

Info-Gap Theory for Strategic Planning: Pollution Control and Climate Change

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Info-gap theory is a method for analysis, planning, decision and design under uncertainty. The future may differ from the past, so our models may err in ways we cannot know. Our data may lack evidence about surprises: catastrophes or windfalls. Our scientific and technical understanding may be incomplete. These are info-gaps: incomplete understanding of the system being managed. Info-gap theory provides decision-support tools for modelling and managing severe uncertainty.

After discussing the idea of info-gap uncertainty, we explore two public policy issues.

We first consider *pollution control*. Given uncertainty in the marginal costs and benefits of pollution emission, is it better to impose a tax on pollution or to establish legal limits to pollution? We perform a welfare analysis and analyze the robustness to uncertainty in the cost and benefit functions.

We then consider policy for *managing climate change*. Profound uncertainty surrounds both the transmission between change in green house gas concentration and temperature rise, and in the transmission between temperature rise and economic loss. This uncertainty motivates two very different sorts of policy responses. On the one hand, precautionary abatement of greenhouse gas emission seems wise. On the other hand, the great uncertainty in our understanding of global processes in extreme conditions motivates intensive research on a wide range of environmental, biological and economic processes. Clearly, both strategies are needed. We use simple models to illustrate the analysis of policy choices in these two categories, and trade-offs between them, when considering highly uncertain possibilities of severe scenarios.