



# Abstracts

## Theme A

### Resources and Environment

Theme Convener: Manfred Grasserbauer, Austria

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**SUSTAINABLE AND SAFE RESOURCE MANAGEMENT:  
SINKS AS LIMITED RESOURCES?**

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During the so called Anthropocene, the per capita as well as the global material turnover provided to satisfy human demand have risen to previously inconceivable amounts. While the supply of materials has been studied, optimized, and managed by different disciplines such as mining, engineering, and economics for centuries, little attention has been paid to the safe disposal of these materials in a comprehensive way.

Materials are “lost” from the anthroposphere by several pathways: As off-products such as off-gas from vehicles or industrial processes, as products of wear, corrosion and erosion from surfaces, and as wastes from households, industry, and agriculture. After treatment, a certain fraction of these material flows inevitably ends up in water, air, or soil. There are several examples that show that these flows may exceed the capacity of regional as well as global sinks. Most prominent - but not the only - cases are greenhouse gases and the resulting climate change, and CFCs and the decrease of the ozone layer.

In this paper, we advocate to investigate comprehensively into the back end of the anthropogenic metabolism, and to link resources to sinks in an all-embracing manner. Such an assessment is necessary for early recognition of overloading of sinks, for setting priorities in waste and environmental management, and for giving guidance for resource extraction and the material design of human activities. Without comprehensively linking resource extraction, stock of materials in the anthroposphere, and losses/disposal of materials into sinks, it may well be that sinks will become a limiting resource for the long-term development of the anthroposphere.

There are many challenges in this new field of research. From a methodological point of view, the following questions arise: How can “sinks” and “final sinks” - as antonyms to “sources” - be defined? What are appropriate sinks for the various classes of substances, and how can the carrying capacities of sinks be determined? What kind of metric allows measuring the flows to appropriate/inappropriate sinks, are “sink indicators” feasible?

For materials management in view of sink constraints, key questions are: Which sink capacities are necessary for accommodating all off-flows from human activities? What are today's sink requirements on a regional and global scale, and how will they change in the future when today's large stock of hazardous substances has to be disposed of? Is general sink overloading to be expected, or will this be an individual phenomenon for a few single substances? How can potential sink constraints be overcome (prevention, design for final sinks, new waste disposal technologies)?

Answers to these questions will be crucial for sustainable resource management and environmental management. They are an essential base for planning and operating cities and regions. Particularly waste management, which is a key filter between human activities and the environment, will benefit from this research. The paper will address these questions on a general level as well as by specific case studies.