Pergamon

Chemosphere, Vol. 34, Nos 9/10, pp. 1997–2010, 1997

PII: S0045-6535(97)00061-1
0045-6535/97 $17.00+0.00

CONCEPTS OF MARINE SPECIMEN BANKING

Matthias Rossbach[1] and Goran Kniewald[1,2]

[1]Institute of Applied Physical Chemistry, Research Center Juelich,
D-52425 Juelich, Germany

*

[2]Center for Marine Research Zagreb, "Rudjer Boškovic´" Institute,
HR-10000 Zagreb, Croatia

ABSTRACT

For more than a decade environmental specimen banking (ESB) has been an established approach for monitoring and retrospective environmental survey purposes in a number of developed countries. Specimen banking is carried out on regional or national scales for various environmental materials. The ecological or problem-oriented approach, as pursued e.g. in Germany or USA has the advantages of a restricted survey and a clear political mandate. Environmental problems, however, are by no means national or regional issues , since the diversity and dispersion of hazardous substances make environmental monitoring clearly a global affair. The structuring of our environment suggests that banking should not be limited by national boundaries, but rather be based on eco-systematic principles. Such distinct banking efforts should be devoted to the monitoring of physico-chemical aspects of climatic change and air pollution, soil quality, and aquatic monitoring on a world-wide scale. As some experience already exists with specialized banking programs for marine samples, such as the National Marine Mammal Tissue Bank or the Mussel Watch Program in the United States, an international marine specimen bank, based on principles of national ESB's, is advocated to be established in due time. Following the recommendations of the 1992 Rio 'Earth Summit' to pursue sustainable development strategies, such an establishment could strongly facilitate efforts concerning pollution control and mitigation, overexploitation and mining of ocean resources on a regional or global scale.

INTRODUCTION

A growing number of pollutants increasingly affect the environment. Adverse climatic changes, such as ozone depletion, are known to be enhanced by catalytic actions of a growing list of trace elements, polycyclic aromatic hydrocarbons and other gaseous species. The combination of environmental monitoring and specimen banking is becoming one of the modern society's principal instruments for identification and evaluating the risks of the release of numerous natural and anthropogenic chemicals to the environment.

Specimen banking for biological and human tissue has now been well established for about two decades. Environmental samples archived as part of monitoring programs have been found useful in a number of specific studies [1-4]. Yet, these are only scattered efforts restricted to regional or national problems. The German Environmental Specimen Bank with its two branches - the Human Tissue Specimen Bank in Muenster and the Environmental Specimen Bank (ESB) in Juelich [5,6] - is a national archive of selected specimens for real time monitoring and retrospective analysis. The German Environmental Specimen Bank (ESB), existing now for more than a decade, has set up Standard Operating Procedures (SOPs) for the collection, preparation, long-term storage and analytical characterization of biological materials[7]. The National Marine Mammal Tissue Bank (NMMTB)[8,9] located at the National Institute of Standards and Technology (NIST) in Gaithersburg, USA, is more devoted to the assessment of the highest links in marine food webs with organic and inorganic pollutants whereas the Environmental Bank at the same institution archives a valuable collection of human livers collected as autopsy samples[10] from various places in the United States in 1981 and 1990. A number of specialized specimen banks exist around the world in different countries (e.g. environmental specimen banking programs in the Nordic countries[11], a fresh water specimen bank in Canada[12] or the Canadian Wildlife Tissue Bank). Though the need for reliable analysis of properly collected marine environmental materials has been emphasized on several occasions (i.e. International Symposium on Marine Pollution - Mammals and Toxic Contaminants (ISMAP), Kamogawa, Japan, February 1993; International Conference on Marine Pollution and Ecotoxiclogy, Hong Kong, January 1995) the correct answer to this scientific problem has rarely been advanced, namely, specialized sampling and storage by dedicated experts of quality assured specimen for further distribution to the analysts. However, at the ISMAP meeting, the establishment of an International Environmental