by 189 UN member countries including Ukraine. The MDGs envisage: poverty eradication, achievement of the most complete coverage of children with primary education, promotion of gender equality, reducing child and maternal mortality, prevention of diseases and promotion of practice of using counter-septic, improvement of the environment, and development of international partnership.

At Johannesburg World Summit in 2002 leaders of the states and governments again agreed to commit themselves to achieve the established target in solving problems of provision of the Planet population with drinking water and sanitation:

to halve the proportion of people without access to clean water and basic sanitation — safe disposal of human activity waste — by 2015.

The fact, that the drinking water and sanitation problems are of the global priority, is confirmed by the decision of the UN Commission on Sustainable Development (CSD) on declaring 2004-2005 the years of solving the water supply and sanitation problems in the world and declaring 2005-2015 the decade of the practical measures on implementation of these decisions. The 12th Session of the CSD (CSD-12) will be held in New York from 18-30 April 2004, which will be entirely dedicated to review the issues of water, sanitation and human settlements in the world, as well as to identify the priorities and ways to solve the related problems.

On 15-16 January 2004 the UN Economic Commission for Europe (UNECE) discussed the situation in the respective region with water, sanitation and human settlements during the last Regional Forum on carrying out sustainable development measures. The Forum has declared that at present every seventh European citizen (or 120 million people) has no access to safe drinking water and adequate sanitation. These problems are especially urgent for the East European, Caucasus and Central Asia countries (former Soviet Republics).

Considering the existing situation with water supply and sanitation in Ukraine, it should be mentioned, that in the soviet time considerable costs were invested in construction of the water sector infrastructure primarily in big cities and industrial regions of the country. The Soviet State paid much attention to solving of this social problem. The water supply and sanitation sector was about 100%

donated by the state, what had its advantages and disadvantages. Due to extensive capital construction in 1960-1970s, the drinking water provision of the former Ukrainian Soviet Republic population improved substantially. Based on the official statistics, it was regarded that the urban population was supplied with water almost by 100%. Such opinion continued to exist till late 1990s. Thus, according to the information of the joint survey of UNICEF and the State Statistics Committee (Derzhkomstat) of Ukraine carried out in 1999, 97.7% of the Country citizens had permanent access to safe drinking water; particularly 93.7% of in rural area and 100% in urban settlements (see Table 1).

Table 1. *Provision of population with the services of centralized water supply and sewerage, as of 2000*

Settlement	Number	Provision of water supply services Number of settlements (%)	Provision of sewerage services Number of settlements (%)
Cities	448	448 (100%)	426 (95%)
Urban settlements	921	796 (86,4%)	518 (58%)
Villages	28,900	6,650 (23%)	841 (2.9%)

However, the analysis of the current situation in Ukraine shows another picture in this respect. According to the calculated data (COWI Report 2002), total provision of centralized water supply services is estimated at the level of 65% (see Table 2), while for urban population this index is 83%. It is assumed, that about 4.1 million rural inhabitants receive centralized water supply services.

Table 2. *Provision of population with the services of centralized water supply and sewerage in different settlements at the end of 2000*

Settlement Thousands of residents	Population		Provision of services (%)		Water resources (%)	
	Mln. people	%	Water supply	Sewerage	Ground	Surface
Cities>500	10.2	21	93	91	12	88
Cities100-500	9.5	19	86	74	34	66
Cities 20-100	13.9	28	75	55	53	47
Rural settlements less than 20 thousand	15.7	32	26	9	55	45
Total:	49.3	100	65	53	25	75

Moreover, during the years of independence the state distanced from solving problems of water sector, having transferred it to the local authorities and water supply companies, thus leaving this industry without state budget support. There is hope, that ultimately from 2004 the envisaged budget funds will be received for solving the water sector problems, first of all for improving the technical conditions of the water supply and sanitation sector.

Even though the percentage of centralized water supply is high, this indicator does not correspond to the level of population's access to safe drinking water.

Quality of drinking water and water supply services remain low due to different factors: water supply sources contamination, out-of-date and inefficient technologies of water treatment, considerable wear and tear of water pipelines and sewerage networks. In 2000, according to official information, from 11.6% to 15.3% of the studied water samples (depending on subordination status of the water supply systems) did not meet the norms of GOST 2874-82 "Drinking Water. Hygienic Requirements and Quality

Technical condition of centralized water supply systems in Ukraine: from COWI report 2002

In 2000 total volume of water intake in Ukraine for centralized water supply was 5.3 milliard cubic meters, where 0.4 milliard cubic meters are used for water supply in rural areas. 25-40% of pumping equipment of all first level pumping stations (water intake pumps) (an equivalent of 8-13 million cubic meters/per day) need to be renovated.

The stations of ground and surface water treatment were built according to standard projects, and often fail to deal with a quality of initial water. In addition, seasonal fluctuations of surface water quality result in the failure to observe the water quality requirements.

A considerable part of ground water is not treated and does not meet the water quality standards.

It is estimated that about 40% of available treatment capacities (6 million cubic meters/day), need to be renovated or modernized to meet the water quality requirements.

Total number of the second level pumping stations is 2000-3000 where over 10,000 pumps are employed. 30-40% of these stations (which is equivalent to 8-10 million cubic meters/day) need to be replaced, including most of electrical equipment.

Total length of centralized water supply lines is about 180,000 km. Out of them 110,000 km are used for water supply of cities. About 40,000 km of water supply lines (30,000 km in urban areas and 10,000 km in rural areas) need to be replaced.

As a rule, the annual number of accidents in water supply lines is 1-4 accidents per 1 km which exceeds 5-40 times similar indicators in Western Europe.

Water losses in urban water supply lines are very high: 10-70 cubic meters/km/day versus similar indicators in Western Europe — 2-10 cubic meter/km/day. Water loss in distribution network is within the limits of 30-50% or more of the total volume of water supply into the network though, according to official data, the water loss (including the process water consumption) is just 25%.

Control" in terms of their sanitary and chemical properties, and 4.4-7.6% of the samples [1] — in terms of their bacteriological properties. Even for those settlements, where the problem of 24-hour access of inhabitants to drinking water can be regarded solved, the quality problem remains urgent.

The problem of drinking water safety becomes extremely urgent in small towns, where, due to considerable deterioration of water pipelines and sewerages, frequent accidents happen resulting in infiltration from sewerage system into water pipelines, and increasing the risk of infectious diseases (A viral hepatitis, intestinal infections, etc.). Thus, in summer of 2003 in the town of Sukhodolsk, Luhansk oblast, drinking water was contaminated due to a sewerage accident and ingress of waste water in the municipal water pipeline system. As a result, throughout June — August 767 town residents including 242 children were taken to hospitals. The diagnosis — "A viral hepatitis" — was confirmed in 725 cases.

The quality of services is low also due to water supply interruptions. On average, uninterrupted water supply in Ukraine is 17 hours per 24 hours. Often, water supply is scheduled: by several hours in the morning and evening. The consumption norm in Ukraine averages at 8.1 m^3 per person per month or 270 l per person per 24 hours. The percentage of population having continuous water supply is 43.7% [2].

According to the statistic data, in 2000 about 17.3 million Ukrainian citizens did not have centralized water supply, among them considerable number in small (20-100 thousand of residents) towns — 4.63 million, and in the rural area — 4.08 million. This part of the Country's population uses water from decentralized water supply sources — wells, captations and open springs. The main problem of such sources is quality of water, which often does not meet the existing standards. In the recent years, problems of nitrate, bacteriological, oil, pesticide contamination of water in rural areas became especially urgent. However, people use such water without any treatment, what results in break outs of infectious diseases and chemical poisoning.

1 The National Report on Environmental Situation in Ukraine in 1999. Kyiv, Rayevski Publishing House, 2000, P. 24.

2 Statistical information about reforms in the water supply and sanitation sector in NIS for 2001, prepared in the framework of the Regulation on Consumer Rights Protection and Public Involvement in the NIS Water Sector Reforming, Materials of the 2nd Meeting of the Top Officials Responsible for the Water Sector Reform in the NIS, 2-3 December, 2002, Paris.

In Ukraine there are settlements, where the residents continuously or temporarily (in some seasons) use water brought from other areas by water carriers. According to the information of local authorities [3], in 13 oblasts of Ukraine and Autonomous Republic of Crimea there are 1,228 rural settlements (814 thousand residents), who partially or permanently use transported water of poor quality; almost half of them do this permanently (383 thousand residents from 737 settlements).

Thus, improvement of the citizens' access to safe drinking water is one of the most urgent problems for Ukraine. It requires attention and active measures at all the power levels. Supporting the global plans and efforts focused on implementation of the Millennium Goals to ensure the population of the Planet with decent living conditions, and, particularly, with regard to water supply and sanitation, at present the Government of Ukraine has to determine the means to ensure the right of Ukrainian citizens to use safe drinking water. The task is complicated and requires consolidation of efforts and involvement of all respective sectors of our society.

3 The Complex Program of Priority Provision of the Rural Settlements Using Transported Water with Centralized Water Supply in 2001-2005 and Forecast till 2010.

Campaign "Drinking Water in Ukraine"MAMA-86

The idea of establishing the Project "Drinking Water in Ukraine" created in 1997 during the discussion of environmental problems by women-leaders of nongovernmental organizations (NGOs). At that time 4 organizations from Kyiv, Odessa, Artemivsk and Tatarbunary decided to consolidate their efforts to solve the local drinking water problems, understanding the necessity of public awareness raising on the existing water problems and their connection with health, as well as on possible and accessible ways of solving thereof.

Since the campaign foundation, its activities were focused on improvement of Ukrainian citizens' access to safe drinking water. The water project was started in fall 1997 with studies of the local drinking water problems, public awareness thereof and drawing the authorities attention thereto. The knowledge was accumulating along with acquiring the experience, and the understanding came of the necessity of practical actions to solve existed local water problems. In May 1999 the first pilot project MAMA-86 started operating in the town of Tatarbunary, Odessa oblast, where an additional water purification device was installed to provide a kindergarten with clean drinking water. The second pilot on the rehabilitation of water supply, heating and sewerage systems of the Sevastopol City Infectious Deceases Hospital was implemented in 1999-2000 by MAMA-86 and Youth Ecological Organization (YEO) "Gaya" under the auspices by the Novib, the Netherlands.

The MAMA-86's "Drinking Water in Ukraine" Campaign is focused on fulfilment of the following *short-term tasks:*

- analysis of drinking water quality;
- studies of public opinion about the water problems in Ukraine;
- gathering and dissemination information about the water problems;
- facilitation of the multi-sector discussions and cooperation between stakeholders;
- exchange of the existing positive practices in water supply;
- holding public hearings concerning the drinking water problems;
- implementation of the pilot projects on technical solutions;
- use of international events for highlighting the situation in Ukraine and facilitating participation, consultancies and partnership development;

and attaining *the long-term objectives:*

- public awareness raising on water, sanitation and hygiene problems; ecological rights and principles of sustainable water resources management;
- participation in the decision taking process (planning, budgeting and implementation of measures) on the drinking water problems at local, national and international levels;
- promotion of the ideas of integrated water resources management (IWRM), lobbying the IWRM development and implementation in our country.

Since 1997 the Campaign "Drinking Water in Ukraine" has been developing structurally and expands the territory of its activities. At present already 11 local organizations (in Kyiv, Artemivsk, Odessa, Tatarbunary, Sevastopol, Mariupol, Kharkiv, Yaremche, Nizhyn, Poltava, Mykolaiv and Feodosia) are involved in the water campaign.

The Campaign develops in the following three directions:

- informational and educational activities;
- implementation of pilot projects;
- involvement of broad public in the decision making process on the drinking water problems at local, national and international levels.

The scheme of the local water project development was the same in all regions — studying local situation: gathering information and analysis data on the drinking water problems, official data analysis, carrying out the public opinion polls and independent analysis of the drinking water quality. The collected

information formed the basis of the MAMA-86's publications for different target groups. Public informing and education were and remain the main direction of the campaign activities. During the last three years MAMA-86 has been conducting informational actions the on World Water Day dedicated and carrying out educational work among schoolchildren.

We involve experts (scientists, lawyers, engineers, medics, economists and producers), as well as volunteers in these activities. Regional NGOs acting in the framework of Drinking Water Campaign managed to attract attention of the citizens and power representatives to the problems of drinking water both in urban and rural areas. In all towns and cities where MAMA-86 Water Campaign takes place, there is a progress in solving the water supply problems. Thus, pilot projects were implemented, which are currently operating supported by the local communities and authorities. We cooperate with and involve representatives of all parties concerned in the discussions of water problems, highlighting the consumer interests and asserting the citizens' rights to safe environment and drinking water.

Pilot Concepts Program

In 2001 MAMA-86 started implementing the ***Technical Solutions Program to improve citizens' access to clean drinking water in urban and rural areas of Ukraine***. The Dutch Novib-Oxfam Fund provided financial support of this ambitious Program implementation. The Program is scheduled for the period from April 2001 to April 2004 and contains 11 pilots implemented in different areas of Ukraine and focused on the technical solutions of the local drinking water problems.

It should be mentioned that the pilot program was developed based on the experience and knowledge accumulated in the framework of the Water Campaign in the previous years. Just due to this work the local drinking water problems were studied, prioritized and select for solution.

Joint project of MAMA-86 and Aquanet, a joint venture of Netherlands water supply companies, water boards and the Netherlands Water Works Testing and Research Institute (KIWA), made an important contribution into the design of Pilot Program proposals on technical solutions.

MAMA-86 — Aquanet Project

In 2000 MAMA-86 in cooperation with the Aquanet experts carried out a project focused on development of MAMA-86 pilot projects.

In February-March 2000 MAMA-86 together with Aquanet conducted meetings with the representatives of main stakeholders groups in Kyiv, Artemivsk, Odessa, Sevastopol and Tatarbunary to gather the information and materials on following issues:

- legislative, institutional, financial and technical aspects of the local water supply;
- requirements in training for the regional MAMA-86 organisations;
- local opportunities and priorities for taking practical measures in the framework of the Project "Clean Drinking Water and Democracy Building."

During the mission the Aquanet experts and representatives of MAMA-86 hade meetings with representatives of the local authorities, water supply companies and other stakeholders.

In May 2000 based on the mission results, MAMA-86-Kyiv together with the Aquanet experts organized training on project planning and management for the whole MAMA-86 network (12 participants from Kyiv, Artemivsk, Odessa, Sevastopol, Tatarbunary Ternopil, Mariupol, Yaremche, Nizhyn and Kharkiv). The training focused on the use of a systematic scheme to plan and describe a viable project proposal: the Logical Framework for Project Design. The one-week training program included different (legislative, organizational, financial technical and managerial) aspects of water production and distribution in the Netherlands comparing to the local situation identified throughout the mission. During the plenary sessions a project proposal based on Sevastopol example was developed. Three other proposals were worked out by the working groups.

The analysis of the three year experience accumulated during introduction of the Campaign "Drinking Water in Ukraine" and the new knowledge acquired during the Aquanet training in May 2000 constituted the basis for the development of a large-scale proposal on the technical solutions of the local problems in the water sector. This Program consists of 11 pilot projects in the following three directions:

- efficient water consumption;
- drinking water for the rural area;
- alternative water supply solutions.

The Program includes implementation of the technical solutions, involvement and cooperation of all stakeholders within each pilot project, working out the models, dissemination of the obtained experience and attraction of attention to the drinking water problems both in the project areas and throughout Ukraine.

Efficient Water Consumption and Water Meters

The issue of natural resources consumption culture is one of the urgent environmental problems. The informational and educational activities of the environmental organizations are focused on training in efficient use of natural resources and public involvement in environment protection.

MAMA-86 began its activities in the field of efficient water consumption with the aim on water resource protection. Water saving is urgent task first of all for big cities.

It is known that in the soviet times fulfilment of the water supply program enabled the majority of urban population in Ukraine to get centralized water supply and canalisation. The state took responsibility for operation of this sector, which was almost 100% donated from the budget. Consumers paid symbolic price for water (2-4% of the cost). One of the negative consequences of such policy was considerable inefficient consumption of the water resources in general and drinking water particularly, and degrading of the water consumption culture of the majority of population.

Water losses are one of the critical problems of the Ukrainian water sector. According to the official information they amount to 25-40%. Obsolete equipment and water pipeline systems from one hand and irrational water consumption from the other hand are the main reasons for such situation. At present considerable number of Ukrainian householders have no water meters, therefore the consumers have no idea about the water volumes they consume.

The pilot projects on the efficient water consumption were introduced by three organizations of MAMA-86: from the cities of Kyiv, Odessa and Kharkiv. It is clear, that big cities are characterized by significant water needs and considerable water supply and sewerage capacities at the same time, as well as substantial losses of drinking water due to deterioration of the network and inefficiency both water producers and consumers.

The main objectives of the Project on water saving were: to facilitate efficient water consumption by introduction of the economic tools — water meters, as well as informational and educational campaign among the consumers.

At the beginning of the pilot Projects in May 2001 MAMA-86 conducted the ***round table "Water Meters are the Important Tool of the Ukrainian Water Sector Reforming" in Kyiv***. Representatives of all stakeholders: governmental bodies (of the national and local levels), industry, public, international organizations (EAP Task Force) and experts in the issues of the water sector reforms and consumer rights protection were invited for the discussion of this subject. In the course of the discussion it became clear that the State Program on Metering Devices Implementation in Ukraine is not fulfilled; the state and water utilities have no funds and adequate interest in establishing permanent control and accounting of water utilization. NGO and the representatives of the Consumer Rights Protection Department expressed the opinion about the reason to use individual water meters for consumer rights protection, decreasing the level of inefficient water consumption and regulating the water producers/provider-consumers relations. It was emphasized that the main responsibility is imposed on the state for establishing the accounting system of water utilization and stimulating the efficient water consumption at all stages: from water intake to waste water discharge in the environment. Water meters may play important role both in reducing inefficient usage of the resource and in the water sector reforming. The discussion resulted in identification of the problems regarding the procedures of mounting and use of the meters, manipulations and water price reduction.

It should be mentioned that the round table contributed into understanding the problems around the water meters and stimulated the efforts to investigate both technical and legal obstacles on the way of using the meters.

The first project started in Kyiv having the task to work out the pattern of this pilot project regarding the following procedures: searching for the candidates to implement the technical part of the Project,

installation of meters and accounting thereof, development of the legal documents for the pilot project implementation and information gathering about the normative and legal basis of using water metering devices in Ukraine.

In all the three cities to implement the efficient water consumption pilot project, three blocks of flats of the same type were identified for the experiment, where the building and individual cold and hot water meters were to be installed. Meter installation contractor was selected by means of tender. All the project relations were established on the basis of cooperation agreements. After the meters were installed, the householders monitored actual water consumption within at least one year, and they were informed about the rules of installation and use of the meters, water payment calculation, rights and obligations of the consumers.

The pilot model was worked out in the three cities: Kyiv, Odessa and Kharkiv, where totally 261 individual cold and hot water meters were installed in 130 flats, as well as 8 cold and hot building block water meters, 3 pressure gauges and one pressure regulator were installed in 10 buildings.

The Project allowed improving the procedure of individual water meters installation in Odessa (a consumer payment for the detail design in the amount of up to UAH 100 (around USD 20) was cancelled).

In Odessa the Project was introduced alongside with significant innovations connected with "Vodokanal" (water supply and waste water disposal municipal utility company) reforming, and the water meters Project played its significant role in solving the problems of consumer rights protection under the conditions of the municipal water sector reforms.

On December 8, 2003, the final regional round table was held in Odessa, representing the results of implementation of the three pilot projects on efficient water consumption in the context of the municipal water sector reforms (Annex 1).

The main results of the water meters pilot projects are the following:

- raising consumers' awareness about the efficient water consumption, water sector reforming and pricing process, use of water meters and payment based on water meters;
- reduced level of water consumption by 20-30% in the Project Blocks of flats;
- developing of the relations between the municipal water utility company (Vodokanal), housing utility companies (ZhEKs) an the consumers: transition to the new constructive producer-consumer relations.

Implementation Efficient Water Consumption Project in Kyiv

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Project background

The first pilot Project of MAMA-86 within the Program of Technical Solutions for the Efficient Water Consumption was implemented in Kyiv. The goal of the first pilot was to build-up a methodological and documentary base for the Project implementation and work out the procedures of installation and use of water meters by individuals in Kyiv, establishing relations between the stakeholders involved in the Project. The Project was to facilitate improvement of the culture of water consumption and to reduce the water consumption level in the pilot houses by means of introduction of the economic instruments — water meters and dissemination of information between the consumers.

The Project scheme consisted of the following three stages:

- preparation (gathering of the documents on the normative and legislative basis of installation of metering devices for individual consumers, searching houses for the Project implementation, development of the tender documents package, selection of the technical contractor, work with the dwellers of the pilot house in terms of cooperation within the Project, informing the local authorities about and familiarizing with the Project, preparation of the documents for Project implementation);
- technical (installation of the meters in the pilot houses and in flats of one of them, entering into contracts for cooperation with the consumers, water consumption monitoring in the pilot houses, analysis of the received data);
- informational and educational.

The preparation phase took six months. The work began in May 2001, when MAMA-86 organized the round table "Water Meters are an Important Tool for the Water Sector reforming in Ukraine." Representatives of main stakeholders groups: NGOs, state authorities (Verkhovna Rada (Parliament) of Ukraine, the Kyiv City Council, Ministry of Environment and Natural Resources of Ukraine, Ministry of Finance of Ukraine, DERZHBUD (State Committee on Building and Architecture of Ukraine), DERZHVODGOSP (State Committee for Water Resource of Ukraine)), the City Consumer Rights Protection Department, the City Water Utility Company "DKP VODOKANAL," business and science were involved in the discussion of economic, environmental and social aspects of this problem. In addition, representatives of the international organization — Task Force on Implementation of the Environment Action Program (EAP) for the EECCA took part in the round table. During this event, the problems of implementation of the efficient water consumption policy in Ukraine, and, particularly, the problems of results of implementation of the State Program on Step-by-Step Equipping of the Existing Housing Resources with the Metering and Regulating Instruments of Water and Heat Consumption for 1996-2000 were discussed. The round table materials were published in a textbook, what facilitated the work on establishing the normative and legislative base in the context of carrying out the pilot Project.

As a result of implementation of the State Program, in the recent years the bodies of local self-government in big cities pay much attention to installation of the building block water metering devices. At present most of the apartment blocks in Kyiv are equipped with the house water meters, and since July 1, 2003 according to the decision No. 2308 dated 26.12.2002 of the Kyiv City State Administration,

payment for water consumption are calculated on the basis of a house water meter dates and distributed among all dwellers registered therein.

Objectives, Place, Term and Scheme of the Project Implementation

The direct preparation to the technical implementation of the Project took place within September-December 2001. The Project scheme included installation of the overall (house) water meters in 3 pilot houses, and individual hot and cold water meters for each apartment in one of these three experimental houses. In Kyiv for the experiment purposes three houses located in old district were selected, aiming at studying specifics and difficulties of the water meters installation faced by the Kyiv residents. Three houses with similar general characteristics were selected for the experiment (see Table 1).

***Table 1**. The characteristics of the houses*

№	The names of the streets	Number of the floors	Number of the flats	Number of the inhabitants
1.	Mykhaylivska, 2	8	44	79
2.	Sofiyivska, 16/16	6	42	101
3.	Mykhaylivska, 24a	5	44	74

The house located at the address: 24-A Mykhailivska Street, was selected for installation of the apartment water meters. Inspection of the house technical conditions allowed developing the terms of reference. In addition, the information about the assortment of water meters available in the Ukrainian market was gathered and list of organizations dealing with installation of the meters in the City of Kyiv was compiled.

On November 26, 2001 MAMA-86 announced the tender on apartment meters installation work. The tender documentation package included the following:

- invitation;
- guidelines for the candidates;
- terms of reference;
- contract for meters installation technical work.

Thirty-three organizations specializing in water metering devices installation in Kyiv were informed about tender. Seven organizations took part in the competition. The winner was the production and trading Firm "UkrServiceMontazh," which the Contract for work was signed with on 19 December 2001. The engineering and installing work was carried out during December 2001 - January 2002. In the framework of the Project 67 individual meters Minomess (made in Germany) for hot and cold water were installed in 27 flats. The total cost of the carried out work was UAH 11,835.40, at that the cost of one meter amounted to UAH 56.30, and the average cost of work on installation of a set of two meters in one flat was UAH 225.00 (see Pictures 4-5 in the color insert).

Just before the Project implementation, all houses of this microdistrict were equipped with house water meters. The funds were directed on installation of ball valves on the lifting pipes in the pilot house. Implementation of this Project confirmed that water meters installation in old houses faces a number of technical problems and requires additional costs for solving thereof. The flats in the pilot house are of different type: with one and two hot and cold water taps, what required installation not two but four cold and hot water meters.

The first meetings with the dwellers of the pilot house showed that most of them are not aware of how much water they use. However, many consumers were thinking of the fact, that they consume less water, but pay for the norm; nevertheless they were not going to install meters because of considerable cost both the meter itself and its installation. At the time of the Project meters had been installed in 4 flats of the pilot house.

MAMA-86 and owners of the flats signed the Cooperation Agreements, in which the NGO undertook to install hot and cold water meters at its expense, and the flat owners would advise the meter readings once a month within 1 year and 2 months.

Table 2 contains data concerning water consumption in the pilot houses.

Table 2. *Data on water consumption in the pilot buildings (the presented data is the difference between of the individual meters readings present and last month's, in m^3)*

Month	Mykhaylivska, 2	Sofiyivska, 16/16	Mykhaylivska, 24a
2001			
December	1,916	2,777	1,170
2002			
January	2,590	2,149	1,165
February	2,596	1,132	504
March	1,206	1,309	639
April	810	1,352	617
May	810	1,353	667
June	931	1,169	635
July	563	922	566
August	425	1,074	650
September	2,513	940	539
October	1,810	1,068	662
November	1,810	1,039	679
December	New meter	1,070	580
2003			
January	846	1,111	595
February	576	975	533
March	New meter	857	571
April	800	1,263	896
May	1,311	990	664

Implementation of the Project in Kyiv disclosed the problems, which require solution on the level of ZHEKs (utility companies) and consumers, as well as on the municipal level. They included the following:

- unawareness of the city residents of the procedures of meters installation and current instruction (see Annex 1);
- no general accessible information about the water saving equipment;
- no staff member envisaged in the staff list, who would be responsible for sealing of meters. At present, the leadership of the District State Administrations is guided by the normative and legislative documents approved in 1983, where such position was not envisaged. ZHEKs (utility companies) solve this problem by means of issuing internal orders. In ZHEK No. 1001 duties on sealing of meters, execution of acts on sealing and seals checks, contract signing with flat owners for installation of meters are imposed on equipment engineer.

In Kyiv, flat owners are not charged for the detail design. However, Order No. 832/3 dated 26.02.02 CE HUD (utility company) of Shevchenkivski District State Administration, establishes the cost of meter sealing at maximum level of UAH 5.70 including VAT. In addition, according to the State Authority decision, tariffs for payable services ordered by legal persons and individuals are established, payment for issuing act during installation of meters is UAH 31 including VAT.

At present, when the cost of services is growing fast, more and more residents install individual meters themselves (from January 2001 till November 2003 in the microdistrict 99 cold water and 92 hot water meters were installed and sealed, 67 out of which were installed in the framework of the Project).

Based on the results of annual monitoring of actual water consumption in the pilot house, the average consumption values were as follows:

- cold water: 3.57 m^3 per person per month (the norm is 5.50 m^3 per person per month), i.e., the saving was 1.9 m^3 per month (or 22.8 m^3 per year);
- and hot water: 2.75 m^3 (the norm is 3.50 m^3 per person per month), the saving was 0.74 m^3 per month (or 8.88 m^3 per year).

Thus, according to the individual meters data, water saving comparing to the normative water consumption is 34% for cold water and 21% for hot water, what in terms of money equals to:

- cold water: UAH 1.59 per person per month, UAH 19.08 per year accordingly;
- hot water: UAH 2.41 per person per month, UAH 28.92 per year accordingly.

According to the house meter data, water consumption in the pilot house decreased approximately by 50% per month.

One of the crucial factors for an ordinary consumer of the services is the payback period of the meters. The studied base can be divided into 4 groups:

1) Payback period of meters of up to 1 year — 26%;
2) Payback period of meters of up to 2 years — 26%;
3) Payback period of meters of up to 10 years — 25%;
4) Meters will not be paid back — 22%.

Conclusions and Recommendations

The data received allow to conclude that using of water meters is the effective economic instrument, which stimulates efficient water consumption. Under the conditions of transit economy, economic constituent is a substantive argument for the majority of the Ukrainian population, and environmental protection problems are of secondary importance. The Project stimulated people to use water safely, change their habits, seek for technological possibilities of efficient water consumption and implement them in their everyday life, what directly resulted in reducing payment for water.

Implementation of the Project confirmed the necessity of the following activities:

1. Informational and educational work among residents focused on efficient consumption of natural resources, particularly water.
2. Legal investigation of the competence to transit from individual to collective responsibility under the condition of usage of a house meter, and water payment calculation based on the house meter data.
3. Informing of consumers about the quality of housing and utility services (water supply in particular); about developing water tariffs and about the existing instructions/procedures of individual water meters installation.
4. Introduction of the program of individual water meters installation for socially unprotected groups of population by the local administrations.
5. Provision ZHEKs with the logistic base for carrying out work on servicing individual water meters.
6. Introduction of economic incentives for water saving for the ZHEKs' employees.

Due to the increase of the number of individual meters installed in the City, in due course the issue of checking (verification) of these instruments will become urgent for both consumers and municipal services, which will ensure this procedure. By now, water meters verification procedures have to be proposed, which would be optimal for all stakeholders.

Meters as the Consumer Right Protection Tool

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Project background

Everyone influences on the environment. Every drop of water we take from our rivers and underground water sources, less water remains for the Nature. It has been proved, that water intake over 10% of the river flow results in degradation and drying out of rivers, disappearance of the natural ecosystems. We pay for inefficient water consumption not only with hard cash, but also with disappearance of rivers, and, consequently, of many species of birds and plants. Within the last 5 years only, more than 5,000 small rivers disappeared in Ukraine. One of the striking examples of careless attitude to the Nature is the history of disappearance of the Aral Sea due to the excessive intake of the rivers flow (40% of the flow is used for growing of cotton).

At present the Ukrainian society, unfortunately, cannot be regarded wealthy, although it is clear, that everybody cannot be rich. However, both poor and rich calculate their money. For the big cities' residents, utility payments are not on the last in their family budget lists, considerable share of which is made up of the payment for water consumption. Therefore it becomes clear, that the issue of quality up-to-date water metering plays far from the secondary role in the economic and social sphere of Ukrainian businesses, although only small percentage of the population realizes, how limited is the drinking water stock, and why it is necessary to utilize the water resources efficiently, thinks of the real volumes of domestic water consumption and actual level of its irrational use.

Installation of the house meters of cold and hot water by the Utility Company (UC) "Odessavodokanal" in Odessa showed that actual water consumption exceeds the normative calculations by 1.57 times.

In summer 1999 the NGO MAMA-86-Odessa decided to find out the level of actual water consumption in 4 houses of Suvorovski District (Luzanivka district) in Odessa. This district is one of a few districts, where due to the specifics of the geographical location (the lowest part of the City) and water supply scheme, water is supplied 24 hours a day. From the other side, due to this peculiarity, the water supply system is effected by excessive pressure, what results in worsening of the water supply services quality, fast deterioration and failure of the utility equipment and ultimately results in loss of water inside the houses.

MAMA-86-Odessa inspected two five-storied and two two-storied houses. Two of the houses had centralized hot water supply, and the other two — gas water heaters. Throughout a calendar week, data of the house meters' readings were registered a daily and hourly basis. In the course of the inspection the following data were received:

1. The actual water consumption (420-820 litres per person per 24 h) exceeded the norm by 2.3-3.6 times, and the water loss in flats (due to leaking taps, flash tanks) amounted to 57-76% of the total water consumption.

2. Excessive water consumption, comparing to the current (very high) norms of water consumption, ranged from 75 m^3 to 180 m^3 per person per year, what cost every consumer UAH 60-144 per year at 1999 price equivalent (UAH 0.8 per 1 m^3 taking into account sewerage).

A number of measures were taken to reduce the level of wasteful water consumption:

- scheduled repair of the internal water supply and wastewater facilities in these houses was carried out by the ZHEU (utility company) employees;
- informational materials (leaflet and booklet) were developed;
- a number of information actions were carried out.

However, the most effective economic tool of reducing the wasteful water consumption level was installation of the individual water meters. This method is the most expensive of the above mentioned, but the most effective by the statistical indices. According to the preliminary calculations, about 150 thousand of cold water meters and 107 thousand of hot water meters are needed for Odessa, and the cost of the city program of flat water metering installation is USD 10-12 million.

In the year of 2000 the Odessa residents suddenly started receiving very high water bills indicated debts of unknown origin. Those consumers who regularly paid for the utility services were the first ones to find out the changes in water bills. The worried consumers became aware shortly, that the calculations were done based on data of house water meters', installed in 1998. In case of any changes in the services payment scheme, according to the Law of Ukraine "On Consumer Rights Protection," the producer is obliged to notify customers thereof and amend the Contract with them accordingly. In Odessa neither the producer (Vodokanal), nor the utility operating company (ZHEU) informed the residents about changes. Based on such rights violations, MAMA-86-Odessa assisted by the Department of Consumer Rights Protection of the Odessa Oblast Administration managed to arrange for the illegally calculated payments to be paid back to residents of several houses. However, this couldn't solve the whole problem. Since 2000 the majority of Odessa residents pay increased water bills. Due to the innovations, considerable part of Odessa residents appeared to be in the tightest conditions (first of all, the poor people and families with many children). Refusal of the residents to pay the inadequate bills became the main tools of protection of the consumers against abuse of the monopolist producer.

Under such conditions in 2002 MAMA-86-Odessa started to implement the Project "Efficient Water Consumption."

Project Objective

To change the attitude of consumer to water consumption, particularly, to its efficient use due to installation of the water meters and informational and educational campaign running.

Term and Scheme of the Project Implementation

The Project lasted for one year and two months and was focused on three target groups: local authorities, consumers (public) and water service provider (business).

In the framework of the Project house water meters and pressure gauges were installed in four houses of Luzanivsky microdistrict (Table 1). In a house located at the address 1-A Sortuvalna, 42-A a pressure regulator was installed. In apartments of two houses (at the addresses: 299, Mykolaivska Road, and 98, Luzanivska Street) individual (per apartment) meters were installed.

***Table 1**. Characteristics of examined buildings*

The house address	Number of floors	Number of flats	Number of inhabitants	Notes
Mykolaivska Road, 305 a	9	80	117	
Mykolaivska Road, 299	9	48	122	Shop in the building
1-a Sortuvalna, 42A	5	74	185	
Luzanivska, 98	2	12	29	No hot water supply

During the experiment, the house water meters were installed in all houses, individual ones — only in two. In two of the houses equipped with both house and individual water meters, informational campaign was carried out regarding efficient water consumption; in one of the houses such campaign was not conducted. In particularly, regular control of water consumption by the dwellers of all the four houses was exercised. Besides, a group of experts was set up comprising 10 journalists — experts, whose flats were also equipped with cold and hot water meters. The total number of the installed equipment was as follows: 100 individual meters, 2 house meters, 3 pressure gauges and one pressure regulator.

Project Budget

The Project budget amounted to UAH 24,633.

The price of one individual meter "TAKT" produced by Truskavets Factory was UAH 86.

The installation service cost was UAH 80 per one individual meter.

Project Implementation Output

Prior to the beginning of the individual meters installation, water consumption in the selected buildings was carried out.

From the first days of the experiment, a tendency of decreasing cold water consumption was observed in the two houses equipped with individual flat meters.

Noticeably, in the course of the experiment in Odessa a group of efficient water consumption "champions" was formed. These were lonely pensioners, who were consuming not more than 1 m^3 of water per month, or about 30 litres per person per day. It should be noticed, that the socially accepted minimum level of water consumption in Europe is regarded 30-40 litres.

Hot water is not supplied to the house located at 98, Luzanivska Street; therefore a clear tendency of reducing the level of water consumption can be noticed. If prior to the installation of individual meters in 2000, according to the house meter data one dwellers spent 662 litres of water per day in average (or 19.9 m^3 per month), in 2001 — 710 litres per day (or 26.1 m^3 per month), after the installation of individual meters volume of consumed water per one person per day decreased to 119.7 litres, or 3.6 m^3 per month (the data for the Project implementation period: November 2002 - November 2003). I.e., direct money saving of each dwellers of the house comparing to 2001 was UAH 320 per year.

Table 2 contains the figures of water consumption level prior to and after the installation of individual water meters at the address: 98, Luzanivska Street.

In the house located at the address: 299, Mykolaivska Road, prior to the installation of individual water meters in 2001, one dweller consumed 473 litres of water per day in average (14.2 m^3 per month), in 2002 — 424 litres per day (12.7 m^3 per month), and after the installation of individual meters, the water consumption decreased to 124 litres per day (3.7 m^3 per month). The direct cost savings of each dweller of the house was UAH 125-146.

This house is the last building in the hot water distribution system of the microdistrict, therefore the quality of "hot" water is very low. Dwellers of 12 flats (25% of the total number) of this house have already been officially refused to use the hot water supply services and installed boilers for the individual water heating. Another 25% of the house flat owners are going to do the same in the near future. In case of poor quality of hot water supply, the owners of individual hot water meters are forced to pay for the low quality service: the lower supplied water temperature, more water has to be "drained" to receive the required temperature water. Thus, one participant of the experiment (note that 100 meters were installed in 56 rooms) observed extremely high water consumption levels. In average, this person, who lives alone in a flat, consumes 8-10 m^3 of hot water and about 2 m^3 of cold water per month. The "hot water" parameters are lowered. This project participant spends 4 litres of water for washing of 1 cup, and 11 litres — for utensils; 28 liters of water for washing two towels, 5 liters for washing himself. All the above measurements were performed by this person himself aimed at seeking for the truth.

At the early stages of the Project implementation amongst the participants "champions" of water saving and wasting were identified. For instance, 2 pensioners, who live in one flat, consume 2 m^3 of cold water per month or up to 30 liters per person per day (they refused hot water supply service). And one person, who is worker, from the other flat consumes 1 m^3 of cold water (he does not open the hot tap from the considerations of saving) or 30 litres of cold water per day. Another example: three dwellers of one flat consume 23 m^3 of cold water per month (no hot water supply) or 256 litres per person per day. At the same time, another family of three persons consumed 9 m^3 of cold water and 26 m^3 of hot water in November, what equals to 100 litres of cold water and 289 litres of hot water per day, i.e., 389 litres of water per person per day.

Table 3 contains the water consumption levels prior to and after beginning of the pilot project in the four experimental houses.

Table 2. *The water consumption levels before and after the installation of individual water meters (IWM)(address: 98, Luzanivska Street)*

Month	The volume of water consumed according to the house meter after the installation of the individual meters, m^3	The volume of water consumed (sum of IWMs readings) after the installation of the IWMs, m^3	Difference between the readings of the building's meter and IWM, m^3	Average level of water consumption per inhabitant (after the installation of IWMs in 2002-2003), litres/day	Average level of water consumption per inhabitant (before the installation of IWMs in 2000-2001), litres/day
November	144	109	35	November 2002 104	November 2000 636
December	Building's meter doesn't work	110		December 2002 101	December 2000 595
January	160	124	36	January 2003 114	January 2001 695
February	169	130	39	February 2003 133	February 2001 941
March	133	102	31	March 2003 97	March 2001 694
April	126	95	31	April 2003 93	April 2001 853
May	241	171	70	May 2003 158	May 2001 801
June	122	91	31	June 2003 87	June 2001 1,116
July	189	141	48	July 2003 130	July 2001 960
August	234	165	69	August 2003 152	August 2001 861
September	206	134	74	September 2003 128	September 2001 788
October	171	137	34	October 2003 126	October 2001 539
November	178	134	44	November 2003 128	November 2001 398
Total	Sum per year 1,923 m^3	Sum per year 1,424 m^3	Difference 505 m^3	Average per year 119.7 l/day	Average per year 759.8 l/day

Table 3. *The water consumption levels before and after the beginning of the pilot project in the four pilot buildings*

The pilot house's address	Number of the		Average water consumption per 1 person (before the project start*), l/day	Average water consumption per 1 person (after the project's start**), l/day
	flats	inhabitants		
Luzanivska street, 98	15	35	759.8	119.7 The flat meters installed
1-a Sortuvalna, 42a	74	185	394.0	232.7 A pressure regulator installed
Mykolaivska Road, 299	48	122	356.0	105.5 The flat meters installed
Mykolaivska Road, 305a	80	117	579.0	330.8 Informational campaign took place
Total	217	459	522.0	197.2

* period: November 2000 - November 2001
** period: November 2002 - November 2003

Conclusions and Recommendations

The experiment covered totally 459 consumers residing in 217 flats of four houses. One hundred individual water meters have been installed in 56 flats.

The main conclusion of the Project is that introduction of individual water meters facilitates efficient water consumption.

In a few months after installation of the individual meters an average statistical participant of the experiment achieved average European norm of water consumption.

It allowed him/her saving from UAH 125 to UAH 320 per year in average (depending of one or two individual water meters are installed in an apartment).

Depending on a family size and level of efficient water consumption, payback period of one or two individual water meters was 4-24 months (in case of no district hot water supplies).

In two other houses (in one of which a pressure regulator was installed, and in the other informational campaign on water saving was conducted) noticeable reduction of water consumption level was also observed.

The active informational campaign among the consumers started in November 2002 and lasted for one year. During this period the following measures have been taken:

- four general meetings of the houses dwellers at which the leaflets "How to Save Water, Your Money and Nature," "Saving Water — Saving Money," calendars "Save Water!" and "How do you Benefit from Water Saving" were distributed;
- one visit of the informational team to the dwellers of each flat giving out leaflets "Why should you Save Water?"; the bulletins "Our Luzanivka" containing articles about the experiment were distributed on three occasions.

As a result of these measures, the house, where only the informational campaign was carried out, achieved 42% of water consumption reduction.

It should be mentioned that in those houses, where individual flat meters were installed in accompaniment of the informational campaign, water savings reached from 337% to 635%.

Especially effective means of water saving for this area (mainly low areas with excessive level of water pressure) is installation of the pressure regulators. Application of this inexpensive instrument in one of the houses ensured 41% of water saving.

According to the pressure gauges data gathered in the pilot houses, average pressure fluctuations were within 6-7 kgf/cm^2. It should be mentioned, that pressure exceeding 6 kgf/cm^2 is unacceptable and does not comply with the standards, according to which, pressure in nine-storied buildings has to be 4.2 kg/cm^2, and for five-storied buildings — not more than 2.6 kg/cm^2 [1:36]. This technological mistake was made by the designers yet at the stage of the microdistrict construction in the 1960-ies. Both the producer and CE "Odessvodokanal" and the operating organization — district utility company "Suvorivske" (up to 2003, and since January 2003 it was renamed in the Directorate of Unified Customer "Zoriane") were aware thereof and its impact on the quality of the services. However, till present they have not been bearing responsibility for the excessive water consumption due to the process miscalculations in the water supply system of "Luzanivskiy." The microdistrict residents were laid the responsibility and economic burden of the problem. At the same time, according to the Law of Ukraine "On Consumer Rights Protection," consumers should not be competent in the technological and professional information and bear responsibility for process miscalculations of producers. Therefore this microdistrict's problem has yet to be arranged and solved with the participation of all power branches and all stakeholders.

Due to the Project, an important step is made forward to consumer rights protection, first of all in the houses with individual meters installed, where the consumers are now paying only for the water consumed by them. They do bear collective responsibility neither for the water wasting of their neighbours, nor for water losses in the basement and upright water pipelines inside the house due to the inactivity and mismanagement of the operating organization. This also disciplines the service provider.

However, the practice of transition from individual to collective responsibility of the water supply services consumer yet since 2001 became norm in Odessa, and since 2003 — in Kyiv, and broadly used

by the water utility companies and local administrations of other cities. As a result of this shifting of accents from individual to collective responsibility, city residents receive very high water bills issued based on the house water meters data. We also made the express assessment of affordability of water services in Odessa. The experts involved in the analysis of this express assessment results, have figured out, that for the consumers, who pay the bills based on the house water meters data, water services are unaffordable in terms of payments. At the same time, the level of payment for water services is quite acceptable and affordable for the group of consumers, who pay based on the individual water meters readings (see Annex 2).

Another, quite unexpected result of the Project was received during the experiment: it was shown, that in two houses, where individual water meters were installed, permanent difference of 20-30% is observed between the data of the house meter and the sum of individual meters readings, and this difference is always in favour of the producer. In the process of seeking of the reasons for this strange phenomenon, we found out, that the state, represented by the State Department for Standardization, Metrology and Certification in Odessa oblast, does not exercise full value control of verification of the house water meters. And although every house meter is sealed, what confirms the state checking, in reality, this procedure is done by the private enterprise "Vodolik" using the equipment, which belongs to the utility company CE "Odessvodokanal," and the state supervisor is just a passive observer of this procedure and seals meters proving the state checking.

In addition, it was determined, that neither operating company, not owner does not have technical passports for any of the installed house meters, i.e., the necessary technical information of the meters themselves is unavailable.

We believe, that in this situation, without sufficient state regulation, there are preconditions for the abuses from the side of the monopolist in the field of water supply and metering. Yet since autumn 2000 numerous protests of consumers indignant about the high water bills calculated based on house meters data and divided between all dwellers registered in the house, take place in Odessa. Sometimes month water payments of small family amount to UAH 70.

It should be mentioned that cooperation with the local authorities facilitated implementation of the Project. In December 2002 MAMA-86-Odessa introduced the draft "Rules of Installation and Operation of Individual Water Meters" for consideration by the local authorities, based on the Kyiv experience and focused on overcoming obstacles and barriers, faced by the Odessa consumers, who intended to install individual water meters. One of such obstacles was the Instruction of the Odessa water utility company about the necessity to request for the design of individual water meter installation and additionally pay considerable amount of money, which sometimes reached UAH 100 (USD 20). By that time an average pension was USD 10, minimum salary — USD 20, and 49% of Ukrainian population (according to the UNDP data) lived beyond the poverty level, i.e., for less than USD 30 per month. In the draft "Rules of Installation and Operation of Individual Water Meters" MAMA-86-Odessa proposed to transfer the responsibility for installation and sealing of the meters from the water utility company Odessavodokanal onto the operating organizations (ZHEKs), which territorially were the closest to consumers, and to cancel the obligatory procedure of working on of technical design for the installation of individual water meters. The new rules allowed reducing costs by up to 40% and considerably simplify the procedure of water meters installation for consumers. In February 2003, after minor revision, the "Rules" were approved by the order of the municipal department of utility economy and were enforced accordingly. Late 2003, 74,000 individual water meters were installed in Odessa, while by the end of 2002 only a few hundred thereof were installed. According to the official data of the utility company OdessaVodocanal, in 2003 the level of water consumption in the city decreased by almost 14%.

As a result of the experiment, we were convinced that installation of individual water meters facilitates not only efficient water consumption and saving water resources, but also raises the issue of consumer right protection at a new quality level.

Literature

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Efficient Water Consumption Implementation Project in Kharkiv

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Project background

Kharkiv Oblast is located in the water resources limited area; it occupies the 24th place in the State with regard to water resources provision. In 1995 the City of Kharkiv experienced ecological catastrophe after an accident at the Dykan'ka wastewater treatment facilities. Residents of Kharkiv and other towns and cities located in the basin of the Siversky Donets River can still feel the consequences of this accident.

Having started the work on the Water Project in November 2001, the Kharkiv City Environmental NGO MAMA-86-Kharkiv initiated public opinion poll concerning water supply services and drinking water quality, as well as efficient water supply and pricing policy in the water sector. MAMA-86-Kharkiv together with the specialists of the sociological faculty of the Kharkiv V. N. Karazin National University carried out public opinion poll. 1,200 city residents were interviewed. The questionnaire contained 57 questions about drinking water problems. The poll created big interest among the residents who regarded the city drinking water problem as urgent, raised a number of problems concerning the quality and efficient water consumption.

The Program "Technical Solutions of Improving Citizens' Access to Safe Drinking Water in Urban and Rural Areas of Ukraine" implemented by MAMA-86 in the framework of "Drinking Water in Ukraine" Campaign, envisages the participation of MAMA-86-Kharkiv in the Pilot Project "Efficient Drinking Water Consumption."

Project Objectives

The task of the Project is installation of house cold and hot water meters in three same type houses in Kharkiv, as well as installation of 50 individual cold and 50 hot water meters in one of these houses. After water meters installation in these houses a monthly water consumption monitoring shall be conducted within two years. In addition, aiming at the analysis of informational activities influence on the water consumption indices, it is envisaged to carry out an informational campaign on efficient water consumption among residents of one of these houses, where only house meters are installed.

Project Implementation Place

To implement the Project, in January 2003 three same type nine-storied houses were selected using expert assistance in the Kominternivsky District of Kharkiv, located at the addresses: 167-G, Geroiv Stalingrada Avenue, 173-A, Geroiv Stalingrada Avenue, 16 Sadovyi Proizd.

Project Implementation Scheme

Information has been collected about availability of enterprises — business entities — in the City, registered with the state authorities according to the established procedure, which were licensed to carry out work on cold and hot water meters installation and had expertise in this work, the necessary equipment and qualified specialists to carry out such works. The necessary precondition for the enterprises was use of the materials and equipment, which comply with the requirements of the Ukrainian metrological and standardization authorities, were able to provide guarantees of work terms.

Terms of Reference for fulfilment of work on installation of house and individual cold and hot water meters in these houses, as well as the instruction for the candidates, draft offer and contract have been developed.

A package of tender documents namely: tender invitation, instruction for the candidates, Terms of Reference offer and draft contract, was prepared. The Tender announcement was published in the newspaper "Vechirniy Kharkiv" on February 27, 2003 (print run 6,737 copies) and March 4, 2003 (print run 7,230 copies). Offers from 3 candidates were received during the Tender.

The tender invitation with the tender package was delivered to ten Kharkiv enterprises. The tender was held till April 29, 2003.

The Tender Committee consisted of O. M. Tsyguliova, I. G. Korsunska, representatives of MAMA-86-Kharkiv, L. V. Golovakhina, Head of Utility Company (KZhEP No. 134), V. A. Patsurkivska, O. G. Fedorova, representatives of TPA "Kharkivkomunpromvod", V. O. Kitanin, Deputy Head of Kharkiv Housing Fund Department was established.

Meeting of the Tender Committee was held On May 13, 2003. OJSC SPE "TEPLOGAZKHOLODVOD" was announced as a winner of the tender for carrying out meters installation work. The Contract for fulfillment of the Project work was signed with OJSC SPE "TEPLOGAZKHOLODVOD"on May 30, 2003.

Project Budget

The Project budget is UAH 24,099.60.

Project Implementation Outputs

Description of the Pilot Houses.

The houses were located close to each other, in so-called "sleeping" district of the City. The buildings were constructed in late 60s of last century. The condition of canalization network was not satisfactory, first of all much water leakages in the apartments. Table 1 contains data on technical characteristics of experimental houses.

Table 1. *Technical characteristics of the houses, in which the water consumption monitoring is carrying out*

Address	Number of floors	Number of flats	Number of inhabitants	Notes
167-G, Geroyiv Stalingradu Avenue	9	51	102	There are a barber's shop and sport club
173-A, Geroyiv Stalingradu Avenue	9	54	113	
16, Sadoviy Proezd	9	51	107	There are cafe and shop

The water meters installation started on June 1, 2003. On June 20 installation of individual cold and hot water meters was finished in 47 apartments of the house located at the address 167-G, Geroiv Stalingradu Avenue. The Project planned installation of 100 individual meters (in 50 apartments), but the remaining flats had been equipped with water meters by the residents. Six house cold and hot water meters were also installed by June 24 in all the three houses.

The individual cold water meters were E-TQn-1.5/40 and hot water meters were E-TQn-1.5/90 produced by the Slovak Company Invensys Metering Systems a.s. They are included in the State Register of metering devices under No. У272-02 and permitted for application in Ukraine (Certificate of compliance of the metering equipment with the approved type No. UA-MI/1p-881-2002).

The house cold water meters were MTK ш32 and hot water meters were MTW ш32 produced by the JV "Centner-Ukraine Ltd," Kyiv. They comply with the approved type, registered in Ukraine under No. У878-97, as well as the requirements of ТУ У 14325332.003-97 and permitted for application in Ukraine (Certificate of compliance of the metering equipment with the approved type No. UA-MI/2-516-2001).

We prepared and, after installation of the meters, signed the agreement with ZHEK (utility company) and the owners (consumers).

Since July 1, 2003, monthly monitoring of water consumption in the pilot houses was commenced. It should be mentioned, that the situation for observation, comparing and analysis of the water consumption performances in the summer period is more complicated, because in this season the

respective services carry out preventive repair measures at the heating and water supply networks, and therefore hot water supply interruptions occur (the quantity of consumed cold water increases accordingly), and, sometimes cold water. Summer is the holiday season, and the City residents spend most of their time in their summer houses and on the kitchen gardens, and therefore they do not use water in their flats. Besides, as it can be seen from Table 1, in two of the three monitored houses there are, apart from the flats, a hairdresser, sport club, cafe and shop. The premises of these infrastructure establishments are equipped with their own water meters, but not always there is access to them in first days of month, when data of the meters are taken.

The first data received during 4 months of the monitoring give a bright picture of our attitude to water, the main treasure of our Planet (see Tables 2, 3).

Table 2. *Information about the water volume consumed (m^3) in the houses, where the monitoring is carrying out (according to the readings of house meters) in July-October 2003*

Month	167-G, Geroyiv Stalingradu Avenue		173-A, Geroyiv Stalingradu Avenue		16, Sadoviy Proezd	
	Cold water	Hot water	Cold water	Hot water	Cold water	Hot water
July	377.7	332.1	—	487.0	1,304.0	632.0
August	379.1	70.7	—	161.0	1,440.0	41.0
September	356.2	121.6	1,219.0	235.0	1,371.0	576.0
October	328.8	264.1	1,260.0	251.0	902.0	611.0

Table 3. *Comparative data of the water volume consumed (m^3) according to the building water meters' readings and sum of the individual water meters' readings in July - October 2003 (167-G, Geroyiv Stalingradu Avenue)*

Kind of information	July		August		September		October	
	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot
Sum of IWMs' readings	309.6	248.3	351.7	56.4	323.7	103.0	302.4	241.7
Building meter	377.7	332.1	379.7	70.7	356.2	121.6	328.8	261.4
% difference	18%	25%	7%	20%	9%	15%	8%	8%

The data contained in Table 3 says about the permanent difference between the data of the house and the sum of the flat meters data both in cold and hot water consumption. To our opinion, there are two main reasons of these situations: water leakages inside the house water networks; insufficient accounting of the consumed water by the infrastructure units, which have connection to the house water supply network after the house meter.

It should be mentioned, that imperfection of the consumed water accounting system based on meters data causes extremely negative emotions of the consumers. They have to inform monthly the water meters figures to the district subscriber services by telephone. Taking into consideration, that only 1-2 telephone channels are available for these purposes, this is a hard job. In case a consumer failed to notify about the consumed volume of water by phone, the data of the individual water meters are ignored, and the consumer has to pay the established water consumption norms, or bill based on the house meter readings, despite the fact, that it indicates the meter data in the utility services bill.

According to the existing norms, one Kharkiv resident consumes 11.1 m^3 of water per month, 8.1 m^3 out of which is consumed directly, and 3 m^3 is used for heating.

Quite often temperature of so-called "heated" water at the beginning of autumn-winter period allows only washing hands. Therefore the consumers, in order to receive "long-waited" hot water, pour several dozens of non-consumed water into the canalization system, and a hot water meter "does its business."

We are very concerned about the water supply companies practice of using water bills calculated on basis of the house water meters data. Table 4 contains data on average indicators of (cold and hot)

Table 4. *Average indices (m^3) of monthly consumption of cold and hot water according to the readings of building meters in July - October 2003*

Address	July	August	September	October
167-G, Geroyiv Stalingradu Avenue	7.0 (5.5)	4.4 (4.0)	4.7 (4.2)	5.8 (5.3)
173-A, Geroyiv Stalingradu Avenue	—	—	12.9	13.4
16, Sadoviy Proezd	18.0	13.8	18.2	14.1

water consumption per person per month based on house meters. In brackets there are data on the same indicators received by individual water meters.

These data show that the consumers of the house located at 167-G, G.Stalingrada Avenue require 1.5-2.5 more water every month, than the norm. However, the consumers of the houses at 173-A, G. Stalingrada Avenue and 16, Sadoviy Proezd (in case they are do not have individual water meters) have to pay, according to the existing normative documents, for the quantity of water, which exceeds the established norms by 2 times. Since part of the apartments in these houses are equipped with the water meters and pay the suppliers based on the readings thereof, which are lower than the established normative, the remaining consumers of these houses have to pay for water even more.

Demands not to use the calculated payments on water supply service based on house water meters data by respective services is the actual priority task in terms of consumer rights protection.

Implementation of the Project at the installation stage faced the problem of social protection of vulnerable groups of consumers. In the house located at 167-G, G. Stalingrada Avenue, where individual water meters were installed, a number of elderly people reside, 12 of them are Second World War veterans and the veteran's widows. Because of their limited family budget, they were unable to install the water meters on their own. While equipping the flats of elderly and sick people with the meters in these flats, to stop leakages, work on sealing water pipeline networks, plumbing, taps were carried out. At present a group of dwellers live in the house, united by the event of meters installation, which prompted them to create "community." The Glazkov's family from the experimental building provides great assistance in collecting of the water meters data.

Conclusions and Recommendations

During the Project implementation we observed the real inter-sector cooperation. We received a great support from TPE "Kharkivkomunpromvod," KZHEP No. 134 employees, installers of OJSC SPE "TEPLOGAZHOLODVOD", colleagues of MAMA-86, MAMA-86-Odessa and NGO provided continuous assistance and consultancy.

First of all, residents of the house located at 167-G, G. Stalingrada Avenue, whose apartments were equipped with individual meters free of charge on a contractual basis, benefited from implementation of the Project. Due to use of individual water meters, consumers pay more attention to water saving.

This process is observed month-by-month, and we can see that the people become more thrifty. The Project is an example of positive experience of improving relations between consumers and producers, ensuring protection of consumer rights, water resources and environment by the authorities.

This Project, even after it formal expiration, will require attention and permanent support, particularly in the following directions:

- to continue water consumption monitoring;
- to continue the informational campaign on efficient water consumption;
- to disseminate the Project implementation experience by means of publishing booklets, publications in mass media and TV broadcasts;
- to continue working with the citizens, officials, because during Project implementation many problems and questions occurred, which cannot be solved in the framework of the Project. Special attention and concern is to the current system of metrological support to the metering devices, i.e., meters verification.

Solving Drinking Water Problems in Rural Area: MAMA-86 Pilot Projects in Poltava Oblast, Yaremche District and in the Town of Nizhyn

At present, the problems of drinking water in rural area are not in the focus of attention of governmental bodies. The existing State Programs concerning water supply and sanitation in rural area are not performed because of lack of financing. The overall crisis situation in the economy, lack of investments and decline in that area caused increase in contamination and decay of springs, absence of control thereof, collapse of the rural water supply and wastewater services, increase of diseases among the rural population.

Long-lasting extensive agricultural activities caused significant contamination of soils and springs (rivers, ground waters and lakes) with chemicals, nitrates, pesticides and other dangerous substances. At present the inhabitants in the rural area use usually water from 5-20 m deep wells. There are wells of collective and individual use. Control of water quality in the public wells is exercised by the Sanitary and Epidemiological Services (SES), but not regularly. Absence of proper state monitoring is caused by the general economic difficulties and lack of funds, specialists, equipment and reagents in the controlling establishments. Public wells are practically not cleaned. Contamination of environment influences the quality of water. Among the common wells water quality problems are nitrate, pesticide, radiation and bacteriological contamination.

Contamination of water supply sources, lack of information about water quality in wells, connection of water problems with health conditions and ways of solving the existing problems create preconditions for worsening of health conditions and lowering of wellbeing of the rural population. Dangerous drinking water causes complex of social, environmental and health problems in the rural areas of Ukraine.

MAMA-86 pilot projects in the rural area are being implemented in Poltava Oblast, Yaremche district and the town of Nizhyn and Nizhyn Rayon. They are focused on the following:

- well water quality analysis;
- raise public awareness on water problems;
- implementation of technical solutions of drinking water quality improvement;
- facilitation of arrangements for water supply and its maintenance based on self-governing within several case studies.

The results of these pilot projects implementation were discussed on December 12, 2003 during the seminar in the town of Nizhyn, and the recommendations on solving drinking water problems in the rural area were developed (see Annex 3).

These projects enabled to achieve the following:

- inventarisation over 150 wells of collective and individual use;
- to initiate issuing passports for wells in Chernihiv Oblast, Yaremche District of Ivano-Frankivsk Oblast;
- to conduct independent studies of over 200 wells in Yaremche District of Ivano-Frankivsk Oblast, in the town of Nizhyn and Nizhyn Rayon, as well as in Lokhvytsia Rayon;
- to arrange wells cleaning services for local residents in Yaremche and Nizhyn Rayons, due to which cleaning and disinfecting of more than 50 wells in Yaremche Rayon of Ivano-Frankivsk Oblast and in the town of Nizhyn and Nizhyn Rayon were carried out;
- to repair in cooperation with local authorities an old water pipeline supplying 3,000 residents of the village of Pisky, Lokhvytsia District, Poltava Oblast.

Drinking Water for Rural Area

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Project background

72,5% of the population of Ivano-Frankivsk Oblast use decentralized water supply — wells. There are over 100 thousand of them, 500 of which are public ones. Considerable part of the wells was built decades ago, and since that time they have not been cleaned even once. Therefore bacteriological contamination of the decentralized water supply sources is urgent problem in Oblast. Taking this into consideration, in 1999 Ivano-Frankivsk Oblast SES conducted survey of water in public wells. 40% of the samples did not comply with the standards (coli index fluctuated within 460-2,380, while the norm is 10). Public wells in the Oblast are controlled irregularly; they often do not meet the sanitary requirements regarding their location and equipment and, practically, are not cleaned. Individual wells were not subject to survey at all, except for individual cases of personal requests of residents.

According to the opinion of medics, two thirds of diseases of rural population are the result of consumption of poor quality water. Among the main reasons of worsening of its quality are to be admitted low level of culture of building and maintenance of wells, mistakes in architectural planning of settlements and condition of utilities (toilets, manure storage). Often the contamination sources are located very close to water supply source. Domestic facilities' discharges inflow in the ground waters, what results in non-compliance of well water with the sanitary-bacteriological and sanitary-chemical norms. The problem is that the depth of the majority of the wells is 1.5-6 meters, i.e., they consume ground waters, which, due to the above mentioned reasons have considerably worse bacteriological characteristics, than the underground waters.

Project Objectives

The main Project objective was improvement of drinking water quality for the rural population of Ivano-Frankivsk Oblast by means of informational and educational activities aimed at improvement of knowledge level of the population concerning the drinking water problems and renewal of the culture of maintenance and operation of the wells, attraction of attention of the local governmental authorities and bodies of self-government to the problem.

Project Implementation Place

The place of Project implementation were settlements of Ivano-Frankivsk Oblast, specifically the territory of Yaremche Municipal Council.

Term, Scheme and Budget of the Project

The term of Project implementation was 3 years (2001 through 2003). At the first stage water quality was analyzed for compliance with the sanitary-bacteriological and sanitary-chemical indices in 15 public wells (8 of them are located on the territory of Yaremche Region). The research was carried out simultaneously by three institutions: Ivano-Frankivsk Oblast SES, Yaremche water utility (VUVKG) and the Carpathian National Natural Park. Nine water samples did not comply with the norm in term of the bacteriological indices. Coli index fluctuated within 23 to over 2,380 while the norm was 10. Based on the research results, MAMA-86-Yaremche published a booklet "Do We Drink Clean Water from Well?" with 1,000 copies print run, in which recommendations were given regarding improvement

of furnishing of these wells and quality of water therein. Fifteen wells were provided with passports containing general information about the water sources: location, belonging to departments, number of water consumers, data of construction, commissioning date, date of last repair; sanitary and technical characteristic (location, depth, furnishing according to the sanitary rules, disinfecting, lab analysis results, recommendations). At the next stage of the project implementation MAMA-86-Yaremche continued providing 36 public wells with passports together with the Carpathian National Park, Yaremche Municipal Council and Ivano-Frankivsk Oblast SES.

At the third stage of the Project implementation for wells cleaning we purchased powerful pump "Gnom" with all the necessary accessories for UAH 980. The capacity of the pump is 17 m^3/h, motor power is 1.5 kW. From the beginning MAMA-86-Yaremche delivered the pump in the balance sheet of Private Enterprise "Skelya," now it belongs to the Yaremche Integrated Utility Company, which provides public and individual wells cleaning up service. Due to this pump, 15 researched public wells were cleaned, and more than two dozens of individual ones; two wells were refurbished (cover repaired), water decontamination and repeated cleaning (Photos 1-3 in the colour insert). Then the experts of Nadvirnianski Disinfecting Department installed 10 chlorine cartridges in the cleaned wells. The results showed, that the drinking water quality considerably improved: coli index decreased by 1-2 orders of magnitude, nitrates content — almost twofold (although this norm was not exceeded), other parameters were within the permissible norms.

However, one cleaning did not allow attaining compliance of water with the sanitary requirements. This was connected with incorrect furnishing of the wells (location at the permanent contamination sources, unsatisfactory technical condition). Taking this into consideration, such wells should be cleaned twice a year. Nevertheless, the positive result is evident, because the level of contamination has decreased, and consequently, the risk of diseases due to poor quality water decreased as well.

It is obvious, that one pump is not enough for the rather large region. Therefore one more pump was purchased and entered in the balance sheet of the Carpathian National Natural Park (CNNP) — important nature protection establishment. More over, according to the cooperation agreement the leadership of CNNP has a responsibility to carry out free of charge cleaning of wells for CNNP workers. At present this work is being arranged in a proper way. For the other people the price of UAH 15 for cleaning of one well was set up according to the established procedure.

The next stage of the Project were studies on the alternative methods of water disinfection by means of natural high-mineral water — brine enriched with necessary microelements (iodine and bromine). Mr. Volodymyr M. Krasnoshtanov, chief expert of the Project, initiated these studies. The above-mentioned brine was named "Zbrui Yakuba." It has no odour, colour, is transparent, salted (contains 40 g of salts per litre). Brine of such source yet in 1930-s was used for preparing baths and inhalations of nose, throat and upper respiratory tract. Having dissolved such water in the 1:10 ration, it can be used as treating and table water. It contains large quantity of Chloride ion, which has disinfecting characteristic. Taking into account the above listed characteristics of high-mineral water, we tried to apply it as an alternative method of well water disinfection, and at the same time to enrich it with the microelements required for human organism, especially with iodine. Iodine deficit, which is characteristic for all highlands, which are effected by frequent precipitation causing water inflow in rivers. The studies were carried out by the experts of Ivano-Frankivsk Oblast SES. For this experiment we selected five wells, four of which were individual ones. It should be pointed out the active reaction of the population on our proposal. After preliminary extensive sanitary-bacteriological and sanitary-chemical analysis, we determined the following: in two wells Coli-index was 23 and 230 units accordingly (the norm is 10). After that we purchased ceramic cartridges, which were filled with high-mineralized water, and placed them into the well. In 10 days were did repeated water sampling. The results of the experiment appeared to be very interesting (see Table with coli index alone).

After disinfection with brine, coli index increased only in just one well. Maybe the contamination happened during the water sampling. Nonetheless, water quality improved in the majority of the wells. This fact may push further studies and scientific justification of the preliminary research.

It is interesting to consider the results of iodine content. After use of brine as a disinfecting agent, its concentration in well water was within 0.0035 to 0.0039 mg/dm^3. This research is a serious precedent for more profound studies, because there was no trace of iodine in the wells water before this experiment.

Sampling points	Results before disinfection by brine	Results after disinfection by brine
v. Mykulichin, 1st Travnya str. (public)	230	9
v. Mykulichin, 1st Travnya str., Kurtyak's private well	23	15
v. Mykulichin, 1st Travnya str., Stefanyuk's private well	9	23
v. Mykulichin, 1st Travnya str., Kiselyuk's private well	9	9
v. Mykulichin, 1st Travnya str., Popovich's private well	10	9

Conclusions and Recommendations

The result of implementation of the practical measures was water quality improvement for considerable number of residents (at least 4 thousand persons), first of all children in pre-school and school institutions. Taking into account the above, the practice of wells cleaning was initiated in the Yaremche region. The public interest to the water quality increased significantly, what is confirmed by the number of requests for cleaning of individual and public wells. We received more than thirty oral and several written requests. Risk of infectious diseases related to consumption of poor quality drinking water has also decreased, particularly, decrease of A viral hepatitis cases was observed: 91 cases in 2001, 53 cases in 2003. All the above is the evidence of considerable progress comparing with the tasks envisaged by the working plan.

In the course of the project implementation certain difficulties occurred because of unfavourable weather conditions, which caused delay in the process of research and cleaning. Some inconveniences were experienced because the purchased pumps designed for the voltage of 380 V but most of houses are provided with 220 V electricity lines.

Close cooperation has been established with different state departments (SES, Vodokanal (water supply utility), Carpathian National Nature Park, environment protection department, etc.), bodies of local self-government, the public. It resulted in appeal written by MAMA-86-Yaremche together with the leadership of Ivano-Frankivsk Oblast SES to heads of all Rayon's and Oblast administrations with request to allocate money in the budgets at the town, village and settlement councils for establishing wells maintenance service. The similar appeal was prepared together with the members of the Oblast Public Council. The problem of drinking water quality in the decentralized water supply sources was raised twice at staff meetings of the Oblast Nature Protection Department.

As far as the state policy in the field of water supply does not take into account interests of rural population, it is difficult to find the required funds in the oblast budget. Despite the fact, that the members of MAMA-86 raised this issue at the legislative level, this problem has not been taken into consideration in the Law "On Drinking Water and Drinking Water Supply" Therefore our next step will be considering this issue at the Parliamentary hearings.

Improving Safety and Quality of Wells Water in the Framework of the Project "Drinking Water in Ukraine" in Nizhyn

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Project background

The wells are used traditionally for drinking water provision in Ukraine.

At present the majority of rural population and considerable part of small towns' residents consume well drinking water. The same situation is in Nizhyn, the town of oblast subordination, which is located in the central part of Chernihiv Oblast. The town is located in the Prydniprovska lowland, at the boundary of mixed forest and forest-steppe zone, occupying the area of 43 km^2.

By 01.01.2003 the population of Nizhyn was 76.3 thousand. The natural population increase was (–6) in 2002. The death index in the oblast is higher than that of the whole country, and it is continuously increasing. The main causes of death are heart diseases (65.2%), cancer (11.0%). There is a tendency of permanent population aging. In the recent years it has been observed the increasing of diseases related to poor quality of drinking water (gastrointestinal tract, liver and gall tract diseases).

About half of the town residents (46%) use centralized water supply, about 30% of the residents are provided with canalization facilities.

During a long period of time quality of wells water was beyond doubts of the consumers.

Lack of information about quality of drinking water, low level of public awareness on water problems, water consumers rights and the ways of these rights protection, as well as disbelief in positive changes did not allow the town residents to participate and influence the water policy making processes at town level.

MAMA-86-Nizhyn was the first NGO, which raise the issue and disclosed the problems of drinking water quality, in particular, well water.

Due to tightening of the area for houses construction in towns and villages and lack of planning and construction regulation, the threat of microbiological contamination of well water appears. The first regulating documents regarding the drinking water quality and guarantees of its safety were focused on prevention of water contamination with waste water (from pit latrines, toilets, manure storage, etc) by means of identification of safe distance (it should be mentioned, that microorganisms can die after passing through aquiferous stratum the along 50 days).

Non-compliance with the sanitary and hygienic norms, construction rules in the course of town development due to objective and subjective reasons *(it is not always possible to keep (20 m) safe distance from contamination source to well in the area of 0.06 ha, according to the sanitary and hygienic norms requirements; there is not information and recommendations for those, who are planning construction of a well, particularly, regarding determining place for future well at the house land plot, etc.)* caused considerable increase of risk of public and private wells bacteriological and chemical contamination.

The problem of nitrate contamination of water occurred in Nizhyn within the last 20 years, as a result of soils contamination with toxic substances due to excessive use of fertilizers, plant protection chemicals and non-compliance with the domestic sanitary and hygienic rules. In Ukraine as a whole this problem has not been studied well, and the authorities and population did not pay much attention to the problem. Already in 1980-s the EU countries approved the directives concerning the nitrates. However, wide public in Ukraine was unaware of this information. According to the preliminary public opinion poll, only 4% of the resident knew about the nitrate contamination of water.

It should be mentioned, that harmful impact of nitrates on the health has already been known to both scientists and doctors. Nitrates cause violation of functions of a number of human body systems and organs, provoke cancer diseases. Children especially suffer from the negative influence of nitrates. In the oblast the cases of medhemoglobinemia disease of infants from the age of 22 days became more frequent, 10% of which are mortal.

Project Objectives

MAMA-86-Nizhyn water initiative was aimed to protect the citizens' right to safe drinking water, as well as to free access to the information about water quality. Within the program of technical solutions MAMA-86-Nizhyn raised the wells water problems and implemented the measures to raise town residents' awareness about the current local water problems, to improve the well water quality and to prevent the aquifer from contamination. The main tasks of the educational activities were the following:

- informing the town residents about ecological, sanitary and hygienic and household norms, as well as rules of wells construction and maintenance;
- cleaning and well-equipping of the wells and territories near by.

The main condition of successful fulfilment of the Project and its further development was involvement and development the partnership among all stakeholders.

Place of Project Implementation

The place of Project implementation was selected private sector of the town of Nizhyn, where the decentralized water supply is the main.

Project Budget

The Project budget totals at 4,963.27.

Project Implementation Term

The Project is implemented within 01.01.2001-31.12.2003.

Project Output

Solving of drinking water problems was identified as the priority direction of MAMA-86-Nizhyn activities from the very beginning of the organization's operation. Yet in 1999-2000 MAMA-86-Nizhyn began collecting information about the environmental issues, particularly, about the quality of drinking water in the town, conducted preliminary survey of environmental problems and influence on health. Public opinion regarding these problems was also studied. These studies confirmed urgency of the well water problems. Due to persistent work of MAMA-86-Nizhyn to attract attention of wide public and authorities, the drinking water problems were recognized as a priority for action by the local authorities, departments of nature protection and sanitary service of the Town.

At the first stage of the Project implementation the main task of the Organization was well water quality analysis and informing the population about the problems and possible ways of solving thereof.

MAMA-86-Nizhyn published 1000 copies of the booklet developed by MAMA-86-Poltava — "Beware of nitrates!" and disseminated it among the local people and respective municipal services; conducted seminar and round table, collaborated with town mass-media to raise public awareness on the water problems. The text of the booklet on nitrates, signed by Mr. M. P. Pyshnyi, Head of Sanitary and Hygienic Department of the town SES, was published several times in the town newspaper "Visti." This publication was the first official informing of the town residents about the nitrate threat.

For deep studying of the situation with drinking well water, at the initial stage of the Project implementation, MAMA-86-Nizhyn proposed the Nizhyn SES to cooperate. However, SES did not support the proposal, and the NGO conducted the nitrate contamination analysis of well water with involvement of independent experts. First, 100 wells were checked using the express analysis method, then analysis of water quality in 10 wells was done assisted by the Bobrovytska SES. Later, these 10 common wells were cleaned up and disinfected preventively. Representatives of business, town residents took an active part in this work. After cleaning, water was analyzed repeatedly, and the relevant conclusions

were made (water samples from 10 wells were analyzed in the National Academy of Sciences of Ukraine (NASU).

The analysis of the received data showed that:

- 70% of wells were considerably contaminated with nitrates. The MPC was exceeded by 2, 10, 20, 40...60 (!) times (this index was later confirmed by the Oblast SES);
- 40% of wells require routine repair (Picture 6 in the colour insert);
- 10% of wells require to be closed by sanitary packing.

Together with wells water analysis's on nitrate contamination, studies of sanitary conditions of wells and wells protection zone were undertaken, paying attention to the distance between a well and potential biological contamination sources.

The studies confirmed, that the quality of drinking water in well is higher, if the hygiene rules are observed at the water intake territories.

It was also identified the dependence of the water quality indicators on compliance with the sanitary norms of wells operation. 85% of wells had not been cleaned throughout all their lifetime.

Lack of scheduled cleaning of wells causes worsening of well water quality by 18%, and increases the risk of diseases related to consumption of poor quality water.

An interesting conclusion was made, based on the analysis of the results, concerning dependence of drinking water quality on the term of well operation. Surprisingly, old wells built over 50 years ago, have water of better quality. We believe, that the main reason of such phenomenon is application of effective traditional techniques of wells construction. The local old residents confirmed this opinion. This is first of all connected with construction of the wells clay "locks," which ensure reliable wells protection from penetrating of rain waters. For the wells aged up to 50 years the clear tendency of nitrate contamination increase is observed, as a result of non-compliance with the sanitary and hygienic rules of their building and maintenance.

Summary of the Survey Results and Recommendations on Improvement of the Situation

№	Study subject	Results	Recommendations
1.	The dynamics of publications on drinking water theme in "Visti" newspaper	The number of publication in 2001 — 3; 2003 — 12	The further increasing of publication number
2.	Public opinion about the drinking water quality	11.8% of 1,120 respondents from Nizhyn residents know what kind of water they use	To develop informational and educational work
3.	Results of the wells drinking water analysis on nitrate contamination (100 wells were studied by express analysis)	Percentage of wells, where the concentration of nitrate in water is: • 29%, proximately to the MPC and doesn't exceed it; • 71%, the MPC is exceeded by 2, 5, 10 and more times	Compliance with the sanitary and hygienic norms of wells construction and maintenance. Use the alternative water supply
4.	Results of drinking water quality indexes before and after wells cleaning up (10 public wells, the conclusion of the Bobrovytsa SES)	Improvement of the situation, especially decreasing: • nitrate contamination — 18%; • hardness — 21%; • bacteriological contamination — 46%	Making regular wells cleaning
5.	Analysis of the wells drinking water quality indexes (independent expertise of water samples from 10 wells, the laboratory of NASU)	9 of 10 checked wells don't meet the norm of nitrate concentration in water by 2-63 times	Necessity of compliance with the sanitary and hygienic rules of wells maintenance, using of organic agriculture
6.	The wells' technical conditions (120 wells checked)	It was shown, that 40% of public wells require routine repair	Routine maintenance and cleaning up the wells

№	Study subject	Results	Recommendations
7.	Wells age and nitrate contamination correlations	Drinking water quality becomes worse with the term of wells operation, with the exception of the wells built 50 years ago	Availability of cement lock and compliance with the sanitary and hygienic norms of wells protection zones
8.	Wells protection zones studies	32% of objects don't satisfy the sanitary norms and rules of operation at the water intake areas	Public awareness raising on household keeping culture
9.	Dependence the water quality on compliance with the sanitary and hygienic rules of wells' operation (100 wells controlled)	The dependence of the water quality on wells conditions was shown	The need of regular cleaning of wells (no less then 1 time per year)

The total number of residents, who benefited from the implementation of the Project, considering the informational support and practical solving of the ecological problems, amounts to 40,000 persons.

The results of the analysis of well water quality and proposals on its improvement were submitted to the town council. The main recommendations were about development and implementation of the specific measures system focused on health protection by solving the problems of water nitrate contamination. First of all, according to MAMA-86-Nizhyn's recommendations it is necessary to provide the public wells with passports, having identified wells with clean and contaminated water.

Taking into account, that in the recent years water supply sources as a whole, and wells in particular, experienced considerable anthropogenic impact, those of them, which remain clean, have to be preserved; and to share experience of clean water provision among people. We are all consumers, who are responsible for safety and quality water and have to understand, that the life requires new philosophy of water consumption and protection. The main priorities in making decisions on water supply is to guarantee the provision of current and future generations with safe drinking water and saving the water resources of the country. Taking this into account, ecological NGO may assist greatly both to the power and the residents.

An example of such assistance in the area of protection of the most vulnerable groups of water consumer from the nitrates, the Organization developed the proposal on preventive measures, which was delivered to the municipal executive committee. This proposal was considered and accepted for implementation at town level and in a time was accepted at the Oblast level. At present, there is a decision on registering and checking of public and private wells, which water is consumed by pregnant women and children. The public local initiative originated in the town of Nizhyn, was disseminated in the Nizhyn Rayon and, later, in Chernihiv Oblast.

The activities of MAMA-86-Nizhyn facilitated raising public awareness on nitrate threat related to wells water and attraction of the authorities and public attention to the water problems and ways of its solution. Opening the facts of harmful impact of nitrates on human health the public contribute significantly into speeding up of the solution of nitrate problems in the town. Only trustful information on the existing situation in development and implementation of measures on prevention of the harmful impact of nitrates on the health of the residents and involvement of all stakeholders to solving this problem could give the real results.

Due to the implementation of MAMA-86-Nizhyn Project, the level of awareness of the town residents on the issues of safety and quality of drinking water increased considerably. Within the last three years the number of publications and broadcasts in mass media has increased threefold. Special informational materials and questionnaires were disseminated among the town residents. At the same time MAMA-86-Nizhyn with assistance and participation of the representatives of different stakeholders carried out broad educational work among the town residents on environment and health problems. Thus, from the side of the power, the municipal sanitary service submitted the information about the negative impact of the nitrate-contaminated water, based on which an alternative water supply was recommended.

One of the positive consequences of this educational work was rapid increase of applications for connecting to the water pipeline from the residents of private sector. Within the last two years the length

of new water pipelines has increased by 17 times: 309 m of water supply pipeline was laid in 2001, and 5,581 m — for 2002-2003.

The Organization pays special attention to the informational and educational work among the schoolchildren of the Town. In the framework of the MAMA-86 campaign "Drinking Water in Ukraine," the local Program "We Have to Live on this Land" was developed and is being implemented. The main goal of this Program is forming of ecological consciousness of youth by means of studying theoretical and practical basics of nature protection. General secondary schools No. 2 and 5 were selected for the Program implementation. Children from other town schools are also involved into the implementation of the Program through the participation in club "Young Ecologist" of the Children and Youth House. The main tasks of the Program are to assist the preparation and undertaking ecological lessons, eco-actions, holidays related to the environment and health protection. The Program is focused on school-children involvement in solving of the local environmental problems. In the framework of this Program schoolchildren are involved in the research and cleaning up actions of the River Oster banks, inspection of private and public wells, planting trees.

One of the main stakeholders concerned about improvement of the environment state and quality of drinking water were representatives of private business, who cooperated with MAMA-86-Nizhyn. They supported financially the informational materials publication, took part in rehabilitation of the collective wells. Lack of technical service, as well as practical experience in cleaning wells required searching for the contractors and new treatment technologies. They were found by the joint efforts, what allowed to establish affordable wells cleaning service to people. Cleaning of one well, depending on scope of work, cost within UAH 150 to 300, when the utility companies put the price of UAH 900 for this work). After cleaning and controlling of the collective wells (see Picture 7 in the colour insert), the residents applied to MAMA-86-Nizhyn for assistance. The Organization provided consultations, equipment and recommended contractors, who in their turn, made advertisement in the mass media offering the wells cleaning services, which they established thanks to cooperation with MAMA-86-Nizhyn.

Based on the experience on solving the well water problem, in January 2003 the Organization prepared its proposals for submission to the municipal council regarding establishment of the wells maintenance service and provision of public wells with passports. On 15 February 2003 the deputies of the municipal council at the Commission meeting, attended by heads of the utility companies, nature protection and sanitary services departments of the town, supported the proposal on passportisation of the town public wells and proposed to develop the joint action plan by representatives of the governmental bodies together with the utility.

Simultaneously, the results of studies of well water quality were delivered to Mr. M. P. Donets, the Chief State Sanitary Doctor of Chernihiv Oblast. It should be mentioned, that the wells passportization, initiated by MAMA-86-Nizhyn, was accepted and supported by the Oblast authorities. Order No. 312 dated 8 September 2003 of the Chernihiv Oblast State Administration "On Provision of the Population of Chernihiv Oblast with Quality Drinking Water" became the basis for the future work on the well water problems.

The Public respond and actively support the initiatives of MAMA-86-Nizhyn on the improvement of the drinking water quality, take part in the actions on cleaning and rehabilitation of wells, cleaning of the wells protection zones. The town resident's attitude to water sources is changing, the responsibility for preserving and preventing contamination of aquifer is increased. Thus, the residents of the Myhalivka district together with MAMA-86-Nizhyn organized a meeting with the municipal council deputies, extended their proposals on public and other stakeholders participation in improvement of the ecological situation if the region. As a result of these decisions, the City Council allocated funds for cleaning of the 2 ha territory in the basin of old bed of River Oster from animal remnants and spontaneous wastes dumps, which were the source of bacteriological contamination of soil and water for a long time not only in this territory, but across the town.

Using the services of the municipal utility companies, the residents themselves also organized cleaning and rubbish dumping from their domestic facilities.

Conclusions and Recommendations

1. Due to the MAMA-86-Nizhyn initiative the information about the quality of drinking water became accessible for broad public, available at the official and public level.
2. The information on the drinking water quality has been open and expanded threefold in the mass media.
3. The level of town residents' awareness on safety and quality of drinking water has been increased.
4. The municipal authorities admitted the wells water problems as the priority for the town.
5. The monitoring of the centralized and decentralized drinking water quality has been done.
6. Wells with clean and contaminated water have been identified.
7. Wells with high levels of contamination, which have to be closed as sources of contamination, have been identified.
8. A map of wells contaminated with nitrates in the Town of Nizhyn has been issued (120 objects, 222 as total).
9. The proposals on improving the drinking water quality and prevention of aquifer contamination have been developed.
10. According to the public initiative MAMA-86-Nizhyn together with the municipal SES fulfilled passports for 126 town public wells.

Joint Solution of Environmental Problems — Step to Health Improvement

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Project background

The current ecological situation and health conditions of the population in Ukraine can be characterized as critical. Violation of the natural processes balance caused development of ecological degradation of the major part of our state's territory. Increasing of environment contamination violated considerably the balance in the human being-environment system. The consequence of this situation is the worsening of the public health, because human organism is effected by new and strong chemical and physical factors, to which it hasn't acquired adaptation in the course of evolution. The environment requires permanent attention, control and comprehensive research. According to the calculations of WHO experts, people health is caused on 50% by the style of living (diet, working conditions, material and domestic factors), on 20% — environmental factors, natural and climatic conditions, on 20% — genetic, heritage factors, and on 10% — by medical help.

No doubt, that at present among all ecological factors, which influence health of children, the first and special place is occupied by water. The fact, that water constitutes 70% of the organism tissues, says about its extraordinary vital role. According to the statistics, about 80% of all diseases and about half of lethal cases in the developing countries are caused by consumption of contaminated water. In average, about one tenth of human being's useful time is spent for treatment of the diseases, which are transferred through water.

Increase of allergic illnesses, chronic bronchi-lungs pathology, gastrointestinal tract, vasculitis, arthritis, development delays and endocrinopathys, embrio- and phetopathys, congenital defects of infant development are connected in the recent time with contamination of environment, drinking water and food products with xenobiotics and other annutrients. Besides, impact of ecopathogenic factors caused appearance of a number of new, earlier unknown diseases, such as chemical intoxication — sulfide, nitrite-nitrate, isotiotsinary, etc.

Particularly, special attention should be paid to contamination of drinking water with nitrogen compounds. Due to violation of ecological balance, they transformed from the means of mineral nutrition of plants into powerful anthropogenic contaminant of the environment. This first of all concerns nitrates, so-called "niters," which were earlier used in agriculture in extremely large quantities. Having the good water solubility nitrates are easily washed out from soil, perform horizontal and vertical migration, and in 10-15 years accumulate in aquifer, and from there into shaft wells of individual and public use. The process of natural waters contamination with nitrates is largely facilitated by the complex of natural and climatic factors — good filtration and aeration features of soil, rather high temperature of the environment, sequence of minimum and maximum moisturizing of soil, low depths of ground waters, intensive operation of aquifer. The problem of nitrate contamination of drinking water is especially urgent for Poltava Oblast. More than 44.7% of water samples have deviations from the established standards. Since recently, cases of nitrates poisoning of infants are occurring more frequently (7 cases for 1997, 12 — 1998, 13 — 1999, 12 — 2000, 13 — 2001, 6 — 2002), which required treatment of children in reanimation departments with application of hyperbaric oxygenation.

Comparing to 1986, content of nitrates in water of shaft wells increased by more that ten times in average per Oblast. According to the data of 1999, almost one third of all analyzed water samples from wells, which were used by pregnant women, was nitrates contaminated.

It should be mentioned, that nitrates impact negatively not only on the whole organism; scientists regard them as predecessors of high carcinogenic compounds. Taking into consideration of the high pathologic nature of nitrate impact, this fact is of great concern, and it requires attention of the power bodies. Particularly, much concern is to the fact of low awareness and insufficient understanding of this problem by the residents, who live in the rural areas of nitrates contamination of the environment and particularly drinking water resources.

Most frequently, and in the biggest quantities nitrates are discovered in water supply sources: public and private wells. In Poltava Oblast there are up to 200 thousand wells. Taking into consideration the above, having analyzed the current situation with water supply, it was discovered, that over 605 thousand of people (36% of the population) consume well water. The number of children, who consume well water, is over 107 thousand, or 35% of the children population of Oblast. Among these children 60 thousand (56%) consume drinking well water with nitrate contamination. To increase the usage of artesian wells for water supply in the rural areas is rather reliable way of prevention chronic and nitrates poisoning. Therefore the objective of our project was to draw attention of the local authorities to solving problem of nitrate contamination of drinking water on the example of rehabilitation of rural water pipeline in the village of Pisky, Lokhvytsia Rayon.

Lokhvytsia Rayon occupied permanently the first places on nitrate contamination of well water in the Poltava Oblast. The population of Rayon is 57,630 people; 9,542 of which are children. There are 80 villages in the Rayon, 75 of which consume only well water. The attention was paid to the fact that the majority of rural pipelines were out of operation, because the pumps were out of order. After consultations with O. D. Kyrychenko, Chief State Sanitary Doctor of the Rayon, and N. A. Okhonchenko, Chief Doctor, we selected the village of Pisky, where 3,000 people reside. There are kindergarten, school, rayon hospital in the village. Monitoring of drinking water quality indicators showed, that alongside with overall high content of nitrates (500 mg/l and higher), there is bacteriological contamination. Due to geographical location of the village, fertilizers and pesticides from storages, located higher than the village level, penetrate into the ground water and to the wells. It should be mentioned, that there are 3 oil and gas mining wells on the territory of the village council.

After long consultations and discussions with the Rayon and Village authorities concerning the current situation with drinking water, and the real ways of its improvement, the priority was made on the necessity of rehabilitation of the water pipeline in the village. To draw attention to solving of these problems in Lokhvytsia Rayon the round table "Problem Issues of Provision Residents of Lokhvytsia Rayon with safe drinking water" was held. Representatives of local authorities, public health, education, utility companies of the Rayon and village level attended this round table. Participants recognized the problem of drinking water quality in the rural area as the priority. The financial options for solution of drinking water quality problems in the rural area, particularly, local fundraising among the oil and gas industries, was considered separately.

Rehabilitation of water supply pipeline in the village was carried out in parallel with the informational campaign among the residents. In particular, special attention was paid to the pathogenic effects of nitrates on human organism, on the measures on protection of organism from nitrates.

MAMA-86-Poltava carried out proper survey of individual wells to identify nitrate contamination. As a result, wells with relatively low and high nitrate content were identified. Particularly, it was figured out, that the schoolchildren consume water from the located nearby well, where nitrate content was over 500 mg/l.

Due to the informational work, the village residents understood the nitrates problem and became determined to solve it: they started constructing wells of over 20 m depth for collective use, and receiving free from nitrates water.

Within three years, MAMA-86-Poltava conducted informational work in the Rayon, which comprised lectures for the population, individual conversations with parents and medical examinations of children, environmental lessons for schoolchildren. Much attention was paid to the informational work among medical staff of the rayon. They were given lectures and distributed methodological recommendations: "Medical and Ecological Aspects of Nitrate Influence," "Baby, Feeding, Nitrates," "Feeding and Nitrates." These publications were distributed among all medical attendant and obstetrics units of the Rayon. The informational activities covered almost 80% of the Rayon residents.

Due to the informational and educational activities, construction of deep wells and other measures, number of nitrate poisoning cases considerably decreased. Thus, for 2002-2003 no child from the Rayon was received by the reanimation department of the oblast children's hospital with the diagnosis "nitrate poisoning." It should be mentioned, that prior to this period, 3-5 such cases were observed annually.

As a result of primary checking the state of the artesian well in the village of Pisky, it was identified, that it did not comply with the sanitary norms: it was not guarded, the motor was out of order, depth pipes were broken, the house was half-ruined, the ceiling was leaking. Due to financial support of the NOVIB fund, new motors were purchased, pipes were replaced, the premises, ceiling and water tower were repaired — totally for the amount of UAH 15,175. However, artesian well water analysis showed high concentrations of chlorides and iron, water had bitter and salty taste. Children did not drink this water, but consumed well water which was contaminated with nitrates in the quantity 10 times exceeding the norm (500 mg/l). It was decided to install additional water purification device in the school. In the course of selection, preference was given to the water purification unit made in Ukraine, which was adapted to local water quality by the experts of the Kirovohrad Polytechnic University and Firm "Konversor." The principle of device operation lied in multi-component purification based on natural filtering elements: kieselgur, activated carbon, lime water, special filtering fabric. Throughout the first months of the installation operation, water parameters were permanently monitored, optimal system and operational regime were adjusted. Capacity of the device, 1 m^3 per day, provides children and staff of local school and kindergarten with water for cooking and drinking purposes. Thus, about 1,320 persons, 370 of which are schoolchildren, received water directly from the artesian well. It should be mentioned, that such local purification unit is cheap (UAH 16,000), user friendly, does not require expensive filters, and has two-year guarantee period.

Aimed at prevention of nitrate poisoning of children in the Oblast, the sanitary and epidemiological service and communal utility service perform a number of the following measures: regular cleaning of the shaft wells, elimination of condition of penetration therein different types of contamination with rain water, incorrect use and non-compliance with the sanitary and hygienic rules. As it was mentioned before, the reliable prevention measure is gradual extension of the village water supply network based on usage of local artesian wells. It has to be mentioned, that Poltava Oblast permanently holds one of the first places among Ukrainian Oblasts by the performances of rural pipelines construction. The first rural water supply pipeline in Ukraine was built in the well-known Village of Sorochyntsi of Poltava Oblast in 1928. However, there is a number of rural water pipelines in the Oblast, which are not operable because of motors failure. It's a shame, but because of difficult economic situation in the country village councils have no funds for the motors repair. Therefore the Poltava City Ecological NGO MAMA-86-Poltava, have evaluated the situation in the region, in the framework of the Project "Drinking Water in Ukraine" under financial support by the NOVIB Fund and after that installed motors in the most of the nitrate contaminated villages: V. of Svyrydivka (October 2002, cost UAH 4,400), V. of Poharschyna (October 2002, cost UAH 4,154), V. of Bilohorilka (October 2002, cost UAH 3,071) of Lokhvytsia Rayon: in the Village of Myloradovo of Kotelva Rayon (June 2003, cost UAH 2,750) and in the V. of Hozhuly of Poltava Rayon (September 2003, cost UAH 540), which also have nitrate contaminated water. It should be mentioned, that the village council of the Village of Hozhuly invested 4/5 of the total cost of work on the repair of water pipeline and pumps.

Thus, due to this Pilot Project implementation the rural residents of the 6 villages (about 6,500 of the population directly and about 8,000 indirectly) of Poltava Oblast are provided with safe drinking water, the attention of the authorities, medical staff, and broad public was attracted to joint solving of the problem on drinking water supply.

Water Supply Alternative Solutions

At present difficulties of water supply problems and their local specifics (availability and quality of the sources, which are used or can be used for drinking purposes; lifetime and technical conditions of the existing water supply infrastructure, traditions and culture) from the one side, and restriction of economic and technical possibilities, from the other side, are requiring a profound knowledge about the new approaches and technologies, and involvement of active and responsible people for solving these problems. The necessity of strategic vision of the ways to solve the problem of people provision with clean drinking water is urgent for Ukraine both at the national and local levels. Exchange of information on successful implementation of effective and low cost technologies and knowledge of local possibilities are currently of special importance for working out alternative solutions of the existing water supply problems.

Based on the campaign experience and collected information on the local drinking water problems, the participants of pilot projects MAMA-86 proposed a few different alternative concepts concerning the drinking water problems at their locations:

- local additional purification of tap water;
- use of alternative water sources for water supply.

Five pilot projects were fulfilled in this direction in the framework of the Technical Solutions Program. Implementation of local additional water purification was made in the Town of Tatarbunary, Odessa Oblast, and in the Town of Mariupol. These pilot projects continued developing of MAMA-86-Tatarbunary experience and multiplying the model of water quality improvement by means of using small-scale local additional purification system (LAPS). Such approach to solve water problem focuses not on the "beginning of the pipe" problem (at the water pipeline), but at the "end of pipe" — at the consumer. At present it may be considered as one of the perspective alternative approaches. Application of LAPS allows for a certain consumer groups preparing better quality water, eliminating secondary contamination, which was caused by poor water pipeline condition. In our cases these groups of consumers were children of school and pre-school age in the Town of Tatarbunary, and the children, which are improving their health in the sanatorium "Aibolyt" in the Town of Mariupol.

The second group of the projects regarding use of alternative local water supply sources was implemented by MAMA-86 organizations in the Town of Artemivsk, the Town of Feodosia and the City of Sevastopol.

Based on the long-term studies and analysis of the collected substantial information about possibilities of using local drinking water sources, the public organizations initiated different by scales projects of strategic solution of drinking water problems in these areas. The pilot projects in the town of Feodosia and City of Sevastopol have demonstrated the importance of using traditional knowledge and methods, which solved effectively local water supply problems in the past.

The results of all five pilot projects on the alternative solutions of water supply were discussed during the regional seminar in the town of Mariupol on January 16, 2004. The results of these discussions were submitted in the recommendations of the representatives of different stakeholders groups, which took part in the implementation of the pilot projects (see Annex 4).

Safe Drinking Water for Tatarbunary Children

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Project Background

From the early days the residents of Budzhak steppe suffered from shortage of fresh water. For the last decades of the XX century the structure and intensity of agriculture; distancing from the traditional use of natural resources as a whole caused in the South of Ukraine the current critical economical, ecological and social situation, particularly in the Tatarbunary District of Odessa Oblast. Poor quality and shortage of drinking water, and often lack of the fresh drinking water sources are the most complicated urgent problems of the region.

Intensive consumption of water for the requirements of rural and urban water supply, agriculture resulted in decrease of the level of main (upper and lower Sarmatian) operational water aquafare, increase of mineralization, exhausting of the stock and worsening of underground waters quality (contamination due to uncontrolled use of pesticides and poisoning chemicals, as well as domestic and communal waste water). Worsening of water quality was identified on separate territories of a number of irrigating systems, particularly Danube-Dniestr one.

Almost all (ground and artesian) sources of water supply in Tatarbunary Rayon do not conform to the requirements of DSTU 2761-84 (State Standards of Ukraine).

Unfavourable situation formed with the ground waters, which are used by the population for drinking and household purposes, first of all in the rural area. It should be mentioned, that the ground waters belong to sulfate-chloride, sodium and calcium-magnum water type with the mineralization of 0.75-10.2 g/l. The indexes of overall mineralization exceed the Maximum Permissible Concentration (MPC) of chlorides by 2-3, nitrates by 2-6 times. The main contaminants of the ground waters are the following: nitrogen compounds, pesticides, heavy metals, oil products. Special concern is to the nitrate contamination of well water due to non-compliance with the sanitary and hygienic rules in using organic and mineral fertilizers. This factor negatively influences the public health, first of all blood system, especially of children.

Project Objectives, Place, Term and Scheme of its Implementation

Rayon Public Ecological Organization MAMA-86-Tatarbunary carried out studies of the drinking water problems in the framework of the Campaign "Drinking Water in Ukraine." As a result of the research work within 1998-1999 and analysis of the additional water purification devices, MAMA-86-Tatarbunary invited the local producer of water purification devices to solve the local drinking water problems.

Having analyzed the quality of local tap drinking water, the specialists of private firm Ecosoft produced second osmosis mini-device UVPM-0.1 for additional purification of water with high content of minerals.

Throughout half a year (May-October 1999) the device successfully passed through tests (the water quality complied with the drinking water standards). In autumn of 1999, 300 children of central kindergarten were provided with additionally purified water. In 2001 MAMA-86 signed the cooperation agreement with the administration of Tatarbunary Educational and Upbringing Complex (EUC) School-Gymnasium (1,200 persons). The second osmosis additional water purification device UVPM-0.1 was installed in accordance with the instruction "On Sanitary-Hygienic Supervision of the Enterprises of Processing and Packing of Drinking Water" in a specially equipped room in the School-Gymnasium.

The Tatarbunary Rayon Sanitary-Epidemiological Station (SES) controls water quality on a regular basis. Throughout 1999-2003 MAMA-86-Tatarbunary did independent analyses of the drinking water quality. The analysis of water quality before and after purification was done in different establishments: in the laboratory of ionic exchange and adsorption of the NTU Kyiv Polytechnic Institute (5 times), in the laboratory of the Odessa Hydrogeological-Reclamation Expedition (HGRE) (3 times), in the Institute of Resort Studies (1 time), in the Ukrainian SRI of Transport Medicine (1 time), in the Physical and Chemical Institute of NASU of Odessa (1 time) and in the Odessa Oblast SES (1 time).

The water analyses confirmed, that the purified water by its chemical and bacteriological composition meets the normative requirements.

In 2001-2003 everyday access to drinking (purified water) was provided to 1,600 persons (children, pupils of EUC, teachers and support staff), in summer season — kindergarten (350 persons).

In 2003 according to the NOVIB Project, MAMA-86-Tatarbunary also worked on rehabilitation of public well at the address: 10, Myra Street. According to the data of Tatarbunary Oblast SES and Odessa HGE, this well is the only one (!) in the town among 100 public wells, which complies with the normative chemical and bacteriological indexes. MAMA-86-Tatarbunary addressed to the local residents with the proposal to renew the well, which was built in 1933, because it got silted, and was not repaired. Fundraising was organized for well rehabilitation. The well was cleaned; a pump was purchased and installed. In accordance with the sanitary and hygienic rules, the well was equipped with a cover, and the surrounding sanitary zone was cleaned. For rehabilitation of this public well and the adjacent territory were used grant money from the NOVIB Project (UAH 525.00) and the local residents donations (UAH 350.00). Every day over 100 local and the neighbouring villages' residents take water from the well, thus consuming 3-5 tons of water per day.

In 2002 the Marzeev Institute of Hygiene and Medical Ecology of the Academy of Medical Sciences of Ukraine issued the Hygienic Conclusion about the state of water provision of the town of Tatarbunary, Odessa Oblast. In this research Ms. S. B. Tarabarova, Candidate of Medical Sciences, senior scientist of the laboratory of water supply hygiene and water resources protection, outlined the analysis of current situation concerning the town water supply and the existing links between specific diseases of the local people and the water quality they consume. Having analyzed the quality of water purified with UVPM-0.1 device, the following conclusions were made: use of second osmosis unit UVPM-0.1 for additional water purification allows improving its quality considerably; water purification unit UVPM-0.1 can be recommended for wide use for additional water purification.

The cost of additionally purified water is rather high — 0.1 hryvnas per litre (the price of 2002). The high cost caused by its low throughput — 40 litres per hour (the unit was manufactured only for the requirements of small number of users), high cost of the SES services and the existing taxation system (particularly, the operator wages).

The unit cost is Euro — 2,429.00. Its maintenance cost amounts to UAH 6,000.00 annually (near Euro 1,000, the prices of 2003).

In 2001 (the educational institutions were on the balance sheet of municipal councils), the Tatarbunary municipal council undertook financing of the installation operation (particularly operator's wages), and Directorate of EUC School-Gymnasium undertook to allocate premises, provide water, sewerage and electricity. Filters and water analysis were financed by MAMA-86 "Drinking Water" Project.

After approval of budget for 2002, schools were transferred to the balance sheets of rayon educational departments, therefore the scheme of financing changed — the Municipal Council refused to allocate funds for operator's wages, justifying its decision that schools were on the balance sheet of the rayon councils, and therefore the rayon authorities was obliged to ensure the necessary financing and pay for the cost of analyzes performed by the rayon SES. Unfortunately, this decision was influenced by the 2002 elections — the deputy corps was changed by 75%. New head was elected, who in that period did not consider problems of provision of residents with clean drinking water as the priority ones (but the issue of insufficient quantity of water resources was and still remain of the utmost priority).

MAMA-86-Tatarbunary carried out a number of measures: round tables, meetings, lessons, interview, and consultations. Deputies of the Municipal Council, representatives of the power (district, municipal), rayon SES, Directorate of EUC School-Gymnasium, kindergarten, parents, as well as the

town residents were being involved in the discussions of the drinking water problems and ways to solve thereof.

In November 2003 based on the initiative of the Rayon environmental NGOs, an inter-sectional round table "Tatarbunary Water Problems and Ways of Solving thereof" was held in the Municipal Council. Anna Bazan, Head of MAMA-86-Tatarbunary, reported on activities of MAMA-86 network, which was implementing the Drinking Water Project, I. Vykhrystyuk, Project Coordinator, who told about its concrete practical results for our town, and M. Dimytrenko, who presented the results of MAMA-86-Odessa Project. After the round table, N. D. Topal — Senior Mayor of Tatarbunary town council, made proposal on development of the municipal Program "Water Supply and Sanitation of the Town of Tatarbunary till 2010" to be developed by NGOs with involvement of rayon specialists. It is planned for 2004 to transfer the UVPM-0.1 unit onto the balance sheet of the Municipal Council aimed at provision of the children with quality drinking water.

Conclusions and recommendations

1. Environmental problems, particularly the issue of drinking water quality, are not the priority for the authorities.
2. Poor awareness of the decision makers about water problems.
3. It is very difficult to work with people, who do not possess the information and have no desire to clarify the problem; this first of all concerns the deputies and rayon and town leadership.
4. There is an insufficient financing.
5. Lack of initiative from the local people: there is opinion that only the power has to deal with these issues.
6. Low purchase ability of the population — not everyone can afford to install water meters.
7. Lack of initiative from the side of businessmen (additional water purification).
8. Social programs, particularly, drinking water, have to be supported by the state funds.
9. Local mass media pay insufficient attention to the issues of drinking water. Neither local mass media, nor medics, nor Rayon SES provides the information (which was received only after our official requests).

Sustainable Technical Concept of Sanatorium "Aibolyt" Drinking Water Supply

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Project Manager "Clean Drinking Water for Mariupol"

Project background

The city of Mariupol is located at the shore of the Sea of Azov. Two rivers — Kalmius and Kalchik are flowing through the city. Staro-Krimsky (Old-Crimean) Reservoir is situated near the city. It seems, that there should be no problem with water, including drinking water. However, the situation with water is critical. The city residents do not receive drinking water in sufficient volumes due to its loss in water supply pipelines on its way to the consumers. In addition, the water quality does not comply with DSTU "Drinking Water."

The reasons are the following:

- difficult ecological situation in the city, a big industrial centre of Donbas (over 90 industrial enterprises are located on its territory, including 2 metallurgical integrated plants, which in the Soviet times were of the Union importance);
- poor quality of water supply sources;
- out-of-date water treatment technologies;
- wear and tear of the water pipeline networks, due to which breaks and secondary water contamination take place.

The Mariupol City Environmental NGO MAMA-86-Mariupol was registered in 2000, and joined the "Drinking Water in Ukraine" Campaign in 2001.

Taking into consideration all these problems, MAMA-86-Mariupol came to the conclusion, that for solving local problems of drinking water problems, the Tatarbunary experience of local additional drinking water purification or local water treatment unit can be useful. Such approach guarantees provision of the consumers with quality safe water.

Project Implementation Place

The place of implementation of the Project on additional drinking water purification was selected the Oblast pre-school sanatorium "Aibolyt" (the City of Mariupol), in which children aged 3-7 years with respiratory diseases are improving their health.

The specifics of this sanatorium are as follows:

1. This is the only profile recovering pre-school establishment in the Donets Basin region, which deals with prevention and treatment of respiratory organs pathologies; 70% of the children, who improve their health conditions, are young residents of Mariupol;
2. Children from families with low income are treated in it, for whom this treatment is free of charge;
3. Children receive full complex of procedures: air cure, vitamin therapy, adjuvant treatment, oxygen cocktails, massage, physiotherapy procedures.

The Pilot Project "Clean Drinking Water for Mariupol" started from independent analysis of drinking water quality, which was consumed by the Sanatorium "Aibolyt." It should be mentioned, that the sanatorium had major problems with water supply, namely:

- irregular water supply, which was connected with frequent accidents at the water pipelines;
- low quality of drinking water, which did not comply with DSTU "Drinking Water" by the following parameters: hardness, sulphates, chlorides, as well as by biological indices.

Project Objective

To find and introduce an optimal and reliable technical solution and provision of Sanatorium "Aibolyt" with quality water.

Term and Scheme of the Project Implementation

The Project was implemented within two years (from July 01, 2001 to July 01, 2003) and consisted of 6 stages:

Preparation (01.07.2001 - 01.04.2002), within which a database of enterprises, institutes dealing with the water treatment was established enumerating over 67 enterprises at the local, oblast and national levels; collected information and database developed of the parameters and tendencies of water quality change in the City of Mariupol. The research showed specifics of the drinking water quality in the City, in particular, considerable content of sulphates (the indexes exceed the standard by 2-3 times), dry residue (exceeding by 1.5-2.5 times) and chlorides (by 1.5 times). At this stage a number of meetings with representatives of the Municipal Council, mass media, public, business were conducted in the form of round tables, consultations, press conferences regarding drinking water problems and implementation of the Project.

At the second stage MAMA-86-Mariupol organized and held tender (01.04.2002-01.07.2002) for the best technical concept of the Sanatorium drinking water.

The tender announcement was made in April 2002 at the local, oblast and national levels. 57 tender packages were sent out; 53 candidates took part in the tender. Within 2 months the received proposals were processed. Board of experts was established for selection of the best technical solution.

By the results of the tender, technical contractor was selected LLC "Ecological Technologies."

The stage of the Project introduction started in September 2002, when the additional water purification unit was installed in Sanatorium "Aibolyt." It consists of the following elements:

- 10 micron mechanical purification filter;
- 5 micron mechanical purification filter;
- chemical purification filter;
- fine purification filter;
- organoleptic correction filter;
- 5 micron mechanical purification filter;
- decontaminator;
- Three water meters: upstream water treatment line, for silt waters, at water tap.

All materials, water purification system components, installed in Sanatorium "Aibolyt" are certified by the Ministry of Health of Ukraine for application in the process of water treatment, which can be used in a children treatment and disease prevention establishment (Pictures 11-13 in the colour insert).

The throughput capacity of the water treatment unit is 1 ton of water per day. At present 100 of children, who improve their health in Sanatorium "Aibolyt" every month, and the servicing staff are provided with quality drinking water.

Project Budget

The cost of drinking water purification unit in Sanatorium "Aibolyt" is UAH 16,179.49.

Project Implementation Outputs

Additionally to drinking water quality the problem of permanent water supply to the sanatorium was solved. Even at the condition of water supply interruptions by 1-2 days, the reservoir containing 1 t of water enables the sanatorium to operate normally and comply with the SES requirements and norms for pre-school establishments. As the over one year experience and observations of doctors showed, that consumption of quality drinking water has positive influence on children's health, who pass through treatment course in the sanatorium. According to the specialists' assessment, the health-improving index has increased by 4-5 per cent.

Starting from introduction of a new water treatment unit in September 2002, control over its operation has been exercising: water consumption recording, regular control of the purified water quality. On a weekly basis, LLC "Ecological Technologies," which has a certified laboratory, perform chemical analyses of water. From September 2002 till January 2003 SES of Ordzhonikidze District of Mariupol exercised control of the purified water quality. To solve the problem of regular control of this water quality, Director of sanatorium together with MAMA-86-Mariupol wrote a letter of appeal to Mr. Y. Y. Khotlubei, Head of Municipal Council. As a result, an order was issued concerning free of charge quality control of additional purified water quality in Sanatorium "Aibolyt" by the municipal water supply utility servicing the sanatorium at present.

Collection of the information about the local water purification system's economic performances indicators, as well as consequences of water consumption impact on human health, related to using purified water is being carried out.

Based on the economic analysis of the purification unit operational cost, it was calculated that cost of 1 l of additionally purified water in sanatorium "Aibolyt" is 0.02 kopecks.

Successful implementation of the pilot Project in the City of Mariupol was possible due to development of partner relations initiated by MAMA-86-Mariupol.

The main stakeholders involved in this Project were NGO MAMA-86-Mariupol, the Sanatorium administration and staff, LLC "Ecological Technologies," as well as City and Oblast authorities. Each of the stakeholders made its contribution in the long-term and sustainable solving of the sanatorium drinking water problem. In particular, MAMA-86-Mariupol initiated the project and at the expense the grant funds installed the additional water purification unit. Within 1.5 years LLC "Ecological Technologies" serviced and maintained the line (weekly water analysis, operational expenses). Continuous and persistent work with the local authorities, which was and is carried out by MAMA-86-Mariupol together with I. E. Babkina, Director of the Sanatorium, resulted in allocation money for operational expenses of the water treatment unit of Sanatorium "Aibolyt" in the Oblast budget from January 1, 2004. We hope, that in the 2005 budget bigger funds will be allocated, taking into account all the necessary expenses for operation of this system. Despite the fact, that the Sanatorium is under oblast supervision, the city power supported this activity by solving the problem of regular water quality control with participation of the municipal water supply utility (Vodokanal).

The Project "Clean Drinking Water for Mariupol" has demonstrated effective cooperation of the main stakeholders: Oblast council, Mariupol Municipal Council, SES, city water supply and waste water disposal utility, MAMA-86-Mariupol, city public, private sector — LLC "Ecological Technologies" and mass media. This cooperation facilitated implementation of the Project in the City of Mariupol.

Reconstruction the Town Soledar Water Supply Based on Local Underground Water Sources

Galyna Oliynykova,
Head of MAMA-86-Artemivsk

Project Background

Donetsk Oblast is a powerful industrial centre of Ukraine. It is one of the most developed economically oblasts of the country. The Oblast is located in the south-eastern part of Ukraine; its area is 26.5 thousand km^2, or 4.4% of the Country's territory. The population is 4,730,357 people, it is the most densely populated Oblast in Ukraine (190 persons per km^2). 90% of the residents live in towns and town-type settlements. The administrative and territorial division includes 28 towns and cities (the biggest cities are Donetsk, Mariupol, Makiivka, Horlivka) and 17 rayons of oblast subordination.

Donetsk Oblast has a powerful mineral and raw materials base: coal, rock salt, limes, potash salt, mercury, asbestos, graphite, etc. — about 100 items altogether, including iron ore and rare-earth elements. The Oblast has its own fuel, energy, mineral and raw materials resources; Kryvorizhski iron ore fields are located nearby, access to sea — all these conditions form the basis of a powerful industrial complex. On the territory of the Oblast there are highly concentrated heavy industry branches, broad developed industrial, scientific and social infrastructure, big quantity of the population and high urbanization level. About 2,000 industrial enterprises are located here, 800 out of which are major ones.

One of the most urgent problems of the Donetsk Oblast is lack of water resources. Provision of the territory and population with water resources is almost six-fold lower, than the country average, and by dozens times lower than in the oblasts well supplied with water. According to the evaluation of the Oblast State Department of Environmental Safety, the water resources, which can be used in Donetsk oblast, are the following: unregulated river water discharge is 400 million m^3; regulated by reservoirs and ponds is 520 million m^3; waste and mine-ore waters, discharged into rivers and reservoirs are about 1,000 million m^3; underground fresh waters are 200 million m^3; Siverski Donets-Donbass Canal is 1,200 million m^3. The actual water intake amounts to 200-300 thousand m^3 per day, or 730-1,095 thousand m^3 per year, thus ensuring 75% of the oblast needs.

The only relatively big river in the Donetsk oblast is Siverski Donets, which belongs to contaminated and high modified water bodies of Ukraine. The underground waters in the Oblast territory are located very unevenly. Considerable water resources are related to the basin of the River Siverski Donets, and are located in the northern part of the Donetsk Oblast. The main underground water resources in the Oblast, which can be used in the industry, are mainly belonged to the chalk deposits. As a result of the leaching process these waters are enriched with salts and have, first of all, high hardness. Due to the natural interconnection of surface and ground waters, the underground aquafare suitable for water supply, have increased concentrated of dissolved salts as well.

The most important indicator of water supply services is uninterruptible water provision. In this respect, the situation in Donetsk Oblast is unsatisfactory: 36 out of 59 surveyed settlements are supplied with water according to water supply regime (it is over 60% consumers). The reasons caused such conditions are the following:

- there are no hydro-hubs in the towns (pumping stations and reservoirs);
- economic difficulties caused by non-payments of the consumers (what, in its turn, causes inability of settlements with the wholesale water supplier — "Ukrpromvodchormet" for the consumed electricity, etc).

The specificity of the Donetsk oblast is that water supply (intake, treatment and transportation of water) is carried out by "Ukrpromvodchormet," and the local water utilities operate only the local distribution networks, which are communal property of local communities.

The program of the water supply and waste water sector reforming, aimed on improvement of the services provision in Donetsk Oblast, envisages, that water loses in the Oblast municipal water supply systems constitute 37% (of the scope of water supplied to the settlements). However, the real value of this index is even higher than 40-48%. In additionally in our country, due to poor condition of sanitation equipment inside the buildings, about 40-50% of the supplied water is lost. Thus, two thirds of the water supplied to the distribution network, is not actually used by the consumers, and mostly lost.

The difficult, critical situation with water supply and waste water disposal in the Oblast requires finding new technical and economic concepts taking into consideration social and ecological factors and involvement of all parties concerned: authorities, producers and local communities.

The Ecological NGO MAMA-86-Artemivsk started dealing with the drinking water problems yet since 1998, having initiated lobbying of public proposals incorporation into the municipal program on drinking water quality improvement till 2002. At that time the public proposals were supported by the deputies of the Municipal Council, and they were introduced by means of additional funds allocated from the town budget.

In 2000, during the visit of the Dutch Consulting Company Aquanet experts to the Town of Artemivsk, MAMA-86-Artemivsk had meeting with the Director of "Soledar-Vodokanal" (Water supply and waste water disposal company) to discuss the water supply problems. Soledar is an administrative unit of Artemivsk Rayon, located in the northern part of Donetsk Oblast. The town population is 15 thousand residents. The water supply system of the town is based on consumption of water from the Canal Siverski Donets-Donbass (4,000 m^3 per day), which at present does not satisfy the town needs (about 6.0-6.5 thousand m^3 per day). Due to lack of water, it is supplied by schedule, for 2-3 hours in the morning and evening, i.e., about 6 h per day in average. Remoteness of the filtering station, from which water is transported to town, leads to increase of water cost. The expenses for purchasing water within the recent years fluctuate from 70 to 40 per cent, and are the highest among the Oblast enterprises. Long ago, the geologists had the idea regarding a possibility of using the local underground water resources for the drinking purposes. The Directorate of "Soledar-Vodokanal" became interested of this idea, which required a detailed feasibility study and development. In summer 2000 MAMA-86-Artemivsk conducted a tender for the best idea of the project. The most successful was the project proposed by the Donetsk Hydro-Geological Group. In summer 2003 the new phase started with collection of the necessary data and development of a business plan based on the selected technical solution idea.

Project Objectives

Reconstruction of Soledar water supply system with transition to use of local underground water resources.

Term and Scheme of Project Implementation

The Project is envisaged to be implemented throughout 2003-2007 in *three stages*:

- stage 1: extension and reconstruction of the municipal water supply networks, replacement of the networks and pumping stations equipment, installation of metering devices;
- stage 2: design, construction and commissioning of the first alternative water supply source — Yalynski water intake, research of the second source — Bilokamensko-Bakhmutski water intake;
- stage 3: construction and commissioning of the Bilokamensko-Bakhmutski water intake.

The Project implementation envisages obtaining credit, i.e., attraction of funds from outside sources.

In December 2003 MAMA-86 initiated development of a business plan. The main contractor for issuing the business plan was selected Tebodin Ukraine Consulting and Engineering Company. Consultants of the Production Geological Enterprise "Artemivsk Hydro-Geological Group," Enterprise "Vodokanal" of Soledar were involved in the work. For the finalization of the business plan, a series of consultations were held participated by experts of Planning and Development in International Cooperation Company "PADCO-Ukraine" and Consulting Company "Energy Consulting." The work

on the business plan was finished in June 2003, and in August MAMA-86-Artemivsk submitted it for consideration to the local and oblast authorities (see Picture 10 in the colour insert). The Oblast Council, Oblast Vodokanal and deputies of Verkhovna Rada (Parliament) of Ukraine from Polling District 46 were involved into implementation of the Project. This Project was included in the municipal Program "Environment Protection and Ensuring Ecological Safety on the Territory of Artemivsk Municipal Council for 2001-2005."

In the course of the Project implementation it was known, that in the oblast program of reforming and improving of water supply and waste water sector of the Donetsk Oblast a possibility to put into operation alternative sources (artesian wells) is considered and the financing of such work for the Town of Soledar (UAH1.8 million) and the Town of Artemivsk (UAH 15 million) is allocated.

Implementation of the Project will allow the following:

- modernization of the existing water supply system of the Town of Soledar;
- providing the town residents with quality drinking water from the ecologically clean underground sources;
- providing the industrial enterprises of the town with the proper quality water and in the required volume;
- protecting the water utility from influence of the external factors, which cause worsening of the quality of services for the residents;
- increasing the level of awareness of the people about the water quality and its efficient consumption;
- facilitating the Enterprise "Vodokanal" to gain sustainable development.

Conclusions and Recommendations

The Project "Alternative Water Supply of Soledar" does not pursue direct commercial purposes, and is focused on solving social problems of providing the residents of Soledar with proper quality water and in sufficient volumes. Solving of this problem is urgent both for the residents and local authorities, communal utility companies and public organizations of the Oblast. Alongside with the social effect, preliminary evaluation demonstrates also the economic attractiveness of the Project provided that privileged crediting is attracted. Implementation of the Project will also create a precedent of fruitful cooperation of public organizations, enterprises and authorities aimed to solve the local problems.

Using Local Water Resources for Solving Drinking Water Problems in the Town of Feodosia

Antonina Kovalchuk,
MAMA-86-Feodosia

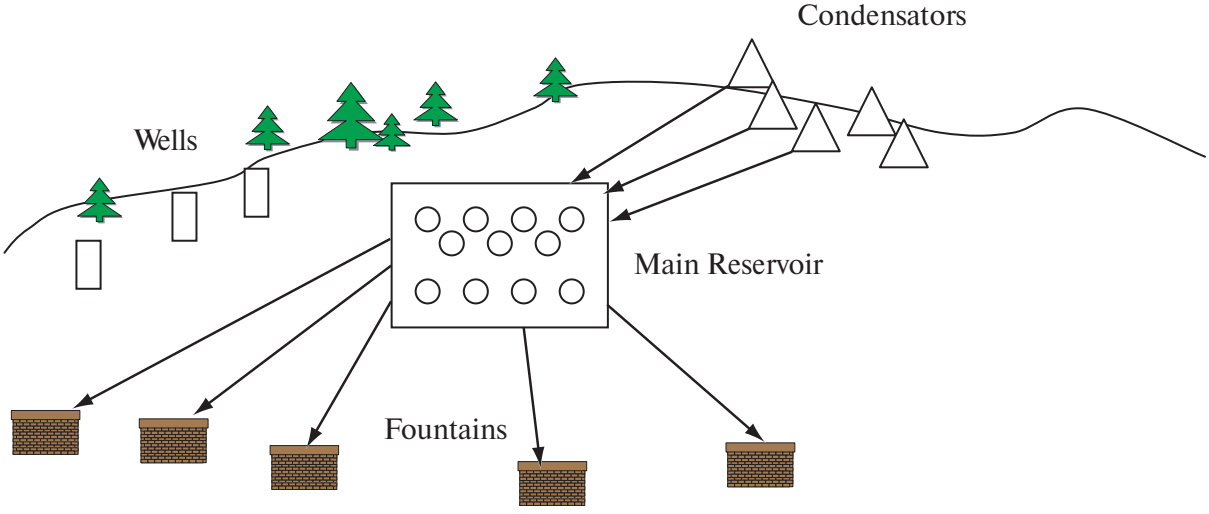
Project Background

The area of Big Feodosia is located in the south-eastern part of the Crimean Peninsula on the boarder of mounting and flat Crimea. By its climatic conditions, this area belongs to arid zone: the annual quantity of precipitation does not exceed 300 mm.

Underground waters constitute the biggest share of natural waters balance of the Big Feodosia area. Accumulation of underground waters in the area takes place due to infiltration of atmospheric precipitation, inflow of ground waters and water condensing in rock cavities. The area ground waters go out to the surface mostly in the form of springs. The processes of water condensing from water saturated air masses generated above the sea play significant role.

The system of accumulation of ground water, as well as the water generated in atmospheric moisture condensers, allowed providing 70 thousand inhabitants of the town of Feodosia with drinking water yet three centuries ago. The ancient tool of water distribution was so rational, and culture of water consumption so high, that nowadays we have to study and restore this experience of past generations to use thereof at the current stage of solving problems of water supply in the area of the Big Feodosia.

Until now on the territory of the Big Feodosia there are remains of ancient water supply systems, which were based on use of local natural stock of ground waters and specially equipped technical facilities for collection of atmospheric moisture. These water supply systems included natural rock cavities and built condensers (e.g., on the mountain sides of the Tepe-Oba ridge there were natural and artificial atmospheric moisture condensers in the form of large piles of crushed rock and pebbles, scattered on a non-penetrating base, in the form of slightly sloping crater with water intake). In addition, another tool for water accumulation was used based on use of drainage trenches dug on the mountainsides in the chess order and filled with crushed rock. Water from the trenches flew into wells, and from there — into stone pools called fountains. Distribution fountains in the town were stone cisterns closed by plates, as well as open pools the inhabitants took water from. From some pools water flew through ceramic pipes into wells. Rain water was also consumed, which was collected as a result of damming at gullies' mouths.



Distribution of water accumulated in the main cistern on the sides of Mitridat Mountain due to precipitation, Genoa wells and condensers, was very efficient. Thus, water was discharged through three levels. During drought, when water did not reach the level of middle row of the drains, water was supplied through the water drains of lower level, which were connected with the most necessary for life objects: drinking fountains, hospitals, etc. In most unfavourable years, when water filled about 2/3 of a reservoir, drains of not only lower, but also middle level were switched on. As a result, water arrived at home facilities and public establishments. It should be mentioned, that in favourable periods of full accumulating of water in a reservoir, it was supplied as well to industrial sites, workshops in the outskirts of the Town.

Also, springs played important role in water supply of the Great Feodosia area. The most powerful of them is located in the region of old Crimea, at the sides of Aharmysh Mounting. It is Subashi spring, which produces about 75 l of water per second.

In the early days, Subashi spring source provided the villages of Subashi and Sheikh-Mamat with water, as well as was used for irrigation of up to 250 ha of land in this area. In the XV century the Genoa people, and later Turks used water of Subashi and nearby Krynychka spring for supplying not only Feodosia, but also all Kerch Peninsula.

In 1888 the Town received water from the Subashi source, which was granted to the Town by I. K. Aivazovski (50,000 buckets per day). Besides water pipeline from the Subashi source, water took also from Koshka-Chokrak sources, but this water is almost not used at present, because all the ancient water accumulating reservoirs and majority of the water pumps are out of order. In addition, the water pipeline, which almost completely collapsed, was dig out, and the network of pressure water pumps, by means of which, in the past, the town residents were supplied with water of Subashi source has been completely destroyed.

The water resources balance of Big Feodosia radically changed due to use of water from artificial filling reservoirs. In 1956 the first Nasypnovske water storage pond was built, which accumulated surface and precipitation waters. In 1972 Feodosia received water from Dnieper River from the Feodosia reservoir, and in 1977 — from the Frontove reservoir. Since that time, water intake from Nasypnovske water storage pond for drinking purposes of the Town residents was stoped.

The amazing fact is the regularity: the more water is available, the less saving is; people became to waste water from sources, which until recently were limited ones. Having built the Nasypnovske water storage pond, they abandoned the springs and Subashi water pipeline; having built the Feodosia reservoir, they abandoned the Nasypnovske reservoir. After water shortages from the Feodosia reservoir, they built the Frontove Reservoir. At the end of the day they came to a critical situation in terms of the people provision with quality drinking water.

In 2001 the population of the Big Feodosia increased comparing to 1910 by 3.33 times, and at present is 113 thousand of people, and water consumption for this period increased by 103.4 times. Obvious is the fact of considerable water losses during its transportation through pipelines from the water treatment facilities (WTF) to the consumers.

Below is given a diagram of changing water consumption in liters per 1 resident per day for the period from 1910 till 2001 (the calculations were made using the data of the Feodosia Museum of Local Lore, History and Economy, the production enterprise of water supply and waste water disposal of Feodosia, Statistics Department of the Feodosia Municipal Executive Committee).

At present the Big Feodosia uses primarily Dnieper water for the drinking purposes from the seasonally filling reservoirs – Feodosia and Frontove.

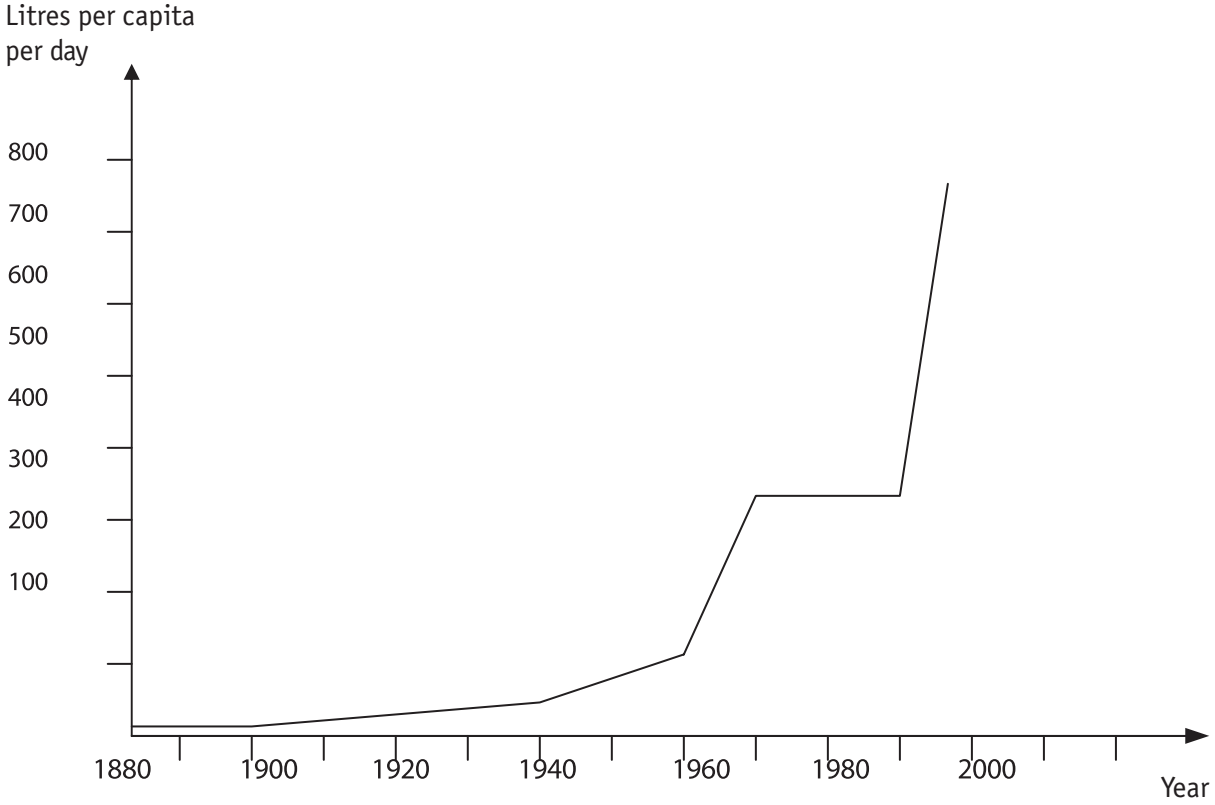
In spite of the fact, that for over 30 years the Town consumes Dnieper water from the North-Crimean Canal (NCC), the problem of clean water becomes more and more urgent, and at the present stage – the crisis.

The main reasons of the crisis situation in water supply of Feodosia are the following:

- the reservoirs of raw water are poorly protected from waste water;
- the treatment technologies applying at the Feodosia water treatment facilities are based on hyper chlorination; as far as NCC water contains big quantities of organic compounds, then as a result of the treatment, chlorine-organic contamination emerges in drinking water;
- no reserved water sources;

- water pipelines of the centralized water supply are deteriorated by 80%, what causes enormous water losses, dependent on which water tariffs are rapidly increased, and, from other hand, it causes secondary contamination of drinking water, particularly, in the water supply network on the distance WTF – consumer.

Diagram of the water consumption changes in liter per capita per day within the period 1910-2001



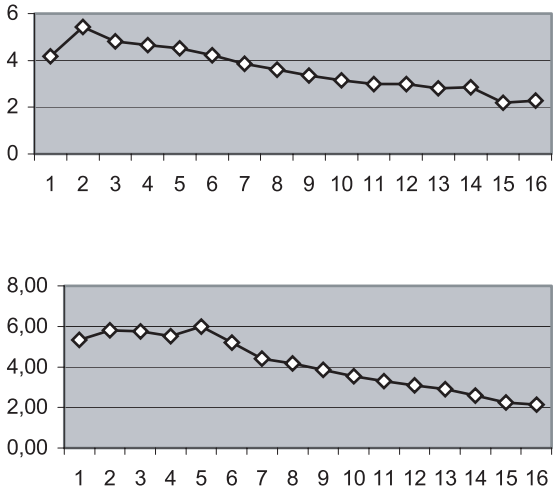
MAMA-86-Feodosia carried out an independent research of the reasons of unsatisfactory quality of drinking water from centralized sources.

The present extraordinary situation occurred due to the fact, that the sediments, which accumulated since 1987 in the area of deep water channel, have almost completely blocked water intake from the Frontove reservoir.

The results of water survey conducted in 2001 by N. V. Shelkovich, a diver, was confirmed by A. N. Lukjanenko, Head of Frontove Hydro-Hub in January 2003, after measuring the heights of upper level of silt dome above the deep water channel of the reservoir tower.

The urgent measure to solve the problem can be the cleaning of deep water channels of Frontove and Feodosia reservoirs from silt. It is also necessary to find other ways of providing the population with clean drinking water.

The studies of the water supply problem of the Big Feodosia in 2002, carried out by MAMA-86-Feodosia, showed, that the issues of drinking water quality in the region require urgent solutions. Independent analysis of quality of drinking water from the main water supply sources: Feodosia water



Results of the sediments dome high measurements in three sectors of Frontove reservoir's underwater channel (unit — metre), January 2003

supply network, filling reservoirs Frontove and Feodosia of the North-Crimean Canal, Subashi and Koshka-Chokrak sources showed low quality of drinking water supplied from the North-Crimean Canal, and high qualities of ground water from the local springs sources.

Project Objectives

The goal of MAMA-86-Feodosia Project was to catch attention of the town citizens to the perspective of using alternative water supply sources of Great Feodosia by means of wide informational campaign and construction of a fountain to enable residents of Feodosia consuming clean water from Subashi and Koshka-Chokrak sources (mixed branch).

Term and Scheme of the Project

The Project was carried out during 2003.

The fountain was built in the area of Aivazovska Railway Station of Feodosia.

The Project Scheme consisted of the following:

- Drinking water quality analysis;
- analysis of the possibility of renewal water supply from Subashi and Koshka-Chokrak sources;
- announcement of tender for the best design of drinking water fountain;
- preparation of documents and their approval by the authorities;
- signing the agreement with the contractor for hydro-technical and decoration work;
- fountain building;
- opening of the fountain on the day of 115 anniversary of Subashi water supply opening — the gift of I. K. Aivazovski (1817-1900) to the residents of Feodosia;
- connecting of the fountain with the water pipeline;
- entering of the fountain into the balance sheet of the Feodosia Municipal Executive Committee;
- holding conference "Clean Drinking Water of Feodosia" (27.11.2003).

Project Budget

The cost of work on building the public well amounted to UAH 14,418.30.

Project Implementation Output

On September 18, 2003 in the Town of Feodosia, the opening ceremony of the public decorative drinking fountain was held by MAMA-86-Feodosia. The fountain was created by sculptor Sergey Mukhin in the shape of a dolphin, which got positive opinion of the residents from the beginning, and was acknowledged as an attractive relaxing place in the Town (see Photos 8-9 in the colour insert).

Every year the fountain will operate from March 22 till October 31. According to its consumption (0.72 m^3 per day), it can satisfy the drinking water needs of 3,600 residents and guests of Feodosia a day. The fountain was connected to the Railway Station pipeline, which consumes clean drinking water from Koshka-Chokrak and Subashi sources. In the place of fountain connection a 1,500 mm well was built with water metering unit installed therein (back valve, valve and 15 mm water meter, the length of straight pipe sections ranges from 90 mm upper and 60 mm down the meter).

In the framework of the Project MAMA-86-Feodosia cooperated with the Verkhovna Rada (Parliament) of the Autonomous Republic of Crimea, municipal authorities, Architectural Department, Dnieper Railway Department, legal organizations, environmental protection inspectorate, public organizations, schools, extracurricular organizations, mass media, etc.

Due to the Project implementation the Town received the source of quality drinking water. Thus, MAMA-86-Feodosia proceeded with a good deed and commemorated I. K. Aivazovski, the honourable citizen of Feodosia, hoping, that the fountain will serve for the sake of health of the residents and guests of the Town, and the authorities will consider the possibility of using local water sources for solving problems of Feodosia residents supply with quality drinking water and improving their health. The newly built fountain is just the only one source of clean drinking water acceptable for every resident free of charge.

Broad informational campaign, which was carried out within the Project, attracted attention of different stakeholders to solving the problem of the Town water supply. Newspaper "Kafa" applied to MAMA-86-Feodosia with a request to put the Organization telephone contact number in the page "Hot Lines" of the paper. We have already received phone calls from the residents inquiring of opening drinking fountains and pumps in other parts of Feodosia. The Dnipropetrovska Railway Department is planning to finance replacement of 5 km water pipeline section from the Koshka-Chokrak source. Simferopol public buildings and water supply company proposed cooperation in construction of a drinking water pump room for the residents and guests of Feodosia.

According to the decision of the Mayor of Feodosia, the "Dolphin" will be recorded in the balance sheet of the Communal Utility Department of Feodosia Municipal Executive Committee. This process has already been started with execution of the relevant documents.

Conclusions and Recommendations

What lessons have been learned?

Technical projects, which are implemented by NGO, face many obstacles and risks, which should be evaluated in advance. These obstacles are both of technical and legal nature. At present we work out an algorithm — sequence of actions necessary for coordination and implementation of a technical project, focused on improving access of the citizens to safe drinking water, by a public organization.

Having implemented the technical project for the first time, we are convinced, that it has positive influence of the residents, makes them more active, in particular, those, who are involved in solving the issues of improving access of the citizens to safe drinking water.

The Environmental Department of the Municipal Executive Committee handed over materials regarding incomplete 1999 Program of springs' renewal in Feodosia. Upon request of L. V. Sydorenko, Chief Ecologist of the Town, a Working Group was set up for further completion of the Program.

Teachers of Children's Centre "Intellect" demonstrated their readiness to perform volunteer work on maintain the "Dolphin" site in good sanitary and aesthetic condition, as well as take part in traditional "Clean Water Festival," which will be held annually on 22 March.

The specialists of water utility complex of the Dniprovska Railway Department showed their interest in organizing the necessary arrangements to make possible consumption of Koshka-Chokrak sources water by the residents.

At present the issue of renewal of Subashi water pipeline is included in the Program of Social and Economic Development of Feodosia.

Efficient Water Consumption and Sanitation Within MAMA-86 "Drinking Water in Ukraine"

Nataliya Kumysh,
Head of Co-ordination Council
MAMA-86-Sevastopol

Project Background

Due to non-efficient use of natural resources and uncontrolled use of new technologies, which are often extensive, the secrets of efficient water consumption (original and economic hydro-technical facilities) thanks to which the people could survive, for centuries, in steppes, mountain areas, on salt lands and in other unfavourable conditions, are forgotten and often lost.

Nowadays, when Ukraine faces an economic crisis, it is difficult to revive the old methods or to introduce the new ones on natural resources efficient consumption. It is difficult to organise adequate conditions for life in countryside and in suburban areas on water supply and sanitation, to keep the sanitary and hygienic regime in water protection zones of small rivers.

Many scientists, experts on local lore, ecologists are studding the issues of lost and forgotten methodologies not only from historical point of view, but also with a purpose to initiate the process of rational using of the local natural reserves.

The climate of Big Sevastopol area belongs to transition type of climate: from sub-Mediterranean semi-subtropical climate of South Coast of Crimea to semi-subtropical (or southern-temperate) continental climate of foothills. Temperate-hot droughty summer and very mild winter are typical to such climate.

Air circulation (western winds mainly) has large influence on climate formation of south-eastern part of foothill Crimea. Such winds make an average annual temperature +12,2° C, warm and humid winter with positive average January temperatures +1,6...+2,2° C (according to the data of Sevastopol meteorological station, on Pavlovsky Cape an average temperature of the warmest month — July is +22,4° C, the coldest month — January is –2,7° C), short duration of blanket of snow is up 13 days per year.

Spring is, typically, late and cool. Autumn is warm and long. Summer is hot and dry. Average temperature of the warmest month is +22,1° C — +23,2° C. Period without frosts lasts for 238 days.

The most important factors in distribution of precipitation are height and location of area. In coastal areas up to height of 500 m the amount of precipitation is influenced by breezes, due to which an amount of precipitation reduces. When a height and remoteness from sea increase, an amount of precipitation increases from 350 mm in coastal zone up to 500-600 mm on the border with the main range of the Crimean Mountains.

The seasonal distribution of precipitation is very unfavourable; their minimum falls on spring and summer, i.e. on the period of vegetation. It has to be noted that summer precipitation falls, mainly, in the form of heavy showers; their large part is fully excluded from water balance of soil because of intensity of surface flowing, weak penetrability of soils and heavy evaporation. Relatively low humidity of air and frequent dry and strong winds — hot winds contribute to heavy evaporation. All that gives the grounds to consider the are of Big Sevastopol as the zone of weak air moistening.

The history of Crimea shows that this region became the area of intensive mixing of different nations: Cimmerians, Tavrians, Scythians, Greeks, Romans, Goths, Huns, Hungarians, Khazars, Pechenegy, Byzantines, Genoeses, Venetians, Polovtsy, Tatars, Armenians, Slavs, Crymchars, Karaites, Germans and others. The culture of Crimea is a conglomeration of these peoples.

In old times the habitants of Crimea knew different methods of water supply, mountain gardening (chairy) as well as the secrets of saving each drop of water, which was transporting to ancient settlements by original hydro-technical facilities (irrigation ditches, captations etc.).

The remains of such facilities have preserved to our times in different places of the Peninsula, revival of the facilities would enable people to resolve the water supply issues under water shortage conditions.

In the framework of archive and archaeological surveys, in 1992 Youth Ecological Association (YEA) "Geia," which was established in 1986 and is the partner of MAMA-86 since 1998, has started to collect the materials about the ancient methods of efficient water consumption. In 1994 the textbook "Heritage of Ancestors" has been published.

Within the Technical Solutions Program, the Sevastopol City NGO MAMA-86-Sevastopol became the partner of YEA Geia. During implementation of the projects the following activities have been conducted:

- information on ancient methods of efficient use of natural resources has been collected;
- mini-expeditions of students have been arranged;
- the All-Crimean Contest "Heritage of Ancestors" for the best case studies on an efficient use of natural resources has been conducted;
- the efforts of Crimean NGOs to collect the information on ancient methods of efficient natural resources use have been unified;
- installation of the model of efficient water supply for drinking, sanitary and hygienic needs in Baidarsky Preserve on the eco-tourist centre area established by Geia YEA and MAMA-86-Sevastopol;
- textbook on methods for efficient use of natural resources in Crimea has been published.

The eco-tourist centre of YEA Geia and MAMA-86-Sevastopol is situated in the picturesque place of the Crimean Mountains, in Baidarsky Preserve.

The landscape of the National Baidarsky Preserve occupies 0,9% of the territory of the Crimean Peninsula; this Preserve is the second one, by size, in Crimea (after Karkinitsky one), the square of the Preserve is 24,295 ha, the perimeter is 80 km.

The peculiar feature of the preserve is considerable development of valleys, which are part of such Preserve (14 residential points of Orlynivska Village Council, number of objects of the Ministries of Defence of Russia and Ukraine, gardener associations, recreation facilities).

On the basis of the Baidarsky Preserve in 1997 the Ecological Centre was set up (lease for 25 years). In the course of 6 years more than 35 ecological camps, 18 workshops, in particular, the workshops "Heritage of Ancestors", "Remembering Future" as well as 11 volunteer camps has been arranged. For the last time children-orphans and inmates of boarding schools are being involved. One camp shift lasts for 5-14 days, 35-100 persons can take part in such shift.

More and more the Centre becomes the youth educational centre, and therefore, we try to introduce the elements of applied ecology in order to address educational, ecological and recreational purposes.

Project Objectives

Short-term:

- introducing and developing the model of complex technical solution of water supply, sanitary and hygienic issues for the eco-tourist Centre Geia and MAMA-86-Sevastopol based on the sustainable consumption of resources (efficient provision with the required water supply and hygiene conditions on the territory of the Centre, protection of environment by minimisation of negative impact of these life support conditions on environment);
- dealing with experts and drafting the conceptual design of an efficient water consumption model;
- constructing and installation an alternative multifunctional thermal complex to provide the efficient water consumption and adequate sanitary. This complex consists of heating kilns (in this case — wooden), accumulative reservoir with water meter and temperature sensor, which is, by pump, being filled with water from well (during drought water is being transported from other area);
- equipping the shower rooms, which are a part of the complex;

- installing an alternative solar heating reservoir on the top of the shower rooms with a purpose to use solar energy to heat water;
- introducing the waste water purification systems under ancient methods of efficient resources consumption;
- repairing and upgrading the well;
- purchasing the pump.

Long-term:

- conducting the mass media campaign to disseminate the experience and model of water saving system among rural habitants and owners of suburban land plots;
- disseminating an idea of sustainable development by introduction of demonstration models, gathering the practical experience in respect of adaptation system to local conditions and carrying out educational activities among participants of camps on the territory of the Eco-tourist Centre of YEA Geia and MAMA-86-Sevastopol.

Scheme and Project Implementation Plan

In 2001 the work on introduction of the efficient water consumption model on the basis of the Ecological Centre has started within the following programmes: MATRA, NOVIB and WASH (WSSCC) Project. The considerable scope of preparatory work has been executed in 1997-1999 with an assistance of the International Renaissance Foundation and "Joining Forces" ISAR.

The surface and underground waters are the main source of water in the Sevastopol Region. Until now water resources of the regions have been consuming in a non-sufficient and inefficient manner. In particular, potential capacities of local water supply are not taken into account: additional water collection of river waters, reserves of underground waters, reconstruction and upgrading of the existing water supply well search of alternative ways to resolve the issues related to provision of habitants with drinking water.

The habitants of the Big Sevastopol use wells for drinking purposes. However, such water supply requires from consumers good knowledge, first of all, in respect of locating of household buildings and cesspits near wells and water protective zones of small rivers. The rural habitants do not know or they have forgotten "small secrets" of efficient water consumption, which have been used in daily life by their ancestors.

In order to improve the level of knowledge of rural habitants having involved the scientists of the Khersones Museum-Preserve, NGOs of Crimea and Ukraine, MAMA-86-Sevastopol has collected the methods of efficient water consumption and published them in an exclusive textbook "Heritage of Ancestors".

In order to introduce the method of efficient water consumption we monitored the most available models, adapted them (using the most modern materials) and built them on the territory of the Eco-tourist Centre, where the representatives of different regions of Crimea, Ukraine and CIS are the participants of the programmes.

It is necessary to note that resolving the issue of an efficient water consumption on a particular territory we also resolve the same important issue related to hygiene and sanitary.

An idea related to revival of the water supply system for habitants using small water reservoir, which was effective some time ago, turned out to be fairly expensive and difficult for NGO.

MAMA-86-Sevastopol has invited the experts in September-October 2003 to prepare the technical concept design.

In the framework of the Project with an assistance of the experts the following activities have been taken: reconstruction of well and purchase of pump, construction and installation of alternative multifunctional thermal complex, the places for construction and installation of shower baths have been equipped, an alternative solar heating reservoir has been produced, waste water purification systems have been equipped, the volunteer camp has been set up.

The considerable work on the multifunctional thermal complex construction has been executed by private company of Mr. Z. A. Kalganov and the Ukrainian Association of Blind People in December 2003.

Project Budget

The budget of the Project with regard to direct implementation of the Project is UAH 20,199.69, including the work of experts.

Project Implementation Output

The Project output could be divided into actual and social.

Actual results:

The capacity of the facility is variety and depends on a number of people in the shifts and is:

- January-March — 12 m^3 per month;
- April-May — 18 m^3 per month;
- June-August — 180 m^3 per month (1,0 m^3 for cooking + 5,0 m^3 for hygienic needs for 50 persons with consumption norm of 20 l per day per capita);
- September-October — 24 m^3 per month;
- November-December — 12 m^3 per month.

Maximal and minimal needs of the Centre in water for 50 persons:

- in drinking water with norm of 3 l per person per day is 150 l;
- for cooking with norm of 15 l per person per day is 750 l;
- to meet the hygienic and sanitary needs with norm of 30 l per person per day is 500 l;
- unforeseen consumption is 10 l per day, that is 500 l of water.

Accumulative reservoirs are designed for:

- reservoir for heating with capacity of 6 m^3 (6,000 l);
- reservoir of drinking water with capacity of 6 m^3 (6,000 l).

Hence, when consuming 3 m^3 of water per day for 50 persons the reserves of water should be filled once per 4-5 days.

Sanitary elements:

Three shower rooms and one bathhouse fully meet the Centre needs in sanitary and hygienic conditions. Water can be heated by two ways:

1) by means of sun (for this purpose flat reservoir with capacity of 2 m^3 has been installed on the top of shower rooms that ensures heating of such amount of water for 4-5 hours);

2) by means of ovens, which are used for cooking; in this case firewood is used (water is heated for 2-3 hours). In general, bathhouses are constructed under the same principle, which was used by Khersones habitants.

The executors of the Project are the representatives of the Ukrainian Association of Blind People; they are Armenians and Tatars by nationality. They proposed the method, which was used by their ancestors, in particular, natural filters under the following scheme: pit with fortified walls, bottom is filled with sand and road metal, and on the top the grate-garbage collector is installed — to hold solid waste.

In order to resolve the issue of utilization of pit latrine content (faeces and urine mixture) the Crimean traditional method is used — toilet pit is filled with lime. The waste separation is used for solid waste (garbage). The rests of the food are partially collected by local habitants to feed cattle, but the rest of such waste is composted by dry method with further usage as an organic fertiliser. It is assumed that for 1 day 1 person can form 1,5 kg of waste. All water supply and sanitary and hygienic systems are situated 70-100 meters below well.

Conclusions and Recommendations

The results of the Project implementation are the following:

- the issue of sustainable water supply and efficient water consumption and sanitary has been resolved for the Ecological Centre;
- the model of alternative multifunctional thermal complex for water supply has been introduced and sanitary and hygiene problems have been resolved;

- shower rooms, which are an integral part of the complex have been equipped with the soldered pipe for water supply;
- an alternative solar heating reservoir on the top of shower rooms to heat water by solar energy has been installed;
- waste water treatment system has been installed. Such system uses the ancient traditional methods and reagents;
- well has been repaired and reconstructed;

Social output:

- taking into account that on the territory of the Mountain Ecological Centre of YEA Geia and MAMA-86-Sevastopol the workshops and summer camps are being conducted for representatives of NGOs of Ukraine and CIS, MAMA-86 and for orphans and children from poor families of the city of Sevastopol and the City of Moscow, in total about 1,500 people stay here annually; all of them receive the direct benefit from implementation of this Project.

It is necessary to note that dissemination of the information and experience of practical use of such facility among local residents of the Baidarsky Valley is conducted also.

Due to the Project implementation we managed to establish partnership and develop co-operation with different organisations and stakeholders groups: City Sanitary and Epidemiological Inspection, Environment and Economy Department of the City Administration, local communities and NGOs.

The operation of the facility on the territory of the Mountain Eco-tourist Centre of YEA Geia and MAMA-86-Sevastopol will allow to resolve the sustainable water supply, sanitation and hygiene problems for people (mainly, for youth), who take part in different environmental programmes in the Centre.

The facility is planned to be operated for many years. After the completion it is planned to call the meeting of rural community, in which both the habitants of villages of the Baidarsky Valley and the representatives of local water supply company, people's deputies, local authorities and mass media will take part.

The wells cleaning up in the territory of Yaremche Town Council of Ivano-Frankivsk Oblast (photos 1-3).

Photo 1.

Photo 2.

Photo 3.

Photo 4.
The cold and hot water meters are installed
in the framework of project on water saving in Kyiv

Photo 5.
Project expert Korol V.V.
in the basement of Kyiv experimental building

Photo 6. Well rehabilitation according to construction and sanitation norms

Photo 7. The consecration of the rehabilitated well in Nizhyn

Photo 8 -9. The ceremony of official opening of the public decorative drinking fountain by “MAMA-86-Feodosia”

Photo 8.

Photo 9.

Feodosia, fountain of Aivazovsky

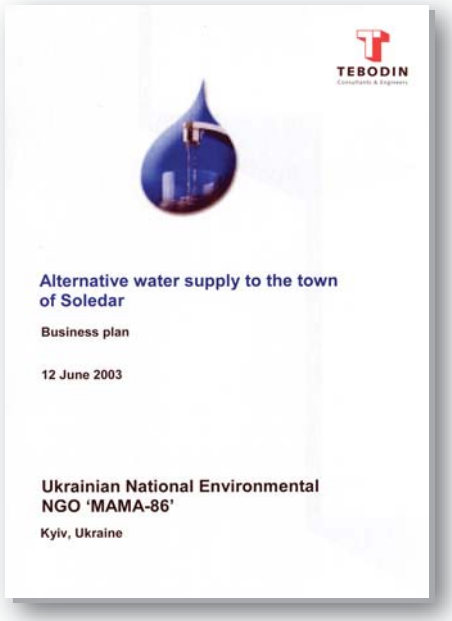


Photo 10. “Alternativ water supply in Soledar” business plan

Photo 11-12. Local additional water purification unit in “Aiboyt” sanatorium

Photo 11.

Photo 12.

Photo 13. The director of sanatorium — Babkina I.E.
demonstrates the work of additional water purification unit

PETITION
for the Protection of Odessa Community Rights to the Information and Participation in the Discussion of Odessa Vodokanal (Water Supply and Waste Water Disposal Company) Reform Plans

Round Table
Water Meters are an Instrument of Ukrainian Water Sector Reform and Consumer Rights Protection

City of Odessa, 8 December 2003

Dear members of Parliament!

While being supportive in general of your policy toward reforming the utility sector, we would like to attract your attention to a number of important issues.

The real success and efficiency of the water utility sector reform depends on whether your reform plans will be supported by consumers and the way the work will be structured on involving the public and individual consumers into this process.

The participation of the public in the utility sector reform has two objectives:

- to ensure the social support of the suggested measures, including the tariff increase;
- to protect interests of broad consumer groups against the administrative arbitrary behaviour and dictate on the part of natural monopolies.

According to the Aarhus Convention ratified by Ukraine in 1999, the planning of production processes related to the water supply and waste water disposal must take place with the provision of the information about such plans and the involvement of the public into the discussion thereof.

Ignoring the public participation in the development of reform plans for utilities in cities is one of the main reasons for the lack of the confidence in the reforms and the support to them by the society.

The main objective of the utility sector reform is the provision of high-quality services on a stable basis and at socially acceptable prices.

The international experience demonstrates that the involvement of the private capital into the water supply and waste water disposal sector does not contribute to increasing its efficiency and provokes new problems.

The orientation toward profit under circumstances of the natural monopoly in the water supply sector results in the unreasonable hikes in the price for this socially important service.

At the moment, only 5 per cent of the total number of water supply companies in the world are "privatised," i.e., owned or managed by private sector. The water supply is managed predominantly by the state sector everywhere in Europe, except for Great Britain and France. The situation is similar in the USA, Canada, Japan, Australia, and New Zealand — the privatisation and partnership between the public and private sectors are exceptions. Historically, the water supply and waste water disposal have been owned by the state for centuries, because the operation of the private sector was found to be inefficient. At the same time, the involvement of the private investments into the water supply and waste water disposal sector in all countries, where this took place, was accompanied by powerful corruption

scandals and dozens of thousands of consumer rights protection court cases. For instance, contracts with private companies in France were terminated in France after the 20-year wave of the last privatisation due to negative findings of the State Audit of France and a number of scandalous court cases, and the water supply companies became municipal again. Four thousand more contracts were prepared for the re-privatisation. Let us emphasise that there is civil society in these countries, there is powerful state regulation and an independent judicial system. Under circumstances of the absolute lack of such regulators and the absence of forms of the direct influence of a consumer onto the water service production, Odessa inhabitants run the risk of being supplied with the most expensive water in the world.

Currently, the utility service providers in Odessa operate beyond the legislative framework of the country as a result of the lack of direct contracts between service consumers and providers.

Starting from 1998, most cities (Ternopil, Lviv, Khmelnitsky, Ivano-Frankivsk, Kharkiv, Dnipropetrovsk, Kherson, and Mariupol) and towns (Yaremche, Soledar, Artemivsk, Kotovsk, Bilhorod-Dnistrovsky, Yuzhny, etc.) of Ukraine have been setting up customer relation services and signing the direct contracts with consumers. At the moment, Odessa is the only city, which has no direct contracts and where the consumer rights vested by the Law of Ukraine "On Consumer Rights Protection" are grossly violated.

Odessa is now an outsider in this process. The conclusion of such contracts disfigures the reform process and removes the providers from the direct influence of consumers.

In order to avoid the distortion of the reform process toward the interests of monopolists and oligarchs,

WE SUGGEST THAT:

1. The process of the rapid privatisation of Odessa Vodokanal (water supply and waste water disposal company) be stopped and plans of possible ways of Odessa Vodokanal reform be presented and opened for the public discussion.
2. Odesvodokanal and all services providers be required to enter into direct contracts with consumers.
3. The introduction of new tariffs be prohibited lacking the commitment to enter into such contracts.
4. The state control in the field of the inspection of house water meters be strengthened. Water supply company be prohibited from inspecting the house water meters with the assistance of a "subsidiary" private company. It should be required to carry out such verification only on the state standardisation authority's equipment.
5. Odessa Vodokanal be required to provide the city community with an annual operations and financial performance report.
6. A mechanism of the public participation in the process of regulating the utility rates, first of all, the water service rates, be developed and approved at the municipal level. An approximate arrangement for such involvement could be as follows:

   a) Ninety days prior to the rate change, the water supply company issues an economic justification of the future tariff.

   b) The economic justification and other necessary documents are provided to all stakeholders groups and individuals for the independent review during 30 days, after which the information is published.

   c) Sixty days prior to the forthcoming tariff change, public consultations and hearings are conducted; other methods of finding out the public opinion are possible as well. The decision must be made taking into consideration the public opinion.
7. Odessa community be provided with full access to decisions of Odessa City Council by means of publishing electronic versions of all decisions in the Internet and letters with the City Council decisions in all public libraries.

Affordability Assessment of Water Supply Services at the Municipal Level (by the example of the City of Odessa)

Tatiana Halushkina, Doctor of Economics

Svitlana Slesarenok, Head of MAMA-86-Odessa

In early 90s, the people in Ukraine were paying only 4 per cent of the actual cost of utility services (the remaining 96 per cent were subsidised by the state). The liberalisation of prices and tariff rates as an integral element of market transformations resulted in the considerable increase in prices for utility services not encountered earlier. This price increase is characterised with the *more rapid* increase in the cost of utility services compared to prices for other consumer goods and services. For instance, while the prices for all consumer goods and services in Ukraine (see Table 1) increased by a factor of more than 89,000 over the period from 1992 till 2001, the utility service rates grew by a factor of 1.46 million! Therefore, the rate of increase in the utility service prices exceeded the rate of the price growth for all consumer goods and services together by a factor of 16 [1].

Table 1. *Index of the consumer prices and the index of the utility service prices in Ukraine (1992-2001)*

The house address	From December to December, ratio				From December to December, percents					
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ICP*	21.0	102.6	5.0	2.8	140.0	110.1	120.0	119.9	125.8	106.1
Index of the utility service prices	14.5	291.0	8.5	9.1	250.0	100.9	109.1	109.4	139.2	105.8
Index of the utility service prices/ICP (ratio)	0.69	2.84	1.7	3.25	1.79	0.92	0.91	0.91	1.11	0.99

* ICP — index of the consumer prices

Abrupt reduction in state budget grants and subsidies took place in addition to the substantial price increase. As a result, a new task came into existence in the agenda — the *full coverage* of the cost of utility services by consumers, for instance, water supply and waste water disposal services, and the dedication of the level of their affordability.

In view of the fact that the increase in revenues of households lagged substantially behind the price increase, this task turned out to be quite complex and, for some consumer groups, simply unsolvable. The portion of the income, which has to be spent by households on utility services payments, grew by a factor of 6 to 8 on the average in comparison with the year 1990 according to economists' estimates.

While assessing the affordability of water supply and waste water disposal services, it is important to distinguish between two components of this notion: the *ability* of the consumer to pay for services (solvency) and the consumer's *readiness* to pay. At that, the analysis of the services affordability must be focused on the solvency indicator answering the following question: whether the household income level is sufficient to pay the increased price for water supply and waste water disposal services without seriously affecting the consumption of other essential goods and services.

In OECD countries, the water is deemed affordable for household consumers, if the expenses for water do not exceed 1.5% of expenses of households; at the same time, it is considered very expensive, if households have to spend 3 to 5% of their expenses on the water supply and sanitation bill payment.

While determining the affordability of water supply and waste water disposal services, the US Environmental Protection Agency assumes that a medium-income household should not spend more

than 2 to 2.5% of its pre-tax revenues on paying for these services [2]. If the cost of services exceeds this limit, then there is an affordability problem.

One more criterion is often used, under which the average payment for the water supply and waste water disposal services should not exceed 4% of the average household income. COWI experts have used this criterion during the analysis of the services affordability in countries of Central and Eastern Europe and the NIS [3].

The water supply and waste water disposal service rates are considerably varied among CIS countries, thus reflecting the national (both economic and political) specifics. For instance, the price of 1 cubic metre of water is the lowest in Uzbekistan, Belarus and Georgia (slightly over 5 cents) among 12 countries of the Eastern Europe, Caucasus and Central Asia region; the population of Kyrgyzstan and Armenia pays about 8 to 9 cents for 1 cubic metre of water. At this background, the rates in Ukraine (about 16 cents) and Russia (19 cents) seem to be quite high [1].

The water consumption tariffs and norms level directly affects the affordability of services. One more key and extremely important factor is, as has already been noted, the household income/expense level. Having compared them, one can with sufficient accuracy tell, how the water supply and waste water disposal services are affordable for the family budget (see Table 2) [1].

Table 2. *Macro-affordability of the water supply and sewage services in the NIS (2001)*

Country	The water supply and sewage services expenses, $/households per month	Total income/expense of households, $/month	Payment for services as % from the income/expense		
			Water supply	Sewage	Water supply and sewage
Armenia	3.09	112.51 (income)	2.26	0.49	2.75
Belarus	0.85	138.10 (income)	0.37	0.24	0.62
Georgia	3.09	126.77 (expense)	1.93	0.51	2.44
Russia	2.67	314.7 (income)	—	—	0.84
Uzbekistan	2.68	116.20 (income)	1.14	1.17	2.31
Ukraine	3.47	113.5 (expense)	1.86	1.22	3.07
Kyrgyzstan	1.57	66.82 (income)	1.70	0.65	2.35

The macro-affordability indicator ranges from 0.62% in Belarus to 3.07% in Ukraine. Is it much or little? To give an answer to this question, one needs to have a specific affordability criterion.

If 4% of the household budget is taken as the criterion, then the water supply and waste water disposal services are *on the average* financially affordable for the household consumers in all the analysed countries.

If one uses a different criterion (1.5% of the overall budget), then these services are *on the average* financially affordable for the household consumers in two countries only — Belarus and Kyrgyzstan.

It is known that the household expense structure is a good indicator of the household's well-being. According to the World Bank criteria, the households spending 70% and more on food are deemed "absolutely poor" and it is beyond any doubt that such households will have problems with paying for utility services.

According to the analysis results the food expenses are the largest household budget item in any of the reviewed CIS countries. Citizens of Ukraine and Armenia have to spend over 60% on food; those of Belarus and Russia — 50 to 60%, and those of Uzbekistan and Georgia — almost a half.

This is substantially larger than the figure in other post-Socialist countries. For instance, the food expenses account for 33% of the total household income in Estonia, 38.2% — in Latvia, 21.4% — in the Czech Republic, 35.2% — in Hungary, 31.2% — in Poland, and 23.8% — in the Slovak Republic. The portion of food expenses is even less in Western Europe (for instance, 14.6% — in France, 12.3% — in Germany, 12.0% — in the Netherlands) and the USA (7.4%) [4].

In order to obtain fuller and adequate information, one has to analyse the service affordability figures at the so-called micro-level:

- in individual cities or *water supply and waste water disposal companies* (which will give an opportunity to evaluate the affordability of services provided to the population of a particular city or consumers of a particular company);
- in terms of the *income/expense* level of service consumers (to find out, how expense water is for the poorest groups of consumers);
- in terms of *household types* (in order to identify the most socially vulnerable households, i.e., those, for whom the payment for water is the largest problem and who is in the need of the social protection first of all).

To solve this problem the special sampling investigations of the life conditions in a country or the utility service consumers are needed. It is extremely important that appropriate special attention be paid within the scope of such investigations to the water supply and waste water disposal services, and not only to the utility services *in general* [1].

From the point of view of the available statistics, let us consider the following approaches as an example of the assessment of water supply and waste water disposal services affordability at the micro-level:

- the ranging of households in terms of the water expenses share in the overall expenses of the household;
- the analysis of the provided services affordability for separate consumers' groups;
- the assessment of the provided services quality.

Currently, the share of those, who have to spend more than 70% of the available funds on food, is about 40% in Ukraine. This is also confirmed by express marketing investigations undertaken in Odessa.

In the summer 2003, MAMA-86-Odessa undertook a sustainable water consumption experiment in a group of buildings in Luzanivsky micro-district, in the framework which an express research of water supply and waste water disposal services affordability at the municipal level was conducted by means of public polling and review of payment documents of 202 respondents. The analysis of obtained data allowed making the following conclusions.

Currently, the cost of water supply and waste water services in Odessa is among the highest in Ukraine. Based on express research it was shown the dependence of payments for water on the differentiation of the household income on Tables 3 and 4 and in Figure 1.

Table 3. *The water consumer differentiation according to the income*

Sum of income, UAH	Number of families (units)	Number of families (%)
under 100	9	4
from 100 to 200	69	34
from 200 to 300	24	12
from 300 to 500	50	25
over 500	40	20
hidden income	10	5
TOTAL	202	100

Thus, the aggregate income of the population majority (according to our data) ranges from UAH 100 to 200 (Table 1, Figure 1), which is much lower than the specified poverty level. The portion of water services payments in the family income (Table 4) ranges from 35.7% (in case of the aggregate income under UAH 100) to 5.6% (in case of the aggregate income over UAH 500). On the average for the city, the water expenses account for 8.8% of the average aggregate income, which exceeds considerably the European and international indicators.

1 This restriction (data on public services are represented in total without the date on constituent components of it, including water) is a limited factor for using the results of these fragmentary researches of the households' incomes and expenses even for the countries (for example, Ukraine, Belarus, Armenia), where these researches are running on regular basis.

***Fig 1**. Water consumer's structure according to the income level (%)*

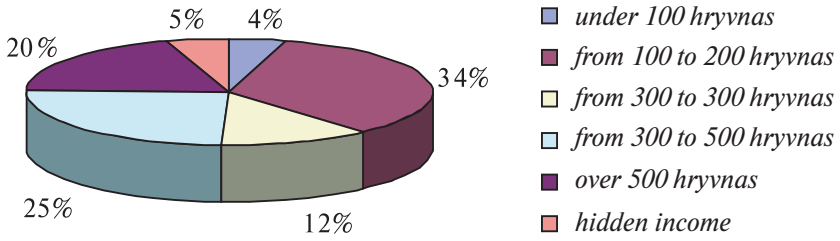


***Table 4**. Portion of payments for water in the family income*

Sum of income, UAH	Average family income, UAH	Average payment for water, UAH	Portion of payments for water in the average family income, (%)
under 100	85.67	30.62	35.7
from 100 to 200	143.49	27.97	19.5
from 200 to 300	226.08	20.72	9.2
from 300 to 500	350.00	35.93	10.3
over 500	698.95	39.34	5.6
Total	285.70	25.00	8.8

It can be summarised that the market relations application to the field of the people provision with water supply and waste water disposal services violates the principle of the social justice toward the poor. For them, the water is and will be not affordable, until the state starts taking appropriate social protection measures. It is this part of the economic system, where the intervention of the state is vitally essential. Its objective is to guarantee the access to water for the poor. The better social assistance system is developed in a country, the higher affordability of service will be under the same remaining circumstances.

Therefore, the definition of the service affordability cannot be considered separately from such key objectives of the state policy in the field of the water supply and sanitation services provision of the public as the economic efficiency, social justice and environmental protection.

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Resolution of Seminar "Improvement of Drinking Water Safety and Quality in the framework of "Drinking Water in Ukraine" Project

Initiated by: City Environmental NGO MAMA-86-Nizhyn
Supported by NOVIB-Oxfam Fund, the Netherlands

Small Hall of Nizhyn City Executive Committee, December 12, 2003

Participants of the seminar, members of All-Ukrainian Environmental NGO MAMA-86, jointly with representatives of other stakeholders: the state authorities, doctors, scientists, drinking water specialists and experts,

LISTENED TO:

1. Reports on outputs of MAMA-86 pilot projects implementation, focused on technical solutions for improvement of the public access to safe water in Nizhyn town, in rural areas of Poltava oblast and Yaremche rayon of Ivano-Frankivsk oblast.

2. It was noted that for the Nizhyn town the decentralized water supply (about 54% of town inhabitants use wells) is the priority issue among other drinking water problems. To resolve this, a number of measures, aimed at raising of town inhabitants' awareness on the drinking water quality in wells, as well as improvement of wells water quality and preventing the further aquifer pollution, has been developed and implemented within the scope of MAMA-86-Nizhyn Project.

Having considered strong concern and significant support from the town inhabitants to resolving the problem of drinking water quality;

Having appreciated commitment of the state authorities, specialists and general public;

Having benefited by achievements of joint practical experience in the field of decentralized water supply improvement;

For the purpose of dissemination of such experience and ensuring steady progress of the processes, initiated by MAMA-86-Nizhyn, the following has been APPROVED:

1. The citizen's right to safe drinking water, in particular the wells water, declared by the constitutional, environmental and sanitary and hygienic legislation of Ukraine has to be guaranteed and protected at all levels of the executive and legislative power.

At level of town authorities:

Local executive authorities, executive bodies of local government, specialized state authorities are obliged:

1. To develop and to implement an integrated program for the water quality improvement in the town wells and preventive measure against its further contamination.

2. To allocate funds from the local budget for implementation of measures for ensuring compliance of the drinking water quality with the legislative requirements and implementation of the alternative water supply.

3. To carry out an inventory of the wells; to improve, clean and disinfect the public wells, including further control of the water quality on an annual basis.

4. To set up a technical service for cleaning of the public and private wells.

5. To allocate funds from the local budget to sanitary closure of dead wells.

6. To envisage social protection measures for the most vulnerable groups of population (children, pregnant and lactating women), related to the drinking water supply, by providing free of charge water testing for nitrates, bacteriological contaminants, iron, hardness; free of charge wells cleaning and disinfecting; in case of wells water contamination to ensure the water transportation to above mentioned groups of consumers.

7. To facilitate regular public informing by local authorities; to support the public initiatives on drinking water quality and informational campaign on the drinking water quality and preventing measures against related diseases.

8. To raise householders awareness on general sanitary and hygienic standards of house development and farming.

9. To commit the town authorities to control of the building and locations of private wells, pit latrines and cesspits, as well as sewage pipeline layouts.

10. To raise drinking water supply, sanitation and hygiene problems of pre-school and school establishments at the Rayon Council meetings.

Oblast level (Oblast State Administration, Oblast State Sanitary and Epidemiology Service, Health Care Administration):

1. To conduct a seminar on raising awareness of the civil servants and managers of respective departments at all levels on the citizens' rights to information, public participation in decision making process and access to the justice on ecological and health care issues.

2. Oblast SES and Department for Emergencies of the Oblast State Administration, in co-operation with Financial Administration, to allocate funds in the oblast budget to procurement of emergency disinfectants for treatment of the wells with high bacteriological contamination and ground waters rising risks; to regular monitoring and scheduled cleaning of the public wells.

3. To regulate fees for the well water quality test that were recently increased by 10 times.

4. To facilitate further protection of pregnant and lactating women and children under age of 15 years from nitrates, by additional inventory of their wells and ensuring free of charge control of the wells water quality and health.

5. Oblast Health Care Administration, to pass an order for compulsory testing of the wells water, used by pregnant and lactating women and children under age of 1 year, for nitrate content.

All-Ukrainian level (to the Parliament — Verkhovna Rada):

1. To promote supplements to the Water Code of Ukraine on decentralized water supply; to facilitate regular control over the drinking water quality by the state sanitary supervisory bodies.

2. To clarify the state and public control issue on decentralized water supply sector.

3. To guarantee the rights to safe drinking water and establish the procedure for their protection and harmonize them with environmental legislation of the EU.

4. To supplement the design and construction legislation with provisions for the decentralized water supply.

We would like to encourage all stakeholders to support the process and thank those, who have already contributed to its progress, as well as those, who would facilitate its further development.

Resolution of Seminar "Alternative Water Supply Solutions"

Initiated by: City Environmental NGO MAMA-86-Mariupol
Supported by NOVIB-Oxfam Fund, the Netherlands

Mariupol City, January 16, 2004

We, participants of seminar "Alternative Water Supply Solutions," members of MAMA-86, jointly with representatives of stakeholders: the state authorities, general public and commercial sector,

LISTENED TO:

1. Reports on implementation outputs of technical solutions projects of MAMA-86 in the field of alternative water supply in Tatarbunary (Odessa Oblast), Mariupol, Feodosia, Sevastopol and Artemivsk.

2. It was noted that gained experience is of high importance, as well as its dissemination and application, aimed at protection of *consumer right to safe drinking water, guaranteed by the constitutional, environmental and sanitary and hygienic legislation of Ukraine*, as well as pursuing of principles of sustainable development

DECIDED:

City level:

1. To develop a comprehensive program "Drinking Water to Children" focused on improvement of the drinking water quality for children in schools of Mariupol.

2. For Program development to set up a working group, involving representatives of all stakeholders: inspections, city water supply company, business entities, general public etc.

3. To allocate annually funds in the city budget to Program implementation by introduction of alternative water supply solutions.

Oblast level:

1. To allocate funds in the oblast budget to additional water purification unit in "Aibolyt" sanatorium.

2. To facilitate regular public informing by local authorities; to support public initiatives regarding information campaign on the drinking water quality, methods of its improvement and preventing measures against related diseases.

3. To recommend development of a Program for efficient resource consumption (energy and water savings) in the field of water supply and sewage system to the Oblast Council.

Country-wide:

1. To recommend issues on development of regulatory and legislative framework of additionally purified water for consideration (either by drafting the Law "On Additionally Purified Drinking Water Supply to the Population," or by introducing amendments to the Law "On Drinking Water" and developing the State Standard "Additionally Purified Drinking Water."

To deliver the decision of seminar "Alternative Water Supply Solutions":

- to the state authorities of municipal, regional and national levels;
- to environmental safety inspections, SES;
- through the mass media.

Host party of the seminar would like to thank those, who have contributed to development of the alternative water supply solutions.