

Preface

There is widespread public concern about hazardous chemicals that are contained in air, soil, water and food which is supported by scientific evidence, however, not as encompassing. Policy has therefore adopted a series of laws and regulations with regard to the emissions into and concentration levels in different media including food. As policy makers do not only have to consider the protection of the environment but also need to ensure a well-functioning economy at the same time, these limit or target values need to be set in a balanced way. The main problem, however, is to compare or rather optimize the different costs for achieving these targets with the benefits to society by having a smaller exposure to hazardous substances. According to neoclassical welfare economics theory, the optimal pollution level is found when the costs of the last implemented measure that just leads to the achievement of an environmental state (e.g., by implementing emission abatement techniques such as filters) are equal to the incremental increase in welfare (e.g., a better health status) valued in monetary terms. The assessment of the increases in welfare expressed in monetary values is associated with a rather high degree of uncertainty. This is due to the fact that not all aspects of environmental pollution can at present be valued (e.g., biodiversity loss) and due to the uncertainties in the employed model-based assessments involving information on emissions, description of the environmental fate of substances, behavioural patterns of people, effect models and their valuation approaches. As a result, current cost-benefit analyses are conducted in a way that they are complemented by qualitative aspects to a greater or lesser extent. It needs to be noted, however, that even in such cases in which the knowledge base is more reliable the target setting process in the end is primarily driven by political constraints and the outcome of complex international negotiations, rather than robust scientific evidence.

This book sets out to improve the reliability of cost-benefit analyses particularly of hazardous substances present in air, water, soil and food. It suggests that the human health risk assessment of chemicals is performed in a bottom-up analysis that is based on a spatially resolved multimedia modelling approach. In order

to allow for cost-benefit analyses to be conducted, this approach is accompanied by monetary valuation of human health impacts.

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