

# Environmental Health Effects in the East Baltic Region - Assessment and Prevention

## Stockholm 27-29 April 1997

G. Pershagen, V. Bencko

A Workshop on „Environmental Health Effects in the East Baltic Region - Assessment and Prevention“ was organized in Stockholm 27-29 April 1997 by the Royal Swedish Academy of Sciences. Participants included 23 scientists from Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Belarus and the Czech Republic as well as from the World Health Organization.

The Workshop had an overall objective to assess the health impact of major environmental hazards in the East Baltic Region (EBR), and to set priorities for preventive actions. The intention was not to be comprehensive, but to focus on some key topics, including air pollution, ionizing radiation, genotoxicity, heavy metals and pesticides. Measures to relieve the problems were also taken up. Primarily the situation in the EBR was discussed, but comparisons were also made with other countries in the Baltic Sea watershed. The EBR was defined as parts of Russia, Estonia, Latvia, Lithuania and Poland.

As the reference inland region was selected the Czech Republic due to the relative availability of data illustrating both the pollution rates of related pollutants and the health impacts as well. Besides, by a part of the territory, though just small, the Czech Republic belongs to the Baltic Sea watershed.

Background reports on specific environmental health issues were prepared and distributed to the participants before the Workshop. These reports were thoroughly reviewed and discussed during the Workshop. They will be published as a supplement to the Scandinavian Journal of Work, Environment and Health.

### Air Pollution

Ambient air pollution is distributed in the atmosphere without regard to national boundaries. Pollutants of primary concern to human health in the EBR include particulate matter and sulphur dioxide. Exposure to elevated levels of NO<sub>2</sub> and O<sub>3</sub> is also wide-spread and may induce adverse health effects. Coal fired power and heavy industrial plants not fitted with efficient air treatment equipment constitute major sources of air pollution: domestic heating with coal cause high local air pollution in some areas. The rapid growth of motor vehicle traffic results in increased emissions, predominantly in densely populated areas. It has been estimated that about 30 % of the European population experience air pollutant levels exceeding WHO guidelines, and the exposure may be even higher in the EBR.

Several epidemiological studies performed in the EBR, mainly in Poland, have documented an association between air pollution exposure and adverse health effects, primarily in the respiratory tract. Short-term exposure to ambient air pollution has been related to an increase in mortality and hospital admissions for illnesses of the respiratory tract. The associations were mainly seen for particulates and/or SO<sub>2</sub>, which confirms the findings from other parts of the Europe and the US. Effects of long-term exposure to increased air pollution levels include lower respiratory airways diseases, such as asthma and bron-

chitis, in both children and adults. One investigation suggests that acid aerosols play an important role. An association between exposure to urban air pollution and lung cancer was observed in two studies. Recent evidence indicates that the prevalence of allergic diseases and sensitization is higher in Western than in Eastern Europe. This does not exclude a role of ambient air pollution for induction of allergic disease but points to a greater importance of other factors.

It is difficult to estimate the role of adverse health effects caused by air pollution in the EBR population, mainly because of insufficient data on exposure. However, it is evident that significant positive effects would occur if air pollution concentrations were reduced. The WHO air quality guidelines should form a basis for action. Current international agreements on emissions reductions are insufficient to reduce population exposure everywhere to levels below these guideline values. Until emissions sources are effectively controlled, measures are needed to deal with acute pollution episodes. For example, warning systems can be adopted to inform the public of elevated pollution levels and measures that can be taken to reduce personal exposure. Temporary restrictions on emission sources during severe pollution episodes may also be necessary.

Reliable data on emissions and ambient air quality are needed for the monitoring and verification of the effectiveness controls. Harmonized data reporting could significantly improve the understanding of the current air pollution situation and assessment of related risks to health.

### Genotoxic agents

Polycyclic aromatic hydrocarbons (PAH) represent a major group of organic genotoxic pollutants generated in the combustion and processing of fossil fuels. Environmental monitoring mainly using benzo(a)pyrene (BaP) as an indicator has been carried out in Estonia. This shows increased levels in fish from polluted lakes and parts of the Baltic sea. Elevated levels of DNA adducts have been observed in workers and the general population of a heavily industrialized area in southern Poland, particularly during the heating season. Detailed analyses suggested that the adducts were of the PAH type, but that the major part was not closely related to BaP. Owing to the carcinogenic nature of this group of compounds exposure should be minimized. However, PAHs are ubiquitously present in the environment and exposure cannot be totally avoided. Individual exposure is to a large extent related to lifestyle, such as smoking and dietary habits, and can thus be significantly reduced through personal choice.

### Ionizing radiation

Residential radon exposure constitutes the dominating source of exposure to ionizing radiation for the population of the Baltic region. Current levels of radon in many dwellings are of public health concern. It is estimated that exposure to residential radon contributes to around 15 % of the lung cancer occurring in Finland and Sweden, which have comparatively

high population exposures. Unfortunately, large representative samples of dwellings have not been measured for radon in the EBR countries, making it difficult to assess the magnitude of the public health problem. Such measurement programmes have a high priority.

Radioactive fallout following the Tchernobyl accident has contributed to significant exposure in certain areas. For example, a clear increase in the occurrence of childhood thyroid tumours has taken place in contaminated regions of Belarus. The population exposure is not known in most areas of the EBR, although it is likely to be unimportant after the first year following the accident. Workers engaged in the clean-up have sometimes received substantial exposures, and it is essential that adequate follow-up of cancer and other relevant effects is performed in these groups.

The main objects that contain considerable amounts of radionuclides in the EBR are nuclear power plants and research reactors. Under normal operating conditions the contributed exposure of workers and the surrounding population is minute. However, it is essential that a high level of ambition is maintained regarding safety in all stages of operation, including transportation of radioactive material and waste disposal. International collaboration is important for surveillance and preparedness in case of nuclear accidents.

Storage of radioactive waste occurs in several places in the EBR, sometimes under inadequate circumstances. For example, large amounts of uranium and radioactive materials are stored in a pond on the Gulf of Finland in Estonia near a metallurgical plant which processed uranium- and thorium-containing ores during several decades. Modern technology should be used for radioactive waste storage to minimize risks of contamination of the biosphere.

## Metals

In general, the information on exposure to toxic metals in the EBR is very limited, which makes it difficult to assess the health consequences. For lead data are primarily available from Poland on levels in blood. There are considerable geographic differences, with very high levels reported close to smelters. In areas of southern Poland children show high uptakes, sufficient to cause adverse effects on the central nervous system and the kidneys. The cadmium concentrations in blood and kidney also varied, again with the highest levels in southern Poland, where proximal tubular damage could be expected in a part of the population. The uptake of mercury is dependent on the intake of fish from contaminated lakes, rivers and coastal areas of the Baltic sea. There are indications of immunotoxic effects following consumption of such fish, but it is not known whether this is causally related to the methyl mercury. For arsenic no data are available to indicate toxicologically noteworthy exposure in the EBR.

There is a great need for more data on exposure to toxic metals in the EBR population. Careful quality control is necessary when analyzing trace metals in biologic media. Some measures should be considered to limit the exposure to toxic metals, such as introducing phase-out programmes for cadmium, lead and mercury. Control and reduction of the cadmium content in artificial fertilizer is desirable. Identification, examination and assessment is necessary of waste dumps and polluted areas. In certain situations sanitation may be feasible.

*Göran Pershagen,  
Institute of Environmental Medicine  
Department of Epidemiology  
Karolinska Institute  
Stockholm, Sweden*

## Pesticides and halogenated organic compounds

The limited evidence available suggests that general widespread exposure from the environment to pesticide residues and chlorinated compounds in the EBR is lower than in most of western Europe. Thus, general public health effects are not likely. The most obvious problem are industrial hot spots and old storage sites where large amounts of chemicals under poor control may cause a health hazard to the near vicinity. It is essential that such sites are identified and that adequate measures are taken to restrict exposure. In addition, continued biological monitoring should be performed to ensure that population exposures are not excessive, particularly in high risk groups.

## Environmental health policy in economies in transition

Environmental policy in the EBR as well as in other economies in transition has only marginally been driven by health considerations. Experience from developed market economies indicates that when strong evidence on environmental health effects is available this often has a great impact on policy decisions. Nevertheless, considerable improvements have been achieved also in EBR, more due to targeted environmental policies than general economic developments.

Causes of poor environmental performance in the former Centrally Planned Economies include excessive resource use resulting from general inefficiency of the non-market allocation mechanism, and inappropriate environmental policies. While it can be demonstrated that the introduction of market logic gradually eliminates one source of problems, a proper choice of policy priorities and instruments continues to pose a challenge.

Everywhere in the region, the cost-effectiveness of environmental spending is questionable. Most countries established systems of market resource and pollution taxes which provide a sizable share in financing environmental investment. While these „environmental funds“ have proved their usefulness, efforts are undertaken to enhance their cost-effectiveness and conformity with private markets operations. Investment processes are financed mainly by domestic sources. It is essential that limited resources be applied to the most urgent problems first.

At the same time, policy reforms could benefit from a more consistent international co-operation.

The common belief that the Western countries had occupied a dramatically better position as far as environmental pollution is concerned than Eastern countries has proved too schematic. So e.g. for PCBs Lithuania comparing with Swedish data is far better off. Besides the diffuse air pollution by industrial emissions or ionizing radiation due to Tchernobyl catastrophe, usually only hot spots significantly affecting the limited areas were involved.

The conference has reflected the traditional decades lasting interest of the Scandinavians, especially Swedes, in environmental problems and related effects on human health. The efforts of the Royal Swedish Academy of Sciences in organizing this workshop are to be highly appreciated.

The conference also gives an example worth following for other regions e.g. in Central Europe.

*Vladimir Bencko  
Institute of Hygiene and Epidemiology  
First Faculty of Medicine  
Charles University  
Prague, Czech Republic*