# ENVIRONMENTAL MONITORING

# CASE STUDY: MONITORING TRANSBOUNDARY AIR POLLUTION[1]

Eight EECCA countries are Parties to the Convention on Long-range Transboundary Air Pollution (CLRTAP). Among these, the Russian Federation also participates in the Arctic Monitoring Assessment Programme (AMAP) and the Helsinki Commission for the Convention on the Protection of the Marine Environment of the Baltic Sea Area. These and other international conventions and programmes call on member countries to submit information on transboundary air pollution. Currently, however, limited measurement data make it impossible to develop an overall pattern of pollution in EECCA.

Some countries provide only partial data on emissions levels. For example, in its reporting for the CLRTAP, Armenia does not estimate lead emissions from road transport, although for the majority of countries this is the main source. Other countries (including Belarus and Ukraine) assess only ammonia emissions from industrial sources, while the main input of ammonia is typically from agriculture.

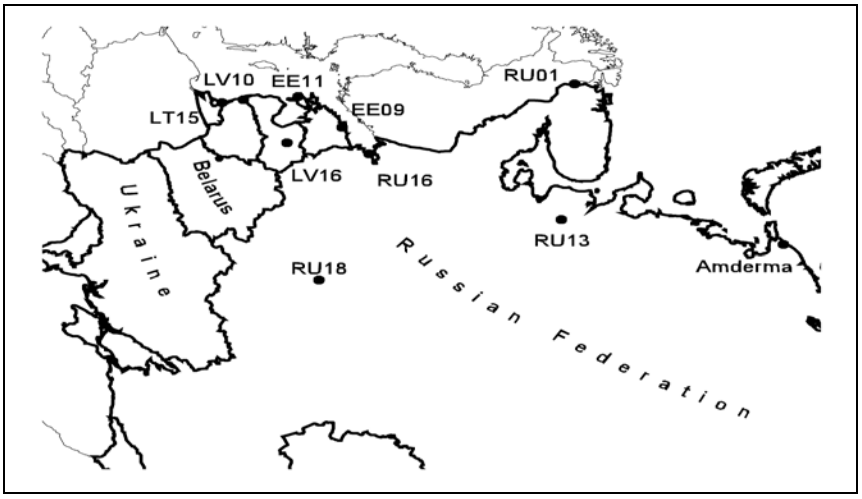
[1] This section is adapted from the UN Publication *Environmental Monitoring and Reporting: Eastern Europe, the Caucasus and Central Asia*, New York and Geneva, 2003 (Sales No. E.03.II.E.33). It is based on a report by the Meteorological Synthesizing Centre – East (2002).

The EECCA subregion has few air pollution monitoring stations that contribute data to transboundary air pollution programmes, such as the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) under CLRTAP. For example, the Russian Federation provides measurement data on nitrogen and sulphur compounds to EMEP. Figure I shows that there are few monitoring stations, and these are located mainly in the northwest of the Russian Federation.

The primary network of long-range atmospheric transport monitoring stations, particularly for persistent organic pollutants (POPs), was developed during earlier AMAP activities. Recently this network has been expanded to fill gaps in geographical coverage. A POPs monitoring station was established in 2000 in Amderma, in the Russian Arctic, within the framework of a joint Russian/Canadian AMAP project.

Along with monitoring data, mathematical modeling provides information about pollution levels from national and external sources, long-term trends, seasonal variations, contributions of different source categories, and exceedance over critical loads. The EMEP Meteorological Synthesizing Centre – East (MSC-E) in Moscow performs calculations of heavy metal and POP transport and deposition in Europe and provisional model runs for the northern hemisphere, providing estimates for Central Asia.

**Figure I. Map of East European monitoring stations involved in EMEP, HELCOM and AMAP**




Ukraine provides an example of the availability of environmental information and the use of modeling techniques. At present, Ukraine submits only emission totals for the pollutants required under EMEP. Spatial distribution of emissions for the evaluation of transboundary transport has been estimated by MSC-E. Modeling is used to calculate the spatial distribution of environmental pollution: figures II to V show emissions levels, emission trends and related modeling results for lead.

The results show that the bulk of the pollution emitted in Ukraine (55%) is deposited within its borders. Figure V shows that the main countries-receptors of lead deposition from Ukrainian sources are the Russian Federation (19%), Romania (4%) and Belarus (3%). Some 7% of lead is deposited in the Black Sea. In its turn, Ukraine is polluted by emissions from the Russian Federation, Romania, Poland and other countries (fig. V). Figure VI shows calculated trends in lead depositions from European countries to Ukraine, from 1990 to 1998.

**Figure II. Spatial distribution of lead emissions for Ukraine for 1999, 50X50 km$^2$ , kg/km$^2$/year**

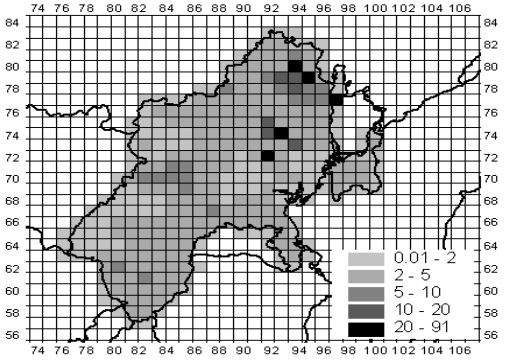



**Figure III. Trend in lead emissions for Ukraine to other countries (Expert estimates), tons/year**

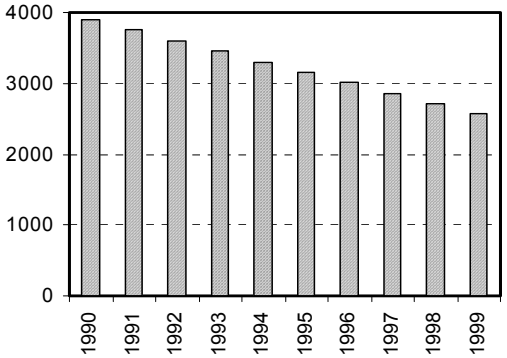



**Figure IV. Lead depositions from national sources in Ukraine in 1999**

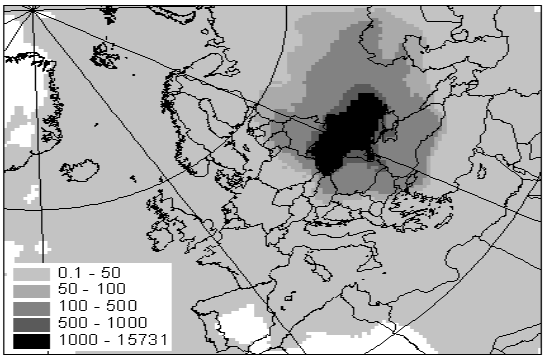




**Figure V. Lead depositions to Ukraine from external sources in 1999**

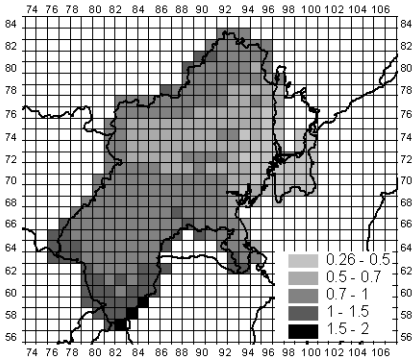
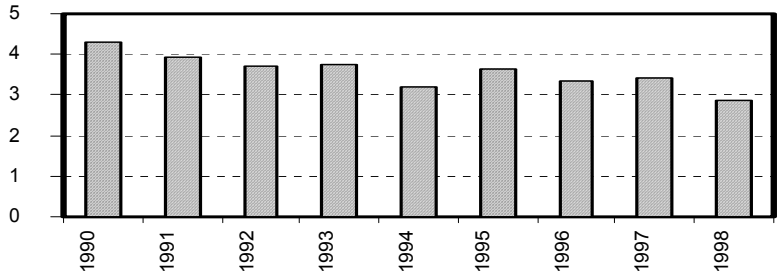



**Figure VI. Trend in total (wet and dry) deposition densities of lead to Ukraine, kg/km$^2$/year**




A similar situation exists in most EECCA countries in terms of the availability of emission and measurement data. Modeling could therefore be an important source of information on the state of the environment. The Case study on Air pollution inventories, monitoring and modeling in Kazakhstan (included in this CD-ROM) describes systems and issues in Kazakhstan, providing recommendations for strengthening monitoring and modeling, developed in national and international meetings.

Overall, EECCA countries need to develop their transboundary air monitoring networks. Given the high cost, however, an integrated approach strengthening both monitoring networks and modeling techniques to evaluate pollution levels appears appropriate. In addition, EECCA countries should consider further accession to international agreements, conventions and protocols: among the benefits, international cooperation under these instruments can help improve air pollution monitoring through technical assistance and training as well as the harmonization of methods.

The Recommendations to EECCA, new CLRTAP Parties on strengthening air pollution inventories, monitoring and modeling, developed through international review and discussion, provide further points. The Recommendations are found in this CD-ROM.