

Risk is a Construct

Perceptions of Risk Perception

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Bayerische Rück

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Bernd Rohrmann

Risk Management by Setting Environmental Standards

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Summary

If environmental immissions place human health and well-being at risk, it is the responsibility of the authorities to assess the scientific knowledge available in order to identify critical exposures and to initiate appropriate abatement measures which protect the affected population. Such measures are typically the setting of emission or immission limits, i.e. environmental standards. However, the utilization of scientific research for the purposes of risk assessment and political decision-making leads to manifold problems. Cardinal difficulties are that the effects of environmental stressors constitute a multicausal process; that data on somatic, psychological or social effects and related evaluations of unacceptable impacts have to be converted into physical and/or chemical units; and that normative statements (not just empirical findings) are required. From this it follows that the make-up of the decision-making body and its legitimation are of key importance, over and above the data basis used and the underlying risk model. Moreover, efficacy studies are required to determine to what extent the defined standards actually bring about the intended protection, in other words whether they are an effective risk management tool.

Foreword

This chapter will look at a particular problem of dealing with risk, that is how to convert knowledge about hazards into exposure limits (German: "Grenzwerte") protecting the affected population. This relates to the issue of "Risk is a Construct" in two different respects: firstly, most of the hazards in question are of a probabilistic nature, in other words, it is not certain that their feared effects will actually occur; secondly, the establishment of critical exposure limits is far more a societal than a scientific or technological issue. How society perceives and evaluates risks to the community at large and/or to the individual obviously has a crucial impact on the way these risks are managed - in the present context by setting environmental standards.

1. Environmental Stressors as Risks to Human Health and Well-being

The environment is the habitat which humans endeavour to shape according to their own ideas and in which they pursue a wide variety of activities. However, the structural, physico-chemical and social environment also houses many "environmental stressors", i.e. adverse environmental conditions which may affect people's physical, psychological and social well-being (Campbell 1983, Evans 1983), and which therefore constitute a risk to human health. A list of such factors is given in Table I.

These factors take effect both at the workplace and in the private home environment. However, the effects are not certain to occur or will not affect everyone exposed, and they may vary considerably in severity between individuals - it is exactly this which makes environmental impacts into risks. It should be noted though that formal risk definitions which are common in risk

Table I

Environmental Problems: Examples

<i>State of the natural environment</i>	<i>Hazards for humans</i>
Soil pollution	Air pollution
Water pollution	Noise
Consumption of natural landscape	Radiation
Waste dumping	Vibrations
Forest dieback	Odours
Erosion/desertification	Heat/cold
Over-use of resources	Food additives
Extinction of animal species	Harmful drugs/cosmetics
Climatic changes	etc.

analyses within engineering or insurance issues (such as the product of probability and severity of damage) are hardly appropriate for risks to human health and well-being – a point that has been stressed among others by the Council of Environmental Experts (SRU) in Germany (cf. SRU, 1987, Section 3.1.2).

So far risks to humans and their activities have been mentioned, but it is equally important to consider risks for the environment itself (soil, air, water etc.), including global and long-term hazards threatening the planet and humankind as a whole, such as the much-feared climatic changes. Of course, any deterioration of environmental quality in turn will have an impact on the living conditions of humans.

Generally speaking, there are three ways in which environmental stressors and their effects can be mitigated. These involve:

- changes at the *source of the emission*, i.e. the “emittent” (e.g. measures to prevent or reduce the generation or discharge of emissions; spatial or temporal restrictions of industrial operations; emission limits);
- changes at the *point of immission* (e.g. wearing of protective clothing; structural/engineered safeguards for exposed workplaces and/or homes; immission limits);
- changes in between by increasing the distance or establishing *barriers* between the emission source and the exposed people (e.g. re-siting of production facilities; re-routing of transport movements; relocation of affected communities; construction of protection walls etc.).

Regulators can employ technological and administrative approaches. Basically, these can be understood as instruments of *risk management*. Irrespective of whether the requirements are defined in terms of emissions or immissions, the “target of protection” is always human health. This reflects the “anthropo-

