

# Learning about climate change adaptation through European cooperation: a preliminary assessment of the WAVE project

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## **Management Summary**

This report was prepared within the context of the Marie Curie funded research ‘Knowledge transfer for climate change adaptation (KNOW2ADAPT)’. In this research, we systematically compare learning in completed European cooperation projects (INTERREG IV and FP7) that focus on climate change adaptation in the water sector. Within this context, learning is conceptualized in three different ways: (1) the increase of knowledge and insights by project participants (group learning); (2) the uptake and use of project knowledge by the partner organizations involved (organizational learning); and (3) the uptake and use of project knowledge by external actors (network and societal learning). Project knowledge refers here to information, experiences, lessons learned or other results that were transferred or generated in the project. On the basis of diverse literature streams, we formulated hypotheses that specify which conditions are potentially relevant to each form of learning. This report provides the results of a pilot case study, which we used to test and refine our conceptual model and hypotheses. In addition, the report presents and applies a method for transforming qualitative case data into quantitative data with values between 0 and 1 (see Annex A). This method has been developed so that we can systematically compare findings across partners and projects using software for Qualitative Comparative Analysis. This methodology will later be used to examine what conditions are necessary and/or sufficient for different forms of learning to occur.

### **Pilot case study: INTERREG IVB project WAVE**

In this report, we apply our conceptual model of learning to the INTERREG IVB project ‘Water Adaptation is Valuable to Everybody (WAVE)’. This project’s central objective was to prepare regional water systems for the potential impacts of climate change. This was achieved by strengthening the value of water, implying that particular attention was paid to aspects such as sustainable regional development, integrated land use and making use of opportunities. The project was implemented by a consortium consisting of six partners from five different Northwest European countries. Project actions included of a series of regional actions (region-specific studies or investments) and joint actions (collaborative workshops to stimulate knowledge transfer and learning). Moreover, as part of the project 11 project partner meetings (two meetings per year) were organized with during five meetings the active involvement of the chairmen or directors of the partner organizations (so-called steering group meetings). The project had a budget of € 11 million and was implemented between the 1<sup>st</sup> of January 2008 and the 31<sup>st</sup> of October 2013 (duration was 5 years and 9 months). The project was one of the eight climate change adaptation projects in the Strategic Initiative Cluster (SIC) Adapt (2010-2013) of the INTERREG IVB programme of Northwest Europe.

### **Group learning**

The outcome “group learning” refers here to the degree to which participants have acquired truly new substantive or relational knowledge, insights and understandings that are relevant from the perspective of climate change adaptation (i.e. we focus on the depth of learning). WAVE partners reported diverse degrees of substantive learning with, for example, one partner stating that the project led to a broader view of the problem rather than a change in understanding and another partner stating that the project has been an eye-opener and led to truly new understandings. Relational learning was reported by all partners; the project actions and exchanges led to new relations and an improved understanding of who is responsible for what, how to communicate climate change and how to involve stakeholders. We further observed that learning was often related to the fact that another organization was more “advanced”. Thus, the project fulfilled an important benchmarking function and learning largely took the form of knowledge transfer.

We asserted that two project conditions (a balanced consortium and high quality interactions) and one participant condition (the characteristics of ability, motivation and opportunity) are relevant to group learning. The project scores rather well on all three conditions as well as on group learning. Interesting though is that the partner with the lowest score on motivation (i.e. participants were not particularly interested in the theme or keen to participate) scores highest on group learning. Thus,

the hypothetical model may need to be refined here. However, additional case studies are needed to do so.

### **Organizational learning**

The outcome “organizational learning” is assessed using six different levels of knowledge transfer with transmission of project knowledge to persons, teams or units inside a participant’s own organization being the lowest level and implementation being the highest level of organizational learning. In the WAVE project, various partners reported that they shared some of the project knowledge with colleagues, in some cases through presentations for larger groups. In some of the organizations discussions are ongoing on whether and how to implement some of the project knowledge. In nearly all organizations project knowledge had an influence on the policies or practices and in several organizations knowledge was also implemented. The overall level of organizational learning (weighted average of the diverse levels) varies and is highest for the partner organizations in which concrete opportunities arose or for organizations of which multiple persons were intensely involved in the project and made concrete efforts to have their organization adopting the project results.

We asserted that properties of participants (ability, motivation and opportunity towards transferring project knowledge to own organization) and their organizations (presence of prior related knowledge, relatedness of the project theme and structural factors) are relevant conditions to organizational learning. Partners that score higher on properties – and on opportunity in particular – also have higher scores on organizational learning. As for organizational properties the results suggest that as long as project knowledge is relevant and related to what is already known, organizational learning is likely to occur, even if the organization context as such is not supportive of learning and knowledge transfer.

### **Network and societal learning**

The outcome “network and societal learning” refers here to the transfer of project knowledge to organizations, networks and communities that were not included as partner in the project and therefore can be seen as ‘external actors’. Like organizational learning, this outcome is assessed in terms of different levels of knowledge transfer. In the WAVE project, most partners have been relatively successful in sharing project knowledge (transmission). This relates to the fact that stakeholder communication was an important aspect of the project and that the project was part of one of an INTERREG “cluster” on climate adaptation. Generally speaking, the project scores rather low on network and societal learning. However, clear differences can be observed across partners. On the one extreme is a partner that made widespread and rather successful efforts to disseminate project knowledge whereas on the other extreme is a partner that made no such efforts (apart from actions that were taken anyway within the context of the regional actions).

We asserted that two conditions at the project level and three partner-specific conditions are relevant to network and societal learning. These project conditions are: (1) the presence of a proactive, specific and engaging communication strategy; and (2) the actual availability, accessibility and relevance of project knowledge. We observed that the WAVE project provided little incentive to partners to communicate the project results widely outside their own project region and that the project as a whole produced and shared project knowledge to a limited degree only. Both project conditions may therefore explain the low level of network and societal learning. The partner-specific conditions are related to participant/partner properties (ability, motivation and opportunity), whether participants/partners have been strategic about the project scope (i.e. what to include, who to involve, how to frame) and whether relevant external actors are likely to absorb (i.e. relevance of project theme and supportiveness of governance system). The results suggest that all three conditions need to be present for high levels of network and societal learning to occur.

### **Conclusions and implications**

When comparing how the WAVE partners score on the different forms of learning, we observe the highest level of learning at the project level, lower levels for partner organizations and the lowest levels for external actors. Although we cannot draw direct conclusions from this since group learning is measured in a completely different way than organizational and network and societal learning, this observation is in line with our expectation that learning is highest among participants since they interact most directly and intensely. One may further expect that partners with high levels of group learning score higher on the other forms of learning. This is, however, not the case.

On the basis of the case study findings, we have refined our conceptual framework. We also observed that the included conditions are likely to be relevant to the different forms of learning. However, at this stage, we cannot draw any final conclusions on the conditions that are necessary or sufficient for learning to occur. The case seems to suggest that high levels of learning is produced by a combination of factors that are related to the project design and implementation, properties of individual participants (ability, motivation and opportunity) as well as to project-external factors (e.g. external events). In other words, a project can have properties that promote learning but they can only do so to a certain extent. For example, a balanced consortium and regular and high-quality interaction moments could promote group learning. Organizational learning is more likely to occur when the project theme is related to prior organizational knowledge and relevant to organizations involved. Lastly, network and societal learning is more likely to occur when a project is good at communicating project knowledge and participants or partners are being strategic about the project theme, activities and who to involve.

# 1 Introduction and methods

This report presents the results of a pilot case study, the INTERREG IVB project WAVE. This project was analysed as part of the research project ‘Knowledge transfer for climate change adaptation (KNOW2ADAPT)’. The purpose of this pilot case study is to test – and, if necessary, to adjust – a conceptual, theoretical model of learning (see Vinke-de Kruijf, 2015) before applying this model at a wider scale. This chapter introduces the research objective, framework, design and methods.

## 1.1 Research objective and framework

The WAVE project is a pilot case study in the research project [KNOW2ADAPT](#). The objective of this research is:

*To produce generalizable insights on the outcomes as well as the combination(s) of condition(s) that lead to the outcomes of European cooperation projects with a focus on climate change adaptation in the water sector by systemically comparing the process, outcomes and impacts of these projects from a multi-level learning perspective.*

This research is guided by a conceptual model of learning (see Figure 1), which integrates insights from the literature on social and societal learning, organizational learning, network and societal learning, knowledge utilization and natural resource governance (Vinke-de Kruijf, 2015).

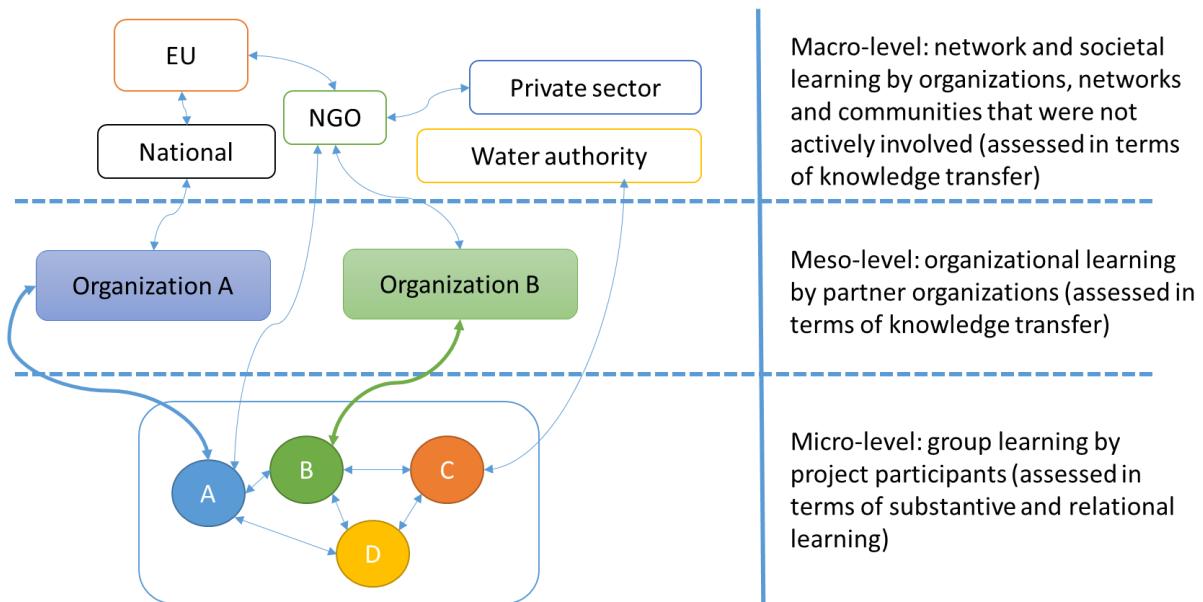


Figure 1 – Conceptual model of learning impacts in a multi-level context

In the conceptual model, a distinction is made between three forms of climate change adaptation-oriented learning: *group learning* by project participants (i.e. increase of substantive and relational insights, knowledge and skills), *organizational learning* by partner organizations (transfer of project knowledge to home organizations) and *network and societal learning* by organizations, networks and communities that were not involved in the project (transfer of project knowledge to external actors). Knowledge transfer refers here to the process through which organizations, networks and communities are affected by project knowledge (i.e. information, experiences, lessons learned or other results that were transferred or generated in the project). As for organizational learning, we initially defined this as learning by all relevant organizations (partner organizations *and* other organizations). In practice, this distinction turned out having no meaning and difficult to make since one may transfer knowledge to another organization that is part of a certain network. Therefore, we decided to use the term organizational learning when referring to learning by organizations which

directly participated in the project (note: these organizations are often, but do not need to be, partners in the consortium). Learning by partners who are not directly involved in the project is referred to as network and societal learning.

## 1.2 Comparative research design

To systematically compare project partners and projects, we use Qualitative Comparative Analysis (QCA) as a research approach and technique (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012). An important step in QCA is the specification of a model that defines one (or multiple) outcome(s) of interest and the conditions that are potentially relevant to the production of this outcome (for more information, see Vinke-de Kruijf, 2015). An important difference between this method and ‘mainstream’ quantitative methods is that QCA focuses on ‘causal complexity’. This implies that the absence or presence of an outcome may be produced by the absence or presence of different combinations of conditions. For example, group learning (outcome = present) may be produced by the presence of participants who are high motivated AND knowledgeable (presence of both conditions is necessary, but insufficient for group learning to occur) whereas no group learning (outcome = absent) may be produced by a lack of productive interactions OR a lack of balanced consortium (the absence of both conditions is sufficient but not necessary for the absence of group learning). Another characteristic of QCA is that data qualitative or quantitative data is transformed into ‘set membership scores’. For the fuzzy-set version of QCA, this implies turning data into values between 0 (no membership in a given set) and 1 (full membership in a given set). For example, when a partner completely lacks the motivation to transfer knowledge to others, this participant has no membership in the set “motivation to transfer knowledge to others”.

For this research, we identified three types of learning outcomes. In addition, we have specified several conditions that are expected to be relevant to this outcome. These outcomes and potentially relevant conditions (including indicators) are summarized in Table 1 (note: several changes were made compared to the previous model that was presented in the Inception Report). The transformation of qualitative data into values between 0 and 1 is guided by a scoring method, which has been developed on the basis of our literature study and the pilot case study results. This method is presented in Annex A of this report.

*Table 1 – Overview of learning outcomes, including conditions and indicators that are potentially relevant to these outcomes*

<b>1. Group learning: changes in substantive and relational knowledge, insights and understandings regarding climate change adaptation</b>	
<i>Conditions</i>	<i>Indicators</i>
1.A. Participant properties	<ul style="list-style-type: none"><li>• Did participants have the knowledge and skills (ability) to meaningfully interact?</li><li>• Did the project/organization context provide participants with a motivation to participate and learn?</li><li>• Did the project/organization context provide participants with the chance to regularly interact over a longer period of time?</li></ul>
1.B. Consortium (project level)	<ul style="list-style-type: none"><li>• Did partners and their organizations collaborate before?</li><li>• Was the partnership characterized by balanced diversity?</li><li>• Did participants have complementary and possess all relevant knowledge?</li></ul>
1.C. Interaction process (project level)	<ul style="list-style-type: none"><li>• Did interactions occur in a good atmosphere and were they regular and long enough to develop relations?</li><li>• Were activities well designed and organized (e.g. thematic, involving experts)?</li><li>• Were the exchanges and learning processes facilitated?</li></ul>

*Table 1 (continued) – Overview of learning outcomes, including conditions and indicators that are potentially relevant to these outcomes*

<b>2. Organizational learning: effect of project knowledge on partner organizations</b>	
<i>Conditions</i>	<i>Indicators</i>
2.A. Participant properties (related to knowledge transfer)	<ul style="list-style-type: none"> <li>• Did participants have the knowledge and skills and were they in the position (ability) to transfer project knowledge to their organizations?</li> <li>• Were participants willing to make an effort to transfer project knowledge to their organizations?</li> <li>• Did the project/organization context provide participants with chances to transfer project knowledge to their organizations?</li> </ul>
2.B. Partner organization properties	<ul style="list-style-type: none"> <li>• Did partners have prior related knowledge and experience related to the project theme or the international context?</li> <li>• Was project knowledge (particularly theme) relevant to partner organizations?</li> <li>• Was the structural organization context supportive or rather restrictive towards learning and knowledge transfer for climate change adaptation?</li> </ul>
<b>3. Network and societal learning: effect of project knowledge on external actors, including organizations, networks and communities that were not involved in the project</b>	
<i>Conditions</i>	<i>Indicators</i>
3.A. Participant properties (related to knowledge transfer)	<ul style="list-style-type: none"> <li>• Did participants/partners have the knowledge and skills and were in the position (ability) to transfer lessons learned to external actors?</li> <li>• Did participants/partners actively look for ways to engage external actors or to enhance knowledge transfer?</li> <li>• Did the project/organization context provide participants/partners with concrete opportunities to transfer the project results?</li> </ul>
3.B. Strategic scoping (participant/partner)	<ul style="list-style-type: none"> <li>• Were project activities chosen to develop or test new or alternative solutions?</li> <li>• Was project knowledge (including theme and results) framed in a way that matches the user-specific situations and circumstances?</li> <li>• Were influential actors or potential users actively engaged in the project to enhance the project impact?</li> <li>• Was the project seen or designed as part of a longer and more encompassing change process?</li> </ul>
3.C. External actor properties	<ul style="list-style-type: none"> <li>• Was the project theme on the agenda or of particular relevance to external actors?</li> <li>• Was the structural governance system supportive or rather restrictive towards learning and knowledge transfer for climate change adaptation?</li> </ul>
3.D. Communication strategy (project level)	<ul style="list-style-type: none"> <li>• Did the project provide a proactive and comprehensive communication and dissemination strategy?</li> <li>• Did the project provide a clear idea of the potential users and how to obtain their commitment or support?</li> <li>• Were various partners explicitly given a role in disseminating project knowledge to external actors?</li> </ul>
3.E. Project knowledge (project level)	<ul style="list-style-type: none"> <li>• Did the project make project knowledge available to larger groups of relevant users?</li> <li>• Did the project make project knowledge accessible (attractive and understandable) to users?</li> <li>• Was project knowledge potentially relevant to external actors?</li> </ul>

### **1.3 Data collection and analysis**

Data collection and analysis is guided by a case study description template (see Vinke-de Kruijf, 2015) consisting of the following parts:

- Part A – General information on the project on the basis of project documents (i.e. duration, budget, partnership, theme, rationale, objectives, interactions, actions and outputs).
- Part B – Specific information on project conditions that are potentially necessary or sufficient for group learning (conditions: consortium and interaction process) or organizational learning (conditions: project theme and dissemination strategy) on the basis of project documents and an interview with the overall project manager or coordinator.
- Part C – Participant, partner organization or context-specific information regarding conditions that are potentially necessary or sufficient for project, organizational or wider learning processes. This includes ability, motivation and opportunity towards the project and knowledge transfer as well as project, organization or context-specific factors influencing the absorption of knowledge. Based on project documents and an interview with the project manager (partner organization level).
- Part D – Participant and organization-specific information on learning outcomes. These outcomes are being assessed in terms of substantive and relational learning at the project level and in terms of levels of knowledge transfer at other levels. Based on project documents and an interview with the project manager (partner organization level).

In the case of the WAVE project, the Lead Partner's project manager and coordinator provided documents containing general information about the project (reports of Joint Actions, Final Report and Magazines). Also we reviewed the information that was available at the project website.

For the WAVE case study, we conducted seven semi-structured interviews (at least one person of every partner) in February and March 2014. On the basis of a document analysis and an interview with the overall project manager (responsible for the implementation of the overall project), we prepared a draft version of parts A and B. We then interviewed project managers at the different partner organizations. These were persons who participated intensely and directly in the project and had a good overview of the overall project and lessons learned. In addition, we interviewed the person that was responsible for project communication. Annex B provides an overview of all case study data.

Interviewees were provided with some generic interview questions to prepare and the case study description template (including general information about the project). They were asked to review the information that was provided in parts A and B. On the basis of the interviews, we further complemented these parts. Interviews results were always inserted directly into the template (most interviews were recorded, no transcripts were prepared). The information in parts C and D was partner-specific and not shared with persons outside of these partner organizations. Interviews were conducted in Dutch or English.

### **1.4 Outline**

The research objective, framework, design and methods are presented in this introductory chapter. Chapter 2 provides a brief introduction of the pilot case study. The results of the pilot case study are presented in chapter 3. Chapter 4 discusses and concludes upon the results (with a focus on the applicability of the conceptual model). The report contains two annexes. Annex A provides a schematic overview of how all relevant variables are dichotomized. Annex B lists the data that were collected and analysed for the presented pilot case study.

## 2 Introduction of the pilot case study: INTERREG IVB project WAVE

The project “Water Adaptation is Valuable for Everybody” (WAVE) was implemented by a consortium of six organizations from five countries under the INTERREG IVB programme for Northwest Europe. The consortium was led by the Dutch Regional Water Authority Regge & Dinkel (WRD) and further included the German Regional Water Cooperation Eifel-Rur (WVER), the Flemish Environment Agency (VMM), the Dutch Regional Water Authority Groot Salland (WGS), the French Regional Water Institute Vilaine (IAV) and the English Somerset County Council (SCC). The project’s central objective was to prepare regional water systems for the potential impacts of climate change. Or, in other words, to make the regions climate-proof. This was achieved by strengthening the value of water, implying that particular attention was paid to aspects such as sustainable regional development, integrated land use and making use of opportunities.

The project was implemented between the 1<sup>st</sup> of January 2008 and the 31<sup>st</sup> of October 2013 (duration was 5 years and 9 months) and had a budget of € 11 million. Work was divided into the following three work packages:

1. Policy and planning (preventing damage and addressing opportunities);
2. Action (reducing vulnerability of stakeholders and nature); and
3. Communication and awareness raising (stressing the importance of water and climate change).

The project consisted of Joint Actions and Regional Actions. The Joint Actions were organized around four series of workshops (see Figure 1): (1) integration of water and spatial planning (2 workshops, 1 conference) (2) regional risk assessment (5 workshops for hydrologists) (3) balancing between water and land use (4 workshops for project leaders) (4) emergency responses and policies (3 workshops for emergency situation managers). In total, circa 60-70 persons participated in one or more workshops. The Regional Actions differed for each partner region and included various projects to better understand and plan climate change adaptation (e.g. hydraulic modelling studies, integrated assessment, feasibility study, investment and management plans), implementation of adaptation actions (e.g. stream or nature restoration, water retention areas, planting of woodlands) as well as communication actions (e.g. books, newsletters, information centres, consultation meetings, website). In two regions, the planned Regional Actions could not be achieved. In France, the planned constructions were cancelled due to strong farmer opposition. In the Netherlands (WGS), planned investments for a residential area were cancelled, partly due to the economic crisis.

In addition to the workshops, the project included 11 project partner meetings (two meetings per year) with during five meetings the active involvement of the chairmen or directors of the partner organizations (so-called steering group meetings). To communicate about the project, the consortium established a website ([www.waveproject.eu](http://www.waveproject.eu)), produced five magazines (in all four project languages) and organized a final conference (Zwolle, the Netherlands in May 2013). Also, the project was one of the eight climate change adaptation projects in the Strategic Initiative Cluster (SIC) Adapt that ran between 2010 and 2013. The cluster was led by the German Lippeverband and included various expert meetings with participants from the different projects (WAVE partners participated in 2 of these meetings). The cluster resulted in a series of policy and programme recommendations as well as a knowledge platform that refers to experts and provides information about tools and measures. In January 2013, the cluster outputs were presented and discussed in a final conference. Information about the cluster is available via its website ([www.sic-adapt.eu](http://www.sic-adapt.eu)).

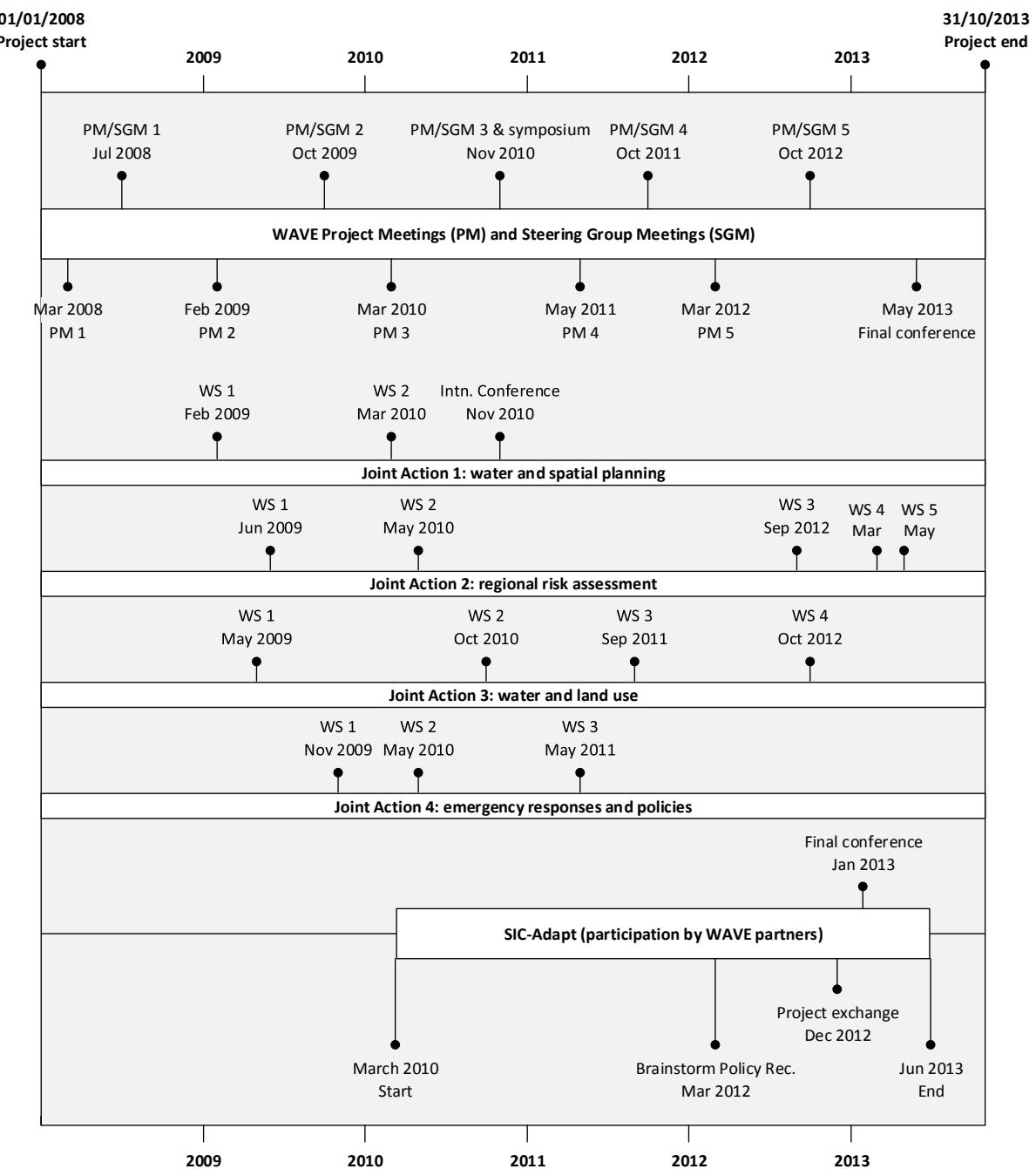


Figure 2 – Overview of joint actions and project interactions in the WAVE project

### 3 Case study results

This chapter provides a description of the case study results with a focus on group learning (section 3.1), organizational learning (section 3.2) and network and societal learning (section 3.3). Each section first provides how the pilot case scores on the relevant learning outcome, then discusses how the case scores on the various conditions and closes with a synthesis and some preliminary observations. Please note that with the use of the scoring method that is presented in Annex A, all qualitative data has been transformed into data with values between 0 (low levels of learning or highly restrictive of learning) and 1 (high levels of learning or highly supportive of learning).

#### 3.1 Group learning

This section describes the results for the variables that are included in the hypothetical model of group (or: project) learning. We hypothesize that the conditions participant properties (PART\_PR), consortium (CONS) and interaction process (INT) may be relevant to substantive and relational learning in a project context. After discussing how the partners score on the relevant outcome (group learning), we provide an explanation of how the project or its partners score on the relevant conditions. We then synthesize and discuss the results.

##### ***Outcome: substantive and relational learning by project participants [average score = 0.67]***

The outcome of substantive and relational learning is measured by the degree to which participants have acquired truly new knowledge, insights and understandings that are relevant from the perspective of climate change adaptation. To assess learning, we have made a distinction between understanding, planning and implementing climate change adaptation from a substantive and relational point of view. While we cannot say that the one type of learning is more important than the other or that they always need to be combined, they tend to be complementary in adaptation-oriented projects. Therefore, rather than taking the arithmetic mean (ignoring that they are complementary), the minimum score (assuming indicators are strictly complementary, i.e. one-out, all out) or the maximum score (assuming achieving one indicator is sufficient, for example, since indicators are mutually exclusive) (Langhans, Reichert, & Schuwirth, 2014), we aggregate this outcome using a mixture of the arithmetic mean and maximum aggregation. In doing so, we take into account that a combination of both substantive and relational learning is more valuable than having only substantive or only relational learning.

In the WAVE project, only one partner reported to have acquired truly new insights. Most of the other partners reported a combination of new and improved insights. Most notably was the learning by the French partner and the German partner, which already started in the proposal phase when they realized that other partners were much more advanced. Also other partners could transfer knowledge from one of the other organizations. Oftentimes, multiple organizations could take similar lessons from the same organization. For example, several partners learned from the Belgium partner about the potential of real-time flood forecasting, from the British partner about the potential of visualization techniques when communicating climate change and from Dutch partners about including climate change scenarios in flood risk management.

While the project focus has been on knowledge transfer, the partners also reported that they collectively learned what and how to communicate climate change and, in particular, that climate change is best communicated through the lens of extreme weather events.

##### ***Substantive learning [average score = 0.68]***

Various partners reported rather different levels of substantive learning. Rather low levels of learning were reported by the lead partner with the project leading to “no change in understanding but a broader view of the problem” and the insight that “climate change adaptation is achieved alongside other objectives”. Learning by most of the other partners holds a middle-position between improved

and new knowledge, insights and understandings. They reported learning using terms like “it was valuable to see”, “it has been useful” or “it has been inspirational to see”. Only one partner stressed that the project has been an eye-opener and contributed to the adoption of entirely new approaches.

#### **Relational learning [average score = 0.50]**

A key characteristics of many of the regional actions was the active involvement of stakeholders. In several regions, this led to new relations and an improved understanding of who is responsible for what, how to communicate climate change and how to involve stakeholders. Relational learning largely took the form of ‘learning from experience’. While some partners mostly learned from their own failures and experiences, various partners also learned from activities and experiences of other partners. No partner reported truly new knowledge, insights or understandings regarding relational aspects.

#### ***Condition: participant ability, motivation, opportunity [average score: 0.83]***

Next to project properties, the ability, motivation and opportunity of individual participants is expected to influence group learning. The underlying hypothesis reads: the higher the ability, motivation and opportunity of project participants, the greater the degree of substantive and relational learning.

#### **Participants' abilities [average score = 0.85]**

Many of the participants had participated in an international project before. Only one organization had no experience with international projects at all. Several participants were not used to speak and write in the project language (English). While language barriers did not withhold them from interacting with other participants, they did not feel comfortable communicating in English from the first beginning. Several interviewees mentioned in their respective organizations only a limited number of persons has the ability to participate in international projects.

#### **Participants' motivations [average score = 0.78]**

Several project managers reported that they sometimes had to motivate participants to participate. In most cases, this only had to be done upfront since participants became more motivated after they participated once. In one organization, the same persons participated in several international projects. As a result, the motivation of these participants to travel and participate was decreasing. Organizational support was limited in some organizations. Superiors sometimes had to be convinced or would only allow for the participation of a limited number of persons. This relates to the fact that some organizations primarily participated to obtain access to financial resources. International cooperation was less important. To other organizations, this aspect was just as important. Also, several participants were involved without having a direct interest in the theme that was being addressed or discussed.

#### **Participants' opportunities [average score = 0.85]**

The project provided regular opportunities for interactions to project managers (twice per year), steering group members (once per year) and participants of a joint action (once or twice per year). The group of project managers remained largely the same. Only for one organization, the project manager was replaced by another person (not new to the project but involved in one of the joint actions before). For some organizations, the member of the steering group changed over time (e.g. due to elections). The persons participating in a joint action hardly changed for some organizations and rather often or always for other organizations.

#### ***Condition: balanced consortium with complementary knowledge [average score = 0.9]***

This condition has been assessed at the project level in terms of: previous collaboration, balanced diversity and complementary knowledge. The underlying hypothesis reads: the the more balanced a consortium is (neither too homogeneous nor too diverse, neither too new to each other nor too

close) and the greater the extent to which partners have complementary knowledge, the greater the degree of substantive and relational learning.

#### **Previous collaboration [score = 1]**

In WAVE, 2/3 of the partners collaborated in the INTERREG IIIB project Joint Approach for Managing Flooding (JAF, January 2002 – July 2006). This project was led by the same organization (WRD) and involved three of the other project partners (WGS, SCC and WVER). To prevent cognitive blockage, as many new persons were involved as possible. Also two new partners were added (VMM and IAV) to cover more countries. The WAVE project corresponds to the ideal situation where previous collaboration experiences were positive (easing collaboration) and new persons and partners were added to create additional opportunities to learn.

#### **Balanced diversity [score = 0.7]**

All partner organizations in WAVE were regional authorities and therefore similar. Four organizations (WRD, WGS, WVER and IAV) are only responsible for water management, whereas SCC is a general public authority and VMM manages water alongside other environmental issues. Climate change potentially imposes problems to all regions, however, problems are not as severe in all regions. Awareness about and the attention for climate change was highest in the SCC region (this region also experienced more floods and droughts than the other regions). That there were differences in prior related knowledge and experience was reflected in the lessons learned with participants learning mostly from SCC and VMM, to a certain extent from WGS and WRD and hardly from IAV and WVER.

#### **Complementary knowledge [score =1]**

The participants who were directly and intensely involved included experts of diverse disciplines (most notably: hydrologists, project managers, emergency situation managers and communication officers). They could provide diverse types of substantive and procedural knowledge. In addition, a steering committee was formed with directors or chairpersons of the partner organization who could provide political knowledge. As a result, the consortium is characterized by a rather balanced involvement of persons with substantive, procedural and political knowledge.

#### ***Condition: quality, quantity and facilitation of interaction [average score = 0.8]***

This condition has been assessed at the project level in terms of: interactions, activities and facilitation. The underlying hypothesis reads: the greater the quality and quantity of interaction moments and activities and the better they are facilitated, the greater the degree of substantive and relational learning.

#### **Interaction moments and atmosphere [score = 1]**

Participants experienced a good atmosphere and an open exchange of information. Many of the participants took part in several activities. Meetings and workshops typically lasted a couple of days with plenty of time for informal contact. Apart from the project interactions, several participants stayed at another partner for a longer period of time (job rotations).

#### **International cooperation activities [score = 0.7]**

International cooperation played a role in project meetings and joint actions. Project meetings often focused on administrative matters with more attention for the exchange of knowledge and experiences in the meetings with the steering group. The Joint Actions were organized around four themes and consisted each of a series of workshops. The workshops had a length of several days and allowed for in-depth discussions across peers. They included presentations by participants as well as by external experts and field trips. The focus was on knowledge transfer rather than on the joint development of new knowledge.

#### **Facilitation of interactions [score = 0.7]**

Facilitation played an important role in the implementation of Joint Actions. Professional facilitators used methods like story-telling and made sure that the workshops were evaluated. Also, they

prepared reports of most of the workshops. Field visits were included to demonstrate certain approaches. Other project meetings were prepared by the project leader in collaboration with an external consultant and oriented more towards administrative matters than learning and knowledge transfer.

### **Synthesis and preliminary observations**

Our hypothetical model of group learning reads that characteristics of the consortium, the interaction process, and participants influence group learning. Productive interactions, a balanced consortium and participants that have the ability, motivation and opportunity to learn are expected to contribute to high levels of substantive and relational learning (i.e. acquisition of truly new knowledge, insights and understandings). This does follow from the WAVE project, which scores rather high on all conditions as well as group learning (see Table 2). As we have only one case, we cannot draw any conclusions as to whether just one or a combination of these conditions are relevant to group learning.

*Table 2 – Overall score of the WAVE project on conditions and outcome of group learning*

	Conditions			Outcome
	Consortium	Interactions	Participants	Group learning
WAVE project	0.9	0.8	0.83	0.75

The hypothetical model of group learning included two variables that were measured separately for every partner organization: the condition “participants” and the outcome “group learning”. Table 3 provides an overview of how the partner score on the condition and indicators of these variables.

*Table 3 – Scores per partner on the condition and indicators of “participants” and the outcome and indicators of “group learning”*

	Participant indicators				Indicators and outcome “group learning”		
	Ability	Motivation	Opportun.	PART_PR	SUB_L	REL_L	GR_LRN
Avr.	<b>0.85</b>	<b>0.78</b>	<b>0.85</b>	<b>0.83</b>	<b>0.50</b>	<b>0.68</b>	<b>0.67</b>
PP1	1	1	1	1	0.3	0.7	0.6
PP2	0.7	0.3	0.7	<b>0.57</b>	1	0.3	<b>0.83</b>
PP3	1	0.7	0.7	<b>0.8</b>	0.7	0.7	<b>0.7</b>
PP4	0.7	1	1	<b>0.9</b>	0.7	0.7	<b>0.7</b>
PP5	0.7	1	1	<b>0.9</b>	0.7	0.3	<b>0.6</b>
PP6	1	0.7	0.7	<b>0.8</b>	0.7	0.3	<b>0.6</b>

When comparing how the partners score on ability, motivation and opportunity and on group learning, our hypothetical model is not confirmed. In fact, the partner with the lowest score on motivation and on all properties has the highest level of group learning. Thus, even when participants are not particularly motivated to participate, they may still learn a great deal. Hence, the hypothetical model may need to be refined here.

The outcomes of group learning show that learning largely took the form of knowledge transfer. Learning from how other partners were doing things was more important than learning from the regional actions. Partners further stressed the “benchmarking” function of the project, i.e. they used the project to compare the practices and performance of their own organization to other organizations. They realized, for example, that other organizations already took climate change into account in planning, had a much better developed system for emergency situation management or a much more advanced flood forecasting system. This inspired them and urged them to put these aspects higher on the agenda in their own organizations. These examples show that who can be a

“source” (highly advanced) and who can be a “receiver” (lagging behind) of knowledge does play a role in group learning. This aspect is not taken into account in the current hypothetical model, which puts more emphasis on actor-interactions.

While the transfer of knowledge has played the most important role in the WAVE project, partners also learned collectively. This collective learning took the form of learning from the experience of other partners (most notably on how to deal with and frame extreme events). The conditions that are included in the hypothetical model are likely to provide an explanation for whether “collective learning” has occurred or not.

### 3.2 Organizational learning

This section describes the results for the variables that are included in the hypothetical model of organizational learning. Initially, we asserted that the conditions theme and strategy would influence organizational learning (see Vinke-de Kruijf, 2015). However, since we decided to our focus to learning by partner organizations these conditions have become less relevant for organizational learning and are now included in the assessment of network/societal learning. Hence, we now hypothesize that the following two conditions are potentially relevant to organizational learning: participant-specific properties (PART\_OR) and organizations absorbing (ORG\_AB). After discussing how the partners score on the outcome of interest (organizational learning), we provide an explanation of how the project or its partners score on these two conditions. We than synthesize and discuss the results.

#### ***Outcome: organizational learning [average score = 0.44]***

Building upon the literature on knowledge utilization and transfer, we assess “organizational learning” using six different levels of knowledge transfer (see Table 4). The underlying reasoning is that even when project knowledge is not directly used to improve organizational policies or practices, organizational learning may still have occurred. Moreover, decisions usually depend on a series of activities and studies converging in a certain direction.

*Table 4 – Six levels of organizational knowledge transfer. Adapted from the standards of utilization (Knott & Wildavsky, 1980), activities of knowledge transfer (Landry, Amara, & Lamari, 2001; Landry, Amara, & Ouimet, 2007) and knowledge utilization scale (Crona & Parker, 2012)*

<b>1. Transmission</b>	Project knowledge was transmitted to or shared with other organizational actors (not directly involved in the project).
<b>2. Presentation</b>	Project knowledge was presented in some kind of tailor-made form to other organizational actors who can potentially use them.
<b>3. Interaction</b>	Project results have been discussed or referred to within the context of relevant organizational groups or teams.
<b>4. Adoption</b>	Other organizational actors actively supported or made an effort to adopt some of the project knowledge.
<b>5. Influence</b>	Project knowledge influenced decisions or choices and contributed to the development of new or improved policies, practices, products or services.
<b>6. Implementation</b>	Project knowledge was applied or used to change organizational policies, practices or services.

Previous studies that assess knowledge transfer generally make use of questionnaires with respondents indicating to what extent a certain level of knowledge transfer applies (with values ranging from never to always). In our case study, knowledge transfer is assessed on the basis of interviews and documents. An example of the resulting data is that climate change adaptation is now

used by the organization as a guiding principle in the development of river basin plans. In this case, highest level of knowledge utilization applies (i.e. implementation). Our initial approach in such a case was to only include a score for the highest applicable level to avoid “double counting”. However, this does not do justice to the actual level of organizational learning as the implementation of specific knowledge by definition involves that this knowledge also had an influence and has been adopted and discussed. We therefore decided to include all applicable levels when assessing the transfer of a specific aspect of the project knowledge. This does not imply that all lower levels of knowledge transfer are relevant. In fact, the case study shows that project knowledge may have been used by project participants and therefore have had an influence on the organization even when no efforts were made to transmit or present project knowledge to other colleagues.

All qualitative data were transformed into data with values between 0 and 1. In doing so, we took into account the intensity and width (and, if relevant, the frequency) of knowledge transfer activities. High levels of knowledge transfer are linked to cases where multiple aspects of the project knowledge were transferred to all relevant (thus: larger) parts of the organization. In assessing the width, we paid attention to the fact that the partner organizations differ considerably in size and can be responsible for rather diverse tasks (e.g. water management, water services, air quality). In the case of large organizations responsible for diverse tasks organizational learning is linked to learning by relevant parts of the organization only.

The overall score of organizational learning is determined by taking the weighted average of the six knowledge transfer level scores (see e.g. Crona & Parker, 2011; Landry et al., 2001). This involves that we multiply the score of transmission (lowest level of knowledge transfer) by 1, presentation (second-lowest level) by 2 and so on. To bring the score back to a value between 0 and 1, the total score is divided by 21. Table 5 provides an overview of how the partner organizations score on the various levels of knowledge transfer.

*Table 5 – Overview of how the partner organizations score on various levels of knowledge transfer*

	Total score (div. by 21)	Transmit (weight 1)	Present (weight 2)	Interact (weight 3)	Adopt (weight 4)	Influence (weight 5)	Implement (weight 6)
Avr	<b>0.58</b>	<b>0.27</b>	<b>0.15</b>	<b>0.55</b>	<b>0.68</b>	<b>0.75</b>	<b>0.58</b>
PP1	<b>0.30</b>	0	0.3	0.3	0.3	0.7	0
PP2	<b>0.60</b>	0	0	0.7	0.7	0.7	0.7
PP3	<b>0.61</b>	0.3	0	0.7	0.7	0.7	0.7
PP4	<b>0.62</b>	1	0.3	0.3	0.7	0.7	0.7
PP5	<b>0.56</b>	0.3	0	0.3	0.7	0.7	0.7
PP6	<b>0.80</b>	0	0.3	1	1	1	0.7

The table shows that the partners reported rather high levels of organizational learning. Except for the lead partner, all partners reported that several aspects of the project knowledge have been implemented by larger or multiple parts of the organization. As a result of the project, partners started taking climate change adaptation into account in planning processes or communication efforts or adopted new approaches towards stakeholder communication or land purchasing. Most organizational learning was reported on by partner 6 (and sub-partners) where the project had a major influence on relevant organizational policies. What played an important role here is that the region was highly affected by floods in 2014. As a result, there have been lots of opportunities to share and discuss the project knowledge inside the various home organizations. It is within this context that the influence of the cooperation project – although hard to prove – has been substantive. Also partner 4 reported a variety of organizational learning processes in relation to communication and hydrology. This organization also made most efforts to actually transmit knowledge to other parts of their organization. What certainly played a role here is that multiple persons (a communication officer and a hydrologist) actively participated throughout the project.

The lowest score is calculated for the lead partner. Most notably in this organization were efforts made by hydrologists, who looked for ways but lacked support to implement an online information system. The influence of the project mostly tacit but still considerable. Since the WAVE project, climate change is considered. This was not the case before.

#### ***Condition: participants transferring to organization [average score = 0.63]***

This condition is assessed by looking at the ability and motivation of participants and the opportunities provided by the project and organizational context to transfer knowledge to the partner organizations. The underlying hypothesis reads: the higher the ability, motivation, opportunity of project participants (or partners) towards the transfer of project knowledge to their respective home organizations, the greater the degree of organizational learning.

#### **Participant abilities [average score = 0.7]**

The key participants (i.e. the project managers) generally worked already for a long period of time at the involved partner organization. All of them have a rather good overview of their own organization and very good knowledge of and contacts inside their own department. Organization size and structure plays an important role. The French partner is a very small organization with everyone knowing each other whereas the German, Belgian and English partners are rather large organizations consisting of rather diverse departments. All of them are in the position to influence decisions or to change routines as long as they concern small-scale changes inside their own department. Changes that involve changes to the yearly budget are beyond their scope. Hence, differences in terms of ability seem to be marginal and all partners are given a 0.7 score.

#### **Participant motivations [average score = 0.57]**

Looking at the motivations of participants to transfer knowledge to their own organization, we observe some clear differences across partners. Some participants were rather active organizing separate meetings and actively sharing information with colleagues. Others would approach a colleague when a topic of interest arose. Again others would just provide information when colleagues were asking for certain information or assert that actively sharing information is hardly necessary. None of the participants was truly motivated to transfer knowledge to larger parts of its organization.

#### **Participant opportunities [average score = 0.62]**

The project context provided very good opportunities to engage various colleagues. Colleagues of various departments could be participate in the Joint Actions and the director or chairman could become a member of the steering group. Several participants mentioned the latter as a very good opportunity for obtaining support inside their own organization. As for opportunities provided by the organizational context, knowledge transfer in some organizations occurs largely ad hoc whereas in other organizations there are more structural means available for transferring knowledge such as lunch break presentations, in-house magazines and regular board meetings to which technical experts can provide direct input.

#### ***Condition: partner organization properties***

This condition is assessed in terms of “prior related knowledge” (the extent to which project knowledge is related to what is already known), the general “relevance” of the project theme to the organization (with specific attention for external events, added on the basis of the case study results) and “other structural factors” such as an aversion to change. The underlying hypothesis reads: the higher the absorption capacity of the partner organizations, which relates to their prior related knowledge and experience, the relevance of the project theme and structural factors, the greater the degree of organizational learning.

#### **Prior related knowledge [average score = 0.68]**

There are rather large differences between partners in terms of prior related knowledge and experience. The lowest score on this indicator is given to the French partner, which did not take climate change into account and had never been involved in a European or other international cooperation project. The Belgian partner and one Dutch partner have the highest scores on this indicator. Both of them participated in multiple European projects before and were already considering the effects of climate change on water management. The other partners had some European project experience and made a start with climate change adaptation.

#### **Relevance of the project theme [average score = 0.75]**

The project theme was, according to the participants, at the interface of climate change and flood risk management. This theme was most relevant to the English partner (including sub-partners). In the country and the region, climate change has been on the agenda for some time (although attention was diminishing during the WAVE project). Moreover, the region experienced two major flood events raising the attention for flood risk management. In most of the other regions, the attention for climate change has been growing during – and also as a result of – the WAVE project. Several participants stressed that the WAVE project made their organizations realize that other organizations were taking more adaptation actions and that they should do the same. Thus, the responses already point towards the influence of the project on the organizations involved.

#### **Supportiveness of organizational context [average score = 0.32]**

All partners mentioned one or multiple structural factors that affected the uptake of project knowledge. Most of these factors were restrictive and they included lack of organizational support (yet), influence of politics on policy processes, contextual differences such as other safety standards or task division. Only the Belgian organization was said to be rather open towards new ideas.

#### **Synthesis and preliminary observations**

On the basis of our conceptual model, we expect that (a combination of) two partner conditions are potentially relevant to organizational learning. The results are summarized in Table 7. The overall level of knowledge transfer to the partner organizations is relatively low (below 0.5) with clear differences across partners.

*Table 6 – Overview of how the project scores on conditions and outcome of network/societal learning*

	Participant indicators				Organization indicators				Outcome
	Ability	Motiv.	Opport.	PART_OR	Prior	Relev.	Struct.	ORG_AB	OR_LRN
<b>Avr</b>	<b>0.7</b>	<b>0.57</b>	<b>0.62</b>	<b>0.63</b>	0.68	0.75	0.32	<b>0.58</b>	<b>0.58</b>
PP1	0.7	0.7	0.7	<b>0.70</b>	0.7	0.7	0.3	<b>0.57</b>	<b>0.30</b>
PP2	0.7	0.7	0.3	<b>0.57</b>	0.7	0.7	0.3	<b>0.57</b>	<b>0.60</b>
PP3	0.7	0.3	0.3	<b>0.43</b>	1	0.7	0.7	<b>0.80</b>	<b>0.61</b>
PP4	0.7	0.7	1	<b>0.80</b>	1	0.7	0.3	<b>0.67</b>	<b>0.62</b>
PP5	0.7	0.3	0.7	<b>0.57</b>	0	0.7	0.3	<b>0.33</b>	<b>0.56</b>
PP6	0.7	0.7	0.7	<b>0.70</b>	0.7	1	0	<b>0.57</b>	<b>0.80</b>

As for the potential influence of the participant properties ability, motivation and opportunity, we observe that three partners have higher scores and that two of these partners also have higher scores for organizational learning. Thus, this condition may be necessary but insufficient for organizational learning. In this specific case, all partners have the same score on ability and therefore this property is not relevant here. The partner with the highest score on opportunity also has the highest score on organizational learning.

The capacity of organizations to absorb knowledge is rather diverse. The partner with the highest score on organizational absorption (partner 3) does have a high but not the highest score on

organizational learning. The responsible project manager explained that the organization is still relatively young and fast-growing. Depending on the organization unit, absorption can be rather high at team level. The organization as a whole has probably already become less flexible. The organization also has a rather large size, which is reflected in the outcome: some concrete project results were absorbed by smaller parts of the organization but no influence could be observed on the organization as a whole.

Partners with the highest scores on organizational learning have relatively high scores on the relatedness and relevance of project knowledge. Structural factors seem to be irrelevant, which could be explained by the fact that as long as project knowledge is relevant and related, it will be used even if the organization context is not supportive of learning and knowledge transfer.

### 3.3 Network and societal learning

This section describes the results for the variables that are included in the hypothetical model of network and societal learning. We initially linked this form of learning only to networks and communities. However, on the basis of the case study results we decided to also include the learning by other organizations. Thus, network and societal learning refers to the transfer of project knowledge (i.e. project information, results and lessons learned) to organizations, networks and communities that were not included as partner in the project and therefore can be seen as ‘external actors’. As for the conditions that are relevant to network and societal learning, we include the two project-level conditions “theme” and “strategy” (they were initially in the analysis of organizational learning) and the partner-specific conditions “participants transferring”, “participants scoping” and “external actors absorbing”. After discussing how the partners score on the outcome of interest (network and societal learning), we provide an explanation of how the project or its partners score on the five presented conditions. We than synthesize and discuss the results.

#### ***Outcome: network and societal learning [average score = 0.27]***

Like “organizational learning”, the outcome “network and societal learning” is assessed using different levels of knowledge transfer (see also Table 4). The focus is here on the transfer of project knowledge (i.e. information, results, lessons learned) to so-called ‘external actors’. These are organizations, networks or communities who were not directly involved as partner in the project. On the basis of the case study results, we decided to exclude the level “adoption” (other actors considering or making an effort to adopt) from the results since separating this level from the levels “interaction” (discussions about project knowledge) and “influence” (contribution or influence of project knowledge) is difficult and not meaningful in practice. The overall score of network and societal learning is obtained using a similar approach as for organizational learning. In assigning scores to the various levels, we valued knowledge transfer to actors outside the project region higher than inside the region (i.e. the region where regional actions have been implemented). Table 7 provides an overview of how the partner organizations score on transferring knowledge to external actors.

*Table 7 – Overview of the transfer of knowledge to external actors*

	Total score (div. by 21)	Transmission (weight 1)	Presentation (weight 2)	Interaction (weight 3)	Influence (weight 4)	Implement (weight 5)
Avr	<b>0.32</b>	<b>0.68</b>	<b>0.38</b>	<b>0.57</b>	<b>0.33</b>	<b>0.05</b>
PP1	<b>0.37</b>	0.7	0	0.7	0.7	0
PP2	<b>0.23</b>	0.7	0.3	0.3	0.3	0
PP3	<b>0.36</b>	0.7	0.7	0.7	0.3	0
PP4	<b>0.23</b>	0.7	0.3	0.7	0	0
PP5	<b>0.12</b>	0.3	0.3	0.3	0	0
PP6	<b>0.59</b>	1	0.7	0.7	0.7	0.3

The results show that network and societal learning was limited even though most partners have been relatively successful in sharing project information, results and lessons learned with other actors, inside and outside the project region. This partly relates to the fact that stakeholder communication was an important aspect of the project and included in the regional actions of all partners. In addition, the project was part of the cluster SIC-ADAPT implying that apart from partner 5, all partners transmitted some of the results to actors outside their respective regions. We further observe that knowledge was rather transferred by means of informal interactions than presentations. The partner that has been most successful in transferring project knowledge to external actors is partner 6, the Somerset County Council. This partner has made widespread efforts to transmit project information and knowledge. The project manager reported – and the lead partner also noted – that transferred knowledge has influenced policy making and was also used to inform the establishment of a new water authority. What may have played a role in this case is that the partner collaborated with several sub-partners.

The partner with the lowest score is partner 5, a French water institute. Within the context of its regional actions, the partner shared some project-related knowledge and interacted about this with actors inside its own region. However, no specific efforts were made to share some of the project results with actors outside the region.

#### ***Condition: participants/partners transferring [average score = 0.63]***

In a previous version of the hypothetical model (see Vinke-de Kruijf, 2015), this condition was assessed using the indicators “linkages” (collaboration with other actors) and “partner-specific factors” (e.g. motivation, ability). When preparing the report of the second interview, we decided to reformulate these indicators into “ability”, “motivation” and “opportunity”. The underlying hypothesis was that network and societal learning is more likely to occur when projects involve partners that have formal and informal linkages with other organizations in networks and are able and willing (i.e. have the motivation and position) to influence networks and policy processes. This hypothesis can now be reformulated as: The higher the ability, motivation, opportunity of project participants (or partners) towards the transfer of project knowledge to other organizations, network and communities, the greater the degree of network and societal learning. In assessing this condition the focus is on key participants since they are most likely to transfer project knowledge. However, the ability, motivation and opportunity of the partner organization as a whole is taken into account when relevant.

#### ***Participant/partner abilities [average score = 0.68]***

Most of the project partners have an extensive network inside the project region and some contacts outside their own region. For example, project participants were also member of an inter-organizational working group or network. The lead partner has the highest score on ability since the involved chairman and project manager both have an extensive national network and also contacts at the European level. The chairman was, for example, in a panel with European commissioner of DG Climate. Partner 2 has the lowest score. Although this partner is involved in other EU projects, the network of partner 2 is mostly in its own region.

#### ***Participant/partner motivations [average score = 0.48]***

Most partners deliberately designed the project to engage stakeholders inside their own region. However, they did not make specific efforts to transfer knowledge to other organizations, networks or region. The most notable exception is partner 6, where the project manager bothered sending information to other relevant projects or organizations. Furthermore, the lead partner reported that the project experiences were used to raise the awareness of climate change at the national level. Also, they actively sought to engage actors at the national level in the final conference.

**Participant/partner opportunities [average score = 0.67]**

Opportunity was initially not included as indicator of this condition. However, in several partner regions opportunities arose, for example, in the form of extreme weather events. The English partner highlighted two flooding events of which one in particular provided a chance to widely discuss the project results. The Belgian partner highlighted an extreme rainfall event, which brought together a wide range of actors. The lead partner explained that the chairman became one of the nine climate ambassadors in the Netherlands and therefore gained direct access to national policymakers. Also other partners explained that they cooperate with other actors in various networks and groups (see also ability). However, they hardly used these networks or groups to transfer project knowledge. For example, partner 5 mentioned several networks and events that could be used to transfer project knowledge but could not identify any opportunity to transfer knowledge.

**Condition: participants/partners being strategic about project scope [average score = 0.49]**

This condition measures whether participants (or their organizations) have been strategic about the project scope. This condition is assessed using the indicators “activities”, “framing”, “actors” and “long-term perspective”. The underlying hypothesis is: the more strategic partners are about the project scope (i.e. what they do and communicate, with and to whom and how), the greater the degree of network and societal learning.

**Strategic inclusion of activities [average score = 0.33]**

The implementation of concrete actions was an important aspect of the project. Some of them were innovative and included, for example, a pilot study or a demonstration project. This was especially the case for the Belgian partner, which tested new approaches for stakeholder communication and land acquisition (the latter was not planned but adopted because of time constraints) and innovative construction techniques. Most of the interviewees stated that the project was no really innovative but accelerated the implementation of existing plans. Worth mentioning is that in several regions, the planned actions had to be adapted due to time constraints or a lack of support. For example, one Dutch partner had to completely abandon its original investments.

**Strategic framing [average score = 0.48]**

How to frame the project theme – i.e. climate change adaptation – was an important aspect of the group learning process. Through their discussions and experiences, the participants learned that climate change adaptation is best framed through the lens of extreme weather events. During the project, such extreme events occurred in England and also in Flanders. The majority of the partners framed the project in a specific way to match the needs of regional stakeholders. The lead partner framed the project theme through two different lenses (climate active cities and extreme events). Only the English partner explicitly stated that project knowledge was presented in different ways depending on whether communication was targeted at the local, regional, national or international level.

**Strategic inclusion of actors [average score = 0.63]**

A strategic choice at the project level was to include directors or chairmen of the various partner organizations. This has been an important aspect to some (most notably the lead partner) but not all partners when it comes to the wider dissemination of project knowledge. Several partners further actively involved one or several persons of other organizations in one of the (joint or regional) project actions. For the English partner, it was a strategic choice to include all organizations with a role in local or regional water management – who had a history of conflicts and disputes – as sub-partner in the project.

**Change process [average score = 0.50]**

For most partners, the WAVE project is not a stand-alone project but clearly linked to the preceding JAF project (four WAVE partners were also in JAF) and the subsequent DROP project (all WAVE partners are in DROP). To the lead partner and some other partners this series of projects is clearly part of a process towards considering climate change in water management. However, in some cases

the linkages across projects are mostly of practical nature. For example, the integrated planning action of the German partner in WAVE was a follow-up from JAF and a study on reservoir management that is now included in DROP is a follow-up from WAVE and another INTERREG IVB project (AMICE). In all cases, connections to a longer and more encompassing change process were limited to the partner organizations.

#### ***Condition: external actor properties [average score = 0.64]***

This condition measures whether external actors are likely to absorb project knowledge. The condition was assessed using the indicators “theme” (added on the basis of the case study results) and “supportiveness of governance system” (initially divided into network and structural context). With respect to the governance system, the focus is on the general supportiveness of the governance system towards climate change adaptation. This includes, for example, the presence of cooperation structures between actors and across governance levels, advanced (open, flexible) information management and polycentric governance with a balance between top-down and bottom-up influence and actors having the capacity to self-organize. Rather than assessing the governance system (which would be a study in itself), we limited our analysis here to factors that would clearly restrict or support the transfer of project knowledge. The underlying hypothesis is: the more relevant the project theme and the more supportive the structural governance system, the greater the degree of network and societal learning.

#### **Relevance of theme [average score = 0.67]**

At the start of the project, climate change adaptation was high on the agenda in Great Britain but far less in other countries. In the Netherlands, this has changed during the project with climate change adaptation becoming a highly relevant theme at various governance levels. Also in Belgium, the importance of climate change in a water management context has been growing during the project. In Great Britain, the attention for climate change as such was diminishing but flood events towards the project end have led to a sharp increase of attention for flood risk management. According to the partners from Germany and France climate change is not yet seen as important in regional water management in these countries.

#### **Supportiveness of the governance system [average score = 0.62]**

In most regions and countries, the governance system was rather supportive of climate change adaptation. Restrictive factors include the role of politics and the need for consensus in decision-making (most notably in Germany, France and the United Kingdom) and the fragmented policy landscape (the Netherlands and the United Kingdom). However, as the Dutch governance systems shows, fragmentation does not need to be a problem when well-developed cooperation structures are in place. The governance system that is most supportive of knowledge transfer is probably the Flemish one since the participating organization is the central actor in water management, cooperates well with other organizations and has advanced systems for information management.

#### ***Condition: communication and dissemination strategy [average score = 0.43]***

This condition focuses on the strategy for communication and dissemination at the project level and is assessed using the indicators of “proactive”, “specific” and “engaging”. The underlying hypothesis is: the more proactive, specific and engaging the diffusion strategy of a project, the greater the degree of outsider learning.

#### **Proactive [score = 0.7]**

A communication strategy has been prepared in the first year of the project. The proposed strategy was facilitative: materials were prepared at the project level and to be used by partners at the regional level. These materials included a website (English only), magazines (five editions, four languages), videos (towards project end) and two conferences (one on communication in November 2010 and an end conference in May 2013). The strategy made use of a limited number of

communication means but was relatively proactive in the sense that materials and actions were implemented throughout the project lifetime.

#### **Specific [score = 0.3]**

The communication strategy distinguished between four target groups: (1) administrators (politicians, policymakers) of water authorities (national, regional), provinces, municipalities and recreational organizations in partner regions; (2) experts spatial planning and water management (e.g. consultants, civil servants); (3) NGOs with a role in flood risk management; (4) nature conservation and environment organizations. All of them would be informed via the website and WAVE magazines and made aware through publications in professional magazines. Moreover, the first and main target group (administrators) would be engaged in the final conference. At the regional level, actions would involve citizens and land owners. Even though target groups have been specified, the strategy does not provide concrete details on how to inform these target groups, raise their awareness or to obtain their commitment.

#### **Engaging [score = 0.3]**

The facilitative communication strategy encouraged partners to communicate project knowledge inside their own region. However, the strategy did not encourage the partners to also communicate project knowledge to other region or levels such as the national or the European level. The strategy engaged partners by actively involving them in providing material for the magazines (e.g. they were interviewed). Furthermore, there were opportunities to engage colleagues and external actors in one of the project actions. Communication officers of the various partners participated in a workshop.

#### ***Condition: communication of project knowledge [average score = 0.3]***

This condition (previously project theme) focuses on the actual implementation of project knowledge communication at the project level. The condition as well as the associated indicators have been adjusted since the case study drew attention to the fact that whether project knowledge is communicated also matters and that this is not necessarily the case. The focus is now on whether and what kind of information has been made “available”, the degree to which information was also “accessible” (understandable, easy to absorb) and “relevant” to external actors (right time and generalizable). The underlying hypothesis is the more and better communicated and directly relevant the project results, the greater the degree of outsider learning.

#### **Available [score = 0.3]**

Those who are interested to learn about the results of the WAVE project have to search for them. The project website provides some basic information on what has been done in the project regions and also provides a copy of the last magazine (in four languages) and a final report (in English only). Apart from the organization of a final conference and participation in an INTERREG cluster, no specific efforts were made to actually communicate the project to larger groups of potential users. Dissemination was mostly achieved via personal contacts and networks.

#### **Accessible [score = 0.3]**

The website provides information on what the partners did in their regional actions and the results of these actions. More information and general lessons learned are provided in the final report. The problem is that lessons learned at the regional level are usually rather context-specific whereas the lessons learned are very general. No information is provided on what would work in which context and why. This probably relates to the fact that participants tend to believe that project knowledge can only be understood when using direct means of communication. The best overview of project results can be obtained from the SIC-Adapt knowledge platform, which includes tools and measures that were applied or developed by five (out of six) partners and contact information of three partners. Contact information for all partners is provided at the website.

### **Relevant [score = 0.3]**

In most of the participating countries, climate change adaptation has been rising clearly on the political agenda implying that the project theme are potentially relevant to other actors. The SIC-Adapt knowledge platform shows that participants consider some of the applied tools and measures as being useful in other contexts. However, the project results particularly stress that implementation of actions is highly dependent on local/regional conditions and circumstances (e.g. problem needs to be urgent and important, need for support from the management, integrated and tailor-made regional approach is required). The idea that WAVE would contribute to the adoption of a ‘blueprint’ of climate-proof catchments (which was presented in the communication strategy) is not reflected in any of the presented project results.

### ***Synthesis and preliminary observations***

On the basis of our conceptual model, we expect that (a combination of) two project conditions and three partner conditions are potentially relevant to network and societal learning. The results are summarized in Table 8. The overall level of knowledge transfer to other relevant, external actors is clearly low. On the basis of a single project, we cannot draw any conclusion regarding the relative importance of one of the conditions. However, on the basis of the qualitative data we can make some preliminary observations regarding how the conditions may have played a role.

*Table 8 – Overview of how the project scores on conditions and outcome of network and societal learning*

	Project conditions		Partner conditions			Outcome <i>NS_LRN</i>
	Strategy	Commun.	Partners	Scoping	Absorption	
<b>Avr</b>	<b>0.43</b>	<b>0.3</b>	<b>0.63</b>	<b>0.49</b>	<b>0.33</b>	<b>0.32</b>
PP1			0.90	0.53	0.85	<b>0.37</b>
PP2			0.30	0.40	0.15	<b>0.23</b>
PP3			0.77	0.50	1.00	<b>0.36</b>
PP4			0.57	0.50	0.85	<b>0.23</b>
PP5			0.33	0.33	0.15	<b>0.12</b>
PP6			0.90	0.68	0.85	<b>0.59</b>

As for the project conditions, we observe that the project provided little incentive to partners to communicate the project results widely outside their own project region. Moreover, the project as a whole produced and shared project knowledge to a limited degree only. The low score on strategy and communication may thus partly explain the low overall score on network and societal learning.

When looking at the partner-specific conditions, we observe that one partner (partner 6) stands out from the other partners. This partner had, on average, a relatively high ability, motivation and opportunity to transfer project knowledge to external actors, has been most strategic about the project scope and, in this region and country, relevant external actors are relatively likely to absorb project knowledge. However, on the first and the last condition, partner 1 has the same score. Moreover, partner 3 has a higher score on absorption. Partner 1 and 3, however, have a much lower score on network and societal learning. All three conditions seem to be necessary but insufficient implying that only a combination of all three may produce high levels of network and societal learning.

## 4 Discussion and conclusions: evaluation method and findings

This section discusses the applied evaluation method and findings. The first section discusses the learning outcomes. The next section discusses the conditions that are relevant to learning and therefore will be included in further research.

### 4.1 Learning outcomes

The outcomes of a European cooperation project have been assessed in terms of group learning by project participants, organizational learning by partner organizations and network and societal learning by external actors. The concept of group learning is rooted in the literature on social learning and measured in terms of substantive and relational learning. The concepts of organizational and network and societal learning are rooted in the literature on organizational, policy, network and societal learning and were measured in terms of knowledge transfer levels. Learning was measured for every partner organization on the basis of an interview with one key participant and documents. The resulting scores for learning are summarized in Table 9.

*Table 9 – Overview of how the WAVE project scores on the group learning indicators substantive learning (SUB\_L), relational learning (REL\_L), the outcomes group learning (GR\_LRН), organizational learning (OR\_LRН) and network and societal learning (NS\_LRН), and learning on average (LRN\_AVР)*

	SUB_L	REL_L	GR_LRН	OR_LRН	NS_LRН	LRN_AVР
Avr	<b>0.68</b>	<b>0.50</b>	<b>0.67</b>	<b>0.58</b>	<b>0.32</b>	0.52
PP1	0.3	0.7	<b>0.6</b>	<b>0.30</b>	<b>0.37</b>	0.42
PP2	1	0.3	<b>0.83</b>	<b>0.60</b>	<b>0.23</b>	0.55
PP3	0.7	0.7	<b>0.7</b>	<b>0.61</b>	<b>0.36</b>	0.56
PP4	0.7	0.7	<b>0.7</b>	<b>0.62</b>	<b>0.23</b>	0.52
PP5	0.7	0.3	<b>0.6</b>	<b>0.56</b>	<b>0.12</b>	0.43
PP6	0.7	0.3	<b>0.6</b>	<b>0.80</b>	<b>0.59</b>	0.66

The table shows that the learning outcomes were in most cases – but not always – highest at the project level, lower for partner organizations and lowest for external actors. Important to realize is that group learning is measured in a completely different way than organizational and network and societal learning. Nevertheless, one may indeed expect that learning is highest among project participants as these are the persons who interact most directly and intensely. The overall learning effect is highest for partner 6. This cannot be related directly to project or organizational learning since other participants and partner organizations learned just as much or even more.

#### Group learning

As for group learning, our main observation is that this largely took the form of knowledge transfer. More specific, the project drew attention to the fact that other organizations were more advanced and therefore had an important benchmarking function. Several partners mentioned that they already realized in the proposal phase that they were lagging behind in comparison with other partners. However, also partners that were clearly taking more adaptation actions could still learn from other partners. So, partners were never just “sources” or “receivers” of knowledge but fulfilled multiple roles (depending on the specific topic that was addressed).

We made a distinction between substantive and relational learning, which has been helpful to obtain more detailed information on learning. However, as the one type of learning is not more important than the other, we did not weight them separately in our assessment of overall learning. In any case, assessing group learning is rather difficult since one ideally wants to include the “depth” of learning as well as the number and relative importance of aspects that participants learned about. This would then lead to highly complex scoring methods, which we did not want to. As we have now chosen to

focus our quantitative assessment on the “depth” of learning, we do not really need to distinguish between different forms (substantive and relational) and aspects (understanding, planning and implementing climate change adaptation) of learning. However, by collecting this information we did obtain information that is very relevant for understanding learning. Therefore, we continue including this in future research.

### **Organizational and network and societal learning**

Organizational and network and societal learning were measured in terms of levels of knowledge transfer (see Table 4). In the case of organizational learning, a particular challenge was to somehow do justice to the size and diverse tasks of an organization. This aspect requires additional attention in further research. There may be a need to develop different scoring systems for organizations with different sizes.

Making use of knowledge utilization levels when assessing organizational and network and societal learning has been helpful. In doing so, we followed the approach of Landry et al (2001, 2007) who also rely on information provided by the senders of knowledge. This approach differs from the approach followed by e.g. Crona & Parker (2012) who assess knowledge utilization by the potential receivers of knowledge. Our approach implies that we can only provide a rough estimate of what has been learned. However, on the basis of the case we have the impression that it still provides an adequate estimation of learning and fits the comparative purpose of this study. As for the levels to be included, we decided to exclude the level “adoption” for network and societal learning but not for organizational learning. The level is sometimes difficult to measure as it indicates whether there is support for implementing the project results. In the case of organizational learning, several interviewees reported that the partner organization supports and in principle will implement a certain measure or tool but did not do so yet due to practical limitations. One may categorize this under “influence” since this implies that knowledge is already considered as input for policy making. However, since the influence has not become concrete we have kept this level as separate indicator. When assessing network and societal learning, this level turned out being irrelevant since participants obviously lack detailed knowledge about the extent to which external actors just consider or actually will adopt certain project results.

## **4.2 Conditions influencing learning**

This section discusses for each type of learning the relevance of the included conditions. An overview of our key findings is provided in Table 10.

### **Group learning**

In the case, group learning has been rather high and so are the scores on the various conditions. As for the relevance of the conditions that were assessed at the project level (consortium and interaction) no conclusions can be drawn on this single case. Most notable are the results for ability, motivation and opportunity since the partner with the lowest score on motivation has the highest score on group learning. The case shows that even though persons involved are not particularly enthusiastic to participate or interested in the project theme, the project may still contribute to “deep” learning.

### **Organizational learning**

Our initial conceptual framework included four conditions that are relevant to organizational learning but we later grouped two of them under network and societal learning. Hence, we limited our assessment to whether the properties of the participants and their organizations are relevant to organizational learning. Both conditions seem to be relevant. In the second condition we also included structural factors related to the general supportiveness of the organization towards learning and knowledge transfer. This indicator seems to be less relevant than relatedness and relevance of project knowledge.

### **Network and societal learning**

In the analysis of network and societal learning we included five conditions that are potentially relevant to network and societal learning. The results indicate that strategy and communication could be grouped since they both address the same key question, namely does the project facilitate and stimulate partners in the communication of project knowledge to external actors. The presence of an adequate communication strategy and the actual availability, accessibility and relevance of project knowledge are all indicators of this. As for the other three conditions, the results suggest that a combination of all three conditions needs to be present for network and societal learning to occur.

*Table 10 – Overview of conditions that may be relevant to the different forms of learning and key findings*

<b>Condition that may be supportive towards...</b>	<b>Key findings</b>
<b>Group learning (substantive and relational)</b>	
<u>Consortium (project)</u> : balanced (neither too homogeneous nor too diverse, neither too new to each other nor too close) and partners with complementary knowledge.	Measured at project level – no conclusions can be drawn. Preliminary observation is that this may be of particular relevance to “collective learning”.
<u>Interaction (project)</u> : quality, quantity and facilitation of interaction moments and activities.	Measured at project level – no conclusions can be drawn. Preliminary observation is that this may be of particular relevance to “collective learning”.
<u>Participants</u> : ability, motivation, opportunity in relation to the project	The results indicate that this relation rather work the other way around, which is highly unlikely.
<b>Organizational learning</b>	
<u>Participants</u> : ability, motivation, opportunity in relation to the transfer of knowledge to their respective organizations	No conclusion on ability as there were no clear differences across partners. Motivation and opportunity seem to be relevant.
<u>Organizations</u> : absorption capacity, which is assessed in terms of prior related knowledge and experience, the relevance of the project theme and structural factors	The relatedness and relevance of the project knowledge are relevant in the case. Data about structural factors is interesting but may not be of direct relevance to organizational learning.
<b>Network and societal learning</b>	
<u>Strategy (project)</u> : a proactive, specific and engaging diffusion strategy	Likely to be relevant, could be merged with communication.
<u>Communication (project)</u> : project knowledge is accessible, available and relevant to external actors	Likely to be relevant, could be merged with strategy.
<u>Participants</u> : ability, motivation, opportunity towards the transfer of project knowledge to external actors	Likely to be a necessary but insufficient condition.
<u>Scoping</u> : participants are strategic about activities, framing, involvement of others and wider change processes.	Likely to be a necessary but insufficient condition.
<u>External actors</u> : relevant project theme and a supportive structural governance system.	Likely to be a necessary but insufficient condition.

### **4.3 Concluding remarks and implications**

As explained in the previous sections, we used the case study to refine our conceptual framework (i.e. conditions were shifted, indicators added or removed). Also, we found that we need to further improve the measurement of organizational and network and societal learning. The conditions that have been included are all likely (or not unlikely) to be relevant to the different forms of learning.

However, at this stage, we cannot draw any final conclusions on the conditions that are necessary or sufficient for learning to occur. Further research (inclusion of more projects) as well as the systemic comparison of findings across projects and participants using software for Qualitative Comparative Analysis is planned and required for this.

At this stage, we cannot provide concrete recommendations to practitioners and policymakers and therefore limit ourselves to some preliminary suggestions. The case seems to suggest that high levels of learning is produced by a combination of factors that are related to the project (design and implementation), properties of individual participants (ability, motivation and opportunity towards the project and knowledge transfer) as well as to project-external factors (e.g. external events). This has a number of implications for those involved in the design and implementation of a project. First of all, we observe that project properties cannot ‘make or break’ learning but certainly can (to a certain degree) promote learning. Examples of such properties are provided by the various conditions that were assessed at the project level: a balanced consortium (condition 1.A), regular and high-quality interactions (condition 1.B), adequate communication strategy (condition 3.A) and actual communication efforts (condition 3.B). In addition, we observe that project properties can influence the properties of participants. The project context (next to the organization context) may strengthen the ability of participants to participate or transfer knowledge and can also motivate them and provide them with opportunities to participate or transfer knowledge. At the project level, the lead partner or a facilitator can initiate certain activities, make suggestions or provide materials. For example, the project design can stimulate organizational learning by actively involving policy and decision-makers in a steering group (as was done in the WAVE project) or stimulate network and societal learning by identifying outcomes that are relevant to other European regions. In any case, participants and partners have an important role since they can ensure that the project activities are in line with or adjusted to organizational or external conditions and circumstances. They can ensure that the project builds upon prior related knowledge and is relevant to the organization. Also, they can be strategic about how they frame the results, who they involve or what they connect. Thus, while external developments cannot be influenced, participants can do a better or worse job in using or acting upon them.

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## Annex A - Operationalization of indicators (scoring method)

### Group learning

#### Outcome GROUP LEARNING (GR\_LRН)

- Starting-points: group learning may concern substantive aspects as well as relational aspects on how to deal with climate change adaptation (including understanding, planning and implementing). High levels of learning have occurred when project documents reflect and participants report that truly new understandings, insights and knowledge were acquired.
- Score: First, substantive and relational learning are each given a score. Next, the overall level of group learning is determined by taking the arithmetic mean of the following two: (1) arithmetic mean of substantive and relational learning; and (2) maximum value of substantive and relational learning (maximum aggregation).

Indicators:	Score = 0	Score = 0.3	Score = 0.7	Score = 1
SUB_L (substantive aspects), REL_L (relational aspects) and GR_LRН (group learning) of climate change adaptation (CCA)	Project did not provide new knowledge or insights to participants. Understandings did not change.	Project led to improved or broader (not new) knowledge, insights or understandings.	Project led to partly improved and partly new knowledge, insights and perspectives.	Project was an eye-opener providing truly new knowledge and perspectives.

#### Condition PARTICIPANT PROPERTIES (PART\_PR)

- Hypothesis: The higher the ability, motivation, opportunity of project participants in relation to the project, the greater the degree of substantive and relational learning.
- Score: For every partner organization, the condition “participants” is measured by taking the average score of the indicators AB\_PR, MOT\_PR and OPP\_PR.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
AB_PR: Did participants have the knowledge and skills (ability) to meaningfully interact?	Partner organization has not been involved in similar projects and participants do not feel comfortable with the project language.	The lack of knowledge and skills of some but not all participants was limiting interactions.	Participants are not fully comfortable but have sufficient ability to interact and contribute.	Partner organization is experienced and participants are comfortable with communicating in project language.
MOT_PR: Did the project and organization contexts provide participants with a motivation to participate and learn?	The theme is not of direct interest to most participants. There is little support inside the partner organization.	Several participants were reluctant to participate multiple times. The project theme was not of specific interest to key participants.	Some participants were initially reluctant to participate or some participants were not really interested in the topics being discussed.	Project has priority in partner organizations and participants are highly motivated to participate and learn.
OPP_PR: Did the project/organization context provide participants with the chance to regularly interact over a longer period of time?	No continuity in participation. Participation on an ad hoc basis.	Participants were changing during the project with very few persons interacting regularly over a longer period of time.	A core group of persons interacted regularly over a longer period of time. Participation of others changed over time.	Regular interactions and high continuity in participation with hardly any changes in staff.

### Condition CONSORTIUM (CONS)

- Hypothesis: The more balanced a consortium is (neither too homogeneous nor too diverse, neither too new to each other nor too close) and the greater the extent to which partners have complementary knowledge, the greater the degree of substantive and relational learning.
- Score: the condition CONS (a balanced consortium with complementary knowledge) is measured by taking the average score of the indicators COLL, DIV and COMPL.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
COLL: Did partners and their organizations collaborate before?	None of the partners collaborated before. Or: one or more partners collaborated before but this experience was rather negative.	Most of the partners are new but there are some linkages that ease collaboration.	Collaboration is only slightly constrained by partners being either too new or knowing each other rather well.	There has been previous collaboration but cognitive blockage has been prevented by adding new persons and partners.
DIV: Was the partnership characterized by balanced diversity?	Partners and partner regions are highly heterogeneous and therefore have great difficulty to find a common theme of interest.	Some of the partners and partner regions can learn from each other but there is no common theme or interest binding all of them.	Partners are rather similar but share a common interest and can still learn from each other.	Partners represent diverse roles and functions, experience highly similar or common problems and can learn a great deal from each other.
COMPL: Did participants have complementary and possess all relevant knowledge?	Participants were similar in terms of role and function in the project and their own organization.	Some diversity was achieved but most of the participants had similar knowledge.	Diversity of knowledge but not all relevant knowledge types were covered.	Participants were diverse and included persons who could provide substantive, procedural and political knowledge.

### Condition Interactions (INT)

- Hypothesis: The greater the quality and quantity of interaction moments and activities and the better they are facilitated, the greater the degree of substantive and relational learning.
- Score: the condition INT (well facilitated and high-quality interactions) is measured by taking the average score of the indicators INTER, ACT and FAC.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
INTER: Did interactions occur in a good atmosphere and were they regular and long enough to develop relations?	Interactions were superficial, no time to develop mutual relations. There were misunderstandings.	Interactions were enough to develop a basic understanding, but did not allow for relations to develop.	Interactions were just long and often enough to develop mutual relations and understandings.	Interaction moments are characterized by a pleasant atmosphere. Information exchange was without problems.
ACT: Were activities well designed and organized (e.g. thematic, involving experts)?	Cooperation activities are scattered and hardly provide new perspectives or ideas.	Only some of the cooperation activities are of high substantive quality. There is no logical connection or overall design.	Cooperation activities are of high quality but focused on knowledge transfer rather than development.	Cooperation activities are of high substantive quality (i.e. well designed and connected in a logical way) and meant to jointly develop new knowledge.
FAC: Were the exchanges and learning processes facilitated?	No involvement of any experienced or professional facilitator.	Some of the meetings have been facilitated in a professional way.	The project included a series of professionally facilitated exchange and learning processes.	All project interactions were designed and supported by professional facilitators to enhance learning processes.

## Organizational learning

### Outcome ORGANIZATIONAL LEARNING (OR\_LRN)

- Starting-points: Organizational learning is measured in terms of six different levels of knowledge transfer with transmission of project knowledge being the lowest level and implementation being the highest level.
- Score: Each knowledge transfer level receives a score on the basis of the width and frequency of knowledge transfer (no action = 0, widespread actions throughout the project duration = 1). Widespread implies that all relevant parts of the organization are concerned. The overall score of organizational learning is determined by taking the weighted average of the “level” scores (lowest level is multiplied by 1 and highest level by 6, total divided by 21). Scores are provided to all applicable level. For example, one aspect of the project may have been adopted, influential and implemented.

Indicators:	Score = 0	Score = 0.3	Score = 0.7	Score = 1
TRANS: Did participants share project knowledge inside their own organization?	No sharing with colleagues who were not involved.	Sharing was done ad hoc on a one-to-one basis.	Efforts were made to share the project results with direct colleagues and the organization at large.	Various communication means were used to share project results as widely as possible.
PRES: Did participants present project knowledge in a tailor-made way inside their own organization?	No presentations.	Presentation once for a small group only.	Multiple presentations for smaller groups or one highly influential presentation.	Various presentations were provided at various points in time for different groups.
INTR: Did participants discuss or interact about project knowledge inside their own organization?	No discussion or interactions	Discussions at one point in time	Discussions at more than one point in time.	Discussions throughout the project duration in all relevant parts of the organization.
ADOPT: Did the partner organizations have concrete plans/efforts to adopt project knowledge?	No aspects are planned to be adopted.	Efforts/support to adopt a single, relatively small aspect in a small part of the organization.	Efforts/support to adopt multiple aspects in larger or multiple parts of the organization.	Efforts/support to adopt project knowledge in all relevant parts of the organization.
INFL: Did project knowledge have an influence on the partner organizations?	Project did not have an influence on the organization.	Project had an influence on a small part of the organization only.	Several aspects of project knowledge has influenced larger or multiple parts of the organization.	Project knowledge had a major influence on the relevant organizational policies and practices.
IMPL: Did the partner organizations use or apply	Project knowledge has not been implemented.	An aspect of the project knowledge has been	Several aspects of project knowledge have been	Multiple aspects of project knowledge were

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
project knowledge thereby changing policies or practices?		implemented in a small part of the organization	implemented by larger or multiple parts of the organization.	implemented leading to major, organization-wide changes in policies and practices.

**Condition PARTICIPANT PROPERTIES related to the transfer of project knowledge to their home organizations (PART\_OR)**

- Hypothesis: The higher the ability, motivation, opportunity of project participants in relation to the transfer of knowledge to their respective organizations, the greater the degree of organizational learning.
- Score: For every partner organization, the condition “participant transferring” is measured by taking the average score of the indicators AB\_OR, MOT\_OR and OPP\_OR.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
AB_OR: Did participants have the knowledge and skills and were they in the position (ability) to transfer project knowledge to their organizations?	Key participants are rather new and not in the position to transfer knowledge inside their own organization.	Key participants have contacts in a limited part of the organization.	Key participants have an extensive network in a smaller part of the organization and can exert some influence on decision/policy processes.	Key participants had an extensive network in various parts and at various levels of the organization and in the position to influence the organization.
MOT_OR: Were participants willing to make an effort to transfer project knowledge to their organizations?	No efforts have been made. Relevance of knowledge transfer is not recognized.	When an opportunity arose knowledge has been transferred.	Made an effort to involve and transfer knowledge to direct colleagues.	Throughout the project widespread efforts were made to transfer knowledge and to engage colleagues.
OPP_OR: Did the project/organization context provide participants with chances to transfer project knowledge to their organizations?	No concrete opportunities.	Few opportunities to engage relevant colleagues.	Some opportunities to engage specific colleagues or to transfer knowledge.	Several very good opportunities to engage different colleagues and to transfer knowledge.

### Condition PARTNER ORGANIZATION PROPERTIES (OR\_PROP)

- Hypothesis: The higher the absorption capacity of the partner organizations, which relates to their prior related knowledge and experience, the relevance of the project theme and structural factors, the greater the degree of organizational learning.
- Score: For every partner organization, the condition “participant transferring” is measured by taking the average score of the indicators PRIOR, THEME and STRUC.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
PRIOR: Did partners have prior related knowledge and experience related to the project theme or the international context?	Organization has no relevant experience with the theme and the international context.	Organization has some but limited experience with the theme or the international context.	Organization has some experience with both the theme and the international context.	Organization has extensive experience with both the theme and the international context.
THEME: Was project knowledge (particularly theme) relevant to partner organizations?	Project theme was and has not become a relevant theme.	Theme was or has become relevant to part of the organization.	Theme is or has become relevant to important part of the organization.	Project theme was and is highly relevant to the organization.
STRUC: Was the structural organization context supportive or rather restrictive towards learning and knowledge transfer for climate change adaptation?	Restrictive and no supportive structural factors.	More restrictive than supportive factors.	More supportive than restrictive factors.	Several supportive and no restrictive structural factors.

## Network and societal learning

### Outcome NETWORK AND SOCIETAL LEARNING (NS\_LRN)

- Starting-points: Network and societal learning is measured in terms of five different levels of knowledge transfer (the level “adoption” is removed in this version) with transmission of lessons learned or project results to external actors (i.e. organizations, networks and communities that have not been involved in the project) being the lowest level and implementation being the highest level. When the indicators below read ‘participant’ one may also read ‘partner organization’.
- Score: Each knowledge transfer level receives a score on the basis of the width and frequency of knowledge transfer (no action = 0, widespread actions throughout the project duration = 1). The overall score of network and societal learning is determined by taking the weighted average of the “level” scores (lowest level is multiplied by 1 and highest level by 6, total divided by 21).

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
TRANS: Did participants share project knowledge with external actors?	No sharing.	Sharing within the context of (regional) project actions.	Some sharing beyond the partner region and/or project context.	Various communication means were used at several points in time to share project results as widely as possible.
PRES: Did participants provide a tailor-made presentation of project knowledge to external actors?	No presentations.	Presentations within the context of (regional) project actions or project knowledge included in other presentations.	Several project-specific presentations to promote project and results.	Presentations were provided in diverse contexts to promote the project and its results.
INTR: Did participants discuss or interact about project knowledge with external actors?	No discussion or interactions.	Interactions within the context of (regional) project actions.	Some interactions beyond the partner region and/or project context.	Widespread and frequent interactions inside and outside partner region.
INFL: Did project knowledge somehow influence the policies or practices of external actors?	No influence.	Influence within the context or related to the scope of (regional) project actions.	Certain influence beyond the partner region and/or project context.	Project results have influenced the policies and practices of external actors at multiple levels in several ways.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
IMPL: Did external actors use or apply project knowledge to change policies or practices?	No implementation.	Influence within the context or related to the scope of (regional) project actions.	Certain use beyond the partner region and/or project context.	Multiple project results have been implemented by various external actors.

**Condition PARTICIPANT/PARTNER PROPERTIES related to the transfer of project knowledge to external actors (PART\_EXT)**

- Hypothesis: The higher the ability, motivation, opportunity of project participants or partners towards the transfer of project knowledge to other organizations, network and communities (external actors), the greater the degree of network and societal learning.
- Score: For every partner organization, the condition “participant/partner transferring” is measured by taking the average score of the indicators AB\_EXT, MOT\_EXT and OPP\_EXT.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
AB_EXT: Did participants/partners have the knowledge and skills and were in the position (ability) to transfer lessons learned to external actors?	No ability outside own organization.	Participants' ability is limited to a small group of actors in the partner region.	Participants' ability includes a large group of actors inside the partner region as well as a small group outside the partner region.	Participants' ability includes large groups of actors inside and outside the partner region and country.
MOT_EXT: Did participants/partners actively look for ways to engage external actors or to enhance knowledge transfer?	No motivation or recognition of relevance.	Project knowledge has been transferred when the opportunity arose (ad hoc).	Made an effort to engage external actors and transfer knowledge.	Throughout the project widespread efforts were made to engage external actors and transfer knowledge.
OPP_EXT: Did the project/organization context provide participants/partners with concrete opportunities to transfer the project results?	No concrete opportunities arose.	One concrete opportunity in direct context (e.g. partner region).	Multiple opportunities in direct contexts or one opportunity in wider context.	Multiple opportunities across regions and governance levels.

### Condition STRATEGIC SCOPING (SCO)

- Hypothesis: the more strategic partners are about the project scope (i.e. what they do and communicate, with and to whom and how), the greater the degree of network and societal learning.
- Score: For every partner organization, the condition “scoping” is measured by taking the average score of the indicators ACT\_STR, FRA, ACT\_INCL and LONG.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
ACT_STR: Were project activities chosen to develop or test new or alternative solutions?	Project activities were ‘business-as-usual’	A very small part of the project was about developing or testing new or alternative solutions.	Some project activities were selected to develop and test new or alternative solutions.	All project activities were selected to develop and test new or alternative solutions.
FRA: Was project knowledge (including theme and results) framed in a way that matches the user-specific situations and circumstances?	No framing of project knowledge.	Project knowledge was framed to match specific situation or circumstance of one group of users.	Project knowledge was framed to match specific situation and circumstances of two groups of users.	Project knowledge was framed in multiple ways to match situations and circumstances in various regions and at various levels.
ACT_INCL: Were relevant external actors (e.g. users, policy or decision-makers, informal networks) actively engaged in the project to enhance the project impact?	No engagement of specific users or other relevant external actors.	Engagement of one specific group of users, policy or decision-makers or informal networks.	Engagement of several relevant groups of users, policy or decision-makers or informal networks.	Engagement of a wide range of relevant groups, including users, policy or decision-makers and informal networks.
CHANGE: Was the project seen or designed as part of a longer and more encompassing change process?	Project was not linked to change process.	Project has specific connections to other projects or actions rather than to a wider change process.	Project was in multiple ways connected to a longer and more encompassing change process.	Project was in multiple ways connected to a longer and more encompassing change process that extends beyond the partner organization.

#### Condition EXTERNAL ACTOR PROPERTIES (EXT\_PROP)

- Hypothesis: the more relevant the project theme and the better interactions and information in the network and structural context are managed, the greater the degree of network and societal learning.
- Score: For every partner organization, the condition “external actors absorbing” is measured by taking the average score of the indicators THE\_EXT and GOV\_EXT.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
THE_EXT: Was the project theme on the agenda or of particular relevance to external actors?	During the project and towards its end, project theme or knowledge was of no particular relevance to external actors.	During the project and towards its end, project theme or knowledge was relevant to a small group of external actors only.	During the project and towards its end, project theme or knowledge was relevant to several groups of external actors.	The project knowledge came at the “right” time since it was high on the political and/or policy agenda of various users.
GOV_EXT: Was the structural governance system supportive or rather restrictive towards learning and knowledge transfer for climate change adaptation?	Restrictive and no supportive structural factors.	More restrictive than supportive factors.	More supportive than restrictive factors.	Several supportive and no restrictive structural factors.

#### Condition COMMUNICATION STRATEGY (COMM)

- Hypothesis: The more proactive, specific and engaging the diffusion strategy of a project, the greater the degree of network and societal learning.
- Score: For the overall project, the condition “strategy” is measured by taking the average score of the indicators PRO, SPE and ENG.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
PRO: Did the project provide a proactive and comprehensive communication and dissemination strategy?	No strategy.	Strategy exists but is limited in terms of timing and diversity of means.	Strategy was limited in means but implemented throughout the project.	Early strategy included a wide range of communication means to be implemented at various points in time.
SPE: Did the project provide a clear idea of the potential users and how to obtain their commitment or support?	No users were identified.	Target groups were identified.	Target groups were identified and partners had some idea on how to engage them.	For each target group, partners had concrete ideas on how to obtain support/commitment.
ENG: Were various partners explicitly given a role in disseminating project knowledge to external actors?	Dissemination was a lead partner task only.	Partners helped to develop or implement actions, with a focus on their own region.	Partners were engaged in shaping and implementing actions, also beyond their region.	Partners were engaged in designing, developing, implementing and evaluating actions, also beyond their region.

### Condition PROJECT KNOWLEDGE (PR\_KNOW)

- Hypothesis: The more and better communicated and directly relevant the project results, the greater the degree of network and societal learning.
- Score: For the overall project, the condition “communication” is measured by taking the average score of the indicators AV, ACC and REL.

<b>Indicators:</b>	<b>Score = 0</b>	<b>Score = 0.3</b>	<b>Score = 0.7</b>	<b>Score = 1</b>
AV: Did the project make project knowledge available to larger groups of relevant users?	Project knowledge was not distributed.	Project knowledge was made available to a limited number of users.	Project knowledge was distributed among users at multiple levels.	Project knowledge was widely distributed across regions and governance levels.
ACC: Did the project make project knowledge accessible (attractive and understandable) to users?	Project knowledge was not accessible to external actors.	Project information but hardly any concrete results or lessons learned are accessible to external actors.	Project information, results and lessons learned are presented but not in a way that makes them attractive and easy to understand.	Project knowledge was presented in an attractive and tailor-made way.
REL: Was project knowledge potentially relevant to external actors?	Project knowledge was of no particular relevant to external actors.	Project knowledge was relevant to a very specific group of users.	Project knowledge was relevant to several groups of users.	Project knowledge was highly relevant to users across regions and governance levels.

## Annex B – List of case study data

### Documents

- [FR] Final report WAVE project, October 2013, <http://www.waveproject.eu/wp-content/uploads/Final%20internal%20REPORT%20Wave.pdf>
- [Mag. 5] WAVE Magazine, June 2013 (No. 5), A WAVE of results: more climate-proof European catchments by transnational cooperation (available in EN, NL, DE, FA),  
<http://www.waveproject.eu/wp-content/uploads/WAVE%20Magazine%20no%205%20-%20juni%202013%20English.pdf>
- [Inv] International Inventory: water and spatial planning policies. April 2009. WAVE Joint Action 1.1 (not available online).
- Reports prepared by Utrecht for partner WGS: Klimaatbeleid bij Overijsselse gemeenten (in Dutch only, available via UT repository, not via WAVE website):
  - o [http://www.utwente.nl/bms/cstm/reports/downloads/WAVE\\_deelrapport1.pdf](http://www.utwente.nl/bms/cstm/reports/downloads/WAVE_deelrapport1.pdf)
  - o [http://www.utwente.nl/bms/cstm/reports/downloads/WAVE\\_deelrapport2.pdf](http://www.utwente.nl/bms/cstm/reports/downloads/WAVE_deelrapport2.pdf)
  - o [http://www.utwente.nl/bms/cstm/reports/downloads/WAVE\\_deelrapport3.pdf](http://www.utwente.nl/bms/cstm/reports/downloads/WAVE_deelrapport3.pdf)
  - o [http://www.utwente.nl/bms/cstm/reports/downloads/WAVE\\_eindrapport.pdf](http://www.utwente.nl/bms/cstm/reports/downloads/WAVE_eindrapport.pdf)
- [CV] Communication Vision WAVE project (version: 15 September 2008) (obtained via Warry Meuleman)
- Reports of Joint Actions: 1.1 (March 2010, November 2010), 1.2 (May 2010), 2.1 (May 2009, October 2010), 3.1 (May 2010, May 2011)

### Online sources

- Project website: [www.waveproject.eu](http://www.waveproject.eu)
- Cluster website (SIC-ADAPT): <http://www.sic-adapt.eu/outputs/knowledge-platform.html> (downloadable excel-sheet with tools, measures and experts)
- EU adapt portal: [http://climate-adapt.eea.europa.eu/projects1?ace\\_project\\_id=85](http://climate-adapt.eea.europa.eu/projects1?ace_project_id=85)
- Het Waterschap (magazine for NL water authorities),  
[http://www.keesfloor.nl/artikelen/diversen/waterschap\\_wave/regge/waterschap\\_WAVE.htm](http://www.keesfloor.nl/artikelen/diversen/waterschap_wave/regge/waterschap_WAVE.htm)
- Somerset partner:
  - o Somerset WAVE website: <http://www.somersetwave.co.uk/>
  - o Water Partnership: <http://www.somerset.gov.uk/organisation/partnerships/somerset-water-management-partnership/>
  - o WAVE presentation by EA:  
<http://www.somerset.gov.uk/EasySiteWeb/GatewayLink.aspx?allId=42513>
  - o Somerset Rivers Authority: <https://www.gov.uk/government/news/defra-and-local-partners-set-up-somerset-rivers-authority>
  - o Climate Southwest: <http://climatesouthwest.org/casestudy/general>
  - o IUCN: <http://www.iucn-uk-peatlandprogramme.org/peatland-gateway/gateway/case-study/rebuilding-ecological-network?destination=search%2Fwave>
  - o CAG Consultants report on local adaptation:  
[http://www.cagconsultants.co.uk/resources/climate-change-case-study/Adapting\\_to\\_Climate\\_Change\\_Local\\_Areas\\_Action\\_June09.pdf](http://www.cagconsultants.co.uk/resources/climate-change-case-study/Adapting_to_Climate_Change_Local_Areas_Action_June09.pdf)
  - o Circle-2 Adaptation Inspiration Book: [http://www.circle-era.eu/np4/%7B\\$clientServletPath%7D/?newsId=432&fileName=BOOK\\_150\\_dpi.pdf](http://www.circle-era.eu/np4/%7B$clientServletPath%7D/?newsId=432&fileName=BOOK_150_dpi.pdf)

### Interviews

- [I1] Piet van Erp, Waterschap Regge en Dinkel (lead partner), overall project manager, 13 Feb. 2015, 2 hours
- [I2] Steve Dury, Somerset County Council, project manager, 20 Feb. 2015, 1.5 hours

- [I3] Warry Meuleman, Waterschap Groot Salland, communication manager, 26 Feb. 2015, 45 minutes
- [I4] Antje Goedeking, Wasserverband Eifel-Rur, project manager, 3 March, 60 minutes
- [I5] Frank Fokkema, Waterschap Groot Salland, project manager, 6 March 2015, 45 minutes
- [I6] Aldo Penasso, Institution d'Aménagement de la Vilaine, project manager, 10 March 2015, 70 minutes
- [I7] Annelies Haesevoets, Vlaamse Milieumaatschappij, project manager, 20 March 2015, 60 minutes