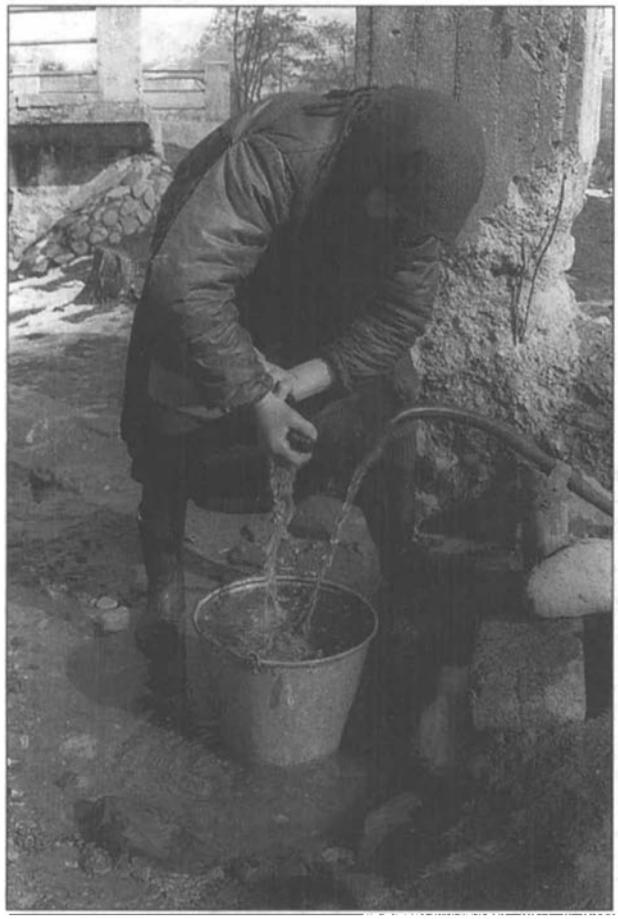
Water supply and quality issues in Central and Eastern Europe and the Newly Independent States

by Jamie Bartram and Jens Jacob

Many of the countries once ruled by centralized bureaucracies are faced with a particular dilemma — rising cases of infectious disease. At the same time, the collapse of heavy industry has led to cleaner air and water. What does the future hold?



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A government's ideology matters a lot less to people than its ability to provide basic services.

CHANGES, UNTIL RECENTLY inconceivable, have been sweeping across the area once referred to as the Second World. Many of the changes have attracted global attention; others are barely noticed outside their immediate environment.

The provision of basic services, such as water and sanitation, falls into this latter category — unless, of course, there is large-scale foreign investment, or spectacular outbreaks of water-related disease to attract the media's attention. Yet behind this wall of apparent silence, millions of ordinary people continue to receive and consume water and produce wastes; and large numbers of professionals of diverse disciplines continue to work to provide water and sanitation services.

A diverse region

Although the areas now generally referred to as Central and Eastern Europe (CEE) and the Newly Independent States comprise a diversity of environments, cultures and economies, this article attempts both to describe some of the principal changes in water supply and sanitation, and to highlight some of the major challenges confronting people working in the region.

The region's diversity should not be underestimated. It includes countries now expected to be in the first wave of expansion of European Union membership, targeting convergence with EU levels and standards of supply; the Russian Federation — which itself varies from relatively densely populated 'European' Russia to the sparsely populated eastern regions; the Caucasian States — some with oil wealth which could, potentially, fuel national programmes of development; and the five central Asian republics, one of which, Kazakhstan, has a land area equivalent to that of Western Europe. The region varies from northern tundra to the subtropical coasts of the Black Sea, and the semi-arid Crimean peninsula. It incorporates one of the largest freshwater bodies in the world, Lake Baikal. It also contains the remains of what was once one of the other great inland seas — the Aral Sea — now reduced to less than a fifth of its former volume largely through abstraction of water, for irrigated agriculture, from its two feeder rivers.

Period of change

Most of the countries of this region do bear the same social and economic consequences of huge upheavals in the politico-administrative systems. Some have also experienced war — be it civil or with neighbouring states.

These young nations inherited highly centralized administrative systems and a professional community accustomed to a command-and-control system of management. Prolonged exposure to such a way of working has had a major effect on both professionals and the public. Whilst substantial energies were expended upon, for example, monitoring of the environment and water supplies, and while there have been organized systems for the evaluation of both environmental and health problems, all data were evaluated only within prescribed boundaries. Notwithstanding the real quality and objectivity of the data, it was impossible for the population to assess this; and because of compartmentalization, few professionals were truly aware of the environment and health situation as a whole.

Since the changes to the administrative systems, therefore, many countries have relied on professionals with only limited experience of either preparing meaningful assessments, or in using them to formulate policy in an increasingly democratic administration. This has been aggravated by the breakdown of systems for encounter and exchange amongst professionals which existed in the former Soviet Union, systems which have still not been fully replaced by alternatives, such as the networks of professional associations common elsewhere. Similarly, the population at

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Filling up at mineral springs after being cut off for three days; water infrastructure is expensive and hard to manage.

large has little experience in exerting pressure upon democratic systems, or indeed, in acting as recipients of the information which is now increasingly entering the public domain.

Finally, State systems may be less than ideal at coping with the needs and demands of a radically changed water-supply sector. In many ways, the changes reflect the recommendations of a series of major international meetings, such as the New Delhi Conference which concluded the International Drinking-Water Supply and Sanitation Decade, the Rio Conference and its follow-up at Noordwijk in the Netherlands. At all of these events, a major theme was that governments should reduce intervention in the provision of services and direct their energies towards 'facilitation and regulation'.

In many ways it would appear that the changes now occurring in the region do follow such recommendations. But, as elsewhere, national systems may be poorly adapted to play such roles. Common problems include:

- weak regulatory agencies;
- utopian standards which may be counter-productive if slavishly enforced without a clear understanding of the importance of availability of safe water;
- an educational system used to preparing staff for a now redundant style of management, and which is in frank decline; and
- little familiarity with financing principles on the part of both suppliers and government regulators.

All too often, even the basic legislative framework fails to support the changes needed to adapt to new systems. On the other hand, some elements of legislation are highly supportive, 'sanitary protection zones' being one important example now threatened in some countries because of rapidly evolving legislation concerning land tenure and owners' rights versus land-use restrictions.

This 'unpreparedness' of States, professionals, and the public to participate in water supply and sanitation within democratic systems should be seen in the context of water supply in the region. Notwithstanding extreme diversity in much of the region, as Table 1 illustrates, levels of water-supply coverage with centralized, piped water supplies are extremely high.

Such an extensive water-supply infrastructure makes great demands upon financial resources, organizational systems and the staff responsible for them. Not surprisingly, therefore, problems have occurred. In Armenia, for example, it is reported that not one kilometre of water-supply pipe has been replaced or installed since 1989, whilst before that date around 100km were replaced each year in the city of Yerevan alone.

Nevertheless, some of the changes in approach are straightforward and already under way. In Armenia, water supply was often based upon pumped systems, even where non-pumped alternatives were available. In an era when energy costs were largely ignored in system design, such decisions could be readily understood. Now that energy costs are being internalized by supply agencies it has become policy to pursue and convert to gravity-fed supply — from protected groundwater sources, wherever possible. In some parts, there is a heavy reliance on surface water compared to groundwater sources as is the case in both Russia and the Ukraine for example. In the Ukraine alone, around 80 per cent of drinking-water is derived from the rivers of the Dnepr Basin; some capacity to improve the quality of supply may exist by pursuing the groundwater alternative. It should be recalled that one of the capital cities of the region — Budapest — is supplied with drinking-water through bankside filtration from the River Danube — the largest bankside filtration system in

Table 1: Water-supply coverage in some of the CEE and NIS.

Country	*Percentage coverage*	
	Rural	*Urban*
Estonia	60	80-95
Kazakhstan	30-50	92
Latvia	55	89
Republic of Moldova	17.5	97.5
Slovenia	95	100
Ukraine	<50	99
Uzbekistan	45.8	82

Source: WHO

Europe and one which has proven a reliable technology for many years.

Not only are the water-supply systems under stress but, in some areas, the water resources on which water supply depends are in a perilous state. Perhaps the most notorious example is that of the Aral sea, referred to above. As a consequence of what can only be described as an unprecedented environmental disaster, the economic basis of life in a 'disaster zone' near to the Sea has been entirely eroded. Whilst the claimed effects of environmental pollution on the health of the population in this region receive wide coverage, it should be recalled that the combined effects of unemployment, migration, social upheaval and increasing poverty are the fundamental health issues in the area.

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The legacy of recent neglect: two women take water from a broken standpipe in Konasub, Uzbekistan.

Outbreaks of disease

Despite the experience and qualifications of staff across the region, not even capital cities have escaped the consequences of the process of change. Outbreaks of hepatitis A have been reported from Riga and Latvia, associated with the use of contaminated source waters, problems of treatment, and failure in continuous chlorination of the city water-supply system: and similar reports have come from other countries in the region. Outbreaks of infectious water-borne disease have also occurred in St Petersburg (Leningrad), across Armenia and in the Romanian town of Sebes, associated with some 180 cases of acute diarrhoea and 565 cases of infectious hepatitis.

Overall, very significant sections of the population rely on water which fails prevailing national standards.

Not all bad

But not all of the short-term consequences of the process of change have been negative. Probably because of economic constraints, there has been a marked drop in the application of inorganic fertilizers, especially in household plots, and the levels of nitrate in groundwater have decreased. Whatever, the number of reported cases of methaemoglobinaemia ('blue baby syndrome') — for example, have decreased dramatically, from 95 recognized cases in 1986, to 52 in 1995 for the District of Dolj, Romania, where around 83 per cent of samples from wells in agricultural areas failed the standard of 50mg/l. In Hungary, methaemoglobinaemia cases peaked in 1977 with 300 cases and 7 deaths, a figure which was steadily reduced, so that, by 1993, there were only 20 cases, and no deaths.

Industrial pollution

It is possible that similar trends affect pesticides, although stocks of older and possibly more harmful pesticides are said to be mitigating against this in some areas. It is also likely that decreased industrial activity will have reduced water-resource contamination, as has been reported from Slovenia, for example.

Areas, such as Kachetia region in Georgia, where there is considerable contamination of groundwater resources from oil production and transport, are less fortunate; in general, groundwaters, once polluted, recover only very slowly because of their large volume and low throughput. Wastewater-treatment plants are often inefficient: this is of concern as any decrease in efficiency of operation leads to increased pollution — often of rivers which are then used directly or indirectly as water sources, downstream.

One unexpected development — and currently limited to one country — is a decision to change sources from groundwater to surface water. This may seem odd to those accustomed to regarding the generally superior quality of groundwater sources — especially with regard to microbiological quality — as of paramount importance. In Moldova, however, where at present around 80 per cent of the population is supplied from groundwater sources, official policy is to pursue such a change, apparently because of the combined effects of high levels of fluoride of natural origin (5 to 12 mg/l), strontium (12 to 14mg/l), and selenium.

Rural areas

As is common when systems are under pressure, groups with the least representation are the ones most affected. During this process of change one such group has been the rural population. In some of the countries concerned, the rural population is a significant percentage of the total, around 50 per cent of the total in Romania, for example. Much of the rural population depends upon private wells in household plots which enclose the family home, some form of latrine or septic tank, and an allotment or smallholding. Most of the wells lack sanitary protection and are highly polluted with faecal microbes and nitrate. In small piped water supplies to rural areas, intermittent supply may be the norm, sometimes because of the cost of pumping, as is the case in Armenia — a country otherwise rich in springs. Similarly, in Moldova, overall rates of piped water supply are some 55 per cent. In urban areas, this figure is some 98 per cent, but are very low elsewhere. In rural Russia around one third of the population uses water from 'non-centralized' sources, of which an estimated 30 per cent fails microbiological quality criteria.

Disinfection

One consequence of the centralized planning of the former Soviet Union relates to the availability of materials. To provide one small but graphic example, Armenia is home to a large factory producing chlorine gas. That country is unable, however, like many others in the region, to reliably supply chlorine to its own water supplies. In light of the desperate need for

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A brother and sister drink water in a village near Tashkent. The lack of effective disinfection means that children are at greater risk of contracting an infectious water-borne disease.

disinfection to control the real and immediate risk of infectious disease, this is a significant problem.

Technically, the decreased attention to operation, maintenance, rehabilitation and extension in recent years leaves a challenging legacy. Many countries report frequent problems related to microbiological recontamination in distribution, presumably caused by the combined effects of poor network maintenance and intermittent supply or low pressures. Rates of leakage from distribution systems are reportedly extremely high — 70 per cent has been claimed in Armenia for example; while in some large Romanian towns such as Constanta and Navodari, the figure is around 40 to 60 per cent.

The need to prioritize disinfection, and the use of a residual disinfectant to provide some protection against reinforced-contamination in distribution is, therefore, clear. Nevertheless, in Russia, 22 per cent of water supplies belonging to public utilities, and 20 per cent of those belonging to official establishments, provide water without disinfection. Whilst both experts and the general public sometimes express concern regarding the risks associated with disinfectant by-products such as trihalomethanes, it is clear that much greater risks of infectious water-borne disease are posed by the absence of effective disinfection.

Monitoring systems

Many of the countries being discussed have extensive networks of experts, facilities for monitoring of drinking-water quality, and vast experience in monitoring and control, but, in some countries at least, these activities seem to be on the wane. Given the overall state of water supplies, this is a matter of concern. Where the monitoring effort has decreased, this appears to be related, to a large degree, to the non-availability of materials for routine testing. But a critical review of practice, such as undertaken by the authorities in Latvia with WHO assistance, for example, highlighted the feasibility of effective monitoring through targeting high-priority 'critical parameters' (such as microbiological indicators, disinfectant residuals, turbidity and nitrate) for relatively intensive monitoring; and being highly selective with other analytical efforts — targeting them in areas of greatest need. It should also be recalled that much effective monitoring can be undertaken with no analytical effort whatsoever, through, for example, sanitary-inspection programmes.

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