In the face of the intensification of human activities on areas of Europe and Asia, more and more harmful chemicals reach the Arctic as a result of their long-distance transport in the atmosphere (eng. Long Range Transport of Atmospheric Pollutants-LRTAP) (Marsz, 2007; Ruman, 2012). Pollutants emitted to the atmosphere from areas of Eurasia appear on the catchment area of the Scott River as a consequence of their transport over long distances, and then the wet and dry deposition from the atmosphere. Harmful chemicals that run down with the waters from the Scott River catchment, get into the Bellsund fjord. Qualitative and quantitative pollutants determination in various sources of the Scott River will allow to define which of these sources are responsible for providing various pollutants into waters of the fjord. In contrast diversity of nature and concentration levels of pollutants transported within the Scott River catchment will be possible by:
a) surface waters sampling over a period of 40-50 days (daily water sampling) on the key areas of the catchment: 1- upper part of the catchment (precipitation waters, supraglacial stream, subglacial waters, moraine gorge, 2-lower part of the catchment (gorge of the Scott river, Reindeer stream (an tributary of the river), estuary of the Scott River to the Bellsund fjord).
While the initial estimate of pollutants loads reaching the Bellsund fjord will be achieved by:
b) measuring flows in the individual sampling points in the catchment area of Scott by the co-contractor of the project, which specializes in hydrology.
In the project, there is planned to carry out detailed research in the field of qualitative and quantitative determination of selected pollutants which are toxic. In addition, collecting surface water and rainwater samples while conducting hydrological measurements let the researchers:
- determine which forms of power of Scott River catchment are responsible for the appearance of its waters particular types of pollution;
- estimate the impact of rainwater on modification of water chemistry that leaves the glacier;
- estimate the spatial and temporal variation of pollutants;
- determine the pollution load brought to the upper part of the catchment by the rainwater;
- pre-determine the pollution load supplied by the Scott River to the Bellsund fjord waters from an area of 10km2.
In 2014 in the Chemical Abstract System (CAS) there were specified only about 0.4% chemical compounds (308 of 790 compounds) that shall be regulated due to its high impact on the environment, from 72 914 493 commercially available compounds (CAS, 2014). The above review of the literature is the proof that within the glacial basin there is still a lack of comprehensive chemical studies on the presence of (highly polluting) of chemical compounds of anthropogenic origin Only a few works focus on the analysis of xenobiotics present in the glacial catchments (Herbert et al., 2005a; Herbert et al., 2005b; Hermanson et al., 2005; Ruggirello et al., 2010; Kwok et al., 2013). Unfortunately this works, with the exception Kwok (2013) describe the most common analyses carried out in different parts of the environment (snow, ice, rivers) and concern different glacial catchments.
The vulnerability of the Arctic ecosystem on impacts of harmful substances is directly related to its simple structure, which is composed of only a few key species (Koivurova, 2005). Introduction of pollution degrading the environment, contributes to the violation of the mechanism of homeostasis of ecosystems vulnerable to their effects. As a result of such conduct, can lead to toxic effects on organisms and, consequently, could lead to the collapse of the ecological balance.
In recent years, a number of reports and publications describing the state of the environment polar areas, which clearly show that the Arctic has become an area heavily polluted (Oehme, 1996; Stange, 1997, Wang, 2009; Kozak, 2013). In recent years, was established a number of reports and publications describing the state of the environment polar areas, which clearly show that the Arctic has become an area heavily polluted (Oehme, 1996; Stange, 1997, Wang, 2009; Kozak, 2013).
Degradation of Arctic environment progresses as a result of the pollutants transport (from areas of lower latitudes of the northern hemisphere) and their deposition in the Arctic areas. Qualitative and quantitative determination of toxic chemicals present in different types of Glacier Scott catchments will make a significant contribution to expand the knowledge of glacial waters quality in the area of Bellsund fjord. Moreover, the results of planned research in the project will also expand the existing state of knowledge about chemistry of ablative waters and their modifications under the influence of rainwater. The novelty of the proposed research project in addition to gathering and interpretation of results for the area where this type of research has not been conducted, is the development of a comprehensive research strategy; Preliminary estimate of pollutants load delivered from a 10km2 area of Scott River catchment to the fjord waters; qualitative and quantitative estimation of the compounds (surfactants), whose presence may increase the toxicity of the compounds that are able to accumulate in marine fauna. Analyzing the literature data it can be seen that the most published studies refer to the compounds from the group of persistent organic pollutants or to the basic hydrological studies carried out only for selected elements of the catchment. The concept of research on a broader spectrum of harmful chemicals in various types of waters from glacial catchments of the Svalbard Archipelago (in connection with precipitation) have not been taken yet.
Catchments that are partially glacierized (such as Scott River catchment) bring significant amounts of chemicals from large areas of the fjords waters which give life to various species of marine flora and fauna. It is therefore important to examine individual elements of the glacial drainage basin for the presence of different groups of chemical compounds with toxic, carcinogenic and mutagenic properties. Particular attention will be paid to these pollutants, which threaten the life in waters and may cause long-term adverse effects in the environment, eg. PCB169.
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