



## **Environmental risk assessment and optimisation modelling: Methodology and applications for Northern Eurasia**

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Environmental risk and impact assessment and prediction modelling are one of the most important instruments in the environmental management, mitigations and preparedness, and these need further development in a quickly changing world and society. Many previous studies in this field, as a rule, have considered only separate aspects of both the risk and impact assessments. New realities and problems in the environmental security, as well as increasing scientific knowledge and power of modern supercomputer facilities, request a new generation of assessments, prediction and optimisation tools. New trends, advantages and perspectives in assessment and forecasting methodology (including integrated and multidisciplinary approaches, health and combined effects of different risk and impact factors, source-receptor, sensitivity and vulnerability problems, and meteorological advances for urban air quality forecasting and assessments) are discussed. The methodology has been developed to build the combined methods of forward and inverse modelling for the air quality problems, environmental risk assessment and control. It is based on variational principles and methods of adjoint sensitivity theory. This allows obtaining the optimal numerical schemes and universal algorithm of the forward-inverse modelling. The concept of environmental modelling and its applications for the North-European and Siberian regions are discussed and presented.