

Using Risk Analysis for Flood Protection Assessment

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 Springer

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ISBN 978-3-319-52149-7 ISBN 978-3-319-52150-3 (eBook)
DOI 10.1007/978-3-319-52150-3

Library of Congress Control Number: 2016963782

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Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Environmental impact assessment (EIA) is an important process that, prior to approval of the investment plan, can provide a detailed examination of the likely and foreseeable impacts of proposed construction activity on the environment. The objective of this book is to develop a specific methodology for the analysis and evaluation of the environmental impacts of selected constructions, namely flood protection structures, using risk analysis methods. Experience in applying this methodology designed for the process of environmental impact assessment also drives considerations for further improvements or more effective implementation and performance of this process. This book looks into the benefits of using risk analysis techniques to evaluate flood protection structures. In doing so, the results of the environmental impact assessment of selected planned flood protection projects are examined.

The book proposes a methodology for the assessment of environmental impact in water management, and it investigates flood mitigation measures with the aim of selecting the best option for the decision process. This methodology should streamline the environmental impact assessment process applied to constructions in the field of the water management. Moreover, the outcome should lead to the selection of future activities entailing minimum risk to the environment. Comparison of alternatives and designation of the optimal variant are implemented based on selected criteria that objectively describe the characteristic lines of the planned alternatives of activity and their impact on the environment.

Specifically, multiparametric risk analysis is used in the proposed method for environmental impact assessment of flood protection projects. This risk analysis method is intended not only to increase the clarity and precision of the evaluation process, but also to align it with the requirements of the environmental impact assessment system of the European Union. This modification should improve the reliability of the environmental impact assessment, and could moreover also be applied to other infrastructure projects. The designed project in Kružľov, Slovakia is used as a case study to clarify and exemplify the methodology and techniques.

This book reviews the literature of EIA and risk analysis and their interconnection (Chap. 1). A proposed methodology for EIA of selected proposed activities

based on risk analysis is described in Chap. 2. Chapter 3 reports the results of research based on the application of the proposed methodology of EIA of flood mitigation measures in Kružlov village (north Slovakia). The conclusions of the research, plus both the theoretical and practical benefits of the book as a tool for decision support and the promotion of sustainable development, are treated in Chap. 4. This final chapter also presents suggestions or recommendations for further research in the field of the methodology of the EIA process.

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Acknowledgements

The authors would like to thank the reviewers namely Prof. h.c. Prof. Ing. Milan Majerník, Ph.D., Professor at Department of Management at Faculty of Business Economy with seat in Košice, University of Economics in Bratislava, Prof. Katarína Pavličková, Associated Professor at Department of Landscape Management at Faculty of Natural Science, Comenius University of Bratislava and Eng. Milan Luciak, working at Department of Environmental Assessment at Ministry of Environment of the Slovak Republic for their constructive comments.

This work has been supported by the Scientific and Educational Grant Agency of Ministry of Education of the Slovak Republic under project VEGA 1/0609/14.

The authors would like to thank also the publisher—Springer Nature for providing the opportunity for this publication.

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Abbreviations

ALARP	As low as reasonably practicable
AS/NZS	Australian/New Zealand Standard
B.C.	Before Christ
CEAM	Cumulative effects assessment and management
DA	Decision analysis
EA	Environmental assessment
ECOTOC	European Centre for Ecotoxicology and Toxicology of Chemicals
EES	Environmental evaluation system
EIA	Environmental impact assessment
EIS	Environmental impact statements
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organization
FPS	Flood protection structures
GIS	Geographic information system
HIA	Health impact assessment
I&APs	Interested and affected parties
IAIA	International Association for Impact Assessment
IAP2	International Association for Public Participation
IAPA	Impact assessment and project appraisal
IEM	Integrated environmental management
IFC	International Finance Corporation
IMP3	IMProving the IMPlimentation of Environmental IMPact Assessment
IUCN	International Union for Conservation of Nature
MAUM	Multi-attribute utility measurement
MCDM	Multi-criteria decision making
MCDM	Multi-criteria discrete model
MoE	Ministry of Environment
MPOM	Multi-purpose optimization model
NEPA	National Environmental Policy Act

NGOs	Non-government organizations
OECD	Organisation of Economic Cooperation and Development
PADC	Project appraisal for development control
PRA	Pest risk analysis
RA	Risk analysis
RIA	Regulatory impact assessment
SA	Sustainability assessment
SEA	Strategic environmental assessment
SHMI	Slovak Hydrometeorological Institute
SIA	Social impact assessment
SWOT	Strengths, weaknesses, opportunities and threats
TIA	Transboundary impact assessment
TIEQ	Total indicator of environmental quality
TSES	Territorial system of ecological stability
UMRA	Universal matrix of risk analysis
UNEP	United Nations Environment Programme
USA	United States of America
USEPA	United States Environmental Protection Agency
V4	Visegrad Four-4
WHO	World Health Organization