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Demonstrating solutions for water supply, sanitation and agriculture

Case Study

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About WECF

Women in Europe for a Common Future is a network of organisations and individuals working for sustainable development, protection of human health and environment and poverty reduction. Our international network consists of members and partners in Western and Eastern Europe, the Caucasus and Central Asia.

WECF supports partners with sustainable rural development projects in 12 countries:

- Afghanistan
- Armenia
- Belarus
- Bulgaria
- Georgia
- Kazakhstan
- Kyrgyzstan
- Moldova
- Romania
- Tajikistan
- Ukraine
- Uzbekistan

Map of Ukraine with the project villages Vorokhta located in Ivano-Frankivsk, Bobryk/Vertijivka in the Chernihiv and Gozhuly in Poltava oblast. 1 Vorokhta; 2 Bobryk/Vertijivka; 3 Gozhuly.

Contents

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Project team and local authorities of Gozhuly in front of the new ecosan school toilet facility

Summary

This publication presents the results of the multi-stakeholder project 'Co-operation for Sustainable Rural Development', that took place in Ukraine between 2003 and 2006. The project was funded by the Dutch Ministry of Foreign Affairs and has carried out by the NGOs MAMA-86, Ukraine, and Women of Europe for a Common Future (WECF), the Netherlands.
The rural population of Ukraine has extremely low incomes, high unemployment rates, limited access to safe drinking water, and a poor infrastructure. Since the independence of Ukraine little has been done to stimulate the development of the rural areas and the situation is worsening. In order to contribute to the rural development and to improve the public health and the economical situation, this project implemented demonstration projects and organized awareness raising campaigns in the areas of water, sanitation and agriculture. To empower the local population and authorities, they were actively involved into the project. The three project villages Bobryk/Vertijivka, Gozhuly and Vorokhta, were selected according to their specific local needs.
To make the population aware of the consequences of water pollution, bad hygiene and sanitation practices and unsustainable agriculture, and of the alternatives and solutions, the project team developed and distributed informative material and organized numerous seminars and workshops. Citizens organised themselves in project committees, which were established to identify local problems and look for suitable and affordable solutions, participated in workshops, and contributed in-kind to several projects. Pupils of the local schools tested over 250 drinking water wells, and found that most of the wells were highly polluted with nitrates.
In the area of water, the project team tested drinking water on pollution and found high levels of nitrates, micro biological pollution and high fluoride levels, all causing health problems. The project team helped looking for alternative drinking water sources, cleaned and restored drinking water wells, installed a water filter for a kindergarten and water meters for private households and contributed to the extension of a central water supply system. Due to these improvements hundreds of people in the project area now have access to safe drinking water.
In the area of sanitation, the project team constructed dry urine diverting toilets and hand washing facilities for local schools and private households. Through the construction of these 'ecosan' toilet facilities the project team aimed to demonstrate an alternative to the traditional pit latrines and to show how management of human waste can contribute to a better ground and drinking water quality and how the reuse of human excrement can be a part of sustainable agriculture. Besides that, it improved the health and life of the toilet users, especially that of the pupils of the local schools.
To promote organic agriculture, explain its benefits and give the (subsistence) farmers practical support and information, an Organic Agriculture Informational Centre was founded in Vertijivka. A local consultant trained farmers continuously, integrating local knowledge. In Bobryk, where the local population is highly depended on potato cultivation, healthy and more suitable potato strains were introduced to the subsistence farmers, improving the yield. An expert in Gozhuly developed a strategy how to switch from unsustainable agriculture to organic farming, and the participating farmers joined the Ukrainian Federation of Organic Agriculture Movement.
In all three project areas, more than half of the project committees consisted of women. These women took a very active part in the project implementation.
At the national level, the project team addressed and discussed the issues of water, sanitation, agriculture and the problems in the rural areas on national television, radio and in national newspapers and had a substantial impact on the Ukrainian National Program on Drinking Water, in which they managed to include the rural areas.
The project results and experiences were presented and discussed on various international forums, for example the World Water Forum in Mexico, the World Water Week in Sweden and the II International Dry Toilet Conference in Finland.

1 | Introduction

Ukraine is one of the Newly Independent States (NIS) that appeared on the world map after the collapse of the Soviet Union. Besides the economical and environmental crisis, it inherited an insufficiently developed infrastructure from the Soviet Union, which mainly aimed to fulfil the demands of urban and highly industrialised areas while the rural areas were often neglected. Since the independence of Ukraine, little has been done with regard to rural areas. As a result, the rural population of Ukraine has extremely low incomes, high unemployment rates and limited access to infrastructure.

Nowadays the water situation of the rural areas in Ukraine is one of the worst of all European and NIS countries. According to the Ukraine National Report on Drinking Water (2004) only 26% of the rural population is connected to a central water supply system; while only about 6% has a direct in-house connection. The remaining rural population gets their drinking water from private or public wells. Moreover, only 4.4% of the rural population is connected to the central sewage systems, while the rest either uses pit-latrines or septic tanks, which are hardly ever emptied. Since the independency of Ukraine, existing central water and sewage systems are often collapsed or maintained badly, because an adequate financing system for operation and maintenance is lacking.
Well water in Ukraine has often high levels of nitrate and/or microbiological contamination, due to inappropriate management of human and animal waste and unsustainable agricultural practices. Poorly managed obsolete pesticides also cause permanent groundwater contamination. Consumption of polluted drinking water in rural areas leads to outbreaks of infectious diseases, hepatitis, and blue baby disease. Ukrainian legislation, however, does not regulate the quality of decentralised drinking water sources, leaving the rural population with uncontrolled drinking water.
This situation has worsened the last few years. The government of Ukraine, however, committed itself to fulfil the Millennium Development Goals (MDGs). One of these goals was: 'Increase the proportion of people of the urban and rural population with access to clean drinking water by 12% from 2001 to 2015'. However, without any policy on improving sanitation, especially in the rural areas, this target is not likely to be reached.
The topics water, sanitation, agriculture and health are all interrelated and influence in their turn the rural development. Therefore, the Ukrainian NGO's MAMA-86[1] in partnership with and coordinated by Women of Europe for a Common Future (WECF) carried out a 3 year multi-stake holder project in Ukraine focussing on all these issues simultaneously, in order to contribute to sustainable rural development. This project, called ***'Co-operation for Sustainable Rural Development'***, was funded by the MATRA programme of the Dutch Ministry of Foreign Affairs and took place between November 2003 and 2006.
It was carried out in three different villages: Vorokhta in the western, Bobryk in the northern, and Gozhuly in the eastern part of Ukraine, all having different geographical, developmental and social characteristics, but all facing similar problems regarding drinking water and sanitation.
The specific project goal was to 'Empower key target groups of rural citizens in 3 rural communities, as well as their local authorities to play an effective and stimulating role in societal transformation by carrying out practical replicable improvement projects in the areas of water, sanitation and agriculture, which have a direct benefit for the economic and health situation of the 3 rural communities, and strengthen participation of women in this process.'
In order to reach this goal, the project team aimed to raise the awareness of the local population about health risks associated with poor sanitation and drinking water quality, improve the access to safe drinking water, introduce the concept of ecological sanitation and promote sustainable agriculture.
The used methodology will be discussed in chapter two. The third chapter is divided into three parts, describing the socio-economic situation and the project results for each of the project areas Bobryk, Gozhuly and Vorokhta. Chapter four describes the project activities and outcomes on national and international level. The report ends with the conclusions and recommendations for national policy makers in the final chapters.

[1] The NGO´s are: MAMA-86 Kiev, MAMA-86 Nizhin, MAMA-86 Poltava and MAMA-86 Yaremche.

2 | Methodology

The methodology of this project consisted of the 5 following steps:

1. ***Collecting background information on the needs and priorities of the project areas*** by conducting a socio-economical and gender survey using the Rapid Rural Appraisal approach (RRA). The quality of drinking water was tested in accredited laboratories, e.g. on metals, fluoride and microorganisms. In addition, well water was tested on nitrate and nitrite pollution using fast and reliable express indicators. The project teams obtained the existing, or ordered new hydro-geological studies to identify the potential groundwater pollution sources and the pattern of distribution.
2. ***Awareness Raising.*** Local citizens and authorities were informed about themes like drinking water, ecological sanitation (ecosan), organic agriculture and decentralised wastewater management, using tools as seminars, workshops, handouts, posters and films. 'Learning by doing' was one of the main approaches of this project.
3. ***Empowerment of local citizens and authorities*** to identify local problems and to involve the target groups looking for low-cost solutions, integrating local knowledge. The project team set up public committees to involve local citizens into the decision making process. Women were especially encouraged to apply.
4. ***Implementing pilot projects*** as alternative solutions for environmental and health problems in co-operation with the local population and authorities.

The choice of these pilot projects were based on community needs and the willingness of people to contribute and cooperate and included:

- Construction of ecosan toilets for schools and households
- Cleaning and restoring public wells
- Improving water supplies for private households, schools and kindergartens
- Demonstration projects to introduce organic agricultural practices

5. ***Working at national and international level*** included working with mass media, influence national policy processes regarding water supply and sanitation for rural areas, presenting the project results to the national and international community and establish international knowledge exchange.

Box 1:
Organic agriculture

Organic agriculture differs from other argricultural systems in a number of ways. It favours renewable resources and recycling, returning to the soil the nutrients found in waste products. Where livestock is concerned, meat and poultry production is regulated with particular concern for animal welfare and by using natural foodstuffs. Organic farming respects the environment's own systems for controlling pests and disease in raising crops and livestock and avoids the use of synthetic pesticides, herbicides, chemical fertilisers, growth hormones, antibiotics or gene manipulation. Instead, organic farmers use a range of techniques that help sustain ecosystems and reduce pollution.

Box 2:
Ecological sanitation

Ecological sanitation ('ecosan' in short) is based on the principle of the reuse of wastewater or human excreta in agriculture, instead of considering it waste. In a dry urine diverting toilet, urine and faeces are collected separately and sanitised by storing the excreta for an extensive period. Storage and treatment of the excreta should be carried out according the WHO guideline for the safe use of wastewater, excreta and greywater in agriculture (WHO, 2006). Hereafter the urine can be used as fertiliser and the faeces as compost. Water pollution and consumption are reduced. Therefore, ecosan is as an economically and environmentally sustainable solution.

Box 3:
High nitrates and methemoglobinemia

Methemoglobinemia is a condition caused by the inability of the blood to deliver enough oxygen to the body. One of the most common causes is nitrate in drinking water. Water from wells in rural areas is of special concern. Bottle fed infants are most often affected, and may seem healthy, but show signs of blueness around the mouth, hands, and feet, hence the common name "blue baby syndrome". These children may also have trouble breathing as well as vomiting and diarrhoea. In extreme cases, there is marked lethargy, an increase in the production of saliva, loss of consciousness and seizures. Some cases may be fatal. Controlling nitrate levels in drinking water sources to below around 50mg/litre is an effective preventive measure (WHO Sanitation and Health). In the project areas nitrate levels are found as high as 500 mg/l.

3 | The project results

3.1 Bobryk and Vertijivka

Bobryk, with 396 inhabitants, is referred to as 'a dying village': most initiative rich people moved out because of limited opportunities, leaving pensioners and embittered people behind. People live in self built houses with a pit latrine and a drinking water well in the yard. The infrastructure is poor: there are almost no means of transport, nor a central water or gas supply system. The unemployment rate is high and incomes extremely low (varying from 19-41 Euros a month), so people are depended on their own agricultural land. With poor soils and the Colorado beetle affecting their potatoes, some people of Bobryk are depended on a cow for additional income or food: '***Without this cow, we could do nothing else than lie down and die***' (a pensioner, living of a pension of 19 Euros/month). It is not surprising that people try to forget about their situation with the help of alcohol. Garbage is not seen as a problem: '***We have very little garbage, as we are not buying much***'. Poverty, lack of hygiene, unhealthy lifestyles and unbalanced diets lead to serious health problems. Despite all this, there is a good community spirit among the residents of Bobryk. Bobryk is one of the nine villages forming the municipality of Vertijivka. Vertijivka has a population of 4.864 people and has a much better developed infrastructure, which allows the residents to seek employment or sell the products of their land elsewhere. Like in Bobryk, people are involved in subsistent agriculture.

Figure 1:
Almost all residents in Bobryk are depended on shared or private wells for their drinking water

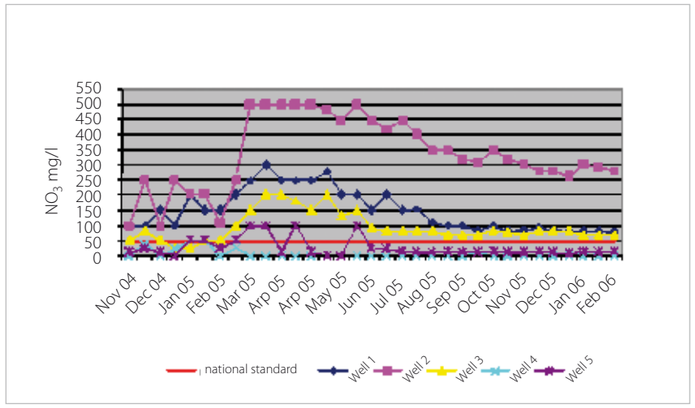
Figure 2:
The infrastructure in Bobryk is poor: the roads are unpaved and horses are used for transport and in agriculture

Figure 3:
The residents of Bobryk spend most of their time working in their own garden, which is usually more than 2 ha big. Most of the work is done by hand

Figure 4:
An informational center on organic agriculture now provides the inhabitants with information on environmental issues

Figure 5:
Nitrate test strips are cheap tools to give a reliable and fast estimation of the nitrate concentrations in drinking water

Figure 6:
The samples of well water, brought to the public meetings by local citizens, were tested on the spot and showed very often high nitrate concentrations



Graph 1:
Fluctuations of NO_3 concentrations in water from 5 wells in Bobryk, 2004 - 2006

3.1.1 Awareness raising, education and empowerment

From a survey held among the residents of Bobryk, the project team could conclude that almost nobody was aware of the bad drinking water quality. Therefore an intensive campaign on drinking water pollution, (ecological) sanitation, (organic) agriculture and the impacts on human health took place. An Informational Centre on Organic Agriculture, opened in February 2006, now provides the inhabitants with information on organic agriculture and environmental issues and conducts individual consultations, lessons and meetings.

In 2004, the project team tested well water in Bobryk and found high nitrate levels. The possible causes, consequences and solutions of this pollution were discussed with the well owners. This raised so much attention, that soon people started to bring their own well water samples to the project events. In the end, 173 wells in both Bobryk and Vertijivka have been tested this way. It appeared that in Bobryk almost half of the wells, and in Vertijivka 78% of the wells, have very high nitrate concentrations[2]. The residents, motivated by these events, took action: several households in Bobryk and Vertijivka started to use nitrate-poor water from their neighbours' wells. Moreover, in Vertijivka some households had 20-40 deep wells drilled for safe drinking water.

The children from Bobryk's school monitored, for two years long, 5 wells on nitrate fluctuations. The results showed seasonal fluctuations. This confirmed that the majority of the wells in Bobryk are too shallow for an adequate decomposition of anthropogenic pollutants by the soil layer, and therefore rainfall and surface pollution strongly affect the water quality.

[2] In Bobryk the nitrate levels were exceeding with 500 mg/l the national standard of 50 mg/l up to 10 times, in Vertijivka the nitrate concentration varied from 150 - 500 mg/l.

Figure 8:
The project team discovered an obsolete pesticide stockpile near Bobryk. Through the hole in the wall, people can easily enter the building

Figure 7:
The obsolete pesticides, partially banned from use, are stored in plastic bags and metal containers

3.1.2 Safe drinking water: protecting groundwater

A hydro-geological survey confirmed that the wells in Bobryk are too shallow for providing safe drinking water under the local conditions. Surface water with high microbiological and nitrate pollution percolates into some of the wells in less than 24 hours, and does not get naturally purified sufficiently. Identified sources of pollution were desolated boreholes, pit latrines, manure heaps, a cemetery located too close to the wells, and a decaying storage place for pesticides and fertilisers. Cleaning the wells would consequently improve the water quality only for a short period. The only solutions to obtain safe drinking water on a short term are to share "clean wells" or to deepen the wells. On the long term the groundwater should be protected against infiltration of pollutants. The results of this survey and the water tests were compiled into a map and displayed in the school of Bobryk.

Since the water wells in Bobryk are not being cleaned at all, the water quality only decreases. Therefore, 3 private wells owned by families with children, with a high microbiological pollution but low nitrate concentrations, have been disinfected.

The local kindergarten in Vertijivka had to use water from a polluted well, from which the caregivers had to carry 80 buckets of water daily, losing precious time. Thanks to a 40 m deep borehole, drilled under supervision of the project team, the teachers can now dedicate all their time to teaching. This allowed 70 more children to join the kindergarten. Soon after, a water filter to remove iron and manganese was installed as well. Currently, the children have access to healthy and tasty drinking water.

In Bobryk, the project team helped the local school renovating the canteen and provided the school and the canteen with an indoor water connection, a hand washing facility and a grey water disposal system. To be able to realise this, two wells were restored and pump installations were provided. Now the schoolboys can focus on their schoolwork, instead of carrying buckets of well water several times a day. All children benefit from the improved hygienic and sanitation conditions in their school.

Box 4:
Obsolete Pesticides in Ukraine

20.000 tonnes of obsolete pesticides are stockpiled throughout Ukraine, many in rotting, rusting containers or bags that were stored or discarded up to 40 years ago. As a result, tens of thousands of tonnes of soil have been contaminated by toxic chemicals, including persistent organic pollutants (POPs) banned internationally by the Stockholm POPs Convention. As these chemicals spill and leach from their containers, they threaten rural and urban populations and contribute to land, air and water degradation, affecting some of the poorest communities across the continent. According to recent national inventory, over 80% of all obsolete pesticides on the territory of Ukraine have unidentified chemical formulae (www.pops.org.ua).

Box 5:
Obsolete pesticides stockpile near Bobryk

The project team found a stockpile of obsolete pesticides 1 km from Bobryk, a potential source for the groundwater pollution. Among other mineral fertilizers and pesticides, nitrophen and polychlorocamphene, banned pesticides according to WHO regulations, were stored here in large amounts in bags and metal containers from 1975 until 1993. What kinds of pesticides are still left in the storage place remains unclear, and further investigation is needed. Since there is a hole in the wall and the roof, anyone can enter the storage room and rainwater falls directly onto the pesticides, which leach into the groundwater. Sometimes pesticides disappear: in all probability people took them for own use or resale. The issue of management of the OP stockpile has been raised to district and oblast level. Based on collected information, a booklet "Watch out – obsolete pesticides" was published. The authorities see incineration as a possible solution for the OP, but the project team opposes, as this will lead to air pollution.

Figure 9:
The project team constructed an indoor water connection for hand washing, accompanied by an educational poster explaining why and how to hand wash

3.1.3 Ecological sanitation: slow bureaucracy, fast construction

To improve the sanitary conditions of the school children and staff members, and to avoid having to leave the school for visiting the toilet, an indoor dry urine diverting toilet facility was designed for the school by the Hamburg University of Technology. Before an ecosan toilet could be constructed in the school of Bobryk, the project team had to collect 8 different permits and approvals from different district authorities. This bureaucratic process was slowed down even more by corruption: obtaining the permit from the fire brigade took half a year, since the concerning official was expecting a bribe. The construction itself took only two months and the first indoor ecosan toilet in Ukraine and one urinal were put to use in 2006[3]. In annex 1 an overview of the costs can be found. The children and teachers were informed well on the basic rules of using and maintaining ecosan toilets and there have been no complaints. Now, 35 pupils and their teachers have access to clean and sustainable toilets.

Moreover, in order to promote the principle of ecological sanitation, two ecosan toilets have been built for private households in Bobryk and Vertijivka. Prior to the construction, the residents were informed on the principles of ecological sanitation and how to construct a toilet.

Box 6:
Technical data of the indoor urine diverting facilty in Bobryk, used by 35 pupils and 16 staff

- One restroom with one plastic urine diverting squatting pan
- One restroom with one urinal, with alternative odour blocker
- Two PE urine tanks of each 1 m^3 for the collection and a 6-month storage time
- One faeces chamber with two wooden doors for isolation
- 80 litre container for collecting faeces
- Sanitising the faeces; by storage, alkaline treatment , composting
- Construction materials: bricks and cement

Figure 11:
The school latrines in Bobryk were unhygienic, attracting flies and had a bad odour

Figure 10:
The school latrines were located outside of the schools, which was inconvenient and cold in wintertime for the pupils

Figure 12:
This toilet is one of the first examples of an indoor ecosan school toilet in Ukraine, has no bad smell and is hygienic. The boy shows how one should cover the excrement with soil or wood chips after a toilet visit

[3] Due to lack of space, a single vault dry ecosan toilet was constructed.

3.1.4 Organic agriculture: first steps towards sustainable potato cultivation

Almost everybody living in Bobryk and Vertijivka is involved in subsistent agriculture and all of these households cultivate potatoes, also referred to as 'the second bread'. Since this crop makes up such an essential part of the diet, very limited or no crop rotation takes place. This results in a huge infestation of potato fields with pests, bacteria and viruses which leads to uncontrolled pesticide application. A survey showed that the residents lack even the most basic knowledge about good agricultural practices. Therefore, the project team, in co-operation with the Chernigiv Institute of Agricultural Microbiology, presented and promoted better potato cultivation practices in Bobryk and Vertijivka.
A study carried out by the Chernigiv Institute showed that more than half of all collected and analysed potato seeds, used by the residents of Bobryk and Vertijivka, were infected with some kind of plant disease. Of some households, over 70% of the potato seed samples were infected. Households do not practice adequate crop rotation and do not update their seed material regularly, causing a decrease in harvest quantity and quality. . A short outline of the conclusions prepared by Chernigiv Institute can be found in Annex 2. The project team organised a seminar in Vertijivka during which potato strains suitable for this region were presented. These healthy seeds could be purchased

Figure 13: Many people in Bobryk spray pesticides uncontrolled and unprotected to fight the Colorado beetle that ruins their potato yield

Figure 14: The potato strains best suitable for the region are demonstrated and sold at a project event

Figure 15: Experts from the Chernigiv Institute of Agricultural Microbiology monitored the pilot fields and crops closely in order to make recommendations on organic potato cultivation

afterwards. This event caused enormous interest among the residents.
During this project, three farmer households agreed to cultivate their potatoes according to the principles of organic agriculture. The farmers allocated land on which previously neither fertilisers nor pesticides had been applied. They were provided with several species of healthy seeds, environmental friendly plant protection substances and educational materials. The whole cultivation cycle was monitored and the harvests were analysed. As a result, the most suitable potato strains for this region could be identified and more specific recommendations on for example crop rotation, soil preparation, seed selection and preparation and pest control could be made.

During the next season of cultivation five volunteers from Bobryk participated in establishing sites for potato seed cultivation in their private gardens. This will assure that the people in Bobryk will be able to update their potato seed material in the future. Additionally, the participants received training on organic potato cultivation.
Although this project was small scale, it played a significant role in improving potato cultivation practices among the local inhabitants.

Table 1: Project results in Bobryk and Vertijivka.

No	Demonstration solutions	Number of beneficiaries
1	2 private ecosan toilets (1 in Bobryk, 1 in Vertijivka)	10 persons
2	1 school ecosan facility with 1 one-vault dry urine diversion toilet and 1 urinal in Bobryk	51 pupils and staff
3	1 restored school canteen well with a pump and indoor connection in Bobryk	51 pupils and staff
4	1 restored school technical well with a pump, indoor connection and grey water pipe in Bobryk	51 pupils and staff
5	Well water tests on nitrate concentrations in Bobryk and Vertijivka	173 families
6	140 m deep well with indoor connection for Vertijivka kindergarten	100 children + kindergarten staff
7	3 wells disinfected	3 families with children
8	1 Organic Agriculture Information Centre in Vertijivka	All villagers of Vertijivka, Bobryk and nearby villages
9	Demonstration garden in Bobryk on potato cultivation	All gardeners/farmers of Bobryk

3.2 Gozhuly

Gozhuly is a green suburban village surrounded by sloping agricultural land with 3.600 inhabitants, 8 km away from the famous and historical city of Poltava. Most residents commute to this city for work; 70% of the people in Gozhuly are employed and household incomes in Gozhuly vary from 23-215 Euros per month. Because of the threat of unemployment and low incomes, having own agricultural land is for many residents a necessity. There is a group of five collaborating farmers that cultivate 70 ha, and a private enterprise that cultivates 240 ha of land, but the farmers can not live from the profit alone. The village has a quite developed infrastructure compared to an average Ukrainian village; there is a central water supply and gas system. The community spirit and involvement is very low. After Soviet times and bankruptcy of the kolkhoz, services as garbage collection, maintenance of the central water supply system (cwss) or the organization of social events and clubs ceased to exist.

Gozhuly was chosen as a project area because there were several cases of blue baby disease (methemoglobinemia) registered. This is an indicator of high nitrate level in drinking water, often caused by industrial agriculture and/or mismanagement of human and animal waste. 800 households in Gozhuly are depended on this polluted well water. The remaining households are supplied by two badly maintained, unsafe and unreliable cwss. The users of the cwss, especially the young ones, suffer greatly from dental fluorosis. 80% of all school children have dental problems. Dental fluorosis can be recognized by spots on the teeth or in more severe cases by brown teeth.
The sanitation situation in Gozhuly is unacceptable. Most people use pit latrines. Some people, for example the apartment building residents, have a water flush toilets and are connected to the sewage system. The treatment plant, though, is not functioning anymore, and sewage pipes are rotten so wastewater leaks on the streets, even just a few meters away from the cwss tower. Sometimes the sewage collector overflows, and the wastewater runs downhill into the recreational lakes, putting people's health in danger. There is no garbage collection service in Gozhuly; many residents dump their garbage usually nearby gullies or obsolete buildings.

Figure 16:
These apartments in Gozhuly were built in Soviet times by factories and kolkhozes for their workers, but since their bankruptcy services, like the maintenance of the central water supply and heating system, discontinued

Figure 17:
Most people in Gozhuly live in private houses with their own gardens and use private or shared water wells

Figure 18:
Sewage pipes are rotten, so waste water is on the streets and even in the water catchment area

Figure 19:
The treatment plant is not functioning anymore

Figure 21:
Children of the school in Gozhuly checked over 150 private wells on nitrates and found that the majority of the wells were polluted

Figure 20:
During seminars residents were informed about issues as drinking water pollution, sanitation, hygiene and organic agriculture

Figure 22:
The majority of private wells in Gozhuly contain nitrate concentrations that are up to 5 times higher then the national standard

Figure 23:
A new hand washing basin at the school in Gozhuly

Box 7:
Dental Fluorosis

Dental fluorosis is an irreversible condition caused by excessive ingestion of fluoride during tooth forming years. It is the first visible sign that a child has been overexposed to fluoride. Other chronic effects from inhalation or ingestion are weight loss, malaise, anaemia and osteosclerosis (brittle bones, calcified ligaments) (WHO, 1984). The WHO standard of flouride levels in drinking water is set on 1.5 mg/l, although this level varies between 7-9 mg/l in Gozhuly.

Figure 24:
High fluoride concentrations in drinking water can lead to fluorosis which causes, among other things, brown teeth.
Photo by
John Colquhoun, DDS

3.2.1 Awareness raising, education and empowerment

During awareness raising activities, the residents of Gozhuly were informed about drinking water, ecological sanitation, the principles of organic agriculture, and gender issues. Users of the cwss were warned about the high fluoride levels in their drinking water and how this affects their health. Parents were advised to give their children bottled drinking water instead.
Although the public participation among adults in Gozhuly was very low, the children were very eager to join the well water monitoring program and tested 150 private wells in one year. 6-13 year old children used inexpensive nitrate testing strips to test the local well water and found that the nitrate levels were high: up to five times the national standard. The results were compiled in a map of Gozhuly and in this way made easily accessible for the residents. Another highlight was the celebration of the World Water Day 2006, during which the children could learn about environment and health issues in a playful atmosphere.
The community and public committees discussed the sanitation issues in the village, which attracted attention of local and regional authorities. Since the project's own budget was limited, the project team decided to lobby intensively with the provincial and district authorities in order to improve the sanitation situation, and with success. A representative of the Poltava Province Sanitation and Epidemiological Station helped with raising 25.000 Euros that was used for the restoration of the wastewater collection system by the replacement of a 640 meters long sewerage pipeline and the reconstruction of a wastewater pumping facility.

3.2.2 Safe drinking water: a restored well improves the health of 96 families

The residents of Gozhuly expressed their doubts about the quality of their tap water provided by the cwss to the project team. They decided to have this water tested by independent laboratories in Germany and Ukraine. And indeed, contrary to the 'official' analyses, the results indicated very high fluoride concentrations in this tap water[4]. The assumption that the children have brown teeth (dental fluorosis) because of their drinking water was confirmed. Besides this, the tap water appeared to have high concentrations of sodium, which makes it unsuitable for babies.
The users of the cwss decided that the best way to improve their drinking water situation was to restore a nearby public

[4] The fluoride concentration in the water of the Gozhuly cwss varied from 7-9 mg/l, while the WHO standard is set at 1.5 mg/l.

well. With common efforts of the residents and the village council, the public well was cleaned up. It was closed from the top to avoid people throwing garbage in it, as this used to happen in the past. Every apartment received a key to the well. The water analyses that were conducted after the well was cleaned showed that the quality now complies with the national standards. The restoration of this well reduces the risk to be affected by dental and bone fluorosis of 96 families significantly.

3.2.3 Ecological sanitation: the first indoor ecosan toilet in Ukraine

The kindergarten, primary and middle school of Gozhuly, situated under one roof, offer education to 160 pupils. The school is connected to the cwss and has two water flush toilets for the smaller children. The

Box 8:
Double vault and single vault dry urine diverting toilet

A urine diverting toilet has two outlets and two collection systems; one for urine and one for the faeces, in order to keep these excreta fractions separate. The double vault toilet has two chambers for the storage of the faeces. While one chamber is in use, the not in use chamber/slab is covered with a lid. Is one chamber filled, the second chamber can be taken in use, and the first chamber with content can be stored and hygienised according to the WHO guidelines. After the second chamber is filled the other chamber has to be emptied and prepared for its reuse. The single vault toilet has one chamber for the storage of faeces. After the chamber is filled the content must be removed and hygienised on another location (e.g. by composting). The dry urine diverting toilet does not need water for flushing, and therefore does not need a connection to a central water supply system or sewage system. Instead, dry organic material ike ashes or wood ships are used for covering the faeces. Well maintained and constructed, a dry urine diverting toilet does not smell or attract flies and prevents the infiltration of excreta in groundwater.

Figure 25:
One of the 4 new urine diverting toilets of the school. The toilet on the left will be used until the faeces chamber is full, after which it will be closed for two years to give the collected faeces time to sanitise

Figure 26:
The older children of Gozhuly's school had to use these unhygienic pit latrines, located far from the school.

Figure 27:
Through the brown doors one can access and empty out the faeces chambers

Figure 28:
The project team installed 3 waterless urinals in the school of Gozhuly

Figure 29:
All but one flow-off holes were blocked in each urinal to minimise the interaction between urine and air

Figure 30:
New urine reservoirs were placed in an underground room with brick walls

Figure 31:
The urine tanks of the ecosan toilets had to be taken out of the ground again: they were not able to withstand the soil pressure

Box 9:
Technical data of the school ecosan facility in Gozhuly, constructed in conjunction with the school

- Three restrooms with one plastic urine diverting squatting pan
- One restroom with three urinals, with alternative odour blocker
- Two PE urine tanks, each with a volume of 2 m^3, for collection, allowing a 6-month storage time
- Three double vault faeces chamber with each a volume of 0,9 m^3
- Sanitizing the faeces; storage, alkaline treatment , composting
- Ventilation pipe connected with the faeces chambers
- Construction materials: bricks and cement

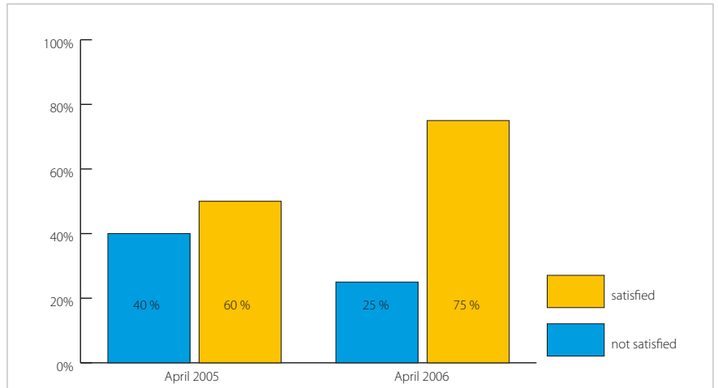
older pupils still had to go outside to very unhygienic, smelly and in wintertime very cold latrines. For these children, the first ecological sanitation toilet facility in Ukraine was built, with 3 double vault dry urine diverting toilets (squatting models) and 3 waterless urinals. With the support of the Hamburg University of Technology a design was developed and the facility was constructed in 2,5 months by a local certified constructor with approval of the school administration and the village council. In addition a simple hand-wash facility for the toilet users was installed.
The project team hired and instructed a caretaker, who monitors and maintains the facility. Since the opening of the ecosan toilet, the water expenses have decreased with 20%. The ecosan school project drew the attention of the wastewater department of the Technical University Poltava, Ukraine, and the regional school administration Poltava.
The total costs of the ecosan facility were high for an average rural school in Ukraine, because of high material and transportation costs and specific Ukrainian regulations on school building constructions.[5]
In annex 1 an overview of the costs can be found.

Technical problems

After a couple of months the boys started to complain about bad smell in the toilets. The many flow-off holes in the installed urinals were identified as a possible cause of the ammonia odour. All but one flow-off holes were blocked in each urinal to minimise the interaction between urine tank and the restroom, which causes this smell. Later on, a smell blocker was placed in the outlets of the urinals. After the implementation of an additional passive ventilation system for the restrooms all odour problems were solved.
In springtime 2005 it appeared that, in spite of the promises of the vendor, the urine tanks that were buried under the ground, had not been able to withstand the soil pressure. They were deformed and

[5] The walls of the facility should be 50 cm thick and the foundation min. 120 cm, and should be built by certified, and thus more expensive, construction companies.
[6] These were two 5 mm Poly Ethylene (PE) tanks with a volume of each 2 m^3.

had to be renewed[6]. Nevertheless, local authorities supported the project by finding appropriate solutions for the storage facility of the urine. They decided to construct and finance a sub-surface chamber, where the new urine tanks could be placed.
In the meantime, the school children had to use the pit latrines again, and were pleased that in November that year the ecosan facility was reopened.
Analyses done on the collected urine showed that the urine is rich in nutrients which means it can serve well as a fertiliser for gardening and agriculture (see table 2). In autumn 2006 a farmer applied the collected urine from the ecosan school toilets on his field to fertilise his crops.



Graph 2:
Satisfaction with ecosan school toilets among pupils in 2005 and 2006 in Gozhuly

Table 2: Results of urine analyses for macronutrients (July 12, 2006)

Parameter	Units	Value
pH	[-l]	8,94
El. Conductivity	[mS/cm]	37,9
total N	[mg/l]	5350
total P	[mg/l]	176
total K	[mg/l]	2290
TOC	[mg/l]	1420
TC	[mg/l]	4030

To estimate the acceptance of the new toilets by the pupils, surveys were held. Although the acceptance of the facility was not as high as expected in 2005, the amount of children being content with the toilets, increased in 2006. This increase could be explained by the reduction of bad smell, and intensified education on topics as hygiene, health and environment. The results the surveys held are summarised in the figure below.

The survey showed that more girls were unhappy with their new toilets than boys, especially teenage girls. Perhaps this was the case because there were no cleaning tools and water available in the restrooms in the beginning. However, the teachers were all very pleased with the new toilet facility.
Without a doubt, this ecosan toilet served its demonstration purposes: after seeing the facility during an opening festivity in November 2004, other requests for this toilet for other schools were received. The experience showed that with proper education even 6 year olds can understand the principle of dry double vault urine diverting toilets as a part of ecological sanitation.

160 children now have access to adequate sanitation due to the construction of clean school toilets and hand washing facilities and are more aware of the consequences of bad hygiene practices and environmental problems. Thereby the groundwater and soil will not be polluted anymore by infiltration of urine and faeces and the water expenses of the school are reduced by 20% since the opening of the new facility.

Figure 32:
Farmers of Gozhuly attending training on organic agriculture

Figure 33:
The organic farmers of Germany paying a visit to the corn fields of Ukrainian farmers

Figure 34:
Residents learned, during one of the many project events, how to recycle their organic waste and construct a compost heap

3.2.4 Organic agriculture: Gozhuly farmers start organic farming

Gozhuly is situated in an agricultural area with fertile soils, which offers opportunities for organic farming. Therefore, the local farmers were informed about the principles, the opportunities and benefits of organic farming to the environment and the consumers' health. To inspire the local farmers, there were exchange trips organised between the local farmers and organic German and Ukrainian farmers. Theories were put into practice: an organic agriculture consultant tested the soil of local farmers, and explained them how to improve it, how to deal with weed, etc. In 2006 the participating farmers became members of the Ukrainian Federation of Organic Agriculture Movement.
Local gardeners were informed about the benefits of crop rotation, biological pest control and the reuse of organic waste. This happened in very practical ways, for example by showing them how to compost and how to construct a compost bin. By establishing contact with universities and certifying institutions, and raising the issue of organic agriculture to the provincial level, the project team tried to pave the way for organic farming in the region.

Table 3: The project results in Gozhuly

No	Demonstration solutions	Number of direct beneficiaries
1	More than 50 educational events	Over 400 residents of Gozhuly
2	General water tests from 2 central water supply systems in Gozhuly	All residents connected to Gozhuly central water supply system
3	Well water tests for nitrate concentrations	150 families
4	1 school ecosan facility with 3 double-vault dry urine diverting toilets and 3 urinals	160 schoolchildren
5	Renovation of 1 public well	96 families
6	Organic agriculture consultations for farmers + soil tests	3 farmers
7	1 demonstration waste composting site	8 households

Figure 35:
The infrastructure of Vorokhta is semi-urban; most citizens have gas and electricity and have access to shops, bars, a post office, a school and a kindergarten

Figure 36:
Vorokhta is surrounded by the Ukrainian Carpathian mountains and is located in Carpathian National Nature Park and attracts many tourists

3.3 Vorokhta

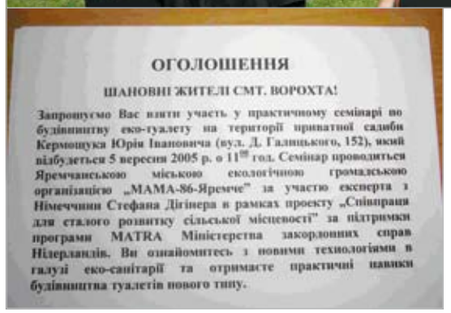
The town of Vorokhta, which has 4000 inhabitants and is located in the heart of a National Park, attracts 35.000 tourists every year. Because of its nice climate and fresh air it also hosts 2 tuberculosis sanatoriums. These businesses make up the major source of employment and income. Since the area is mountainous it is not quite suitable for agriculture. Nevertheless, most people have a small plot where they grow vegetables for own use. Men do the most and heavier work on these plots, while women do most of the house work. After Soviet times a lot changed in this village as well; most community organisations were closed down and people lost their faith in politics: ***"Many promises, nothing done", "Only a strong person can improve the situation, but nice and honest people cannot achieve much..."***

Although part of this town is served by a central water supply system, the water that flows from its corroded and broken pipes is micro-biologically polluted and the supply is regularly interrupted. Most people have pit latrines in the yard and are very unhappy with them. The latrines are considered unhygienic, dirty, smelly and cold and inconvenient in winter-time. Bathrooms and hand-wash facilities are rare. Wastewater flows almost untreated directly into the river and garbage is being piled up in enormous mountains of waste. These poor sanitary circumstances have a great impact on the inhabitants' life and health. For example, there has been a dramatic increase of hepatitis A (1999), dysentery (2001) and gastroenterocolitis (2002). In addition, unbalanced diets have a negative health impact.

Figure 37:
With latrines in the yard and piles of garbage near the houses, the sanitation situation in Vorokhta is far from optimal.

Figure 38:
Many residents of Vorokhta use public wells that can dry up in dry seasons, so the users have to search for alternative drinking water sources.

Figure 39:
Booklets about environmental issues and their impact on health are being presented. With these educational events the project team has been able to reach over 1000 children.



ОГОЛОШЕННЯ

ШАНОВНІ ЖИТЕЛІ СМТ. ВОРОХТА!

Запрошуємо Вас взяти участь у практичному семінарі по будівництву еко-туалету на території приватної садиби Кермощука Юрія Івановича (вул. Д. Галицького, 152), який відбудеться 5 вересня 2005 р. о 11[00] год. Семінар проводиться Яремчанською міською екологічною громадською організацією „МАМА-86-Яремче" за участю експерта з Німеччини Стефана Дігінера в рамках проекту „Співпраця для сталого розвитку сільської місцевості" за підтримки програми MATRA Міністерства закордонних справ Нідерландів. Ви ознайомитесь з новими технологіями в галузі еко-санітарії та отримаєте практичні навики будівництва туалетів нового типу.

Figure 41:
An anouncement for a workshop on ecological santitation

Figure 40:
Local citizens of Vorokhta attending a workshop on how to construct an ecosan toilet

3.3.1 Awareness raising, education and empowerment

With an awareness raising campaign, the project team reached 1000 children in Vorokhta of 7-16 years old and educated them on issues like safe drinking water, waste management, organic agriculture, environment, hygiene and health. The schools and libraries received the educational materials. To get the children even more involved, the project team took the 'learning by doing' approach. The pupils tested 89 wells on nitrate pollution and monitored the water quality of the local river Prut. They also were given the opportunity to share their experiences with pupils of other schools in the area.

During seminars, the residents of Vorokhta were made aware of how mismanagement of human waste can cause nitrate and microbiological pollution of drinking water and the possible solutions that can prevent this. One solution is installing an ecosan toilet. Due to workshops on this theme, participants became very interested in this concept.
To give the local population means to empower themselves, a public committee was established. The members showed immediately great enthusiasm and initiative. This committee, together with the local authorities, prepared a 'Program on the Improvement of the Hygiene and Sanitation in Vorokhta', which was

accepted and adopted by the concerned authorities[7].

3.3.2 Safe drinking water: the highest priority in Vorokhta

Improving access to safe drinking water was a priority for this project, starting with the restoration of the existing central water supply system (cwss). For more than 20 years this problem has been discussed but no decision was made. Besides renovation of the pipes, reservoirs and water catchment, a water filtration system came out as a necessity. Unfortunately, bureaucratic barriers prevented this from being implemented within the timeframe of the project and a decision about an alternative had to be taken. The project team involved the local community in finding the best alternative solution for the problematic drinking water situation in Vorokhta. According to their wishes, this project contributed to the construction of an additional 265 m long pipe-branch of the cwss, connecting more than 100 people. Additionally 41 water meters were installed. Another result from this project and its aim to empower people was the awarding of a fund from the Ukrainian government to renovate the whole water supply system, after a long period of lobbying by the local authorities, the public committee and the local project partner.
For two years, the project team monitored the quality of 5 public wells for microbiological and nitrate pollution. The results of these tests were made easily accessible to the well users. In addition, the wells have been cleaned. This means that 400 people now have access to drinking water of improved quality. By the end of the project, the Village Council included the maintenance and operation of public wells into their duties.

[7] The Executive Committee and the Village Council of Vorokhta.

Figure 42:
The drinking water treatment of the old central supply system of Vorokhta consists of a pan that is slowly adding hypochlorite to the water

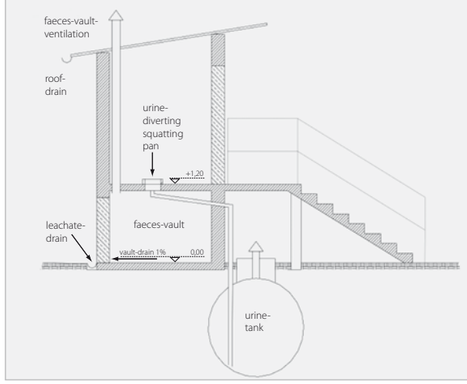
Figure 43:
The public committee and project partners are checking out the central water supply system

Figure 44:
An additional 265 m long pipeline was needed, a branch of the central water supply system, was built, connecting more than 100 people

Figure 45:
The foundation of the ecosan toilet is being laid, with the help of the prospective owners

Figure 46:
Foundation is being prepared

Figure 47 - 48:
The frame of the ecosan toilet is being constructed



Graph 3:
Cross section of a dry urine diverting toilet (source: TUUH)

3.3.3 Ecological sanitation in Vorokhta: a good solution for a mountainous area

Since the soils are very rocky in Vorokhta, it is difficult to dig a pit for a latrine. This is one of the reasons the ecosan toilets were a welcome alternative for the residents. With the help and input of the prospective owners and under the supervision of an expert from the Hamburg University of Technology the project team constructed 5 ecosan toilets as demonstration models. A local citizen was intensively trained on the principles, maintenance and construction of ecosan toilets. With a mould the toilets seats were made out of cement and the toilet owners contributed with labour to the construction of the new toilets. In annex 1 an overview of the construction costs can be found. Given good weather, an ecosan toilet can be constructed within one week. The new toilets are now used by 31 people.
As a result of this project, the topic sanitation was put on the agenda of the local authorities. In general it looks like the local authorities are trying to fulfil their duties as described in the 'Program on the improvement of hygieneic and sanitation', mentioned above. By the end of 2005 an anaerobic sewage facility was constructed for the centre of Vorokhta. For the other part of Vorokhta the authorities plan to construct a soil filter, also referred to as bio-plateau. Furthermore, the local authorities purchased a garbage truck and installed several garbage containers.

Figure 49: With cement and a plastic mould, the urine diverting toilet seat is made locally

Figure 50: The urine diverting toilet seat is almost finished

Figure 51: Ready for use...

Table 4: Summary of the project results in Vorokhta

No	Demonstration solutions	Number of beneficiaries
1	Educational events for children	Over 1000 children (7-16 years old)
2	Well water tests on nitrate pollution	89 families
3	5 public wells cleaned and disinfected	Approximately 400 persons
4	265 m long pipe branch of cwss	100 persons
5	41 water meters	41 families
6	5 household ecosan toilets	31 persons
7	1 connection to sewage system	2 persons

Figure 52: In total 5 of these ecosan toilets for private households were built

Figure 53: The urine of the ecosan toilet users is collected in a reservoir and reused on the fields

4 | The project at national and international level

WECF aims to involve people, organizations and governments at all levels. This is why WECF and her project partners were not only active on a local level, implementing practical projects, but were simultaneously addressing issues such as environmental and sanitation problems in rural Ukraine at a national and international level.

In Ukraine, taboos prevent people from discussing human waste management issues in public. The national media avoids this topic as well, leading to unawareness about the existing sanitation problems in the rural areas. The project team tried to break this taboo and filled up the informational gap by organising talk shows about sanitation on regional and national radio and television. Also, the project activities and results were covered by the media.
The project team participated in the public hearings on the Ukraine National Program on Drinking Water. In its initial state, this program did not mention the rural areas and its problems. Due to the comments and additions submitted by the project team, the rural areas were included into this program, which was adopted by the Parliament in March 2006.
Throughout the project World Water Day celebrations were organised yearly in different parts of Ukraine. Children that participated in the well water monitoring presented their results, and were given the chance to present their results at the Youth Water Parliament in Moldavia in 2006. The first experience with ecological sanitation in Ukraine was presented at many international conferences like, in 2005, the Almaty Ministerial Meetings in Yerevan, the Women for Water Conference in The Netherlands and the World Water Week in Sweden, and in 2006, the IV World Water Forum in Mexico and the II International Dry Toilet Conference in Finland. Extensive international knowledge exchange was ongoing during the project. International experts from Germany (TUHH), Sweden (SIDA) and the Netherlands (Aqua for All) visited all the demonstration sanitation projects and provided valuable recommendations.
Water service representatives from the project area visited their German colleagues of the water works of Munich in 2005, and so did 8 Ukrainian farmers, who discussed agriculture with organic farmers in Germany in 2006.

In the framework of this project, many booklets, handouts, articles and posters were prepared to inform people at a national and international level on project related issues (see Annexes).
During a final international seminar named "Public participation in improvement access to safe drinking water and sanitation in the rural areas of the Ukraine" the problems identified during the project were pointed out by the project team[8]. These were: the lack of attention at all governmental levels to water and wastewater problems in rural areas, low level of awareness and knowledge about sanitation system maintenance and hygienic rules, and the absence of skilled staff and financial resources, and high bureaucratic barriers to solve these problems. Among the more than 100 participants were representatives of the government, science, water management, rural communities and NGOs.

[8] This seminar was held within the framework of the IV International Water Forum "AQUA Ukraine-2006"

Figure 54: Ukrainian partners and authorities visit a water utility station in Germany and exchange knowledge about ground water protection and water supply

Figure 55: The project coordinator of mama '86 presents the project experiences on the third World Water Forum in Mexico

5 | Conclusions and lessons learned

Social participation and community spirit

- The success of a project highly depends on the involvement and co-operation of all stakeholders and desire for change and action
- It is important to involve the local population while identifying the main issues and finding solutions
- Too many local resource persons (teachers, doctors etc.) involved in a committee, though, might restrain the rest of the local population from joining
- In the regions where public participation is low, a personal approach is essential. Ideally, the project partners should be local citizens
- To motivate and get people involved, it can be useful to implement some demonstration solutions in the first part of the project period
- Involvement of children into project activities brings positive results, and a 'learning by doing' approach both raises awareness and increases social participation of the young generation
- It is impossible to change the life-style of people in a few years. However, by offering knowledge and means (ecosan toilets, potato seeds, biological pesticides etc.) the mentality can be influenced

Awareness

- In general, the level of awareness of environmental and sanitation issues in the project areas is low
- On local level there is very limited access to information on environment or water quality and a low awareness about the relation between environment, water quality and health
- On local level there is a low awareness about sustainable agriculture and gardening, leading to loss of nutrients, and plant and livestock diseases
- The implementation of demonstration solutions together with educational activities to increase this awareness has proven to be a very successful strategy

Politics, bureaucracy and corruption

- Bureaucracy, very often in combination with corruption, can be a major barrier to the implementation of demonstration projects and can even slow this process down for years
- The more innovative the solution (e.g. ecological sanitation), the more resistance can be expected, as the officials are not willing to take responsibility
- Since a project can stagnate due to bureaucracy and corruption, alternative programs should be prepared in advance for large scale projects with a limited time frame
- Water, wastewater and waste management in Ukraine is a political post – the managers are appointed according to their political preferences instead of their experience. This situation puts a strain on rural development
- The responsible local authorities of Gozhuly kept information on the high fluoride levels in cwss water from the local population
- After Soviet times a lot of administrative information disappeared or got missing, like locations of obsolete pesticides or the quality of public drinking water

Lack of experience, expertise and financial recourses

- The execution of a development project requires authorities to create a good plan of action that involves all stakeholders and experts. However, local governments are often lacking experience and expertise
- Most municipalities lack financial resources and adequate systems, leading a deficient maintenance and operation of public services, like drinking water, wastewater treatment or heating systems
- On local level households carry out activities that should actually be executed by experts, like making water connections
- Solutions to local problems do not necessarily have to be very expensive, but require co-operation of all different stakeholders. In this case, NGOs could play the role of facilitators and/or mediators

Drinking water

- In Gozhuly children suffer from dental and bone fluorosis, caused by high fluoride concentrations in tap water. These concentrations exceeded the national standard for drinking water 5 to 6 times, a fact neglected by the responsible authorities
- In all three project areas nitrate levels of well water exceeded the national standards 5-10 times, posing a health risk on the users
- In Bobryk, the old pesticide storage place poses a risk on the environment as obsolete pesticides leak into soil and groundwater, and need to be cleaned up
- Water supply and waste water systems are in state of decay posing a health risk on the citizens and need restoration
- In Vorokhta , there are several multi storage houses without a connection to a water supply system
- In Vertijivka, extremely high nitrate concentrations in all the wells were found. In former times a fertilizer stockpile was located close to the village
- In general there is no tradition of cleaning the drinking water wells
- As the example of the kindergarten in Vertijivka showed, access to safe drinking water is crucial for the children's development

Sanitation

- In general the level of sanitation in the rural areas is very low: in particular the toilet facilities in the schools and other public institutions are in a disastrous state.
- The authorities pay no or very little attention to the problems of the school sanitation
- Due to lack of financial resources and lack of awareness, safe management of human waste is absent
- Attention of the regional school authorities was attracted with pilot projects on indoor dry urine diverting toilets for schools; school sanitation got an issue for the decision makers
- It was shown, that even without a connection to the central water or sewage system, the dry urine diverting toilet is a very fast and easy to realise tool to protect groundwater
- It was shown, that the new approach of ecological sanitation improved the sanitary conditions of the school in an affordable and sustainable way, and thus improved health conditions

Ecological sanitation- dry urine diverting toilets

- A very crucial factor is the real understanding of the dry urine diverting facility and its effects by the stakeholders. This was addressed in workshops, which were held before and after the installation of the toilets, and by comprehensible posters for children
- With proper education also young children understand the principle of urine diverting toilets as a part of ecological sanitation
- To have access to an indoor toilet facility without having to walk through the cold or rain, was for the users a real improvement. The new toilet system was accepted very well
- The final success of ecological sanitation partially depends on the involvement of local farmers, who should be informed well and be willing to use the urine on their fields as fertiliser
- It is important to have an appointed caretaker to monitor and maintain the school facility, and to sanitise the urine and faeces fractions according the guidelines of the WHO
- Any construction attended for schools in Ukraine will require higher costs than average because of national regulations, transportation costs and mandatory certified constructors
- Since ecological sanitation is a new concept to many authorities, it takes much time and effort to obtain their approval and the permits needed to construct an ecosan facility
- In Ukraine it is difficult to find suitable and affordable tanks for the collection and storage of urine and that can withstand high soil pressure
- The project design of ecosan facilities in temperate climates should include measures concerning ventilation, cold and freezing of the ecosan products (e.g. insulation of the doors of the vaults)
- It is important to assure that there are means for abstraction of the stored urine from the tanks, its transportation to the farmers' fields and for its application
- There is a big interest in ecological sanitation in Vorokhta because the rocky soil makes it difficult to dig a pit. For ecosan toilets no pits are needed
- The absence of ecological sanitation experts and equipment in Ukraine is a barrier for the further spreading of the ecosan technologies

Agriculture

- In the three project areas most residents are subsistence farmers, where the potato is the main crop. There is no culture of crop rotation and composting
- In all the project areas the potato Colorado beetle is the main pest in households' gardens. Pesticides are frequently used, often without protection
- Organic farming was in the area a rather new issue. Demonstrations and showing succesful examples proved to be a good tool to convince some farmers
- Lack of legal framework, access to information, support by consultants and common price policy for organic agriculture and processing is a barrier for the development of this method of farming

National and International level

- International funds focus on urban areas and totally neglect rural ones
- There is no effective rural state programme in Ukraine. This is partially a consequence of the lack of awareness on the rural situation of national policy makers
- The sanitation situation at schools should receive more attention from national authorities.

6 | Recommendations

There is a need to give priority to rural development through:

- The implementation of stricter environment and water protection measures
- The establishment of regional public water and wastewater companies
- Appointment of specialists on water and wastewater management positions should be based on expertise and experience – it should no longer be a political appointment
- Developing a program for monitoring and emergency measures (e.g. according the WHO Water Safety Plan")
- Strengthening of and co-operation with civil society
- Developing and introducing legal certification of organic produce
- Introducing incremental, cost covering water and wastewater tariffs

There is a need for prevention measures:

- Agriculture is one of the sectors responsible for the drinking water pollution; therefore establishment of environmental regulations for this sector could solve part of the problems
- Training of farmers and gardeners on good agricultural practices, integrated pest control etc.
- A regulation for current pesticide use in agricultural sector and on household level
- An urgent clean up policy and implementation of all obsolete pesticides stockpiles
- Adjusting regulations for easier implementation of on-site decentralised wastewater treatment, like ecological sanitation
- A realisation of a stringent identification and protection of water catchments zones
- Developing a more efficient government
- Establishment of international co-operation on low chemical input (organic) farming, sustainable and affordable water and wastewater management

For ecological sanitation to develop there is a need:

- To approve and regulate ecological sanitation on national level
- For national regulations on safe reuse of human waste in agriculture
- To develop a market for ecosan equipment
- To develop decentralised wastewater management (ecological sanitation) expertise in Ukraine

Finally there is a need for financing the rural areas:

- The state budget should set priorities for the development of rural areas, like rural water infrastructure
- Investments should be made in affordable, decentralised and sustainable systems
- In general, at least the converting from conventional to organic farming should be subsidised
- Water protection measures carried out by farmers in water catchment areas should be subsidised
- The government should negotiate with international financial institutions for the implementation of rural development programmes

Annexes

Annex 1
Costs of construction of the ecosan toilets in the project areas

1. The costs for the indoor school ecosan toilet facility in Bobryk, serving 35 pupils and 16 staff members.

Cost items:	Euro
Required documentation	400,- €
Materials	1020,- €
Transportation	150,- €
Construction	1680,- €
Total costs	**3060,- €**
Costs per square meter	**60,- €**
Costs per square meter (5,56 m^2)	**550,- €**

2. The costs of the indoor school ecosan facility in Gozhuly, serving 160 children

Cost items:	Euro
Total construction and material costs Urine tanks + transportation	9292,- € 895,- €
Sub total costs	**10.187,- €**
Improvement of the system: • New urine tanks, ventilation, rehabilitation of the area • Contribution of authorities for sub-surfaced storage place for tanks	 1.597,- € 1500,- €
Total costs	**13.284,- €**
Costs per user	**83,- €**
Costs per square meter (5,56 m2)	**553,- €**

3. The costs of an out-door ecosan toilet in Vorokhta, serving one family

Cost items:	Euro
Material for basic construction	115,- €
Finalizing the facility (paint, screws, linoleum, etc.)	58,- €
Urinal and home-made seat riser	27,- €
Total costs (exclusive transport costs)	**200,- €**
Total costs per square meter (2.56 m^2)	**78,- €**

Annex 2
Conclusions of the Chernigiv Institute of Agricultural Microbiology on potato cultivation in Bobryk and Vertijivka

The short outline of the conclusions prepared by Chernigiv Institute of Agricultural Microbiology of Ukrainian Academy of Agrarian Sciences after the survey of the potatoes seeds material conducted in the private households in Bobryk and Vertijivka.

1. The phyto-sanitation conditions of the household gardens do not meet the elementary requirements for potato cultivation:

- the potatoes are not isolated from other vegetables by high plants (e.g. maize, beans);
- the crop rotation is not appropriate;
- nobody uses green fertilizers that also help to fight with potatoes diseases.

2. The cultivation techniques and the equipment needed for potato cultivation in the households meets only basic requirements:

- the potatoes are being seeded too early;
- only few households use mechanical equipment while potatoes are seeded;
- when the potatoes are seeded manually;
- the distance between the rows is too small;
- the households apply fresh (not composted) manure which creates favorable conditions for fungi's and bacteria;
- chemical pesticides against Potato Colorado Beatle are applied and often in inappropriate way, thus causing the plants and soils contamination, intoxication of persons who apply the pesticides and/or the consumers of young potatoes.

Annex 3
Publications and other educational materials, MAMA-86

Publications

1. Final Report of the MATRA project "Co-operation for sustainable rural development: water supply, ecological sanitation and organic agriculture" (600 copies in Ukrainian, 500 copies in Russian and 300 copies in English), 2006.
2. Magazine „Ekomama" N 4 of MAMA-86; October 2006 (1000 copies).
3. Ukrainian version of WECF publication "Dry Urine Diverting Toilets: Principles, operation and construction "; September 2006 (500 Ukrainian copies)
4. Practical recommendations on organic agriculture and modern methods of material and technical recourses' use reduction in crop production – 2005.
5. Ukrainian version of WECF publication "Ecological Sanitation and Associated Hygienic Risk. An overview of existing policy making guidelines and research".

Booklets

1. Ecological sanitation - a new approach to solve wastewater problems in Ukraine; March 2006 (2500 copies).
2. About ecological sanitation and its advantages.

Leaflets

1. World Water Day 2004; Water and Disasters; 22d of March - World Water Day; About World Water Day; World Water Resources and Water Resources of Ukraine; Millennium Development Goals: Ukraine; World Water Monitoring Day – 18 October; Water Monitoring Instructions for Safety; Water Monitoring; World Water Day 2006 and Water and Sanitation week; Water related diseases; Recommendations to well users; Ground water protection; Iodine in the environment and in water; Clean rivers – the healthy environment; How to prepare safe drinking water; Let's take care of water - a cradle of everything alive on the Earth; Take care: fluorine in water; How can one protect family from nitrates; Fluorine.
2. Dry ecosan toilet; Ecological sanitation. What and how?; Ecological sanitation. What and how?; Dry toilet; Ecosan toilet. What is it?; Microorganism: safe water at home.
3. Composting is simple and effective; Pesticides! Your health is in danger; Plant-doctors; Dakar Declarations; Dakar Declarations: actions and obligations.
4. Solid waste and our health.
5. Take care: Pesticides!; Aspects of organic agriculture in Ukraine; Potato - a second bread; Handle soil with love and passion; Nizhyn cucumber is our wealth.
6. Hygiene for girls; Hygiene for boys; Hygiene for every day.

Abstracts

1. 4 Abstracts for the scientific-practical Conferences of International Water Forum; AQUA Ukraine-2003, Kyiv, 2004, P. 290- 318
3. Tsvietkova Ganna, Kovalyova Olena. "First eco-san-toilet in Ukraine: co-operation for sustainable rural development" – Abstract for the 15th Stockholm Water Symposium, 2005, P. 163.
4. 15 Abstracts for the scientific-practical Conferences "Water, sanitation and hygiene for all in Ukraine. "AQUA-2005", Kyiv, 2005, P. 280- 317.
5. The abstracts of 4 presentations of the MATRA seminar "Water, Sanitation and Hygiene for all in Ukraine", IV International Water Forum, AQUA Ukraine-2006, 19-21 September, 2006. – Kyiv, 2006, P.474- 490.
6. An abstract "The practice, problem and strategy of ecological sanitation toilets with urine diversion in rural areas of Ukraine (The experience of NGO MAMA-86 in eco-sanitation project implementation) and presentation for The Second International Dry Toilet Conference. August 16-19, 2006, Tampere, Finland.

Posters

1. Sustainable Sanitation for Children in Ukraine
2. Water Basins of Ukraine
3. GTZ Poster in Ukrainian " Ecosan – closing the loop in wastewater management and sanitation"

Annex 4
Media coverage in Ukraine

- Radio: 5 interviews with project partners of MAMA-86 were held, 4 news items on local radio were broadcasted and a representative of participated in 1 talk-show
- Television: 2 films about the project results were made, two interviews were held, 7 news items were broadcasted on TV channels and representatives participated in 3 talk-shows and TV programs.
- Newspaper articles were published by project partners of MAMA-86 on the following themes:

Water	Sanitation	Sustainable rural development and environment in general
Who will protect the consumers from bad water quality?" in: Carpathian National, November 2003	Eco-toilet for schoolchildren, in: Kolo, 10.11.2004	Co-operation for sustainable rural development, in: Carpathian National, November 2003
Inhabitants of Vertijivka would like to have clean water, in: Nizhynsky Visnyk, 17.06.2004	Ecological sanitation over all, in: Yaremche messenger:September 2005	Future for our children, in: Carpathian National, April-June 2004
Let the springs be clean, in: Nizhynsky Visnyk, 24.06.2004	Opening of the ecosan toilet in Bobryk, in: Nizhynsky Visnyk, 07.09.2006	The environment and health are synonyms, in: Nizhynsky Visnyk,„12.08.2004
Clean water for all, in: Nizhynsky Visnyk, 16.10.2004	Toilet in the school, in: Sivershchyna, 13.09.2006	How the project„Sustainable Rural Development" worked in Bobryk, in: Nizhynsky Visnyk, 13.11.2004
To Save water – to save life, in: Visti, 25.03.2005	The ecosan toilet in Gozhuly – to be or not?, in: Kolo, 21-27.09.2006	And they think about us, in: Nizhynsky Visnyk, 19.11.2004
Water, you are life yourself, in: Nizhynsky Visnyk, 24.02.2005	**Agriculture**	The environment – a priority number one, in: Visti 02.09.2005
22 March – World Water Day, in: Carpathian National, March 2005	Mountain farming as element of organic farming, in: Carpathian National, April-June 2004	People in Bobryk are wise, in: Nizhynsky Visnyk, 26.05.2006
Water quality is being checked by children, in: Carpathian National, 2005	You harvest what you have sown, in: Nizhynsky Visnyk, 20.01.2005	"MAMA" will help Gozhuly school and kindergarten" in: Visti, 11.11.2005
Once more about water, in: Stolytsya, 01-07.04.2005	You harvest what you have sown, in: Visti 04.02.2005.	Young parliamentarians made Ukraine famous, in: Carpathian National, October – December 2006
„World Water Day in 2006, in: Carpathian National, January-March 2006	On the edge to pesticides poisoning, in: Sivershchyna 26.08.2005	
"New Approaches to Water Resources Management", in: Carpathian National, January-March 2006	How to manage to feed children?, in: Nizhynsky Visnyk, 01.09.2005	
"Children projects in Vorokhta, in: Carpathian National, April-June 2006	Who will help a farmer in Ukraine, in: Nizhynsky Visnyk, 18.02.2006	
"The problem with bad water quality in Gozhuly is not solved yet", in: Kolo, 28.09-04.10.2006	Opening Organic Agriculture Centre in Vertijivka, in: Nizhynsky Visnyk, 18.03.2006	
"World Water Day. Water should be valued", in: Visti, 21.04.2006	Regional programme on sheparding – to help farmers, in: Carpathian National, October – December 2006	

Annex 5
Other WECF publications

Other WECF-projects related publications are available on the website of WECF:
www.wecf.eu/publications

Romania Gender Socio Economic Analysis Report,
A report on a short survey of the socio-economic and gender situation in Garla Mare, Romania, 2004.
http://www.wecf.eu/cms/publications/2004/Romania_Report.php

Experience in Roma District,
An insight into the safe drinking water project in Garla Mare, Romania, 2004.
http://www.wecf.eu/cms/publications/2004/roma_experience.php

Ecological sanitation and Associated health Risks,
An overview of existing policy making guidelines and research, 2004.
http://www.wecf.eu/cms/publications/2004/eco_san_pub.php

Co-operation for Sustainable Rural Development - Involving Citizens and Local Authorities in Rural Ukraine in the Improvement of Drinking Water, Sanitation and Agriculture.
Socio-economic and gender survey of Vorohkta, Bobryk and Gozhuli. 2005.
http://www.wecf.eu/cms/publications/2005/socioecon_survey_ukr.php

Solid waste management in Garla Mare,
Solid waste management report for the village of Garla Mare, Romania, 2005.
http://www.wecf.eu/cms/publications/2005/solidwaste.php

Small-scale environment-friendly tourism in Garla Mare,
A report on small-scale ecotourism on the borders of the Danube. Opportunities and chances for the villagers in Romanian Garla Mare, 2005.
http://www.wecf.eu/cms/publications/2005/tourism_gm.php

Socio-economic and gender survey of Topoli, Sulitsa and the Stara Zagora Spa, Bulgaria,
Developing a Model for Sustainable Water and Waste Management for Rural Areas in Bulgaria.
http://www.wecf.eu/cms/publications/2005/survey_bulgaria.php

Armenia - Pesticides Guidelines and Project Report,
Two publications by the University of Wageningen on pesticides use in Armenia, 2005.
http://www.wecf.eu/cms/publications/2005/hayanist_rep.php

Armenia - Socio-Economic and Gender Survey
A survey conducted by WECF and AWHHE as part of the TMF project „Tapping Resources", 2006.
http://www.wecf.eu/cms/publications/2006/armenia_socio_economic.php

Dry Urine Diverting Toilets, Principles, Operation and Construction, 2006.
http://www.wecf.eu/cms/publications/2006/ecosan_reps.php

From pit latrine to ecological toilet, Results of a survey on dry urine diverting toilets and pit latrines in Garla Mare, Romania, 2006.
http://www.wecf.eu/cms/publications/2006/ecosan_pitlatrines.php

Sustainable Development for All,
Reducing effects of polluted drinking water and inadequate sanitation on children´s health in rural Romania, 2006.
http://www.wecf.eu/cms/publications/2006/sustain_all.php

Urine Diverting Toilets in Climates with Cold Winters,
Technical considerations and the reuse of nutrients with a focus on legal and hygienic aspects., 2007.
http://www.wecf.eu/publications

Documentaries: CD or DVD
No Drinking Water, Documentaries on Women and Water, CD-rom/DVD, 2004.
http://www.wecf.eu/cms/publications/2004/wecf_dvd.php

Poverty, Pollution and Bad Health "in Prislop" a Romanian settlement,
Welcome to the European Communitiy / Willkommen in der europäischen Union. DVD 2007.
http://www.wecf.eu/cms/publications/2007/prislop_dvd.php

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