# Methods for Climate Change Adaptation

## Choosing salient approaches and methods for adaptation

Summary of Methods and Case Study Examples from the MEDIATION Project

SEVENTH FRAMEWORK PROGRAMME

Mediation

# Key Messages

- There is increasing interest in research that supports adaptation on the ground as adaptation moves from theory to practice.
- In response, there is a greater need to consider the approaches and methods for adaptation, and to use existing and new decision support tools, including methods that address uncertainty.
- At the same time, policy analysts, consultants and researchers who wish to assess climate change vulnerability, impacts and adaptation (CCVIA) are currently confronted with a large number of concepts, methods, frameworks, guidelines and toolboxes to choose from.
- The FP7 MEDIATION project has undertaken a detailed review of these approaches and methods, and has tested them in a series of case studies. It has used these to provide guidance to help choose the appropriate methods for adaptation. The findings are included on the MEDIATION Common Platform and summarised in a set of policy briefing notes.
- This policy brief sets out a summary of guidance for choosing the salient methods and approaches for adaptation.
- The key messages are set out below.
- Message 1: There is no standard recipe for addressing climate change adaptation. Adaptation challenges are diverse and depending on the specific challenge, different natural and social science research approaches as well as practice approaches are appropriate.
- Message 2: The MEDIATION project has developed a diagnostic framework that supports selecting appropriate approaches and methods for a given adaptation challenge.
- Message 3: Different approaches may lead to different conclusions regarding further research needs and/or adaptation practice.
- Message 4: More social science research on adaptation governance is needed. Adaptation research most often focuses on appraising decisions and under-emphasises conflicting interests and collective action involved in adaptation. Social science targeted at this can inform the selection and design of appropriate policy instruments.
- Message 5: MEDIATION has developed a novel systematic terminology to support cumulating scientific knowledge on adaptation. This improves upon the current scientific terminology for CCVIA, which is not adequate for understanding the diversity of approaches and methods applied.

## Introduction

There is increasing policy interest in research that supports adaptation on the ground as adaptation moves from theory to practice. At the same time, it is recognised that the appraisal of climate change adaptation involves a number of major challenges, particularly the choice of methods and approaches, and consideration of the uncertainty. In response, a number of existing and new methods and tools are being considered for adaptation.

The European Commission FP7 funded MEDIATION project (Methodology for Effective Decision-making on Impacts and AdaptaTION) is looking at adaptation support tools, in line with its objectives to advance the analysis of impacts, vulnerability and adaptation, and to promote knowledge sharing through a Common Platform (http://mediation-project.eu/). To complement the information on the Platform, a series of Policy Briefing Notes have been produced on Decision Support Methods for Climate Change Adaptation.

This Policy Brief provides a summary of choosing salient approaches and methods for adaptation. It provides the overview to the structure for the Common Platform. It is stressed that this note only provides an overview: more detailed information is available in MEDIATION deliverables, and sources and links on the Common Platform.

The note is complemented by additional briefing notes, which provide greater information on decision support tools. Policy Briefing Note 1: Method Overview provides an overview of various tools, and Policy Briefing Notes (2 – 10) describe and give examples on cost-effectiveness analysis and multi-criteria analysis, as well as techniques that more fully address uncertainty (real options analysis, robust decision making, portfolio analysis and iterative risk (adaptive) management). The series also includes complementary tools that can assist in adaptation assessment, including analytical hierarchic processes, social network analysis and adaptation turning points.

## The Challenge for Adaptation

Policy analysts, consultants and researchers who wish to assess climate change vulnerability, impacts and adaptation (CCVIA) are currently confronted with a large number of concepts, methods, frameworks, guidelines and toolboxes to choose from. This methodological diversity is not surprising because CCVIA is assessed at all scales, for diverse sectors, regions and groups of people and across policy domains.

The systems, time-scales and adaptation challenges considered are many. Adaptation involves a diversity of challenges such as mainstreaming climate considerations into policy, raising dikes, or helping communities to mobilise their own resources to adjust to increasing frequency or intensity of storms and flooding.

As a consequence, a wide variety of methods are applied from various natural and social science fields and disciplines, including participatory, experimental, action-research, decision analysis, institutional analysis and computer simulation methods.

Given this diversity of adaptation challenges and methods, two issues are apparent.

1. Within adaptation research, there is a lack of clarity and precision in language for differentiating diverse adaptation challenges and methods. Different adaptation challenges are usually not distinguished and approaches and methods are labelled using broad and ambiguously defined concepts such as vulnerability, resilience and adaptive capacity. This leads to difficulties in understanding what questions have been addressed in adaptation studies and in selecting approaches suitable for a given adaptation policy problem. Further, comparing and accumulating knowledge across case studies for improved adaptation decision making is inhibited by the lack of a common language.

2. There is little to no guidance on which approach is appropriate for a given challenge. Toolboxes enumerate a large number of approaches and methods but usually say little on which ones are suitable for a particular case. In addition, abstract and often ambiguously defined concepts such as vulnerability, risk, resilience, adaptive capacity are used to label approaches and methods making the selection of an appropriate approach even more difficult.

The MEDIATION project has addressed these two issues. It is one of the first attempts to design a logical, coherent and problem-oriented framework for adaptation research, which serves to integrate the major part of problem-oriented case studies addressing adaptation. This is timely because adaptation research has produced a fragmented collection of case studies mixing empirical with theoretical aspects (Hoffman et al. 2011). Specifically, MEDIATION has developed

- A more precise and specific language for describing the various challenges addressed and methods applied under the broad labels of impacts, adaptation and vulnerability (Hinkel and Bisaro, 2013b);
- A diagnostic framework for problem-oriented adaptation research that matches adaptation challenges to appropriate approaches and methods for addressing them (Hinkel and Bisaro, 2013a).

The language and diagnostic framework were developed by analyzing a suite of cases taken from the MEDIATION project and the literature.

From this data, we abstracted typical adaptation challenges, typical methods applied, and empirical and theoretical criteria relevant for choosing a particular method. Empirical criteria for classifying adaptation challenges are, for example, the private and public actors involved, individual or various types of collective action involved, and the stage of the adaptation process. Theoretical criteria refer to assumptions underlying a given approach.
Finally, a series of decision trees has been developed that map types of adaptation challenges, specified through empirical and theoretical criteria, to appropriate research approaches and methods, or in cases in which research is not applicable, to practice and implementation approaches and methods.

This policy brief summarizes the findings of these MEDIATION activities into a set of key messages.

## Key messages

**Message 1: There is no standard recipe for addressing adaptation.**

Adaptation challenges are diverse and depending on the specific challenge, different sequences of diverse natural and social science research approaches as well as practice approaches are involved.

Adaptation is a broad concept which can mean many things and includes action at all levels of society. Hence, there is no standard way of addressing adaptation, but multiple ones. Moreover, addressing adaptation may involve both research approaches from diverse natural and social science fields as well as practice.

Research approaches thereby aim to gain more knowledge about the adaptation challenge, as, for example, with computation models projecting impacts on agricultural yield or forest fire risk. Practice aims to act upon and hence change the adaptation challenge through, for example, economic incentives or awareness raising campaigns. However, this diversity does not mean that all approaches are relevant for every adaptation challenge. For example, impact assessments is not necessarily a prerequisite for advancing adaptation. Because of high uncertainties in future climate impacts, understanding what factors currently constrain or enable people in responding to climate variability may be most salient (Dessai and Hulme, 2004).

In some situations, adaptation action may even proceed without research. For example, in community-based adaptation, mobilising available capacities and resolving conflicts may be more salient than producing more information on climate impacts or adaptation options via research.

Importantly, in most situations no predefined sequence of approaches can be specified ex-

ante. Rather, addressing adaptation proceeds as an iterative learning process: based on current knowledge, an adaptation challenge can be identified and addressed through research or practice, which leads to new insights or changes the situation

This in turn leads to the identification of a new challenge. In the literature, this is commonly conceptualized as an iterative learning or policy process (Figure 1) involving a number of stages ranging from the identification of impacts and capacity to monitoring and evaluating adaptation progress (e.g., UKCIP 2003; EEA 2013).
Here we use these five general stages of adaptation as high-level entry points for adaptation research and practice. We then go beyond this by further specifying particular adaptation challenges and approaches for addressing them. The approaches and methods salient within each stage, and the empirical and theoretical criteria for choosing them, are elaborated for adaptation for the first time.

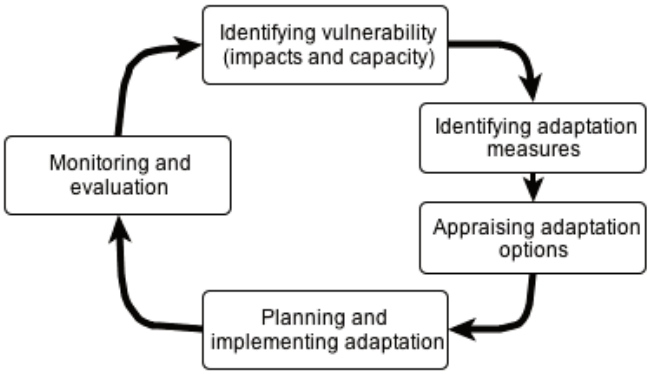


Figure 1: Five stages of adaptation.

**Message 2: The MEDIATION project has developed a diagnostic framework that supports selecting salient approaches and methods for a given adaptation challenge.**

An important objective for adaptation is selecting and applying approaches that are salient for stakeholders (Cash et al. 2003). The diagnostic framework consists of a sequence of decision trees that map, based on empirical and theoretical criteria, types of adaptation challenges to salient research approaches, or, in those cases in which research is not applicable, to practice approaches (Hinkel and Bisaro 2013a).

The empirical criteria refer to the characteristics of the adaptation challenge confronted. One important criteria is whether the adaptation challenge is a private or public one.

Private adaptation challenges are those in which a private individuals or groups take action in their own interest. Public adaptation challenges are those in which a public actor takes action with a fiduciary duty to act in the public interest. A public actor is anyone acting in a group or collective interest, and trying to influence or co-ordinate the actions of that group. Public actors are, for example, local authorities, government ministries, public water boards, etc. Another important empirical criteria is the stage of adaptation introduced in Figure 1: i) Identifying vulnerability (impacts and capacity; ii) identifying adaptation measures; iii) appraising adaptation options; iv) planning and implementing adaptation options; and v) monitoring and evaluation of adaptation.

Theoretical criteria refer to assumptions made in applying a given method. For example, for a given adaptation challenge, it may be useful to assume that actors behave according to rational choice theory, as opposed to assuming that social norms are more important in explaining behaviour. Combining these empirical and theoretical criteria yields decision trees for choosing approaches and methods at each stage of adaptation.

It is however important to note that the framework is not meant to be prescriptive. In both research and decision making, selecting approaches is strongly influenced by many normative criteria. The challenge of drawing boundaries around a system of interest is ever present, and often cannot be resolved empirically or theoretically. Selecting, for example, which options to consider in a decision is often a normative choice depending on the needs or framing of the decision maker. The framework cannot hope to provide a panacea solution for issues of this kind. Rather, the framework can assist to make explicit some of the criteria that should be considered in VIA, and outline the fact that normative choices must be made in selecting and applying approaches and methods.

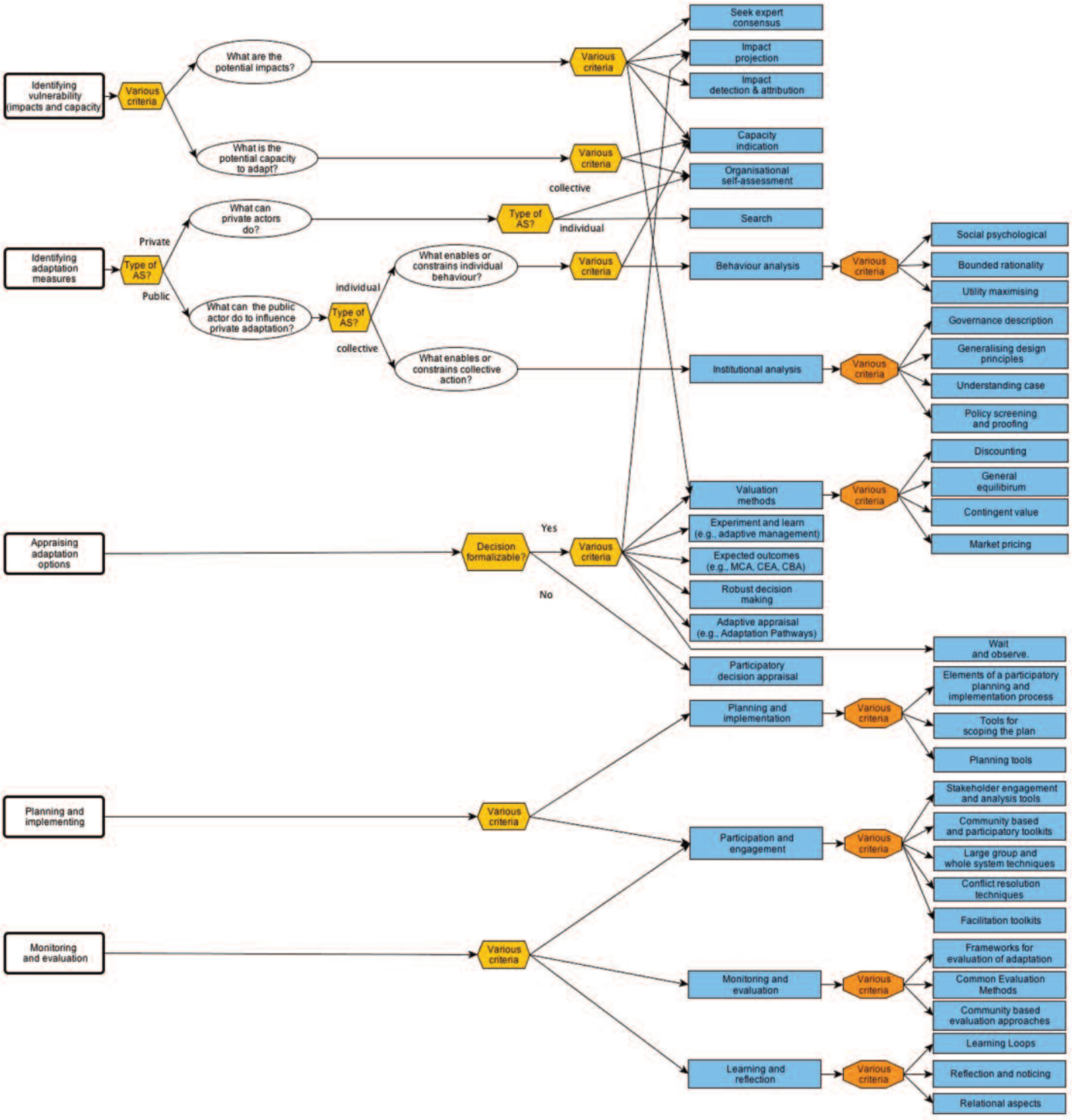


Figure 2: Overview of decision trees for choosing approaches and methods for all 5 stages of adaptation

Figure 2 provides an overview of the decision trees developed for choosing approaches and methods at each stage of the adaptation process. Research approaches are particularly important at the first three stages, as these stages concern generating knowledge about climate change and the measures available to address it. The decision trees in these stages aim at further refining research questions to be addressed.

Social science approaches of behaviour analysis and institutional analysis are especially important for identifying what measures are available. These methods have generally been under-applied in adaptation research (Adger et al. 2009; Moser and Ekstrom 2010), and a strength of the diagnostic framework is integrating these methods into a general framework for problem-oriented adaptation research. Governance of adaptation can benefit from an increased emphasis and application of these social science methods (see Message 4).

The diagnostic framework makes up one key component of the MEDIATION Common Platform. For further information, please see the MEDIATION Adaptation Platform (http://www.mediation-project.eu/platform) and Hinkel and Bisaro (2013a).

**Message 3: Different approaches may lead to different conclusions regarding further research needs and/or adaptation practice.**

Given the variety of approaches and methods for assessing and advancing adaptation, there is an on-going debate in the scientific literature about which methods are most salient (O'Brien et al. 2007, Dessai et al. 2009). This debate has, however, been largely theoretical and few studies have analysed the implications of different methodological choices.

To address this gap, cases within MEDIATION have compared the application of different approaches to the same case. The comparison illustrates that the selection of an approach has an influence on which problems are addressed in subsequent steps of adaptation. Different approaches lead to the identification of different research needs or practice.

By classifying approaches according to the stages at which they are relevant the diagnostic framework developed in MEDIATION explains why different approaches lead to different conclusions regarding research needs and/or practice. Stage 2 and 3, for example, assume that a problem has already been identified and framed, the challenge now being to solve the problem. Approaches applicable at this stage are thus solution and decision-oriented. However, where stage 2 is descriptive and explanatory, exploring possible measures, stage 3 is normative in terms of which option should be chosen. Each stage has a different objective, which explains why different approaches may lead to different conclusions regarding subsequent steps.

To give an example, when appraising adaptation options, decision analysis approaches are often used together with impact analysis approaches. In practice, this may lead to a focus on the need for improved information on climate variables, or other socio-economic variables, in order to better quantify risks and outcomes. On the other hand, in the same setting, identifying possible adaptation measures may be relevant. For this challenge, social science approaches can be employed to understand and explain individual behaviour or social dilemmas that require collective action. In practice, this may lead to a greater focus on the institutional context and motivations and preferences of different actors, and what is needed to understand and overcome social dilemmas.

Defining an adaptation challenge as one of appraising adaptation options, therefore naturally puts an emphasis on decision analysis approaches, which can lead to the conclusion that better impact analysis is needed. Whereas defining an adaptation challenge as one of identifying adaptation measures may lead to the application of social science methods of behavioural and institutional analysis.

Results are often an in-depth understanding and explanation of the institutional context and an identification of barriers to adaptation that can serve as an input into the design of policy instruments. Here, the conclusion may point to the need to apply a particular policy instrument and for further research to inform its design (see Case Study 1).

Further, different approaches to decision analysis may lead to different adaptation options being chosen. This may be due to criteria being weighted differently by different approaches, as, for example, multi-criteria analysis can often produce different rankings from cost-benefit analysis (see Watkiss et al. 2013 for further details).

Conclusions to be drawn for adaptation research and practice differ for different resulting options, because each option has implications for its implementation. While some options may have cross-sectoral impacts, and therefore require integrated planning, others may only require effective awareness raising or monitoring and evaluation (see Case Study 2).

**Case 1 – Serbian agriculture:**

In Serbia the MEDIATION team applied two different approaches, institutional analysis and decision analysis for adaptation to droughts in the agricultural sector (Bisaro et al. 2013). Climate change is projected to bring increasing temperatures and changing precipitation to Serbia. Recent decades have seen an increasing frequency of droughts which negatively impact farmers, small-holders disproportionately so. A decision analysis was carried out applying multi-criteria analysis, which identified a preferred adaptation option for public investment in irrigation systems at the district level.

This led to the conclusion that further research is needed to reduce uncertainties in future climate and other drivers. Institutional analysis was also applied and provided insight into why existing irrigation systems are not collectively maintained or improved and measures for improving this.

Results of the institutional analysis identified farm registration, and the factors influencing it, such as farm size and social benefits, as key barriers to collective action. The conclusion thus is that cross-sectoral planning to address specific legal and procedural barriers while also building stakeholder networks is needed. This should be informed by further research to understand and explain the emergence of the identified barriers.

**Case Study 2: Tuscan wine**

In Tuscany, the MEDIATION team applied two different approaches for appraising adaptation options in wine production. Climate change is projected to bring increasing temperatures and changing precipitation affecting grape yields and quantities.

The first approach was a participatory one using the Analytical Hierarchy Process (AHP). Stakeholders representing wine production associations, environmental associations and regional government participated and preferred an option of genetic selection applied to current wine varieties (see Zhu et al. 2013). The conclusion is that adaptation practice may proceed without encountering significant barriers as this adaptation option can be implemented by individual farmers. Monitoring and evaluation of adaptation is required.

The second approach was cost-benefit analysis. This approach did not consider the option of genetic selection simply because it was not possible to model this option in order to simulate its costs and benefits. The results identified a mixed strategy of changing crop varieties and relocating vineyards to higher altitudes as optimal.

The different resulting options lead to different conclusions regarding adaptation practice. Changing crop varieties and farm locations have wider implications for regional planning than the genetic selection of crops on individual farms. Adaptation practice in this latter case therefore may involve a wider group of stakeholders in an integrated cross-sectoral planning approach.

**Message 4: More social science research on adaptation governance is needed.**

Adaptation research most often focuses on appraising decisions and under-emphasises the socio-institutional processes involved in adaptation. This greater focus should aim to inform the selection and design of appropriate policy instruments.

Up until recently, adaptation research has largely applied biophysical models and economic approaches to identify impacts and appraise adaptation decisions. This is partly because economic approaches analysing the costs and benefits of adaptation options can be applied together with global and regional climate and impact models. Further, national and regional policy-makers are often required to provide economic rationale for policy choices, and thus have exerted demand for such approaches. Several authors have identified a methodological divide in the literature, with a majority of approaches aimed at impact and decision analysis (O'Brien et al. 2007).

Evidence is now emerging that barriers to adaptation often arise from institutional and cognitive constraints (Moser and Ekstrom 2010). The literature on barriers to adaptation illustrates that there is an emerging need for more research analysing adaptation governance through behavioural and institutional analysis approaches aimed at understanding and overcoming individual and social constraints.

Institutional analysis is particularly relevant, because deciding between options and implementing them is usually not a matter of a one-shot decision but rather of an ongoing process involving complex inter-linkages between public and private decisions at multiple levels of decision making and in the context of other issues, existing policies, conflicting interests and diverse governance structures (e.g., Urwin and Jordan 2008; Hinkel et al. 2009).

Not considering this context may hinder or mislead adaptation, as illustrated by the emerging literature on barriers to adaptation (Moser et al. 2012). Institutional analysis strives to understand this context and insights gained may be employed to craft effective institutions and policies for adaptation.

Not only is more governance research needed, but within adaptation governance research a framework is needed for selecting salient research approaches and policy instruments. The MEDIATION diagnostic framework provides a first rough elaboration of the approaches and policy instruments relevant for different adaptation governance challenges.

Figure 3 illustrates a module of the adaptation governance framework targeted at governance challenges that involve influencing collective action. The need for collective action arises when interdependence exists between adapting actors, meaning that actions of one actor affect another actor. Typical examples of interdependence come from common-pool resource use, such as, common use of a shared aquifer for irrigation, and public good provisioning, such as, coastal dwellers maintaining shared flood protection.

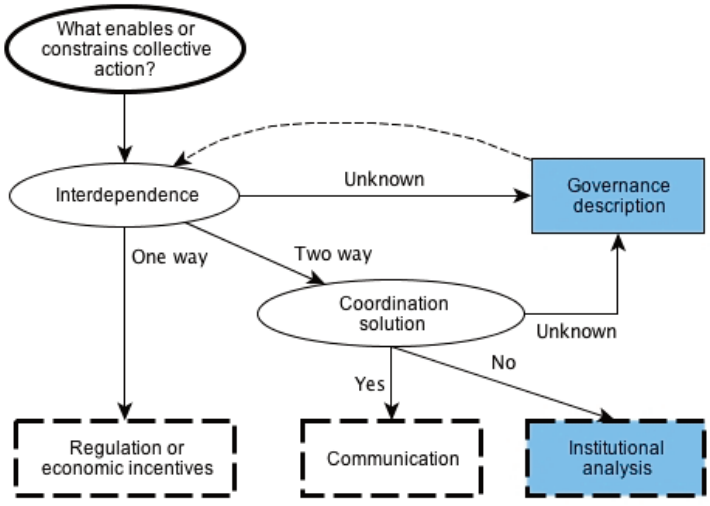


Figure 3: Example decision tree for choosing salient approaches for adaptation governance in collective action situations. Characteristics of the adaptation governance challenge lead to the selection of appropriate research methods and policy instruments for adaptation. Source: Hinkel and Bisaro (2013a).

An adaptation challenge of addressing social dilemmas exists when there is two-way interdependence between actors and no co-ordination solution exists. This means that there is a conflict between the social optima and individual private interests and some or all private actors involved need to compromise their own interests.

A typical common pool resource example is found in the Guadiana river basin, where groundwater that is declining under climate change and is commonly used by farmers for irrigation (Varela-Ortega et al. 2013). In these cases, internal solutions are not very likely, but still possible and understanding the nature of these conflicts and identifying policy measures requires in-depth institutional analysis.

An adaptation challenge of co-ordination exists when a collective adaptation measure that satisfies all interests is available. For example, for Rhine river riparians implementing the Rhine 2020 salmon restoration policy this is currently the case (van Slobbe et al. 2013). Reintroducing salmon into the Rhine can be achieved in the current hydrological regime without the involved stakeholders having to comprise their interests provided that they coordinate these. This is because under the current hydrological regime, discharge from power producers will not raise water temperatures enough to threaten salmon migration provided producers adhere to current agreements during low flow events. Such challenges thus have a high possibility of stakeholders finding an internal solution and the public actor may influence this via communication instruments such as awareness raising and information provision.

When interdependence is one-way the action of one actor influences another actor but not vice versa. Examples of such challenges include pollution problems and upstream-downstream situations in shared river basins. In this case, the public actor needs to find a normative agreement between the conflicting interests and may achieve this through regulation and economic incentives.

One major source of confusion is, for example, the concept of vulnerability. “Assessing vulnerability” might stand for diverse methods, such as, projecting impacts, aggregating socio-economic data, building statistical models that explain observed impacts or analysing institutions (Wolf et al. 2013). Therefore, vulnerability is not a useful concept for naming methods.

To resolve these ambiguities, MEDIATION developed a refined classification of methods (Table 1). On the top-level, the classification distinguishes between research and action approaches. The former are applied with the goal of generating knowledge about the study unit while the latter are applied with the goal of intervening and hence changing the adaptation situation. Research methods are further sub-classed into impact analysis, behaviour analysis, institutional analysis, decision analysis and valuation methods. Methods for assessing vulnerability are referred to under several more specific names including “impact attribution”, “impact projection” and “governance description”. For further reading, please see Hinkel and Bisaro (2013b

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| Top-level class | 2nd-level class | 3rd-level class | 4th-level class |
|---|---|---|---|
| Research | Impact analysis | Trend detection | |
| | | Impact indication | Vulnerability indication<br>Capacity indication |
| | | Impact attribution | through climate variables<br>through socio-economic variables |
| | | Impact projection | Potential impact projection<br>Residual impact projection |
| | Behaviour analysis | Social-psychological theory<br>Rational choice | <br>Bounded rationality<br>Utility maximisation |
| | Institutional analysis | Governance description<br>Explaining governance emergence | Anthropology and political ecology<br>New institutional economics |
| | | Explaining governance performance<br>Governance monitoring and evaluation | New institutional economics<br>Regime effectiveness<br>Programme and project<br>Participatory |
| | Decision analysis | Cost-benefit analysis<br>Cost-effective analysis<br>Multi-criteria analysis<br>Robust decision-making | |
| | Valuation<br>Indirect outcomes<br>Inter-temporal outcomes<br>Uncertain outcomes | Non-market outcomes | |
| Action | Knowledge mobilisation | Participatory rural appraisal<br>Knowledge elicitation techniques<br>Brainstorming<br>Spatial visualisation | |
| | Knowledge harmonisation | Framing tools<br>Participatory modelling<br>Future-oriented participatory | |
| | Consensus building | | |

**Table 1.** Hinkel and Bisaro, (2013a). Review and classification of methods for climate adaptation. In preparation.

## Outlook

As a key output of the project, the diagnostic framework makes up one key component of the MEDIATION Adaptation Platform. The framework is implemented in the platform to both support the selection of approaches, and provide structured access to the MEDIATION cases.

Another prominent application of the diagnostic framework is through the UNEP Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA) updated guidance. The diagnostic framework provides a basis for the forthcoming updated technical guidance on assessing climate change vulnerability, impacts and adaptation (PROVIA 2013). PROVIA is also planning a web-based version of the guidance.

Through these channels, further work will be carried out to test and improve the framework with a wider set of cases and stakeholders, and to develop sector specific modules for selecting approaches for adaptation in coastal management, agriculture, water management, health and biodiversity conservation. For further information, please see the MEDIATION Adaptation Platform and Hinkel and Bisaro (2013a).

## References

Adger, W. N., S. Dessai, M. Goulden, M. Hulme, I. Lorenzoni, D. R. Nelson, L. O. Næss, J. Wolf, and A. Wreford. 2009. Are there social limits to adaptation to climate change? Climatic Change 93(3):335-354.

Bisaro, A., E. van Ierland, X. Zhu, M. Khovanskaia, and J. Hinkel. 2013. Identifying public adaptation challenges in Serbian agriculture: comparing insights from institutional and decision analysis Regional Environmental Change Special Issue: in preparation.

Cash, D. W., W. C. Clark, F. Alcock, N. M. Dickson, N. Eckley, D. H. Guston, J. Jäger, and R. B. Mitchell. 2003. Knowledge systems for sustainable development. Proceedings of the National Academy of Sciences 100(14):8086-8091.

Dessai, S. and M. Hulme. 2004. Does climate adaptation policy need probabilities? Climate Policy 4(2):107-128.

Dessai, S., M. Hulme, R. Lempert, and Pielke Jr, R. 2009. Do We Need Better Predictions to Adapt to a Changing Climate? EOS 13:111-112.

EEA. 2013. Climate-ADAPT: European Climate Adaptation Platform. European Environment Agency, Copenhagen

Hinkel, J., A. Bisaro, T. E. Downing, M. Hofmann, K. Lonsdate, D. McEvoy, and D. Tabara. 2009. Learning to Adapt: re-framing climate change adaptation.in M. a. N. Hulme, H., editor. Making Climate Change Work for Us: European perspectives on Adaptation and Mitigation Strategies. Cambridge University Press, Cambridge.

Hinkel, J. and A. Bisaro. 2013a. Methodological choices in problem-oriented adaptation research: a diagnostic framework. Regional Environmental Change. MEDIATION Special Issue. submitted.

Hinkel, J. and A. Bisaro. 2013b. Review and classification of methods for climate change adaptation. In preparation.

Moser, S. C. and J. Ekstrom. 2010. A framework to diagnose barriers to climate change adaptation. Proceedings of the National Academy of Sciences 107(51):22026-22031.

Moser, S. C., S. J. Williams, and D. F. Boesch. 2012. Wicked Challenges at Land's End: Managing Coastal Vulnerability under Climate Change. Annual Review of Environment and Resources 37(1):51.

O'Brien, K., S. Eriksen, A. Schjolden, and L. P. Nygaard. 2007. Why different interpretations of vulnerability matter in climate change discourses. Climate Policy 7(1):73-88.

PROVIA. 2012. PROVIA Guidance on assessing vulnerability, impacts and adaptation (VIA). UNEP.

UKCIP. 2003. Climate adaptation: Risk, uncertainty and decision-making. UK Climate Impacts Programme.

Urwin, K. and A. Jordan. 2008. Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance. Global Environmental Change 18:180-191.

van Slobbe, E., S. E. Werners, M. Riquelme-Solara, and T. Bölscherb. 2013. The Rhine. No more salmon and stranding ships? Regional Environmental Change Special Issue: in preparation.

Varela-Ortega, C., I. Blanco, P. Esteve, S. Bharwani, T. E. Downing, S. Fronzek, and E. Juarez. 2013. How can irrigation agriculture adapt to climate change? Insights from the Guadiana basin in Spain. Regional Environmental Change Special Issue: in preparation.

Wolf, S., J. Hinkel, M. Hallier, A. Bisaro, D. Lincke, C. Ionescu, and R. J. Klein. 2013. Clarifying vulnerability definitions and assessments using formalisation. International Journal of Climate Change Strategies and Management 5(1):54-70.

## Further information

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To find out more about the MEDIATION project, please visit:
http://mediation-project.eu/

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