

## Topics:

- *Sharing Data and Information*
- *Case Studies (good practice)*

### **DIAGNOSTICS OF TRANSBOUNDARY POLLUTANTS TRANSFER IN THE CASPIAN SEA**

Vitaly Tatarnikov, Caspian Marine Scientific Research Center, Astrakhan, Russia

Maria Belyaeva, Russian State Hydrometeorological University, St.-Petersburg, Russia

Assessment of transboundary transfer by direct measurements of pollutant fluxes across internal boundaries of the water bodies presents nowadays a technical challenge that requires rather financial expenditures than intellectual efforts.

However, financial allocations are not always justified and feasible, therefore we have to apply to intelligence. In the first place, it refers to artificial intelligence – i.e., water circulation models, which enable for water exchange assessment and (together with observations and data on water pollution) transboundary pollutants transfer.

Currently, Russian HydrometCenter has developed a hydrodynamic model of the Caspian Sea that is applied (in synergy with the regional meteorological model) to forecasting the Caspian Sea currents. Shortly, this model will be adjusted for assessment of transboundary pollutants transfer.

Meanwhile, the surface and water column of the Caspian Sea, in accordance with historic treaties, represent the common heritage of the Caspian littoral states, except for the coastal (territorial) waters, their borders set unilaterally by the certain riparian countries.

At present, only one interstate border traverses the Caspian surface, whereas its seabed is almost completely divided. This border separates the Russian and Kazakh parts of the reserved zone in the North Caspian established as early as the Soviet period by the governments of Russian and Kazakh Soviet Republics (as parts of the USSR). To assess the transboundary transfer in this zone, we used a method that defines the source / origin of pollutants occurring in the estuarine waters of the Volga River (these may be of fluvial or marine origin).

Applying this method is justified by the fact that the boundary between the Russian and Kazakh parts of the reserved zone passes through this coastal area. Besides, we were looking for a method, which does not require for using a supercomputer, unlike working with hydrodynamic models.

The diagnostics method of pollutants' source is based on the analysis of their distribution in salinity field. Supplemented with the analysis of spatial salinity distribution, it may be applied to diagnostics of transboundary pollutants transfer.

For instance, according to the data obtained from vessel observations in autumn, 2007, at the Russian-Kazakh border of the reserved zone, the main route of pollutants transfer came from the Kazakh to the Russian part of this zone, while the majority of these substances was of riverine origin (most likely, from the Volga River).

It should be noted that presently we are trying to define the chemical vector of transboundary pollutants transfer. The reason for this search lies in the different chemical composition of the waters in the eastern (Kazakh) and western (Russian) parts of the reserved zone.