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Late lessons from early warnings: the precautionary principle 1896–2000

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Preface

To know and not to know. To act or not to act...?

The task of the European Environment Agency (EEA) is to provide information of direct use for improving decision-making and public participation. We often provide information in situations of scientific uncertainty, in which the precautionary principle, enshrined in the Treaty of the European Union, is increasingly relevant. The growing innovative powers of science seem to be outstripping its ability to predict the consequences of its applications, whilst the scale of human interventions in nature increases the chances that any hazardous impacts may be serious and global. It is therefore important to take stock of past experiences, and learn how we can adapt to these changing circumstances and improve our work, particularly in relation to the provision of information and the identification of early warnings.

Late lessons from early warnings is about the gathering of information on the hazards of human economic activities and its use in taking action to better protect both the environment and the health of the species and ecosystems that are dependent on it, and then living with the consequences.

The report is based on case studies. The authors of the case studies, all experts in their particular field of environmental, occupational and consumer hazards, were asked to identify the dates of early warnings, to analyse how this information was used, or not used, in reducing hazards, and to describe the resulting costs, benefits and lessons for the future.

The lessons they drew from their histories were then distilled into twelve 'late lessons' by the editorial team, under the guidance of the EEA Scientific Committee. In a separate EEA publication some implications of the late lessons for the policy process and associated information flows will be further explored.

The precautionary principle is not just an issue for the European Union (EU): its potential impact on trade means that its application can have global repercussions. The current dialogue between the EU and the United States on the use and application of precaution is partly affected by confusion about the meaning of terms used in the debate. This report should contribute to a greater and shared understanding about past decisions on hazardous technologies and therefore, we hope, to improved transatlantic agreement about future decisions. It may also help the dialogue *within* both the EU and the United States, where there are healthy debates about the pros and cons of applying the precautionary principle.

That we have all acted too late in many areas is now well known. Over the next 50 years we will see some thousands of extra skin cancers as today's children grow up exposed to the higher levels of ultraviolet radiation penetrating the normally protective ozone layer through the 'hole' created by chlorofluorocarbons (CFCs) and other synthetic chemicals. Over the same period many thousands of Europeans will die from one of the most painful and terminal of cancers, mesothelioma, caused by the inhalation of asbestos dust. In both cases we were taken by surprise: the hazards of these beneficial technologies were not 'known about' until it was too late to stop irreversible impacts. Both phenomena had such long latent periods between first exposures and late effects that 'pipelines' of unstoppable consequences, decades long, were set in place before actions could have been taken to stop further exposures.

The first reports of injuries from radiation were made as early as 1896 (hence the title of the report). The first clear and credible early warning about asbestos came two years later in 1898. A similar signal for action on CFCs came in 1974, though some may argue that important clues were missed earlier. Eleven other well-known hazards are dealt with in this report. We invite the reader to judge whether, as in the cases of radiation, asbestos and CFCs, the early warnings could have led to earlier actions to reduce hazards, at a lower overall cost to society.

The costs of preventive actions are usually tangible, clearly allocated and often short term, whereas the costs of failing to act are less tangible, less clearly distributed and usually longer term, posing particular

problems of governance. Weighing up the overall pros and cons of action, or inaction, is therefore very difficult, involving ethical as well as economic considerations, as the case studies illustrate.

A key question arising from the case studies is how to acknowledge and respond not only to scientific uncertainty but also to ignorance, a state of not knowing from which springs both scientific discoveries and unpleasant 'surprises', such as ozone holes and rare cancers. Socrates had a response to this when he acknowledged ignorance as a source of wisdom. Our report shows that this is a lesson from history that many people have forgotten. Misplaced 'certainty' about the absence of harm played a key role in delaying preventive actions in most of the case studies. However, there is clearly nothing scientific about the pretence of knowledge. Such 'certainty' does little to reduce ignorance, which requires more scientific research and long-term monitoring in order to identify the unintended impacts of human activities.

Could we have known about, or anticipated, the hazards any earlier? Are there ways of 'knowing more' or 'knowing better' that could help justify our self-awarded title of *Homo sapiens* — the 'wise ones'?

Readers of the case studies in *Late lessons* may conclude that we have a long way to go. Some possible directions are indicated in the chapter 'Twelve late lessons', derived from the case studies.

A phenomenon that Socrates probably did not know about, but may have suspected, is that 'everything connects' — or at least, so many things do react with each other that the simple science of linear, mechanistic propositions needs to be supplemented with the dynamic and emergent properties of systems science. The potential systemic instabilities of such complex phenomena as climate change or brain cell behaviour may be critical yet unpredictable determinants of our fate, whether they be systems that govern the stability of the Gulf Stream or that generate the 'genomic instabilities' of irradiated cells.

Compartmentalised science, no matter how erudite, is an insufficient base for knowing enough to anticipate or mitigate the impacts of such complex systems: integrated and synthesised knowledge, which pools the wisdom from many natural and social sciences, is a necessary condition for being *Homo sapiens*. But just knowing enough is not of itself sufficient: acting wisely, and in good time, is also necessary. It is part of the EEA's task to help expand the knowledge base through integrated assessments, thereby assisting decision-makers to foresee the possible consequences of regulatory and stakeholder actions and inactions.

Knowing enough, and acting wisely enough, across the full range of environmental and related health issues seems daunting. The interconnections between issues, the pace of technological change, our limited understanding and the 'time to harm and then to heal' of the ecological and biological systems that can be perturbed over decades by our technologies together present an unforgiving context. Some people fear or imagine that a more precautionary approach to forestalling potentially irreversible hazards will stifle innovation or compromise science. However, there are immense challenges and opportunities in understanding complex and emergent systems while meeting human needs with lower health and ecological costs. Many of the case studies suggest that wider use of the precautionary principle can help stimulate both innovation and science, replacing the 19th century technologies and simple science of the first industrial revolution with the 'eco-efficient' technologies and systems science of the third.

One final and obvious question arises from the case studies in *Late lessons*: why were not only the early warnings but also the 'loud and late' warnings often ignored for so long? This question we largely leave to the reader, whilst noting that the absence of political will to take action to reduce hazards, in the face of conflicting costs and benefits, seems to be an even more important factor in these histories than is the availability of trusted information. However, as Aristotle observed, the way we perceive the world determines in large part how we act, and information plays a critical role in how we see the world. But whose information is received? Is it 'true, fair and independent'? And is it understandable to the politicians and business people who are rarely experts but nevertheless have to make the difficult decisions?

This report notes the importance of trusted and shared information for effective policy-making and stakeholder participation in decision-making, especially in the context of complexity, ignorance, high stakes and the

need for 'collective learning'. We must not forget that EU product legislation defines as safe any product that does not present 'unacceptable risks' under normal or foreseeable conditions of use. Public acceptability of risks requires public participation in the decisions that create and manage such risks, including the consideration of values, attitudes and overall benefits. Sound public policy-making on issues involving science therefore requires more than good science: ethical as well as economic choices are at stake. Such matters concern not only the experts and the politicians but all of us.

It is therefore my hope that this report contributes to better and more accessible science based information and more effective stakeholder participation in the governance of economic activity so as to help minimise environmental and health costs and maximise innovation.

Decision-makers need not only to have more and better quality information but also to act wisely more often so as to achieve a better balance between the benefits of innovations and their hazards. Learning and applying these late lessons from the last century's early warnings could help all of us to achieve this better balance during this century.

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