Guest editorial

Antarctic environmental banking: the quest for a global approach

Recent estimates report that more than eight million substances are known and that about 70 000 of them are widely exploited as pesticides, food additives, pharmaceuticals and industrial compounds with a total production of several million tons per year. The global circulation of polluting chemicals is well known to have reached even the Antarctic continent. This has resulted in an enhancement both of the baseline levels of naturally occurring organic and inorganic substances and an increasing presence of man-made compounds that simply should not be there. Localized anthropogenic activities are also contributing to the overall low yet progressive deterioration of the pristine Antarctic conditions. Local pollution may well be alleviated by a full implementation of the Madrid Protocol, but the crucial phenomena of worldwide chemical contamination will continue. To maximize the value of Antarctica as a source of global baseline data cooperative and harmonized approaches need to be adopted at the international level to monitor chemical pollution, thus avoiding useless duplication of effort and maximizing the comparability of data. From this standpoint the importance of the establishment of Antarctic environmental specimen banks cannot be exaggerated. The rationale behind such undertakings is certainly not new: specimen banks have been in operation for twenty years e.g. at the former National Bureau of Standards (now National Institute of Standards and Technology) in the USA, at the Swedish Museum of Natural History and at the Jülich Research Center in Germany. Although designed to meet a variety of specific needs, all of them share a key goal, namely the long-term storage and preservation of spatially and temporally well characterized samples representative of human settlements and the biosphere.

Through this four major benefits will ensue, i) the possibility of verifying at some future date with improved techniques the accuracy of data collected now; ii) self-consistent modelling of long-term trends in biogeochemical cycles of pollutants by subjecting both stored and newly collected specimens from the same component of a given ecosystem to examination with the best state-of-the-art methodologies available; iii) retrospective analysis for the presence and amount (if any) of pollutants unsuspected at the time of storage of a given sample, but later found to be of importance (platinum released into the atmosphere from catalytic converters may well be an appropriate example); iv) evaluation of the adequacy of legal provisions adopted to regulate environmental chemicals.

The Italian National Program for Research in Antarctica has recently approved the establishment of an environmental specimen bank in close cooperation with the project for quality control of analytical measurements and preparation of certified reference materials in Antarctic matrices. The challenges posed by an endeavor of this kind in terms of variety of materials to be stored (e.g. soil, sediment, sewage sludge, algae, shellfish, fish, bird eggs, animal organs, plants), facilities needed for their preservation under appropriate temperature and humidity conditions and the costs for the maintenance will be too great for the resources available in a single country.

Sharing of tasks by forming an international network of closely interactive specimen banks under the auspices of the SCAR, all devoted to maintaining the same operating criteria, would thus appear to be the only general strategy worth launching. Ensuing that the seventh continent does not become the next scientific wasteland may also depend on the success of such initiatives.

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