



# Introduction

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Widening the perspective in risk management towards broader and more people-centered approaches has been, and is still, a general endeavour in risk management (e.g. United Nations ISDR, 2015). The complex and dynamic nature of environmental problems and risks resulting from natural hazards requires flexible and transparent decision-making that embraces a diversity of knowledge and values (Renn, 2008a) in order to successfully deal with the effects and impacts of these problems and risks on the society. This requires enhanced risk management processes, which emphasise integrating different rationalities and concerns of various institutions, sectors and the public. In order to facilitate such processes, enhanced stakeholder involvement is required, hereafter referred to as multi-stakeholder involvement, as much as the understanding that participation and societal support have to be understood as crucial for successful risk management processes.

The case study area of the **trilateral Wadden Sea Region (WSR)** is facing the challenge of a complex and dynamic nature of environmental problems and risks. The WSR, which includes the seaward Wadden Sea areas of the bordering North Sea as well as the landside<sup>17</sup> (see **Figure 11.1**), is a **multi-risk area**, resulting from different risk components such as: natural hazards like storm surges and sea level rise, socio-economic risk from demographic change, and conflicting spatial uses due to environmental changes. Storm surges are a constant hazard along the WSR and projected climate change conditions may lead

to increasing risk (Woth et al., 2006, Weisse et al., 2014) through, for example, increased sea levels in the coming decades (Church et al., 2001; Katsman et al., 2008; IPCC, 2013; Katsman et al., 2011). The challenge in the WSR is not only its flood risk resulting from multiple drivers, but the fact that risks and uncertainties appear on a **trans-national scale**, affecting the entire WSR – in the three Wadden Sea Region countries of the Netherlands, Germany and Denmark. Partly resultant from similar ecological characteristics as well as similar social and economic structures, the multitude of risks in the region represents a highly interlinked risk system of threats, causes and consequences that goes beyond administrative borders.

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<sup>17</sup> The definition of the vulnerable landside in the WSR case study follows the definition of the Wadden Sea Forum, encompassing the administrative units of municipalities/counties/provinces in Denmark, Germany and the Netherlands along the Wadden Sea coast.

**“Storm surge protection is considered to be in good hands, therefore risk management of storm surge events is not perceived as a burning issue. Rather, it is important to consider risk management as a process to ensure that we identify and understand the risks; and, that we manage the risks according to the identified needs and concerns not only of the people involved in the process but as well of the society at large.”**





**Figure 11.1.**

The Wadden Sea Region, as defined by the Wadden Sea Forum (Source: Common Wadden Sea Secretariat, CWSS).

The specific spatial dimension in coastal risk management in the WSR strengthens the call for collaborative actions in risk management on a trilateral level. However, most of the risk management processes are currently performed within the national and administrative borders. For example, storm surge risk management processes have taken place exclusively within national and in Germany within the Bundesländer boundaries. No management processes are in place across the national borders, even though risks appear on a trilateral scale and affect all three countries in a comparable way.

Based on this situation, the need for enhanced coastal risk management processes in the WSR becomes apparent. In this spirit, it is appropriate to question whether the current understanding and structures of risk management allow the implementation of risk management processes in the form of broader cross-national and more inclusive approaches.

This case study addressed the claim for enhanced coastal risk management processes by asking the question if and how multi-stakeholder processes, in the form of a Multi-Sector Partnership (MSP) on a trilateral level, can improve risk management in the WSR? What is the role of such an MSP? What are their contributions towards enhanced trilateral risk management processes? And how can trilateral, multi-stakeholder involvement be performed successfully? The challenge for this case study lies in the reframing of risk management, detecting mental lock-ins against alternative approaches and tackling potentials for trilateral cooperation in a multi-risk area.



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Wadden Sea Coast in Northern Frisia.  
Photo by Birgit Gerkenmeier.



# Why an MSP in trilateral risk management?

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Successful risk management processes in the trilateral WSR should be guided by perspectives and concerns of stakeholders and the society to encourage that the multiple risks are managed according to the identified needs and concerns of the people involved in the process. Risk management, therefore, becomes **a societal endeavour**, which has to consider people's awareness and perception of risks. To underpin this rethinking of (coastal) risk management processes, an integrative risk management approach is needed which includes stakeholder interests and respects urging issues of the population.

## *The MSP 'Wadden Sea Forum'*

The focus of our case study is the **Wadden Sea Forum (WSF)**, an already established transnational MSP. The WSF is an independent platform of stakeholders from Denmark, Germany and the Netherlands, once established to contribute to an advanced environmental protection scheme and promote sustainable development of the WSR. In particular, this means integrating specific cross-sectoral and transboundary strategies, actions and techniques which are environmentally sound, economically viable and socially acceptable (Wadden Sea Forum, 2013). The participating stakeholders represent the sectors Agriculture, Energy, Fisheries, Industry, Harbour, Nature Protection, and Tourism, as well as local and regional governments from the three Wadden Sea countries. In addition, the national governments are represented as observers (Wadden Sea Forum, 2005; 2010). The WSF is equipped with an advisory function in the Wadden Sea Board, the governing body of the Trilateral Wadden Sea Cooperation on the protection of the Wadden Sea.

In the context of ENHANCE, the case study analysed benefits, disadvantages and limits of the WSF, as a MSP, in the risk management processes. **What is new here is the idea to organise risk management processes on a cross-national level with the help of a MSP, without creating a new organisational body.** Although the WSF has a legal status as a non-profit organisation, it has no normative power in decision-making outside the forum. Consequently, this MSP will not have any direct influence on developing or instructing technical and economic measures in the three Wadden Sea countries. Nevertheless, the experience over the years has shown that a trilateral MSP, also anchored in decision-making as an advisory board, will not be ignored and has proved its communicative and advisory power. Furthermore, the MSP can use its already existing trilateral grass-root structure to foster trilateral collaboration.

For the target to enhance risk management as people-centred and as requiring acceptance and understanding within society with its stakeholders and interest groups, the WSF is an appropriate MSP to cooperate with.

The topic of risk management has been put on the agenda for the WSF following the 12th Trilateral Governmental Conference on the Protection of the Wadden Sea in Tønder (Common Wadden Sea Secretariat, 2014) so that the ENHANCE case study was able to take advantage of the situation and support the WSF in developing its newly declared objective and investigate the potentials to integrate risk management in the WSF's future activities.

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### ***Integrated Risk Management Approach – the conceptual background***

Trilateral risk management processes involve more than the development and monitoring of technical measures to reduce the impact of risk and the harm to society caused by their consequences. Risk management is a societal process, which addresses uncertainties in relation to society's concerns. This understanding is rooted in a sociological perspective on risk<sup>18</sup>, which understands risks as constructs that are mentally and socially conceived. These constructions result from people's perceptions and interpretations of the environment and responses depending on social, political, economic and cultural contexts and judgments (Luhmann, 1993; Ratter, 2012; 2013) as much as on responses of actors on the individual level and the societal system's level due to expected exposure to hazard events and their potential consequences (Luhmann, 1991; IRGC, 2005. Ratter, 2012). Possibilities for future events are not confined to the calculation of probabilities, but encompass group-specific knowledge and vision (Renn, 2008b) as a result of negotiation and evaluation processes within the society.

In consequence, risk management is not only a technical issue, but also takes place within a societal frame as much as in historical and cultural settings with constantly changing and uncertain boundary conditions. Therefore, dealing with risks requires more than the classic elements of risk management, commonly understood as risk analysis, risk assessment, development of strategies and measures to handle the risks and processes to monitor these elements.

An **Integrative Risk Management Approach (IRMA)**, as we present it, includes and fosters the integration of different sectoral interests and concerns and the influences and restrictions imposed by societal frames. The starting point for an integrative risk management is the identification and integration of the regional society's understanding of risks, as it determines the concerns and needs of the people involved in and impacted by the risk management process – in our approach represented by the element of risk perception and risk awareness (see **Figure 11.2**). In consequence, a thorough risk analysis is needed, which helps to identify risks from the perspective of vulnerabilities and in the light of existing or future drivers operating in the management area. Risk assessment, in this context, aims to acquire an understanding of the potential consequences and impacts in relation to the perceived risks. These basic steps are followed by the development of an adequate risk strategy or measures to adapt to the causes of risks and reduce the consequences of risks. And finally, the risk management process has also to include an on-going evaluation and monitoring process in order to deal with changes and upcoming uncertainties (Ratter, 2013). Figure 11.2 illustrates the essential elements and processes of IRMA..

<sup>18</sup> In contrast to natural science and technical perspectives on risks, where risk is mainly understood as an algorithmic calculation to estimate expected physical harm from hazard events in the form of likelihoods.

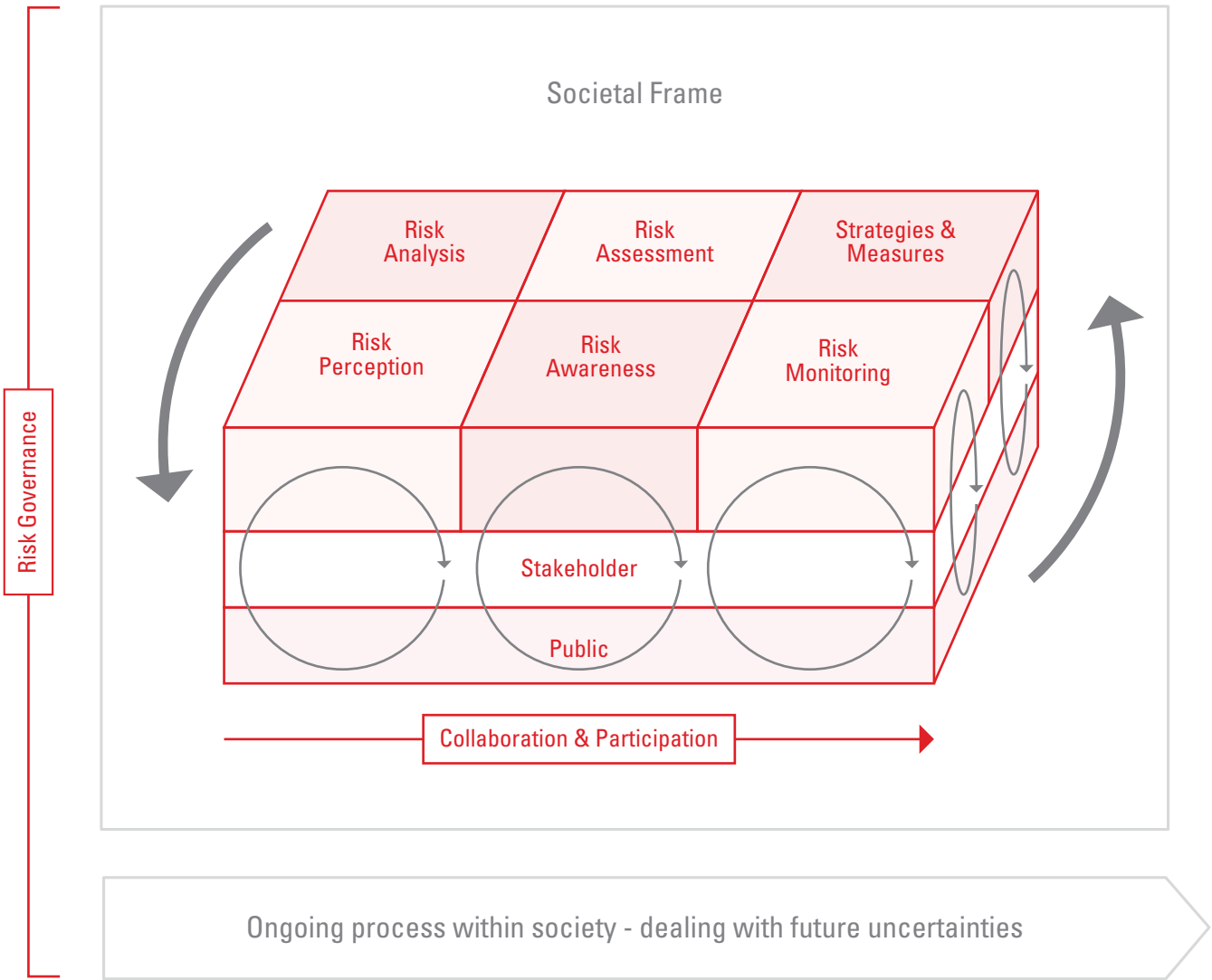
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**Figure 11.2.**

Integrative risk management approach (IRMA). IRMA includes the classic elements of risk management (risk analysis, risk assessment, development of strategies and measures to handle the risks, processes to monitor these elements) as much as it considers risk perception and risk awareness as equally important elements – all of them are interlocked as pieces of a jigsaw. Risk management takes place within a specific societal frame with constantly changing and uncertain conditions influencing the management processes. These aspects require collaboration and participation of the public and governmental/administrative institutions. Therefore, risk management has to be understood as a negotiation-based process of governance which addresses needs, objectives and goals, mediates between different interests and, if necessary, (re-)arranges responsibilities.

The above-mentioned elements should not be seen as independent from each other, but rather being complementarily connected like interlocking pieces of a jigsaw. In view of these aspects, IRMA is comprehensive not only in the sense that all management steps are included in an on-going, iterative process, but also in terms of acknowledging the shared responsibility between the agents of the social system. Integrative risk management in this sense becomes **a collaborative process involving the public sector, the private sector and the public at large**. Top-down approaches imposed by governments are less successful; rather, risk management has to be

understood as a negotiation-based process of governance which addresses needs, objectives and goals, mediates between different interests and, if necessary, (re-) arranges responsibilities. Therefore, it is essential to have continuous and close connections to stakeholders and the public during the process. Collaborative and participatory processes represent a central element in IRMA in order to ensure a continuous exchange and feedback to current management processes. Communication and discussion are essential in order to continuously adjust risk management processes to the societal frame.







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# Investigating the multi-risk situation in the Wadden Sea Region

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Addressing risk management issues in the Wadden Sea Region (WSR) started with the identification and investigation of the hazard situation, followed by differentiating between the causes and consequences of the perceived risks. On this basis, we assessed consequences based on competing interests in different sectors, and identified the scales at which risks will be addressed and where respective responsibilities lie.

Practical implementation of IRMA's discursive processes was based on **a series of three moderated, participatory workshops** with the stakeholders of the MSP, supported by different methodical approaches and supplemented by additional analyses. The latter were performed mainly as further in-depth analyses on the risk of storm surges (one risk out of many in this multi-risk area) to generate and provide additional knowledge supporting the collaborative stakeholder process.

The first workshop was dedicated to the disclosure of different risk perceptions and stakeholders' awareness on existing risks and risk management processes in the WSR. In the second workshop we supported a structured and guided dialogue using the bow-tie analysis to facilitate enhanced understanding of risk pathways, including the overview of causes and consequences of risks, and to disclose the feasible points of action for a risk management strategy. The third workshop continued the discussion and detected the potential role of the WSR in risk management processes on the trilateral level. This combination of different methodical steps provides a practical example of how to implement the integrative risk management perspective, as described in IRMA, in collaboration with stakeholders.

Disclosing the different risk perceptions of the stakeholders in the kick-off workshop underlined the fact that the WSR is faced with a multitude of risks resulting from different natural hazards and socio-economic developments. Natural hazards in the area, particularly storm surges, represent major risks. The importance of stakeholders' risk perceptions and risk awareness were underpinned by a personalised stakeholder online survey on storm surge management, conducted with stakeholders beyond the MSP who were directly and indirectly related to storm surge management (for detailed information see González-Riancho et al. 2015). However, stakeholders in the WSR do not consider storm surge risks as the highest priority for improved trilateral risk management actions – but perceive an urgent need for improvement with regard to other risks. These include risks related to demographic change, the imbalance of interests in nature conservation, and social and economic development in the WSR.

Building on the insights on risk perception and awareness, assessing impacts of disastrous events like storm surges is the next crucial step, in order to provide a descriptive basis to evaluate DRR solutions with regard to their suitability, feasibility and effectiveness. From our understanding, risk assessment not only involves the assessment of hazards or risks from a scientific point of view, but it has to include societal experiences with hazardous events and their impacts on their life worlds, too

We performed an in-depth risk assessment on the specific risk of storm surges as well as a risk assessment together with the stakeholders focussing on the multi-risk characteristic of the WSR. For the latter, results from the storm

surge risk assessment provided additional background information, supporting a broad understanding of the issue. The in-depth assessment of storm surge risks should be seen as an example; ideally these steps could be conducted for the other risks as well.

### **Risk assessment and information**

The in-depth risk assessment on storm surge risk in the WSR highlighted that in the WSR, risks can be more successfully assessed by a combination of quantitative and qualitative risk assessment approaches in order to arrive at a comprehensive integrated risk assessment.

We gained this insight by combining three different perspectives to assess the impacts of storm surge risks to society:

- (1) climate scenarios and flood maps;
- (2) a comprehensive state-of-the-art desktop study on storm surge damage modeling;
- (3) a perception study carried out through the stakeholder online-survey mentioned before (see González-Riancho et al., 2015).

The results of these steps on storm surge assessment highlight that management of the causes of storm surge risks is restricted by climatic and topographic boundaries. Existing coastal protection measures designed to deal with the causes work adequately and largely satisfactorily. The consequences of storm surges will pose a greater challenge in the future due to climate change. Impacts will occur in different sectors and at different levels and will affect the economic, social and environmental spheres. Stakeholders along the Wadden Sea coast of Schleswig-Holstein (results of the online-survey) are mainly concerned about impairments of living conditions, including financial penalties as a consequence of storm surge events. It follows that enhanced (storm surge) risk management in the WSR has to focus on the consequences of storm surges if the society's capability of mitigating and successfully lowering these risks is to be improved.

The state-of-the-art desktop study on storm surge damage modelling showed that damage modelling could facilitate the decision-making process by showing what economic consequences could be expected in the case of storm surge events. However, modelling results differ widely based on different projections, specific boundary

conditions, data sets and levels of detail defined in each project. In general, little research has been carried out at the national or transnational level, and damage estimates are of very limited significance and validity. The majority of research focuses on the meso- and micro-scale levels. A major challenge is an adequate process of damage estimation; often damages are estimated in different damage categories, each of which is related to certain estimations of values. Key aspects are the level of detail and the range of damages considered in the assessment of values, as these are essential for the level of detail of the estimated final risk – and in most cases call for a huge amount of data for each approach (see in detail Gerkenmeier et al., 2015 presenting a comprehensive desktop study on storm surge damage modeling). Under these circumstances, general transnational damage assessment remains rather vague<sup>19</sup>. These results can merely support the essential negotiation process surrounding the risks to be taken by society.

### **Bow-tie analysis: causes and consequences of perceived risks**

For the multi-risk area of the WSR causes and consequences of perceived risks need to be assessed keeping in mind that risk management in the WSR has to consider and negotiate different perspectives from different sectors and across the different countries.

In order to enhance understanding of this complexity, we introduced the bow-tie analysis as a structural tool to the stakeholder forum in the second participatory workshop. The bow-tie analysis is a commonly used risk assessment technique of the International Organisation for Standardisation IEC/ISO 31010. It is used to analyse cause and effect pathways of risk and enables the users to develop a common, sound understanding about the differentiation of risks, their causes and consequences (IEC/ISO 2009). Moreover, the bow-tie analysis facilitates the identification and analysis of the system of management controls which is necessary to adapt to the causes and to mitigate the consequences.

We chose the bow-tie analysis to derive an improved understanding of what elements constitute risk management, to differentiate between the system elements and increased awareness towards interlinkages between different risks. Therefore, we adapted the bow-tie analysis

<sup>19</sup> An exemplary study by Schwerzmann & Mehlhorn (2009) highlights an increase of expected annual losses between 100% and 900% compared to today for all North Sea countries.

for the framework of the WSR, which is usually applied to analyse the management control system in place for a well-known risk, to our specific needs and to facilitate participatory stakeholder involvement in risk management processes (for a more detailed description of the bow-tie analysis in the WSR see Gerkenmeier et al., 2015). The bow-tie analysis showed that hazard impacts and damages affect social, physical and economic structures in comparable ways. Three major risk complexes were addressed: a) demographic change, b) environmental change and c) imbalanced development. Discussions and analysis along the bow-tie also emphasised the interconnectedness of the different risks and risks complexes alike. Feedback as well as cascading effects between the complexes can influence the performance of the others.

Structured risk analyses and comprehensive risk assessment, as presented above, are the basis for the subsequent development of risk management strategies and measures. These strategies and measures for enhanced trilateral risk management processes on the WSR should meet the requirements of the stakeholders elaborated in the previous steps: Improved activities on awareness raising, information and knowledge exchange as well as communication are essential actions for an improved trilateral risk management. Such actions will address the negligence of societal risk perception for the development of DRR solutions as well as they will facilitate society and practitioners to overcome the existing lock-in situation resulting from trust and success of the recent technical measures in which continuous, successful investment in construction measures hinders a perspective on non-technical or mixed adaptation measures and strategies.

Based on these requirements, it became clear that the MSP itself has to be seen as an important, structural DRR tool that has the potential to improve trilateral risk management processes in the WSR. The MSP in the WSR will be able to make a significant contribution to an increased communication and enhanced integration of stakeholders' and society's risk perception in transnational risk management in the WSR. These improvements could pave the way for additional DRR solutions. From this it becomes clear that the MSP itself has to be understood as one of the most important DRR solutions that are needed in the WSR for the moment and in the near future.

### ***Using future scenarios to test the MSP***

In order to further define the scope, ability and limits of the MSP as a structural DRR tool, the MSP's ability to operate

was tested under critical conditions. We used a qualitative future scenario approach (based on the Future Search Method) as a participatory scenario approach. Qualitative scenarios provide a (negotiated) future vision about a certain area or sector. Qualitative scenarios are visionary narratives of future development based on experiences, regional cultural frames and a visionary dialogue process, as defined by Possekel (1999).

In the third stakeholder workshop three different extreme risk scenarios related to the risk prioritisation given by the stakeholders were developed and discussed within small stakeholder groups:

- (1) a very low-pressure system heading towards the WSR;
- (2) the closure of grocery shops in peripheries cause special problems of provision especially for the rural WSR;
- (3) an oil tanker crashes in an offshore wind farm and leaks.

In practice this meant that each working group, consisting of members from different countries and sectors, received a small set of information that was used to set the scene. Based on this information the working groups were asked to look ahead to the year 2030 and describe the anticipated threat and the impacts of the crisis for the society and the region. Based on these extended future vision scenarios, discussions were focused on how to handle gaps in management and strengthen the already existing management strategies and measures, and how to define roles and responsibilities for these actions, and on defining the role of the MSP in this context.

# Key findings of the MSP performance assessment - role of the MSP

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The ENHANCE cases study of the WSR highlights the need for enhanced communication beyond the limits of technical measures of storm surge management as much as for enhanced understanding of the risk management processes in a multi-risk area by the stakeholders.

Following this claim, the MSP's major role is seen as a communicator, multiplier and institution to raise awareness about risks and potential improvement of management processes. In this context the MSP provides an exchange platform of knowledge and experience (cross-sectoral and cross-national), offering space for discussion of new issues and reflection on on-going processes. Thereby, the MSP can initiate a snowballing effect and inspire other stakeholders to open up their minds towards a more comprehensive thinking about risks and uncertainties and stimulate a process of awareness of natural hazards.

In this sense the MSP might contribute to enhanced risk management strategies in two ways: (1) the MSP fosters new discussions on different political levels, especially on the trilateral one, and (2) the MSP might use its networks to communicate new developments in the region and support the implementation of already existing strategies. Thereby the WSF can function as a bridging body using the stakeholders' networks and contacts to foster acceptance of necessary decisions in risk management. Outcomes, such as elaboration of advice for political levels, might be a practical contribution fostering transnational collaboration in the trilateral WSR beyond national legal requirements.

In relation to these findings about the role of the WSF as a MSP in trilateral risk management processes, the con-

ducted MSP performance assessment under ordinary and critical conditions offers suggestions on how to further improve and strengthen this role. The current composition of the WSF, including stakeholders from all three countries as well as from the public and private sectors on local, regional and national levels, provides a comprehensive basis for an enhanced level activity. There is actually no urgent or essential need for increased personal capacities. However, there is a continuous need to maintain personal commitment of the participating stakeholders. As a voluntary, advice-giving stakeholder forum, the WSF is highly dependent on the personal engagement and commitment of each participant. Continuous and strong stakeholder engagement and commitment is an essential attribute for successful performance of an advice-giving, independent MSP in order to sustain a broad commitment and to achieve a win-win situation for the voluntary stakeholder organisation and the normative political level.

Nevertheless, the analysis of the current level of activity and responsibility makes clear that all parties involved in the work of the WSF do not make the maximum use of this win-win situation for the time being. The WSF, currently, does not use the potential and its possible political weight in current debates. Continuous activities to encourage and strengthen stakeholder engagement and commitment are of major importance. There is a need to make the WSF more visible and heard at the political level in the WSR, therefore, striving actively for a larger role in decision-making. However, for an on-going and lasting role in decision-making, appropriate structural and financial support is crucial. At this point, improvement is needed with regard to the WSF. Secured long-term structural and financial support is an urgent issue in terms of further improvements of the MSP; otherwise the success of the WSF's work is at risk.

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