

ADVANCEMENT FORWARD TO IMPLEMENTATION THE APPROACHES OF LRTAP CONVENTION IN THE REPUBLIC CRIMEA

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Introduction

Our previous investigations were devoted to gradual introduction of LRTAP Convention approaches on territory of Crimea peninsula, that has many various ecosystems and many natural and technogenic conditions on limited geographical space. Supported only by local Republic Committee of ecology these researches had fragmentary character. Nevertheless some steps to advancement forward to implementation of approaches and methods of LRTAP Convention were realized. Main results of ones and our perspectives in further due to new conditions are presented in this material.

Methods

In order to assess the ecological situation in various regions of the Crimea peninsula we used two approaches: determination of critical loads exceedances by LRTAP methods and determination of heavy metals content in soil and comparison with traditional national standards.

The total number of the monitoring sites to define the actual depositions by definition of HM concentration in precipitation was 16: 3 on the north, 1 on the west, 2 in the center, 8 on the south, 2 on eastern region of the Crimea peninsula (fig.1a). All of the sites in the south and one on the north belong to protected territory, in contrast 1 on the west and 2 on the north arable areas close to the large industrial factories. Monitoring is realized in whole during 3 years (2009-2011). More details are published in [1].

To compare these results with traditional national approaches the HM content in soil were determined in thirty experimental sites in different geographical regions (eastern, western, north,

south, central) of Crimea (fig.1). Most part of these sites (Fig.2) are located near experimental monitoring sites for accumulation of precipitation.

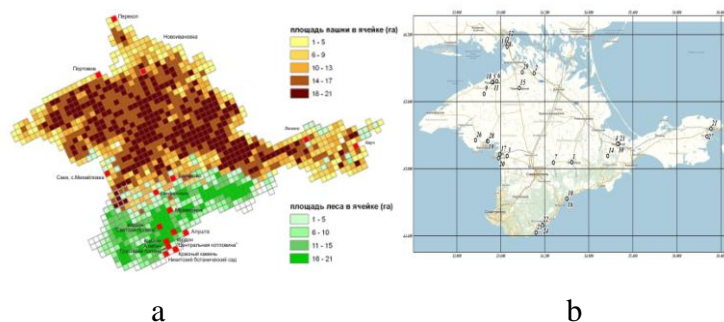


Figure 1. Sites for accumulation of precipitation (a) and determination of heavy metals in samples of soil (b)

The content of 19 toxic and essential metals by X-ray fluorescence and atomic absorption spectrophotometer was determined in hair of humans who live near location of these sites. HM effects on functional systems of tested individuals were estimated by Spearman’s correlation analysis and by multiple regression analysis

Results

The comparison of CL for HM (Hg, Pb, Cd) for terrestrial ecosystems (forest and arable) and current depositions in precipitation during 1-3 years had shown the exceedances of these metals on urbanized, some arable and even protected (north) territories, where are located near industrial factories (Fig.2).

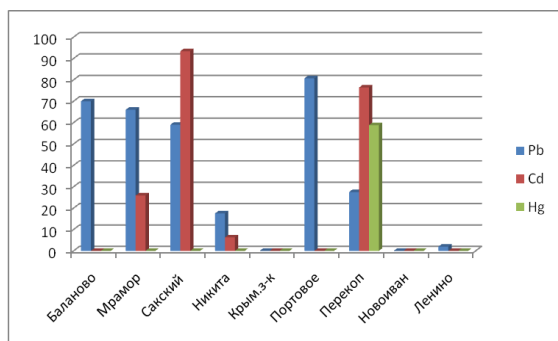


Figure 2. Exceedances of heavy metals (%) in different regions on Crimea peninsular sites

Determination of heavy metals content in soil shown exceed of national standards in some Crimea sites. For example Pb content in samples varied from 1 to 68 mg/kg. In Simferopol's recreational area content of Zn, Pb, Co, Cr, Ni did not exceed normal values. The same situation was observed for the hair content of toxic metals (table 1), while content of essential elements (Fe, Zn, Mn, Cu) was less than normal (tabl.1).

In the same places (3 sites: city Simferopol and 2 villages near large factories) Hg, Pb, Cd, Zn, Cu, Fe, Mn, Ni in 350 samples of hair were determined in different cohorts of population and some several physiological effects of heavy metals on functional systems revealed and described earlier [2].

Besides heavy metals the CL for sulphur and nitrogen oxides for forest ecosystems of Crimea peninsula were calculated (fig.3).

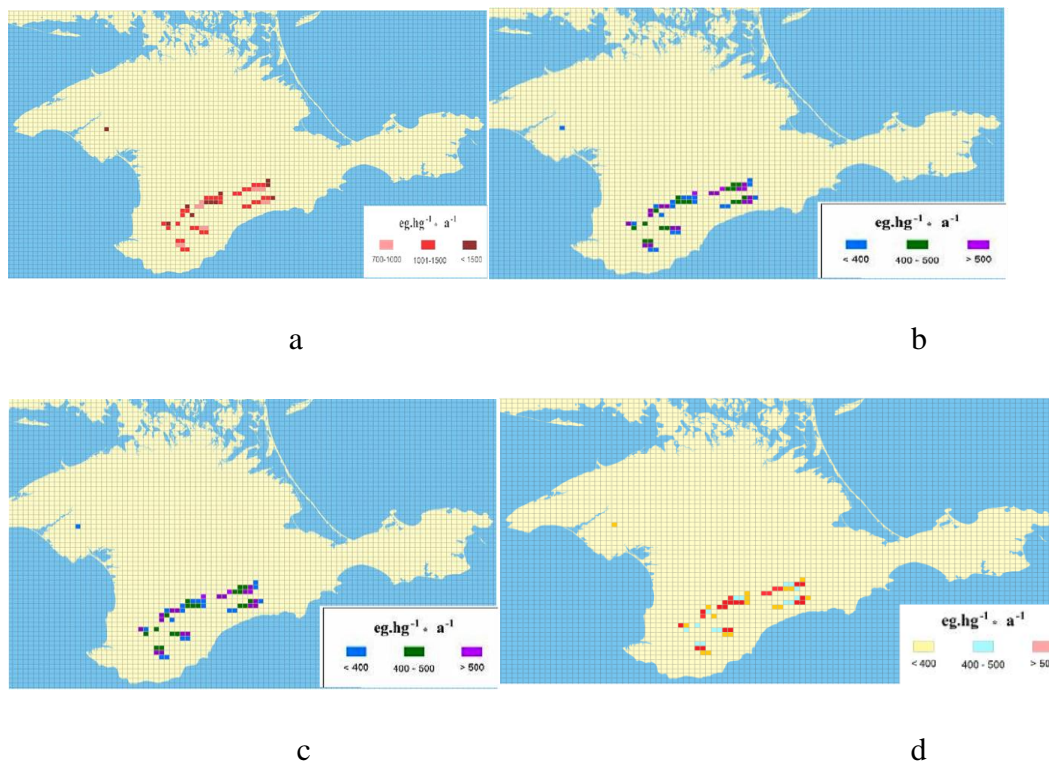


Figure 3. CL for NOx (max, min, nutrient - a,b,c accordingly) and SOx (d)

Conclusion

Described above the results of realization of approaches to assessment of ecological situation in relation to content of heavy metals indicated that both ones were principally similar but there was some

quantitative difference. From our point of view the LRTAP methods are much more objective and informative due to opportunity to take into account the natural resistance of ecosystems to pollutant's effect and long-term climatic trends that is very particularly important for such unsustainable in climatic relation region as Crimea. Due to that our observation for monitoring results has shown that there is the significant variations in different years. At present days the work on determination and calculation of exceedances for another pollutants (nitrogen and sulphur oxides and pesticides) are carrying out.

Crimean scientific and polis makers group is interested to continue and develop LRTAP Conventions approaches on territory of Crimea peninsula including such receptors as biodiversity and human health and modelling of ecological situation. In new conditions we have new possibilities for that. These intentions are included in Program of Crimea Federal University development and maintain by Ministry of Ecology and Natural resources of Republic Crimea.

References

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