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Mitigation planning: practical lessons within the European Union

Within the EU the necessity of sustainable strategies for risk mitigation is more and more widely accepted. The efforts of both national and local/regional governments in many member states are directed to a more adequate implementation of structural risk mitigation in spatial and economical development policies. Also governments are thinking about how the concept of ‘multi layer safety’ may help to coordinate the efforts for mitigation on one side and crisis management on the other. But how can all this be done practically? What are do’s and don’ts? In this second MiSRaR brochure you will find an overview of the experiences of seven local and regional governments in the EU.



Collapsed buildings after the 1995 earthquake in Aegio-Greece

main focus of the MiSRaR project – might be aimed at both risk reduction and enhanced preparation for actual incidents or even at better recovery afterwards. In the scheme on the next page this is illustrated.

In the practical experience of the partners three kinds of safety management can be distinguished: *risk management* directed at reducing risks, *crisis*

management directed at ‘fighting’ the consequences of an actual incident (‘a materialized risk’) and *recovery management* directed at returning society to its normal state from before the incident. On the other hand a distinction can be made between four different phases: the pre-risk phase before there is a risk, the risk phase during which a risk is present but

not yet materialized, the incident phase and finally the recovery phase.

The three kinds of safety management are not strictly corresponding to these phases, but are gradually ‘phasing in and phasing out’. In the pre-risk phase all is directed at the ultimate form of risk management: preventing a situation from becoming a risk, sometimes also referred to as ‘pro action’. This is the most fundamental form of

Putting mitigation in context

In the first MiSRaR brochure the concept of mitigation was defined as "risk reduction by reducing the probability and/or impact of a hazard and/or the vulnerability of the society." It has also been pointed out that in the practical experiences of the partners the distinction between risk management and crisis management is not absolute. For example, spatial measures – which are the



mitigation: As soon as a risk is 'in place' the attention shifts to prevention measures for reducing the probability, the potential effects from an incident and the vulnerability (exposure and susceptibility) of the 'elements' at risk for those effects. At the same time, in this risk phase, the responsible public and private partners, like the emergency services, will prepare for incidents. This preparation of course consists of disaster planning, education and exercises, but as pointed out before may also include spatial measures. Examples are access routes for emergency services, water supplies for fire brigades and clear grounds for disaster relief operations.

Moreover, in the risk phase a start can be made with recovery management, by preparing measures which make recovery more easy. Examples are recovery plans and contracts with private partners for restoring public utilities. Also structural and even spatial recovery measures could be taken. For example, an extra (redundant) motorway may be constructed for when another is blocked by a land slide or flood, or reserve production capacity may be prepared on a separated location of an industrial factory. Another example is planting trees which recover quickly after a forest fire. However, in practice the experience is that these kinds of measures mostly have no priority for the decision makers, because all attention goes to mitigating the risk and preparing for disaster relief.

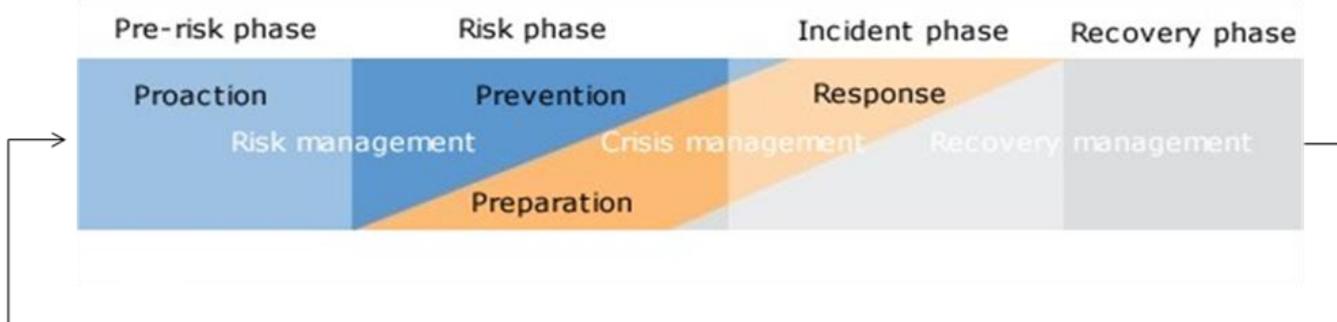
During the incident phase the preparation turns into actual 'response' or disaster relief. During this phase a start is made with recovery. Many actions by the emergency services may be charac-

terized as recovery rather than actual response. As time goes by the priority more and more shifts from response activities to recovery, until in the end the actual incident phase is closed and is followed by the stage of recovery. During the recovery a new situation arises. The recovery may be an opportunity to re-assess the risks. In most cases the occurrence of a crisis or disaster generates public and political attention for risks. This new risk awareness may strongly decrease the risk acceptance, leading to all kinds of mitigation strategies. Therefore the cycle is closed: from the recovery phase a new pre-risk phase arises.

Roadmap for this brochure

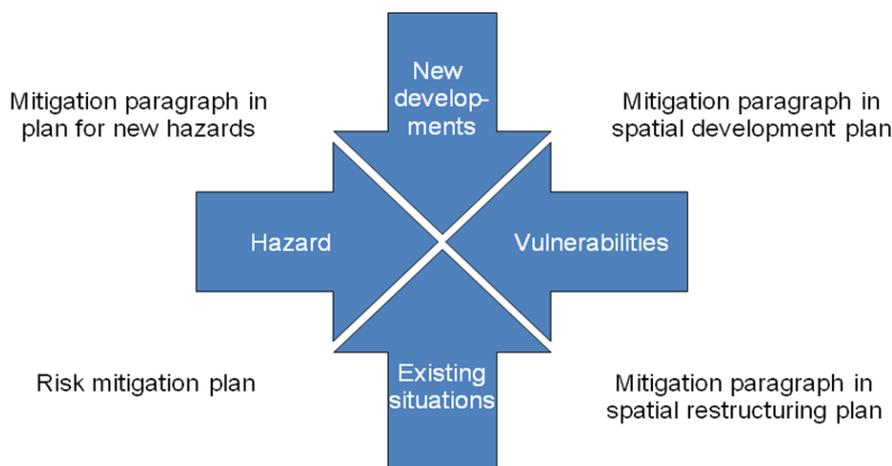
This brochure is divided into three main parts. In the first part the different approaches to mitigation are outlined. The main question is which kind of mitigation processes and plans the MiSRaR partners have found in practice. The second part describes the ideal steps which the MiSRaR partners identified. Which kind of activities do we believe to be necessary for a successful mitigation strategy? In the third part this is integrated into a proposed content of a mitigation plan.

The MiSRaR brochures are aimed at the sharing of practical experiences: practical tips and tricks are presented. Also, a brief explanation is given of some of the good practices of the MiSRaR partners. A more detailed description of these and other practices can be found at www.misrar.eu. For those interested in more information, the contact information of the participating partners is included at the back of this brochure.



Differences in mitigation processes

The MiSRaR partners have found that in practice the majority of mitigation processes is not “by the book”. The instances in which a conscious decision is taken by the responsible authorities to start an integral mitigation process and follow a complete and rational planning process are limited. When this is the case, it is mostly on the basis of a directive of the national government, which indicates that regional and local governments are required to develop a mitigation plan for a specific risk. In those cases mostly the national government also sets the general principles and sometimes even directs the financial resources to the specific risk.



However, in the broader perspective of different approaches to mitigation planning the instances in which a conscious decision is taken to start an integral mitigation process are limited. In most cases mitigating a risk is not the primary goal. Safety often is merely one of the vital interests which should be taken into account, alongside interests like the economy and ecology. Result of the discussions by the MiSRaR partners is a typology which differentiates between four kinds of mitigation planning processes, derived from two distinctions in the underlying cause or motivation

of the process. The first distinction is that between existing risk situations and new ones. The second distinction is that between processes which primary try to address the risk sources (hazards) themselves versus those aimed at the elements at risk (vulnerabilities). In the figure these two dimensions are confronted to each other, leading to a typology of four kinds of mitigation plans.

Mitigating new hazards

The first one is the introduction of a new (or increased) hazard. In cases of man-made risks this mostly concerns the founding of new industries and new infrastructure (with transport of dangerous substances). Those kinds of risks are governed by many forms of legislation, like the SEVESO-II guideline (96/82/EG)¹, which require risk and environmental assessments and risk prevention policies. In those cases the mitigation process is aimed at a transparent evaluation of the projected economical benefits of the proposed activities, confronted by the (potential) costs in terms of risk mitigation and actual damage by incidents. In con-

crete, mitigation might be a chapter or paragraph in the overall development plan, but depending on the legal obligations also a formal mitigation (and disaster preparedness) plan may be required. In case of a new or increased *natural* hazard there are less formal or legal incentives for a mitigation plan or paragraph. A solid approach to risk identification is needed to have an early warning for new or increased natural risks and to be able to contemplate on the necessity of a specific mitigation plan. Examples are mitigation plans for global warming.

Mitigation in (spatial) developments

The second type of mitigation processes is when there are new developments, not of new hazards, but of new vulnerabilities. This includes the development of new housing projects, new 'vulnerable objects' (like hospitals, schools) and new vital infrastructure for public services (like power or water stations), which might be in the vicinity of man-made or natural risk sources. These developments are not primarily motivated by reduction of risks, but mostly by economical gains. Also in these cases there is legislation which governs the development process. However, in the practical experience of MiSRaR the legislations on spatial development in the EU member states is not always sufficiently taking into account aspects of mitigating physical safety risks. Fire safety of individual buildings is strongly regulated, but an all hazard, territorial view on safety risks seems to be lacking. From the point of view of risk mitigation the most important task in these kinds of developments, is to ensure attention for risks in the earliest stages of designing and to include a mitigation paragraph in the spatial development plans.

Mitigating existing hazards

The third type of mitigation processes is the one that is the most 'by the book'. This kind is started from the perspective of existing hazards. On the basis of a full risk assessment insight may be gained in the most important hazard locations to mitigate. For those ones a mitigation plan might be drafted, including all kinds of measures from the perspective of 'multi layer safety'. This kind of fundamental mitigation processes is very limited.



Heavy snowfalls are a serious risk in the mountain areas in the north-west of Greece.

By the MiSRaR partners only single hazard examples have been found. An all hazard territorial approach to mitigation, starting with an all hazard risk assessment, seems to be rare. Moreover, the examples of the complete (single hazard) mitigation plans which do exist show that most attention is given to non-structural measures and disaster relief. The reason for this is quite logical: structural and spatial mitigation measures are very expensive and mostly arise when there are other (economical) interests in spatial development.

Mitigation in (spatial) restructuring

The fourth category of mitigation is from the perspective of existing vulnerabilities. This is the

case when a local government decides to restructure an existing area. Like new (spatial) developments this kind of cases is mostly not primarily motivated by risk mitigation. However, because existing risk situations often have been already identified and discussed

upon in the past, the political decision makers might be more willingly to take safety measures into account. In those instances the goal might be to incorporate the safety interests in the overall restructuring plan.

Tips and tricks

Lessons learnt on mitigation processes in general

Discussing on the previous notions and exchanging the practical experiences and good practices



the MiSRaR partners have found the following lessons on the mitigation process in general:

- *Integrate safety interests in other processes.* The general and most important lesson for the MiSRaR partners is: try to incorporate safety interests and mitigation in all different types of plans and on all possible levels of developments. Most opportunities for mitigation arise in developments which are motivated from economical interests. The actual instances of complete mitigation plans from safety perspective are very limited.
- *Build your network.* Direct consequence of the previous lessons is that attention has to be paid to building of good network. Cooperation among involved bodies is vital, because it is important to know exactly what each partner has to do and how this will be done. Because the most opportunities for mitigation arise in initiatives from other (economical) perspectives, it is important to help other public and private organizations to understand the safety interests. In the third MiSRaR brochure this topic of networking, but also of joint financing and making use of formal mandates of the partners involved will be discussed

Furthermore the MiSRaR partners share the opinion that, before designing a mitigation strategy and starting the drafting of a mitigation plan, it is important to take reflect on the following questions:

- *Mitigation or multi layer safety?* Mitigation is just one aspect of addressing risks. In a multi layer safety approach also aspects of disaster preparedness and recovery can be taken into account. Also risk measures in spatial planning (which is the focus of MiSRaR) may be broader than just mitigation: in spatial planning also measures to improve disaster response could be taken, like escape routes, wa-

Good practice

Region Epirus, Greece

Mitigation planning for frost and snowfalls

The Region of Epirus is located in the north-west part of Greece. The problems of snowfalls and frost are two of the main problems that the Civil Protection has to deal with in Epirus, during winter. Low temperatures result to ice on road, making driving extremely dangerous, while heavy snowfalls can make villages in the mountains and farms with live stock inaccessible.

In Greece mitigation planning is divided into three different levels, which all take into consideration 'multi-layer safety'. On the highest level, there is the General Plan for Civil Protection named "KSENOKRATIS". Ksenokratis is the general frame for the protection of natural environment and people's lives, health and fortunes from all kinds of disasters, both natural and manmade. A list of potential disasters is provided, while the plan refers to the whole country and to all levels of public administration. On the middle level there are the plans/guidelines from the General Secretariat of Civil Protection. Each one of them refers to a specific kind of hazard and can be applied to the whole country. Of course, those guidelines are in accordance with Ksenokratis. On the lowest level there are the plans on regional/local level. Those plans are based on the guidelines of the General Secretariat of Civil Protection and take into consideration the vulnerabilities and the needs of an area. Many partners, such as the Region, the Municipalities, the traffic police, the fire brigade, the army, volunteer organizations, enterprises etc. are involved in the implementation of these plans.

The plans for frost and snowfalls specify the actions that should be implemented during three different periods: the pre-winter period (April-September), the preparedness period (October) and the winter period (November-March). The mitigation plans give an outline of the competences of all the involved organizations and public bodies, while the 'memorandums of actions' of the partners involved answer who does what, when, how and why. Another important aspect is the public risk awareness, for example on protection measures villagers and farmers can take for themselves.

Visit www.misrar.eu for the full description of this good practice.

ter supply for the fire services, roads and spaces for the emergency services to operate on et cetera.

- *Single hazard or multi hazard?* Mostly mitigation plans are made for a single risk (like floodings) or even a single risk location (like a specific industrial site). However, mitigation plans sometimes address more than just one risk, or even the whole range of risk in an all hazard approach. Think carefully what it is you want.
- *Geographic scope?* Different risks have different scopes. For example, flooding risks are clustered by river basins, landslides only occur in mountainous areas and forest fires only in forests. On the other hand various risks are not limited by any border, like a flu pandemic or nuclear fall-out. In any case most risks are not automatically confined to the artificial borders of a municipality, province, region or even country. This means that mitigation measures for different risks often have a different geographic scope. Therefore also mitigation plans can differ from each other: for flooding risks a mitigation plan on the scale of a river basin authority is much more logical than a mitigation plan on municipal level. Think carefully what is the appropriate scale for a mitigation plan and which networking partners have to be involved within that area.
- *Joint planning or separated planning?* Often mitigation plans are made in a partnership by the actors involved. However, in some cases partners prefer to just make their own mitigation plan or even refuse to cooperate with



To prevent land slides series of terraces have been built in the Bulgarka Natural Park

the main authorities. Sometimes a phased approach can be useful, for example making a general mitigation plan with joint objectives, but implement this by means of several (partial) mitigation plans of the partners involved. This could help to implement the mitigation, because each partner takes the necessary measures into account in their own (regular) plans.

- *Lead partner?* For different risks different (government) organizations are 'in the lead'. Mostly the primary government levels (municipalities, provinces, regions) are leading, but sometimes organizations like forest or water services dictate the mitigation process.

This can lead to different mitigation plans for different organizations for a similar risk.

The start of the mitigation process

In many cases a mitigation process has no

clearly identifiable starting point. Like described before, a lot processes with consequences for risks and opportunities for mitigation are triggered by other interests than physical safety. When trying to integrate mitigation in economical and spatial development the most important task is to have an early warning for new initiatives. Ideally in the first stage of developing ideas and concepts for a new spatial plan the safety experts are invited automatically to participate.

Ideally every mitigation process should start with a transparent problem definition and description of goals and objectives. What is it the responsible



governments want to achieve? What mandate do they give to the involved bodies? What is the scope and budget of the project organization? For a successful mitigation process these kinds of questions should be answered before starting.

Risk assessment

In the previous brochure the initial step of the mitigation process was described: the risk assessment. Surely, only when there is a good insight in risks the following steps in the mitigation process can be undertaken. In the first brochure practical 'lessons learnt' were given for the three phases of risk assessment: risk identification, risk analysis and risk evaluation. This last step of risk evaluation involves the comparison of the results of the risk analysis with political and public criteria to determine whether the severity of the risks is acceptable or tolerable. The outcome of the risk assessment therefore is not only insight in the actual present and future risks within the defined area, but also a political prioritization of the risks: for which risks is mitigation deemed necessary?

Setting objectives

The MiSRaR partners believe the step of political consultation of the risk analysis also should include a second aspect. Once insight is gained in the nature of risks and the political preferences regarding the prioritization of risks, the following step is to set general objectives for each of the chosen priority risks. In the context of MiSRaR an objective is defined as a (political) decision on a concrete policy for mitigation (and also disaster preparedness), in terms of a desired, measurable outcome on society. These objectives should be SMART:

- Specific: it addresses a concrete priority risk and contains a concrete objective.
- Measurable: the outcome on society can be measured, for example in percentage of risk reduction.

Good practice

EPF, Bulgaria

Risk mitigation for NATURA2000

The Bulgarka Natural Park in Bulgaria is protected under NATURA 2000. The possible threats for the natural value of this area include safety risks like forest fires, land slides, erosion and droughts. In the NATURA 2000 management plan the possibilities for spatial mitigation measures for these risks have been considered.

An important lesson which was learned is that the mitigation process should begin with a thorough risk identification. Extensive research and risk mapping with GPS coordinates was needed to be able to comprehend the full extent of the threats to the protected area.

Furthermore it was found that the protection against safety risks may sometimes conflict with traditional natural conservation, which is the main aim of NATURA2000 management plans. The conservation might for example call for an undisturbed life cycle of the forest, while forest fire prevention might involve the cutting of dead trees, removal of dead branches or even creation of bare areas as a 'stopping line' for forest fires. Close cooperation between natural conservators and emergency services is very important for mutual understanding about these potential 'conflicts of interest'.

Also during an incident there might arise a conflict between nature conservation and crisis management. The actual operations of emergency services during an incident, like a forest fire, might inflict substantial damage to the protected area in a short period of time. Fire trucks and fire fighters might for example crush endangered flora and fauna. Therefore, to prevent unnecessary damage to the protected area a joint mitigation strategy from both the perspective of safety and nature conservation should also include close cooperation with the emergency services and specific preparation, like guidelines for operations.

Risk awareness of inhabitants and visitors proved to be a very important way of protection. Education and information, but also public participation and involvement of environmental NGOs in the policy process of creating a management plan and enforcing mitigation measures, can largely contribute to mutual understanding.

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- Acceptable: the objective is acceptable for the decision makers and stakeholders.
- Realistic: the objective can realistically be realized.
- Time bound: the objective is set for a concrete period.

This kind of political objectives is deemed necessary as a guideline for further identification and (cost benefit) analysis of mitigation measures, resulting in a concrete mitigation plan. Without insight in the political objectives there is a serious risk that the further technical assessment of mitigation measures is directed at the wrong kinds of policies. For example, in case of tunnel safety the experts might do research into life saving mitigation measures, while for the politicians maybe the most important is to prevent a tunnel from collapsing and thus inflicting serious damage to transportation and industries and the national economy in general. Without political consultation beforehand the technical research and expert judgement on mitigation might become useless.

On the other hand the expectations of such a political consultation on objectives should not be too high: without knowing the financial consequences of the final mitigation strategy it is not certain whether the chosen political objectives will prevail till the end of the mitigation process. Preferences might shift and even more so when the costs of the objectives prove to be high. Moreover, before the assessment of mitigation measures it cannot be known for certain which kind of measures will be most (cost) effective. The setting of objectives therefore must not limit the further technical research too much. There must be room for assessing other mitigation measures which not directly address the set objectives, for they might prove to be more desirable in the end. For this reason the setting of ob-

jectives should be restricted to the desired societal outcome and should not include actual concrete mitigation measures. Fictional examples of such objectives are:

“We want to reduce the probability of a catastrophic flooding on our territory from once every 1.000 years to once every 10.000 years”

“We don’t want new vulnerabilities in areas with the highest land slide risk”

“We want to ensure that new spatial projects don’t threaten the ecological value of Natura 2000”

“We want to reduce the number of forest fires with 30%”

“We want all our citizens to be self reliant for 24 hours in case of failure of the drink water system”.

To be able to set such objectives the main political questions are: do we want to address the risk by means of risk management, crisis management or recovery management? In case of risk management: do we want to reduce probability, effects or vulnerabilities? In case of crisis management and recovery management: do we want to increase preparedness or resilience of the emergency services, or self reliance of citizens and corporations? And finally, which kind of impact – economic, ecological, physical – do we want to reduce?

Capability assessment

In the previous stages of the mitigation process insight is gained in the nature and severity of risks and the political objectives. The next step should be to perform a capability assessment, which by MiSRaR is defined as “the process of identifying, analysing and evaluating the risk management capabilities available to reduce the priority risks and also the crisis and recovery

management capabilities to improve the disaster relief and recovery.” Capabilities in this case are defined as “all possible factors, measures and policies with which the risks can be reduced and the final outcome of disasters and crises can be influenced positively”. Important is that capabilities do not only refer to operational capacities like fire engines or ambulances, but also to mitigation measures, or in other words to all possible measures in multi layer safety.

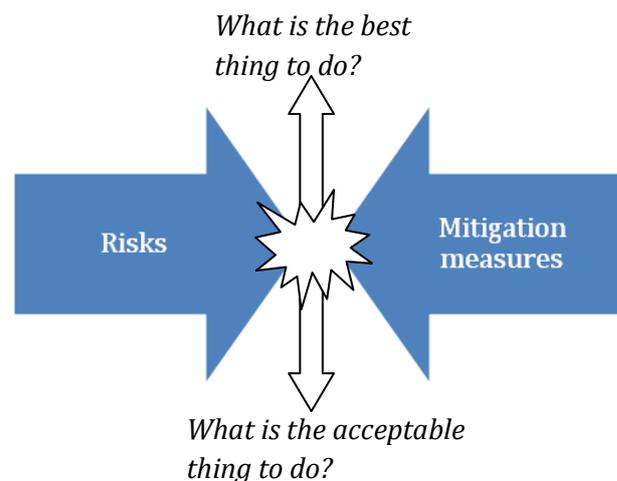
The purpose of capability assessment is to enable the political decision makers to make strategic choices on concrete policies and measures that contribute to the chosen objectives. This is actually the phase that is all about the strategy: where are the weaknesses in our ability to reduce risks, and what can we do about it?²

The MiSRaR partners have found it most transparent to make a distinction in three parts of the capability assessment, similar to the risk assessment:

1. *Capability identification*: contemplate on the causal web in order to find possibilities for mitigation.
2. *Capability analysis*: do research into the relative value of the identified capabilities.
3. *Capability evaluation* : a comparison by the decision makers of the possible measures on basis of their political criteria.

The capability identification is a follow up on the scenario analysis performed for the risk assessment: by researching the scenario specific measures can be identified that contribute to the chosen objectives. This results in a list of different measures, varying from concrete safety measures on site till general measures like public education to improve self reliance. The next two stages of the capability assessment are best illustrated by the following figure. When confronting risks with

possible mitigation (and preparedness) measures the first question that arises is: which are the ‘best’ measures? Answering this question is the goal of the capability analysis. This may require the quantification of projected positive effects and ideally should include a cost-benefit analysis (see further on). The second question is: which measures are most acceptable to the decision makers? The best thing is not necessarily the most acceptable. The outcome of a cost-benefit analysis might help to objectify the political evaluation, but other political preferences and interest may always interfere. It is the job of technicians and experts to present the decision makers with the relevant information, but the final judgment has to be made by the elected officials who are accountable.



Cost-benefit analysis (CBA)

Ideally the capability analysis includes a cost-benefit analysis (CBA). CBA is defined by the EU as “a procedure for evaluating the desirability of a project by weighting benefits against costs. Results may be expressed in different ways, including internal rate of return, net present value and benefit-cost ratio.”³ The goal of a CBA is to enable informed decisions on the use of society’s scarce resources.⁴ CBA is within the EU quite commonly

used, specifically nationally in the fields of infrastructure, environmental policy, traffic safety, spatial planning, external safety and also risk management.

To be able to incorporate a CBA in the mitigation process it is important that it is not limited to money value alone. The nature of (all hazard) mitigation is that different vital interests of society are taken into account: just like economical aspects also the societal costs of casualties or ecological damage should be considered. Therefore a CBA, or *Societal CBA*, also should incorporate information on effects (advantages and disadvantages) which cannot be put into money value.⁵ Because this requires a multi-criteria approach the expertise needed for a CBA is diverse.



Every year many land slides occur in the Italian Apennine Mountains.

Tips and tricks

Lessons learnt on cost-benefit analysis

From their own practical experience the MiSRaR partners have collected the following lessons on CBA:

- The performing of a CBA to make informed decisions requires different kinds of expertise. It involves not only technical expertise on the mitigation measures itself, like knowledge on risk, crisis and recovery management and for example engineering, forest-

ry, geology and geostatistics, but also specific economical and statistical expertise. This expertise is mostly not available within local governments and professional safety institutions.

- The probability of a risk has a very high influence on the outcome of a CBA. It makes quite a difference whether a structural investment into mitigation measures has to be valued against a scenario with a probability of for example once every 10, 100 or 1000 years. The problem is that the probabilistic estimation of risks is in most cases very uncertain. The macro-factors which govern the probability of a risk are significantly uncertain. When this uncertainty cannot be reduced the outcome of a CBA in many cases could go either way: positive or negative.

- Specifically the probability of events related to the climate is difficult to calculate for a longer period of time, because of global warming. For example floods as well as rain and snow induced landslides are likely to occur more often in future. This means with the ongoing discoveries and insights in global warming the outcome of CBA's on mitigation measures for those related disasters will have to be reevaluated continuously.



- A specific problem is the spatio-temporal variability of risks, meaning the probability and impact of risks can be very different over time and for different places. This means a CBA in many cases is only valid for a specific location and timeframe and has to be repeated over and over to be able to make informed decisions for a larger area.
- For the calculation of vulnerability and actual potential damage in Euros in many cases extensive research is needed. This might not always be possible or desirable.

Suggested content of a mitigation plan

Because there are different types of mitigation plans no mitigation plan will have exactly the same content. However, based upon the outlined mitigation process and the practical experiences of the MiSRaR partners the following index may be suggested.

Chapter 1. Introduction

Every mitigation plan should start with a transparent problem definition. Why have the involved organizations decided to develop the mitigation plan? This may involve a general description of the risks within the area and the vital interests of society which are at stake, but also of the initial political decisions and the formal assignment of the mitigation project. Secondly the introduction should include a description of the objectives which were set at the start of the mitigation process. What was the intended result of the plan?

Chapter 2. Organization

At the outset of mitigation planning it should be made clear which are the responsibilities and mandates of the partners involved. In this chapter a general description of the legal framework should be given. Which national and region-

Good practice

Province of Forlì-Cesena, Italy

Cost-benefit analysis for flooding and land slide risks

The Romagna River Basin Authority, an essential partner of the province of Forlì-Cesena, has had practical experience with the performing of cost-benefit analysis. In the first instance the mitigation measures for the flooding risk of the Montone river near Ravenna were assessed. The identified best solution to prevent a flood was a combination of two main structural measures. Firstly the acquisition of extra space for the river channel over a stretch of 4 kilometers downstream of the threatened area. This required the shifting of the existing embankment by demolition and complete rebuilding. By this means the capacity of the river would be increased in order to prevent high waters upstream. The second measure was to place waterproof screens in the actual threatened area.

The total costs for the realization of the proposed measures were estimated at 12 million Euros. The structural maintenance was estimated at 100.000 Euros every 10 years. On the other hand the total costs of flood damage were calculated at 405 million Euros. Calculating with a probability of a flood once every 300 years and taking into account an estimated discount rate the total net benefit was calculated at 77 million Euros.

The second practical experience was with the land slide risks in the Santa Sofia area. To be able to make informed policy decisions on the prevention of landslides and/or to minimize the impact of landslides the basin authority is experimenting with methods for risk assessment and cost-benefit analysis. The total estimated costs of for the realization of some of the proposed spatial mitigation measures were calculated at 1.4 million Euros. The structural maintenance was estimated at 50.000 Euros every 10 years. The outcome of this CBA was negative: there was an expected net cost of 0.7 million Euros. Based upon this CBA the decision was made not to implement structural works. Instead the basin authority decided to issue a mandatory rule for territory management by the municipalities and province. This rule prohibits new buildings in high risk land slide areas and requires new buildings in medium risk areas to be built on piles, with a maximum of 20% more buildings than the current situation.

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al/local legislation governs the mitigation process? What are the competences of the public bodies and private partners? Furthermore the mechanisms for the cooperation between the partners should be described. Which partners coordinate? How are information flows guaranteed? Which are the formal decision processes?

Chapter 3. Risk assessment

In this chapter the outcome of the risk identification, risk analysis and risk evaluation is presented. To provide practical insight in the risks it is advisable to include risk maps of the relevant risk types on a level that corresponds with the needs of the political decision makers, main stakeholders and the general public. In case the mitigation plan is 'all hazard' the outcome of the risk analysis could be presented by means of a risk diagram.

Chapter 4. Objectives and mitigation measures

The risk assessment is followed by a capability assessment, based upon the objectives set by the (political) decision makers. In the mitigation plan the outcome of this capability assessment is presented in (sets) of measures for each type of hazard within the scope of the plan. This may include:

Risk management:

- Proaction measures
- Measures to reduce probability
- Measures to reduce effects
- Measures to reduce vulnerabilities

Crisis management:

- Preparation measures (safety zones, education, exercises, materials)
- Organizational description of the response and operational hierarchy
- Scenario procedures, task descriptions

Recovery management

- Preventive measures to improve the resilience and recovery
- Preparation of recovery
- Organization of recovery activities

The capability assessment itself, including the cost-benefit analysis, may be presented as a appendix or separate annex.



Also Greece has to deal with land slide risks

Chapter 5. Resources

For the implementation of the proposed measures funds and human resources are needed. In this chapter the financing and available working force are described.

Chapter 6. Public participation

The MiSRaR partners think that for a good mitigation strategy involvement of local society is crucial. A successful mitigation strategy should always involve some kind of self reliance and risk communication. This is important enough to justify a separate chapter in the mitigation plan. This chapter could include measures by the public, communication on risks, accountability for the residual risk and procedures on public participation in the decision and implementation process.



Chapter 7. Updating paragraph

A mitigation plan should never be static. New risks and other developments should be identified timely and results from the actual implementation of mitigation measures may require updating of the plan(s). Therefore it is suggested that in a separate chapter a description is given of the responsibilities concerning the making, evaluation and updating of the plan. This may include a procedure for evaluation, the collecting of feedback and research into the resulting outcome. Also it is suggested that the mitigation measures and policies for disaster preparedness are tested in practice by means of operational exercises. This may be a useful basis for future updates and new mitigation processes.

Appendices

In the appendices the list of receivers of the mitigation plan and an overview of the full legal framework and relevant official documents can be included.

The RISCE approach

The main practical lessons described in this brochure can be summarized in what the MiSRaR project has come to call the RISCE approach. For a successful mitigation strategy at least the following five basics have to be taken into account:

Risk assessment: insight in risks is the starting point for successful mitigation.

Integral: only when all effects and all vulnerabilities are taken into account a meaningful mitigation strategy can be designed. A successful strategy includes measures in all layers of multi layer safety.

Structural: mitigation is a continuous process, which has to be embedded in the relevant organizations

Cooperation: all relevant government agencies, civil society, industries and inhabitants need to cooperate

Early: risks can be most effectively mitigated if safety is considered in spatial development as early as possible

Preview on the third brochure

The mitigation process doesn't stop at CBA. The following MiSRaR brochure deals with the necessary conditions for implementation of a mitigation strategy. How can we make it work? What kind of cooperation is needed? How do we get the budget? These and other questions will be answered in the next brochure. Amongst other, the subjects that will be discussed are networking, financing, lobby & advocacy and monitoring & enforcement.



Interested in more information?

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The MiSRaR project

Seven partners from six EU countries have joined forces to share knowledge and experiences on management of physical safety risks, specifically through spatial planning and design. The project Mitigating Risks in European Regions Relevant Spatial and Towns (MiSRaR) is cofinanced by the ERDF and made possible by the INTERREG IVC programme. Participants in the project are:

- Safety Region South-Holland South, The Netherlands (lead partner)
- Municipality of Tallinn, Estonia
- Epirus Region, Greece
- province of Forlì-Cesena, Italy
- municipality of Aveiro, Portugal
- municipality of Mirandela, Portugal
- Euro Perspectives Foundation (EPF), Bulgaria.

The goal of the project is to enable professionals in the field of risk management to learn from experiences in other parts of Europe. The project leaders and experts from the participating partners meet to do so at sixteen international seminars. To be able to share lessons learned widely within the EU, the results of the project are presented in three brochures and a complete handbook. Herein, based on experience of the participating partners and taking into account relevant EU regulations, the process steps of risk management and mitigation are described, with practical tips. Also, the good practices of the participating partners are made available. This way other governments within the EU can find inspiration and practical contacts on existing implemented policies which can improve systematic risk management.

Note of the author

This is the second of three brochures. The main language of the MiSRaR project is English. Besides English, the brochures and the handbook have been translated into the languages of the participating partners: Bulgarian, Dutch, Estonian, Greek, Italian and Portuguese. The most important concepts are always indicated in English as well as in the partner language. Due to differences between the languages it is possible that certain words in the translations might be interpreted (partially) different than in English. To prevent this as much as possible, for several concepts a definition is provided.

Notes

¹ <http://ec.europa.eu/environment/seveso/>

² *Working with scenarios, risk assessment and capabilities in the National Safety and Security Strategy of the Netherlands*, Dutch Ministry of Safety and Justice, October 2009.

³ *Guide to CBA of major projects; in the context of EC regional policy*, European Union.

⁴ Quah, Euston, Toh, Raymond, *Cost benefit analysis cases and materials*.

⁵ Guideline for CBA on infrastructure, *Netherlands, Ministries of Economy and Transport*.



Colophon

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