

Berichte aus der Landschafts- und Umweltplanung

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**Decision Support Systems for
Integrated River Basin Management**

Requirements for appropriate tools and structures
for a comprehensive planning approach

Shaker Verlag
Aachen 2008

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Zugl.: Hannover, Leibniz Univ., Diss., 2008

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Printed in Germany.

ISBN 978-3-8322-7515-0

ISSN 1611-1087

Shaker Verlag GmbH • P.O. BOX 101818 • D-52018 Aachen

Phone: 0049/2407/9596-0 • Telefax: 0049/2407/9596-9

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Kurzfassung

Vor dem Hintergrund der weltweiten Herausforderungen einer geforderten nachhaltigen Bewirtschaftung natürlicher Ressourcen wie Wasser und Boden ist das Konzept des integrierten Flussgebietsmanagement (FGM) hervorgegangen. Hierunter wird die integrierte Betrachtung der natürlichen und sozial-ökonomischen Komponenten bei der Bewirtschaftung von Flusseinzugsgebietsebene verstanden.

In dieser Arbeit werden die Managementbereiche von Wasserqualität und -quantität, Auenbewirtschaftung und Hochwasserrisiko als wesentliche Säulen des Flussgebietsmanagement betrachtet und untersucht.

Offenkundig ist dies ein komplexer Ansatz, bei dem Computer basierte Instrumente wie Entscheidungsunterstützungssysteme (Decision Support Systems – DSS) hilfreich sein könnten. Obwohl einige DSS für den Bereich des FGM entwickelt wurden, kommen diese kaum in der Praxis zum Einsatz.

Daher verfolgt die vorliegende Arbeit das Ziel zum einen die Gründe dafür zu untersuchen, warum DSS für das integrierte Flussgebietsmanagement nicht oder nur wenig genutzt werden. Der Analysepfad beleuchtet Fragen bezüglich des eigentlichen Managementgebietes (dem FGM), strukturelle und administrative Rahmenbedingungen, DSS inhärente Charakteristika sowie individuelle Einstellungen oder Vorbehalte der potentiellen Nutzerinnen und Nutzer mit solcher Art von Computersystemen. Zum anderen werden die Anforderungen für adäquate Systeme und Planungs- und Entscheidungsprozessen ermittelt und beschrieben, damit DSS den Nutzeransprüchen von Beteiligten im FGM besser entsprechen.

Mit Hilfe von Literaturstudien, Synopsen verschiedener Workshopergebnisse sowie eigenen Expertenbefragungen von mehr als 140 Expertinnen und Experten aus Großbritannien, den Niederlanden, Belgien, Schweden, Norwegen und Deutschland wurden Erfolgs- und Scheiterfaktoren von sowie Anforderungen an DSS im FGM ermittelt. Die Expertinnen und Experten stammen aus den Bereichen Wasserwirtschaft, Raumplanung, Naturschutz und Systementwicklung bzw. GIS-Bearbeitung und Politik. Als Erhebungsmethoden wurden Workshops (Diskussion in Kleingruppen anhand von Leitfragen), Fragebögen und Interviews angewendet. Darüber hinaus wurde eine Evaluation eines DSS Prototypen für das Flussgebietsmanagement im Einzugsgebiet der Elbe, dem ElbeDSS, mithilfe von Nutzertests und einem Fragebogen durchgeführt.

Es hat sich gezeigt, dass, obwohl die Erhebungen aus den verschiedensten Arbeitsgebieten und Regionen stammen, die Ergebnisse verallgemeinerbar und generelle Ansprüche an DSS formulierbar sind.

Es zeigt sich, dass mitnichten nur technische Charakteristika oder die Konzeption eines DSS über eine erfolgreiche Nutzung entscheiden. Genauso ausschlaggebend sind institutionelle und gesellschaftliche bzw. persönliche Motive. Demzufolge werden die aus den Untersuchungsergebnissen gezogenen Schlussfolgerungen als Anforderungskatalog für die Punkte (1) gewünschte Funktionalitäten, (2) externe Schnittstellen, (3) Performance, (4) Attribute, (5) Einschränkungen für das Design, (6) Entwicklung und Implementierung sowie (7) institutionelle Strukturen und Anreize für Zusammenarbeit beschrieben.

DSS können als sozio-technische Instrumente angesehen werden, die sowohl als Maschine (z.B. für Datenverarbeitung), als Werkzeug (z.B. für Analysen und Visualisierung) als auch als Medium für Partizipation und Zusammenarbeit dienen können. In Management und Planungsprozessen können DSS als ein Vehikel für Kommunikation angesehen werden. Die Entwicklung von DSS muss als ein andauernder Prozess verstanden werden, bei der die potenziellen Nutzerinnen und Nutzer, bzw. Nutzergruppen direkt beteiligt werden sollten.

Schlagworte: Entscheidungsunterstützungssysteme, DSS, Flussgebietsmanagement, Anforderungen

Abstract

The concept of integrated river basin management (IRBM) emerged against the background of the challenge arising from global demands for sustainable management of natural resources such as water and soil. The term IRBM is used to mean that both natural and socio-economic components should be integrated in a contemplation of management on a river basin level.

This study surveys and investigates the principal pillars of river basin management: water quality and quantity, flood prone areas and flood risk management.

This is clearly a complex task in which both computer-based instruments and Decision Support Systems (DSS) might be useful. Although some DSS have been developed for IRBM, these are rarely used in practice.

Thus, the present study pursues two goals: Firstly, to examine the reasons why DSS are not used – or only infrequently used – for IRBM. The analysis highlights issues relating to the actual management area (the IRBM), the structural and administrative situation, characteristics inherent to DSS and the individual problems of potential users with such computer systems. Secondly, to identify and describe users' requirements of appropriate systems and planning and decision-making processes, with a view to making DSS conform better to the expectations and needs of people involved in IRBM.

The factors determining success and failure of DSS in IRBM as well as users' requirements of the system were identified using literature studies, synopses of various workshop results and the results of questionnaires and interviews which I conducted among 192 experts from Great Britain, the Netherlands, Belgium, Sweden, Norway and Germany. These people came from the fields of water management, spatial planning, nature protection and system development or GIS processing, and politics. The methods used to elicit information were workshops (discussions in small groups based on a number of given central questions), questionnaires and interviews. Over and above this, user tests and a questionnaire were used to perform an evaluation of a DSS prototype for river basin management in the Elbe region, the ElbeDSS.

It evolved that, although people from widely varying fields of work and regions took part in the survey, it is possible to generalise the results and formulate common requirements of DSS.

It becomes clear that the technical characteristics or conception of a DSS are by no means the only factors which determine whether the system will be successfully used. Institutional, societal and personal motives are equally crucial. Hence, the conclusions drawn from the survey results are presented as a catalogue of requirements for the points (1) desired functionalities, (2) external interfaces, (3) performance, (4) attributes, (5) constraints on the design, (6) development and implementation, and (7) institutional structures and incentives for cooperation.

DSS can be regarded as socio-technical instruments which can serve either as machines (e.g. in data processing), as tools (e.g. in analyses and visualisations) or as a medium for participation and cooperation. In management and planning processes a DSS can be seen as a supporting communication vehicle. The development of a DSS must be understood as an ongoing process in which potential users should be directly involved.

Key words: Decision Support Systems, DSS, River basin management, Requirements

Acknowledgements

I would like to thank everybody who made this work possible.

In particular, I would like to express my sincere appreciation and gratitude to my supervisors Prof. Dr. Christina von Haaren for her wise advice and professional and patient guidance and Prof. Dr. Michael Abbott for his supportive and, for me, sometimes unconventional input and his critical feedback.

Many thanks go to all the people who gave responses during the elicitation activities and shared their helpful practical expertise. I would like to express special thanks to the interview partners who spent their precious time in valuable discussions and shared their knowledge with me.

I am indebted to all my colleagues from the ElbeDSS Team. Dr. Sebastian Kofalk gave me indispensable support in the evaluation of the ElbeDSS with his critical review and discussions. I very much enjoyed doing the interesting user tests together with him. Dr. Jürgen Berlekamp introduced me to the secrets of the ElbeDSS and gave me valuable feedback on parts of my research and Bernhard Hahn provided helpful information and support.

I would like to thank Dr. Andreja Jonoski for his continuous, sympathetic and substantial feedback and Dr. Thomas Horlitz for interesting discussions, his considerable comments and identification of aspects which still need to be investigated more closely. Thanks also to Prof. Dr. Harald Heinrichs for his views on the participation chapter and to Dr. Christina Westphal for her feedback to a variety of aspects.

I also wish to thank the Ministry of Science and Culture of Lower Saxony for their financial support of the position at the University of Lüneburg (former University of Applied Sciences) for four years which enabled me to pursue this research. Thanks also to all those who supported this programme at the university, and particularly Anne Dudeck and Prof. Dr. Christa Cremer-Renz.

Parts of the research such as the elicitations of experts' views were imbedded in the EU-FLOWS project. My thanks go to the EU INTERREG 3B Programme and to my colleagues of the FLOWS project, particularly Hanko Rubach, Hallvard Berg, Toby Forbes Turner and Antoon Kuypers who accepted and supported my conducted methodologies.

I want to apologise to all my good friends and members of my family who I have neglected over the past few years. Thanks so much for being so understanding.

My deepest gratitude and love are expressed towards my husband for his unflinching technical, practical and, above all, mental support.

Contents

1	Introduction	1
1.1	Integrated River Basin Management (IRBM)	4
1.2	Decision Support Systems (DSS)	7
1.3	Research questions and scope of this study	8
1.4	Methodology of this study	11
1.4.1	Identification of characteristics of IRBM which impede use of DSS	13
1.4.2	Identification of legal and management conditions for IRBM in the context of DSS	19
1.4.3	Identification of specific characteristics and capacities of existing DSS	21
1.4.4	Identification of individual specifics and reservations of (potential) DSS-users	22
1.4.5	Obtaining information about DSS requirements from experts	24
1.4.6	Identification and formulation of user requirements for IRBM-DSS	35
2	Fields of application and important elements of an IRBM-DSS	39
2.1	Characteristic elements of river basins	40
2.2	River basins: status, impact, pressures and driving forces	41
2.2.1	Quality and quantity of water	42
2.2.2	Wetlands and flood prone areas	53
2.2.3	Floods and flood risk	63
2.3	Problems identified by experts	70
2.4	Interrelated problems in IRBM	74
2.5	Conclusions	76
2.5.1	Key impacts and pressures on European river basin systems	76
2.5.2	Difficulties for the integration of IRBM issues in a DSS	77
2.5.3	Important elements which a DSS must include to be named an IRBM-DSS	78
3	Legal and structural management conditions for IRBM	81
3.1	Introduction IRBM	81
3.2	Legal foundations and technical guidelines for IRBM	82
3.2.1	Water quality and quantity	82
3.2.2	Integration aspects with elements of IRBM	91
3.2.3	Flood Risk Management	94
3.2.4	Management of flood prone areas	101
3.2.5	Planning and implementation instruments	106
3.2.6	Other related European policies with regard to IRBM	108
3.2.7	The legal situation and its implications for IRBM-DSS	109
3.2.8	Compilation of objectives for IRBM and possible DSS scenarios	113
3.3	Institutional structures for IRBM	115
3.3.1	General aspects	115
3.3.2	Examples for organisational structures on river basin level	120
3.3.3	Structural problems identified by experts	121
3.3.4	Institutional and structural situation and requirements	125
3.4	Problems resulting from administrative and institutional structures	127
3.5	Requirements for IRBM-DSS with regard to institutional structures	128

4	Participation in IRBM	131
4.1	Introduction and definitions	131
4.2	Reasons for participation	135
4.2.1	Participation for sustainable development	137
4.2.2	Democratisation as an important element of IRBM	137
4.2.3	The role of narrative knowledge in a broad discourse	139
4.2.4	Making use of encapsulated knowledge	141
4.2.5	Decision-making process as a democratic process and legitimating for democracy	142
4.2.6	The benefits of public participation in IRBM: a summary	143
4.3	Requirements and instruments for participation	144
4.4	Potential users of IRBM-DSS	149
4.5	Experts view on participation issue	152
4.6	Problems for IRBM-DSS with regard to participation	153
4.7	The decision-making process	157
5	Characteristics of existing DSS and factors determining success and failure	159
5.1	Decision Support Systems – an Introduction	159
5.2	Reasons for using DSS in IRBM – Added values and required functionalities	164
5.2.1	Added value, areas of use and functionalities of a DSS	164
5.2.2	Information and Data Management	172
5.3	Characteristics and classification of existing DSS in Integrated River Basin Management	185
5.3.1	Classification on the technical level	186
5.3.2	Classification on the management level	190
5.3.3	Classification on the decision-making process level	192
5.3.4	Classification on the architectural level	193
5.4	Factors determining success and failure of DSS	202
5.5	Case study: Evaluation of the generic ElbeDSS	210
5.5.1	Description of ElbeDSS	211
5.5.2	Evaluation results	214
5.5.3	Summary of ElbeDSS evaluation results	229
5.6	Individual reasons for not using IRBM-DSS	231
5.7	Areas of use for generic DSS	236
5.8	IRBM-DSS as a socio-technical instrument and communication vehicle	238
5.9	Conclusion	241
6	Specification of requirements for IRBM-DSS	245
6.1	Desired content and functionalities	247
6.1.1	Content which has to be integrated	247
6.1.2	Desired functionalities	248
6.1.2.1	Support of planning and decision-making processes	249
6.1.2.2	Handling of complexity, better understanding and future perspectives	256
6.1.2.3	Support of participation processes	262
6.1.3	DSS architecture	265
6.1.4	Data to be included in the data base	268
6.1.5	Output and visualisation	270

6.2	External interfaces – interactions with user	270
6.3	Performance	272
6.4	Attributes	273
6.5	Design constraints – imposed on an implementation	275
6.6	Development and implementation	276
6.6.1	Definition of purposes	277
6.6.2	Definition of resources	278
6.6.3	Active involvement of users in an interdisciplinary and iterative process	279
6.6.4	Requirement elicitation, prototyping and evaluation	280
6.6.5	Consideration of the institutional and normative context	282
6.6.6	Implementation and documentation	283
6.6.7	Maintenance	284
6.7	Institutional structures and incentives for collaboration	284
6.7.1	Organisational and structural requirements	284
6.7.2	Possible incentives for catchment approach	285
7	Conclusions	299
8	Summary	307
9	References	323
	Appendix	235