



Ministry of Agriculture  
and Forestry of Finland

KIRSI MÄKINEN

JAANA SORVALI

ANNA LIPSANEN

MIKAEL HILDÉN

# Implementation of Finland's National Climate Change Adaptation Plan 2022 - A Mid-term Evaluation

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Kirsi Mäkinen, Jaana Sorvali, Anna Lipsanen and Mikael Hildén



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<p><b>Abstract</b></p> <p>The aim of the National Climate Change Adaptation Plan 2022, published in 2014, is to ensure that Finnish society has the capacity to manage the risks associated with climate change and to adapt to changes in the climate. The interim review of the plan assesses the status of its implementation and identifies needs for development in order to advance it. The coordination group, group interviews and the results of regional stakeholder workshops, as well as on a national survey and documentation base the review on a self-evaluation.</p> <p>According to the review, awareness of climate change and the need for adaptation has increased among the relevant operators. The effects and risks associated with climate change are being discussed more broadly when producing information. However, measures to manage climate-related risks are still partly lacking. Investing and focusing more on the planning and implementation of adaptation actions makes it possible to mitigate the negative consequences of climate change more effectively than what is currently being done.</p> <p>The most important needs for development have to do with increasing awareness of weather and climate-related risks and the possibilities to adapt to them, clarifying the roles and responsibilities related to adaptation and ensuring well-functioning coordination. It is also important to develop sector-specific guidance, along with tools and instructions that regional and local operators in particular can use to strengthen their adaptive capacity at their own initiative.</p> <p>Publication contains accessibility limitations related to alternative texts of graphs and images.</p>			
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<b>Tiivistelmä</b>	<p>Vuonna 2014 julkaistun Kansallisen ilmastonmuutokseen sopeutumissuunnitelman 2022 päämääränä on, että suomalaisella yhteiskunnalla on kyky hallita ilmastonmuutokseen liittyvät riskit ja sopeutua ilmastossa tapahtuviin muutoksiin. Suunnitelman väliarvioinnissa arvioidaan sen toimeenpanon tilaa sekä kehittämistarpeita toimeenpanon edistämiseksi. Arviointi perustuu hallinnon itsearviointiin, ryhmähaastattelujen ja alueellisten sidosryhmätyöpajojen tuloksiin sekä valtakunnalliseen kyselyyn ja asiakirja-aineistoihin.</p> <p>Tietoisuus ilmastonmuutoksesta ja sopeutumistarpeesta on arvioinnin mukaan kasvanut hallinnon toimijoiden keskuudessa. Ilmastonmuutoksen vaikutuksia ja riskejä käsitellään lisäksi nykyisin aiempaa laajemmin tiedon tuotannossa. Ilmatoriskien hallinta on kuitenkin vielä osin puutteellista. Paneutumalla ja panostamalla enemmän sopeutumistoimien suunnitteluun ja toimeenpanoon ilmastonmuutoksen haitallisia seurauksia voitaisiin rajoittaa nykyistä tehokkaammin.</p> <p>Keskeisiä kehittämistarpeita ovat tietoisuuden lisääminen sää- ja ilmatoriskeistä ja sopeutumismahdollisuuksista, sopeutumiseen liittyvien roolien ja vastuiden selkeyttäminen sekä koordinaation varmistaminen. Lisäksi tulisi kehittää toimialakohtaista ohjausta sekä työkaluja ja opastusta, joilla erityisesti alueelliset ja paikalliset toimijat voivat omatoimisesti vahvistaa sopeutumiskykyään.</p> <p>Julkaisun saavutettavuudessa on puutteita kuvien vaihtoehtoisten tekstien suhteen.</p>		
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<b>Referat</b>	<p>Målsättningen för den nationella planen för anpassning till klimatförändringen 2022, som publicerades 2014, är att det finländska samhället ska kunna hantera risker som anknyter till klimatförändringen och anpassa sig till förändringarna i klimatet. I halvtidsutvärderingen av planen bedöms läget när det gäller verkställandet av planen och vilken utveckling som krävs för att främja verkställandet. Utvärderingen baserar sig på en självutvärdering inom förvaltningen, på resultaten av gruppintervjuer och regionala workshoppar för berörda grupper samt på en riksomfattande enkät och dokumentation.</p> <p>Utvärderingen visar att kännedomen om klimatförändringen och behovet att anpassa sig till den har ökat bland aktörerna inom förvaltningen. Effekterna av och riskerna med klimatförändringen behandlas dessutom nuförtiden i allt högre utsträckning i produktionen av information. Hanteringen av klimatriskerna är dock fortfarande delvis bristfällig. Genom att i högre grad fördjupa sig i och satsa på planering och genomförande av anpassningsåtgärder kan klimatförändringens skadliga verkningar begränsas effektivare än i dagens läge.</p> <p>Till de centrala utvecklingsbehoven hör att öka kännedomen om väder- och klimatriskerna och om anpassningsmöjligheterna, att tydliggöra de roller och ansvar som är kopplade till anpassningen och att säkerställa samordning. Därtill bör man utveckla styrningen inom respektive sektor samt de redskap och den handledning som kan hjälpa framför allt regionala och lokala aktörer att på egen hand stärka sin anpassningsförmåga.</p> <p>Publikationens tillgänglighet är bristfällig vad beträffar de alternativa bildtexterna.</p>	
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## EXECUTIVE SUMMARY

A key finding of the mid-term evaluation is that awareness of climate change and the need for adaptation has spread within the government, and information production has been stepped up. However, the climate risks and need for adaptation are not yet recognised well enough in all sectors. Some inadequacies remain in climate risk management, and all adaptation actions have not been planned and implemented carefully enough to effectively limit the negative impacts of climate change. As key development needs in the evaluation emerged:

### **Improving awareness of weather and climate risks and the need for adaptation.**

While progress has been made since earlier evaluations were carried out, especially among government actors, the level of awareness continues to vary considerably also within the government. These variations are evident both between branches of administration and within organisations. The level of awareness is generally lower among non-government actors, and in some sectors even very low. The evaluation clearly showed that a better understanding of the relationship between adaptation and mitigation is needed among both governmental and non-governmental actors. The government has a particular responsibility to increase awareness through clear communication and systematic dissemination of information tailored to different target groups. Both governmental and non-governmental actors have the responsibility to build up the knowledge base by filling in identified information gaps.

**Clarification of roles and responsibilities associated with adaptation and ensuring sufficient coordination.** While the administrative branches have sound knowledge of the need for adaptation and available adaptation actions at least to some extent, the division of responsibilities in promoting adaptation is unclear in many sectors. The fact that non-governmental actors do not know who or which party is responsible for promoting climate change adaptation in their sectors was highlighted in stakeholders' views.

The need to clarify roles and responsibilities is stressed for cross-sectoral issues and between private and public actors. The importance of cross-sectoral adaptation issues was

highlighted by the evaluation findings, which indicates that adaptation to climate change could be promoted significantly by investing in improved coordination between actors. The roles and responsibilities should also be clarified in order to step up cooperation between adaptation and preparedness.

**Developing policy instruments to support adaptation and tools to promote practical implementation.** In all sectors, it should be ensured that preparedness for climate risks is addressed systematically when developing policy instruments. The plans and instructions produced by the government should consistently lay a foundation for practical adaptation actions. In particular, different actors' needs for concrete and practically oriented information and tools to support adaptation should be responded to.

To support the implementation of policy instruments, tools to support practical work are needed, including guides, early warning systems and communication materials as well as information targeted at individual regions and sectors, including risk and cost estimates as well as coherent scenarios and situational analyses for managing issues that transcend sectoral boundaries. Especially in those sectors where few practical level adaptation actions have been carried out so far, the focus should be on developing steering instruments and implementation tools to support actors at the operative level.

# 1 INTRODUCTION

The first National Strategy for Adaptation to Climate Change in Finland was adopted in 2005<sup>1</sup>, and its implementation was evaluated in 2009<sup>2</sup> and 2013<sup>3</sup>. In 2014, the National Strategy for Adaptation to Climate Change was followed by the National Climate Change Adaptation Plan 2022<sup>4</sup>, which is part of the planning system referred to in the Climate Change Act and which was adopted as a government resolution. The Plan also promotes the national implementation of the EU strategy on adaptation to climate change<sup>5</sup> adopted in 2013 and the UN Framework Convention on Climate Change and the Paris Climate Agreement<sup>6</sup> adopted in 2015. At Government level, adaptation work is coordinated by the Ministry of Agriculture and Forestry. A cross-sectoral monitoring group representing different ministries, research institutes and other actors playing a key role in the adaptation efforts supports the plan's implementation<sup>7</sup>.

The goal of the National Adaptation Plan is that the Finnish society has the capacity to manage the risks associated with climate change and adapt to changes in the climate. In order to reach this goal, three main objectives were set in the plan:

- A. Adaptation has been integrated into the planning and activities of both the various sectors and their actors.
- B. The actors have access to the necessary climate change assessment and management methods.
- C. Research and development work, communication and education and training have enhanced the adaptive capacity of society, developed innovative solutions and improved citizens' awareness of climate change adaptation.

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1 Ministry of Agriculture and Forestry (2005).

2 Ministry of Agriculture and Forestry (2009).

3 Ministry of Agriculture and Forestry (2013).

4 Ministry of Agriculture and Forestry (2014a).

5 European Commission (2013).

6 United Nations (2015a).

7 In the term 2015–2018, the Monitoring group members represented the Ministry of Agriculture and Forestry (Chair), the Ministry of the Environment (Vice Chair), the Ministry of Transport and Communications, the Ministry of Education and Culture, the Ministry of the Interior, the Ministry of Social Affairs and Health, the Ministry of Economic Affairs and Employment, the Ministry for Foreign Affairs, the Prime Minister's Office, the ELY Centre for Pirkanmaa, the Finnish Meteorological Institute, the Finnish Transport Agency, the Natural Resources Institute Finland, the Finnish Environment Institute, the National Institute for Health and Welfare, the Association of Finnish Local and Regional Authorities, the Helsinki Region Environmental Services Authority, Finance Finland (since 2017) and the Finnish National Rescue Association SPEK (since 2017).

The objectives of the plan are set for 2022. In that year, an evaluation of the actions and a review of the objectives will be conducted in the light of the improved knowledge base and experiences gained. The plan states that a mid-term evaluation will be conducted in 2018, at which time the additional actions necessary to reach the objectives will also be specified.

The main objective of this mid-term evaluation is to look at the progress made in implementing the National Climate Change Adaptation Plan and to gauge the level reached in practical adaptation work. A key objective is identifying actions requiring particular inputs in order to promote the plan's implementation in the remaining years of its term (2019–2022). The aims of the mid-term evaluation also include promoting climate change adaptation in different sectors, regions and municipalities.

The National Climate Change Adaptation Plan 2022 differs from the National Adaptation Strategy of 2005 in that examinations and goals relevant to individual sectors have been replaced by packages of measures and objectives concerning all sectors. The approach is cross-cutting, and the choice of more detailed actions has been left to the sectors themselves. This evaluation follows the structure of the Adaptation Plan, deviating from previous evaluations. Interviews with government actors were an important information source for the evaluation. Representatives from the energy, transport, natural resources, natural environment, defence, built environment, social and health and water resource sectors took part in the interviews.

This evaluation report comprises the following chapters:

**Chapter 2: Mid-term evaluation methodology and data sources.** The Chapter describes the data sets collected in the course of the evaluation process and the methods used to analyse them for the purposes of this report. It also introduces readers to the criteria applied in the evaluation.

**Chapter 3: Examination of the implementation status of actions in areas described in the Adaptation Plan based on the plan's objectives.** The data for this Chapter were obtained from a self-evaluation table (Appendix 1), in which members of the National monitoring group on climate change adaptation entered actions completed in their sectors, as well as through interviews with government actors conducted to complement the information in the table (Appendix 2). Section 3.5 also describes findings on regional and local adaptation work. These findings are based on interviews with Monitoring group members who are regional and local government actors as well as data collected from non-governmental stakeholders (Appendix 3).

**Chapter 4: Examination of cross-cutting themes essential for Adaptation Plan implementation.** This Chapter adds detail to the analyses discussed in Chapter 3 and focuses on central themes whose importance was stressed in the collected data: awareness of risks and need for adaptation, reconciliation of adaptation and other objectives, and cooperation related to adaptation issues within and between different sectors. The data were obtained through interviews with government actors and collected from stakeholders.

**Chapter 5: Mid-term evaluation findings on Adaptation Plan implementation.** Based on the findings described in Chapters 3 and 4, this Chapter evaluates progress made in Adaptation Plan implementation and the observed challenges. The Chapter assesses progress made with Adaptation Plan objectives A to C in relation to the evaluation criteria. The Chapter concludes with a general evaluation of Adaptation Plan implementation.

**Chapter 6: Actions to enhance Adaptation Plan implementation.** Based on the evaluation observations, recommendations are given for actions that would strengthen Adaptation Plan implementation. The proposed actions will support the work of the Monitoring group on climate change adaptation in the implementation and further development of the plan.

## 2 MID-TERM EVALUATION METHODOLOGY AND DATA

### 2.1 Evaluation process and data

The decision to launch the mid-term evaluation was made at the meeting of the National monitoring group on climate change adaptation in September 2017. The mid-term evaluation was commissioned by the Ministry of Agriculture and Forestry, and the Monitoring group participated in its planning and steering. The mid-term evaluation was coordinated by Kirsi Mäkinen from the Finnish Environment Institute. In addition, Jaana Sorvali from the Natural Resources Institute Finland, Mikael Hildén from the Finnish Environment Institute, Anna Lipsanen from the Finnish Environment Institute (from September 2018) and Essi Lahti from Tapio Oy (January–June 2018) participated in the evaluation team's work.

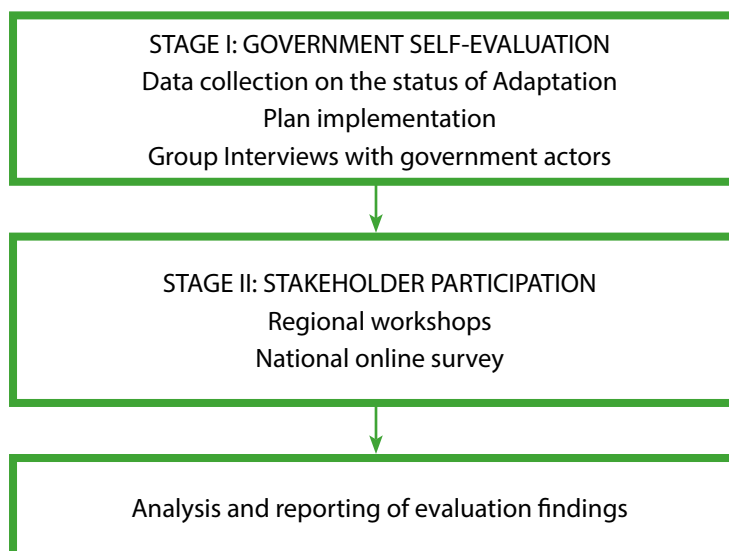


Figure 1. Process description of the mid-term evaluation



The first stage of the evaluation process was conducted as a government self-evaluation, in which a key role was played by the members of the national adaptation monitoring group. Initially, monitoring data on the status of Adaptation Plan implementation in different administrative branches were collected in the table described in Appendix 1. The self-evaluation stage included group interviews with actors from different administrative branches, mainly representatives of ministries and their agencies and research institutes. The groups were primarily convened by members of the National monitoring group who work in different administrative branches. The evaluation team facilitated and conducted the interviews. These interviews conducted in April–November 2018 were used to assess progress made with Adaptation Plan implementation and the management of identified weather and climate risks. The discussions were underpinned by monitoring data and the results of the SIETO (National weather and climate risk assessment funded by the Government's analysis, assessment and research activities) project on key weather and climate risks in each branch<sup>8</sup>. The evaluation encompassed the energy, transport, natural resources, natural environment, defence, built environment, social and health and water resources sectors. A group interview with regional and local government actors was also conducted. For information on the participants in the group interviews, see Appendix 2.

In the second stage of the mid-term evaluation, a national online survey addressed to non-government stakeholders was carried out in 11 sectors in September–October 2018<sup>9</sup>. This survey was commissioned by the Ministry of Agriculture and Forestry and conducted by Tyrsky Konsultointi Oy. As part of the same commission, stakeholder views were collected at five regional discussion events led by Akordi Oy. The stakeholder events were organised in cooperation with the producers of regional risk assessments prepared in connection with the National risk assessment update. For a full description of the stakeholder data and methods used to collect them, see Appendix 3 to this report compiled by Kati Berninger, Jonna Kangasoja, Noora Piila, Emma Luoma, Lasse Peltonen and Oras Tynkkynen. Where applicable, observations arising from the stakeholder data have been included in this evaluation report.

In addition to data collected through the group interviews with government actors and from stakeholders, the mid-term evaluation drew on the National monitoring group's meeting documents as well as the publications and online sources listed in the References section of this report.

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8 Tuomenvirta et al. (2018).

9 The consultant carrying out the third-party survey of stakeholder views was selected as a result of a tendering process. The winning candidate was selected among five tenderers based on the tender price as well as quality criteria, which comprised work plan contents and employees' competence and experience.

The analyses of the evaluation data and the report were completed in March 2019. The Monitoring group on climate change adaptation that initiated the evaluation process finished its term at the end of 2018, and a new Monitoring group started its work at the beginning of 2019. The draft report was commented on by Monitoring group members, both those having recently finished their work and the new ones, as well as experts invited to do so. The mid-term evaluation report was complemented with the comments received and submitted to the Ministry of Agriculture and Forestry in March 2019.

## 2.2 Evaluation criteria and analysis methods

The mid-term evaluation followed the structure of the Adaptation Plan based on three main objectives. When the contents of the group discussions with administrative branch representatives were analysed, a special focus was on progress made with implementing the first two objectives of the plan. In the analysis of stakeholder views, progress made towards the third objective of the plan in a broader sense was also taken into account.

The criteria shown in Table 1 were used in the mid-term evaluation to examine both the implementation process of the Adaptation Plan and viewpoints related to its effectiveness. In addition to criteria based on international and national evaluation practices and methods, questions were formulated that helped to structure the data for the purposes of this report. In particular, the criteria were used to support the evaluators in analysing the group discussions conducted with representatives of various administrative branches.

**Table 1. Evaluation criteria used in the mid-term evaluation**

<b>Adaptation Plan evaluation</b>	
<b>Criterion</b>	<b>Questions</b>
<b>Evaluation criteria and questions relevant to the implementation process</b>	
<b>Institutional capacities</b>	Do the sectors find that awareness of climate change and the risks associated with it is sufficiently high? Do they find the resources adequate for implementing adaptation actions? What capabilities do the sectors have for responding to climate change risks? Do the branches have key processes promoting preparedness in place, including plans, warning and monitoring systems etc., in which climate risks are addressed?
<b>Barriers</b>	What types of barriers to implementing the Adaptation Plan related to legislation, information, cooperation or authority and similar issues have the sectors come across?
<b>Stakeholder participation</b>	How has stakeholder participation been ensured in Adaptation Plan implementation? Which stakeholders have participated and how? How has stakeholder participation promoted the plan's implementation?
<b>Collaboration of actors</b>	How has collaboration related to climate risk management and the promotion of adaptation work between different actors and sectors progressed? What types of questions/themes does the collaboration focus on and what methods are used?
<b>Lessons learnt</b>	Is information on the plan's implementation, its success and its challenges collected systematically? Has the collected information been used to develop adaptation activities?
<b>Evaluation criteria and questions relevant to Adaptation Plan effectiveness</b>	
<b>Effectiveness</b>	How and in what ways has Adaptation Plan implementation promoted Finnish society's capacity for managing climate risks and adapting to climate change? How has the national plan influenced the preconditions for regional and local adaptation work?
<b>Efficiency</b>	To what extent have the sectors discussed or assessed the perspective of efficiency in the context of Adaptation Plan implementation?
<b>Relevance</b>	Are the objectives and actions of the Adaptation Plan correctly targeted considering up-to-date information on climate change risks and impacts?
<b>Coherence</b>	Are the Adaptation Plan actions compatible with other policy objectives and associated measures?
<b>Side effects</b>	What types of (unanticipated) positive or negative side effects (economic, social or environmental) have cropped up in the context of implementing the Adaptation Plan? Have the actions supported or undermined capabilities for climate change mitigation?

The main emphasis in the criteria described in the Table is on process criteria. As the plan has so far only been implemented for a short period and the available resources and information sources were limited, a comprehensive evaluation of effectiveness could not be carried out. An effort was nevertheless made to examine perspectives related to effectiveness where applicable, among other things to support future evaluations and evaluation method development.

## Data analysis methods

Chapter 3 is primarily based on the self-evaluation table of government actors (Appendix 1), which was completed by monitoring group members and complemented through group interviews. It was supplemented with data added to the table when the draft report was circulated for comments.

The interviews with the representatives of various administrative branches were recorded, and notes were taken during each interview. The recordings were used to complement the notes and produce an edited version which, rather than comprising a full transcript of the entire recording, only included key issues relevant to the topic being discussed, without changing the factual contents. The data thus produced was coded, grouped and analysed on the basis of the interview questions using NVivo software. Initially, the data were coded by sector and following the battery of questions used in the interviews (Appendix 2). All data were then coded by question based on the different answers received. The response codes linked to the questions were further arranged in groups for use in this report.

For a description of the methods employed in the stakeholder survey and events, see Appendix 3. The stakeholder survey also contained open-ended questions, the answers to which were grouped and analysed using the same methodology as for the interview material described above. A subset was additionally formed with local government representatives who responded to the stakeholder survey (n=117). The analysis of this subset complemented the interview data on local adaptation work for section 3.5.

## Limitations of the evaluation

Above all, the mid-term evaluation of the Climate Change Adaptation Plan is an evaluation of activities looking to the future, and the possibilities of examining concrete results in the area of adaptation are thus limited. It is not possible to collect data that would enable unambiguous comparisons with a situation where the Adaptation Plan would not have been implemented and climate change would have progressed as foreseen in different scenarios. The main emphasis has thus been on evaluating the learning processes the Adaptation Plan has initiated or strengthened. In this respect, too, it has been difficult to unambiguously determine what role the Adaptation Plan has played in the development and to what extent any progress has been due to a general increase in awareness, for example, or even local special situations and adaptation to them. In particular, this applies to the development of adaptation actions and awareness at the regional and local level. Consequently, the evaluation has focused on identifying processes and practices relevant to adaptive capacity and evaluating development.

## 3 STATUS OF ADAPTATION PLAN IMPLEMENTATION

### 3.1 Objective A: Adaptation has been integrated in the planning and activities of various sectors

The first objective of the Adaptation Plan is promoting a cross-cutting approach to adaptation in society. The Plan notes that the most cost-efficient way of implementing adaptation actions is by integrating them into the planning, decision-making and activity of each sector. Mainstreaming of adaptation is promoted by ensuring that key policy instruments, especially legislation and financial steering, support reducing climate risks and improving adaptive capacity. Climate change must be taken into account in the foresight work underpinning government decision-making. The objective also includes taking special characteristics of individual sectors and regions into account in the planning and targeting of adaptation actions as well as developing enabling preconditions for local and regional adaptation work.

#### 3.1.1 Climate resilience studies at the national level

The National Adaptation Plan sets out four national-level actions related to studies on climate resilience. Responsibility for these actions has been assigned to different ministries. The actions referred to in the Adaptation Plan are described in the boxes on the page margins.

- 1. STUDIES ARE CONDUCTED ON CLIMATE RESILIENCE ON THE NATIONAL LEVEL**
  - a) Assessment of the impacts of climate change is integrated in the Government foresight scheme.
  - b) Guidelines concerning the impacts of climate change are included in the guidelines for the impact assessment of legislative proposals.
  - c) Assessments of climate resilience are included in the strategies, programmes and other steering instruments of individual administrative branches (incl. financial steering). The impacts of climate change and climate risks are assessed in the legislative preparation and acts of the various sectors.
  - d) Steering targeted to municipalities by the Centres for Economic Development, Transport and the Environment concerning the assessment of climate resilience is developed in cooperation between the areas of responsibility.

Assessing the impacts of climate change has been integrated in the Government foresight scheme. The ministries' futures reviews rely on foresight work carried out by the Prime Minister's Office, which is based on analysing the drivers of change affecting the global operating environment. They include ecological drivers of change, the foremost one of which is climate change<sup>10</sup>. The current guidelines for assessing the impacts of legislative proposals do not address the impacts of climate change and adaptation to them. These guidelines are planned to be updated during the forthcoming electoral period. The perspective of assessing the impacts of climate change can be integrated then.

The evaluation showed that the administrative branches do not have a consistent procedure for examining climate resilience. The climate work of different branches has also progressed very unevenly in different ministries. The Ministry of the Environment and the Ministry of Agriculture and Forestry have been addressing climate change at a strategic level for a number of years. In the Ministry of Transport and Communications, climate work is part of more extensive environmental work, and the Ministry of Economic Affairs and Employment and the Ministry of Defence seek to promote climate issues as part of their normal activities. In the National Risk Assessment produced in 2018 under the leadership of the Ministry of the Interior, climate change is discussed as a key factor affecting the operating environment<sup>11</sup>. In the Ministry of Social Affairs and Health, the work to coordinate climate change adaptation is only taking its first steps.

Climate change adaptation is present in many branch-specific strategies and other steering instruments. The Ministry of Transport and Communication's Environmental Strategy for Transport 2013–2020<sup>12</sup> as well as the Finnish Transport Agency's environmental policy<sup>13</sup> (2014) and the environmental programmes 2015–2018<sup>14</sup> and 2017–2020<sup>15</sup> supporting its implementation contain the perspective of climate change mitigation and adaptation. Additionally, guidelines and policies in such areas as drainage of roads and railways, dimensioning of culverts, bridge arches and sewers, and winter maintenance of roads were updated in 2018.

In the Ministry of Agriculture and Forestry's administrative branch, climate change adaptation is included in the National Forest Programme 2015<sup>16</sup> (implementation evaluated in 2018<sup>17</sup>), the Climate Programme for Finnish Agriculture 2014<sup>18</sup> (reviewed in

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10 Finnish Government (2019).

11 Ministry of the Interior (2019).

12 Ministry of Transport and Communications (2013).

13 Finnish Transport Agency (2014).

14 Finnish Transport Agency (2015).

15 Finnish Transport Agency (2017).

16 Ministry of Agriculture and Forestry (2015).

17 Ministry of Agriculture and Forestry (2019a).

18 Ministry of Agriculture and Forestry (2014b).

2018), the Finnish Wildlife Consortium's strategy and blue bioeconomy projects<sup>19</sup>. A reform of the EU Common Agricultural Policy (CAP) is currently underway, and climate change plays a key role in the Commission's proposal for a regulation<sup>20</sup>. Under this proposal, 40% of the EU's CAP funding package should be spent on climate-related actions. The Rural Development Programme currently serves as an essential instrument for promoting adaptation actions in agriculture. In the reform of water management regulations, the need for climate change adaptation has been addressed since 2008 in provisions on dam safety, flood risk management, water supply plants and water system regulation. Climate change adaptation is also addressed in the Act on Managing the Risk Caused by Alien Species<sup>21</sup> and its implementation as well as the Ministry of Agriculture and Forestry's Genetic resources policy<sup>22</sup> completed in 2018 and the Finnish National Genetic Resources Program for Agriculture, Forestry and Fishery<sup>23</sup>.

In the Ministry of the Environment's administrative branch, climate change adaptation is taken into account in legislative drafting, strategy development and the ministry's action plans (including the National strategy and action plan for conservation and sustainable use of biodiversity in Finland, the Cultural Environment Strategy, and national land use guidelines). An overhaul of the Land Use and Building Act is underway, in which climate change adaptation and mitigation are a cross-cutting theme. Conservation areas in the changing climate (SUMI), a project funded by the Ministry of the Environment<sup>24</sup>, looked at incorporating climate change adaptation and mitigation in policy instruments for safeguarding biodiversity.

The Ministry of Economic Affairs and Employment heads the Energy and Climate Policy Network. The issues coordinated and discussed by this inter-ministerial network include climate change adaptation when needed. The Ministry of Defence's Strategic Plan 2035 accounts for climate change and adaptation. The Ministry of the Interior is responsible for the cross-administrative National Risk Assessment, and the impacts of climate change were included in the National Risk Assessment update of 2018. The National Institute for Health and Welfare, which is steered by the Ministry of Social Affairs and Health, monitors the status of communicable diseases, and the Institute's Health Protection unit follows the environmental health situation as part of its normal official duties.

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19 Ministry of Agriculture and Forestry (2019b).

20 The objectives of the proposal for a regulation include contributing to climate change mitigation and adaptation, as well as sustainable energy. The proposal's aims also include supporting viable farm income and resilience across the EU territory to enhance food security.

21 Act on Managing the Risk Caused by Alien Species 1709/2015.

22 Pehu (2018).

23 Pehu et al. (2018).

24 Aapala et al. (2017).

The ministries that steer the work of regional Centres for Economic Development, Transport and Environment (ELY Centres) have developed mechanisms, such as performance guidance as well as projects that support the Centres steering of municipalities within their regions. In the Ministry of Agriculture and Forestry's administrative branch, adaptation was a key performance guidance objective in 2018. The Ministry of Economic Affairs and Employment incorporated preparedness work in the performance guidance of the ELY Centres, and in the Ministry of the Environment's administrative branch, assessments of climate resilience were promoted through guidance on land use planning. In interviews with regional actors, it emerged that the municipalities' representatives do not find the guidance related to adaptation they receive from the ELY Centres sufficient. They felt that while some guidance relevant to floods is provided, guidance related to planning and land use was inadequate.

**2. ACTION PLANS FOR SPECIFIC ADMINISTRATIVE BRANCHES ARE DRAWN UP AND IMPLEMENTED, TAKING ACCOUNT OF THE INTERNATIONAL REPERCUSSIONS OF CLIMATE CHANGE**

a) Adaptation plans or action programmes for individual branches necessary on the basis of the assessments of climate resilience are drawn up or updated as well as implemented, utilizing the most recent information on climate change.

### 3.1.2 Action plans for specific administrative branches

The Ministry of the Environment and the Ministry of Agriculture and Forestry are currently the only ministries with dedicated action plans for climate change adaptation. The Ministry of the Environment's current action plan from 2016<sup>25</sup> is the third<sup>26</sup> of its kind, and an evaluation of its implementation was underway at the time of writing of this report. The measures in the Action Plan for the Adaptation to Climate Change of the Ministry of Agriculture and Forestry 2011–2015<sup>27</sup> were updated in 2018. Both action plans describe challenges, current status and adaptation needs and set scheduled and targeted objectives in each ministry's remit.

While these action plans for adaptation focus on direct and partly indirect impacts, awareness of international repercussions of climate change remains at a relatively low level. The Ministry of the Environment's action plan refers to international repercussions but does not provide a detailed description of them. Whereas the Ministry of Agriculture and Forestry's action plan contains no mention of international repercussions, the State of Adaptation in Finland 2017<sup>28</sup>, a report completed by the Natural Resources Institute Finland in 2017, also looks at international repercussions in the context of analysing vulnerabilities in the agriculture, forestry, fisheries, game and reindeer husbandry sectors.

<sup>25</sup> Ministry of the Environment (2016).

<sup>26</sup> The environmental administration's first action plan for climate change adaptation dates back to 2008 (Ministry of the Environment, 2008) and its update to 2011 (Ministry of the Environment, 2011).

<sup>27</sup> Ministry of Agriculture and Forestry (2011).

<sup>28</sup> Peltonen-Sainio et al. (2017).



The Ministry of Agriculture and Forestry used the actions proposed in this report in an update of the measures in its action plan in 2018. These themes were covered in the branch-specific interviews; the identified indirect impacts are discussed in greater detail in section 4.1.1, and the international repercussions in section 4.1.2.

Metsähallitus is preparing an action plan for climate change adaptation and mitigation. The Defence Force's Energy and Climate Programme, which was updated in 2018, also contains goals and measures relevant to climate change adaptation<sup>29</sup>. While climate change has not yet made its way to the Ministry of Social Affairs and Health's strategy level documents, perspectives relevant to this sector (health protection infrastructure, favourable economic development and monitoring health changes) have been scrutinised together with different actors.

### **3. DRAFTING OF REGIONAL AND LOCAL ADAPTATION STUDIES IS PROMOTED**

- a) Regional and local demonstration, research and development projects relating to adaptation are promoted.
- b) Assessments of climate resilience are incorporated in the local government preparedness and emergency supplies planning.

### **3.1.3 Regional and local work on climate change adaptation**

Projects related to climate change adaptation are underway especially in the largest cities and municipalities. According to a report<sup>30</sup> produced by the Finnish Association of Local and Regional Authorities in 2015, almost all municipalities with more than 50,000 residents were preparing climate strategies at that time. While this report does not comprise a comprehensive evaluation of the effectiveness of climate strategy work, it offers practical experiences and recommendations to support climate work in municipalities and regions. Examples of cities' concrete adaptation work include trial and pilot projects on storm water management (Helsinki, Vantaa, Lahti) and the development and testing of the green factor method in collaboration with international partners.

Regional and local adaptation projects are financed under various funding instruments: for example, the Rural Development Programme for Mainland Finland 2014–2020 funded the information project Climate-wise solutions for the countryside (VILMA)<sup>31</sup>, and the Ministry of Agriculture and Forestry has financed a project on bioeconomy and climate resilience (BILKE)<sup>32</sup>. Additionally, regional projects on storm water and water resource management have been carried out. According to information compiled by the Ministry of Economic Affairs and Employment, the total value of Structural Funds projects promoting

<sup>29</sup> Finnish Defence Forces (2018).

<sup>30</sup> Parviainen (2015).

<sup>31</sup> VILMA (2019).

<sup>32</sup> BILKE (2017).

climate change mitigation and adaptation has amounted to approx. EUR 240 million in programming period 2014–2020, of which approx. EUR 23.5 million has been granted to projects with a link to adaptation<sup>33</sup>. The overall effectiveness of this funding in terms of climate change adaptation has not been evaluated.

In the Helsinki metropolitan region, responding to climate change and extreme weather events has been included in preparedness planning of cities. Helsinki has also commissioned a dedicated study on climate risks and preparedness<sup>34</sup>. The National Emergency Supply Agency has funded projects on developing tools for municipalities' and regions' operational reliability in 2014–2019 and provided regional training on continuity management assessment for municipalities' employees<sup>35</sup>. These projects have also looked at the needs arising from climate change. Municipalities' preparedness and security of supply work is supported by such actors as the Defence Forces (within the framework of regional cooperation) and the Ministry of Social Affairs and Health (by means of issuing guidelines for preparedness), but such measures have so far not included a climate change perspective. The Ministry of Economic Affairs and Employment has issued municipalities with instructions related to the security of supply of daily goods.

In Lahti, public servants in other departments besides the environmental and building sector have also become increasingly involved in climate change adaptation work, and adaptation has been put on the agenda in the field of preparedness. Larger municipalities generally have the preparedness to maintain their basic infrastructures even if risks are realised, but this is likely to pose a greater challenge for smaller municipalities.

To sum up the information obtained through the interviews, most Finnish municipalities have not taken climate change into account in their risk assessments and preparedness plans. It was generally considered that in flood risk zones, however, expertise and risk management is adequate. The interviewees considered the privatisation of municipalities' functions as a challenge to climate change adaptation and preparedness. Being able to manage a cross-sectoral issue in the growing network of private and public actors was brought up as a particular concern.

The evaluation discovered that no compilation of information on regional adaptation actions is available. Opinions of the ELY Centres' work related to adaptation differed, for example, and a number of interviewees indicated that the ELY Centres do little to promote adaptation and that the implemented projects have mainly focused on water resources.

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33 Structural Funds information system (EURA 2014) (2018).

34 Pilli-Sihvola et al. (2018); Mäkelä et al. (2016).

35 Kuntaliitto.fi (2018).

As the draft report was circulated for comments, a comprehensive range of areas in which the ELY Centres do engage in adaptation work came up. The issue thus seems to be that information concerning all adaptation work within ELY Centres' organisations is not widely known. The ELY Centres have carried out long-term work in such areas as developing water course regulation, flood risk assessment and management, and water supply site risk assessments. In the area of land use, climate change risks have been taken into account in efforts to promote zoning (including guidance on building in flood zones). The ELY Centres participate in combating invasive alien species, exercises related to regional cooperation in preparedness for extreme weather events, and the implementation of revised guidelines on winter maintenance of roads. The ELY Centres are also involved in international transboundary water cooperation, which takes into account adaptation to flood risks, regulation of water courses and energy projects. Identifying any regional differences in the scope of the preparedness work between the ELY Centres or other regional actors was not possible based on this report.

### 3.1.4 Adaptation in international cooperation and EU policies

Adaptation plays a key part in international climate negotiations, in which the Ministry of the Environment leads Finland's participation. The Ministry of the Environment consults a network consisting of all ministries when preparing for climate policy talks. In addition to climate policy, adaptation questions are discussed at the international level within the Sendai Framework for Disaster Risk Reduction. The Ministry of the Interior coordinates Finland's participation in this cooperation. The Ministry for Foreign Affairs plays a key role in international talks, with the other ministries also participating in negotiation processes. Climate change mitigation and adaptation are separate themes in international climate talks, and in the area of climate change adaptation, financing adaptation actions in developing countries has been prioritised in the talks.

#### 4. ADAPTATION IS PROMOTED IN INTERNATIONAL COOPERATION

- a) Adaptation is promoted in the negotiations under the UN Framework Convention on Climate Change.
- b) Incorporation of climate change adaptation into national development plans is promoted.
- c) Mainstreaming of climate resilience and the perspective of restricting environmental disasters and accidents in the Finnish development policy continues and actions in developing countries to reduce climate and catastrophe risks as part of development cooperation are supported.

#### 5. ADAPTATION IS INCLUDED IN EU POLICIES AND INTERNATIONAL REGION-BASED COOPERATION PROJECTS

- a) Action is taken through work in both the EU institutions such as the EU Climate Change Committee and the various sectors to promote adaptation as a cross-cutting theme in the steering instruments of EU policies and in the national implementation of these instruments.
- b) Adaptation actions that should be addressed as multi-lateral, cross-border projects are promoted through active participation in international cooperation projects and processes and environment agreements.
- c) Nature protection cooperation between Finland, Norway and Russia in the Fennoscandia Green Belt is developed so that the connectivity of the protected areas improves and there is growing awareness of the threats to the ecosystem services of the region caused by climate change. Possibilities for cooperation with Russia in climate change adaptation are examined, with special focus on the management and use of transboundary waters, preventing the spread of invasive alien species and pests as well as on biodiversity.

Climate change is a cross-cutting objective of Finland's Development Policy Programme. In keeping with Finland's development policy, an effort is made to include adaptation perspectives in the country strategies of the countries participating in development cooperation. Bilateral development cooperation projects funded by Finland are expected to use a climate resilience check list, which includes items related to reducing disaster risks.

In international cooperation related to nature conservation, Finland has actively promoted taking climate issues into account, for example in the work related to the Ramsar Convention on Wetlands. Adaptation perspectives have also been brought up within the framework of the Convention on Biological Diversity. In the interview with the environmental administration, however, it was noted in the context of nature conservation that challenges have been encountered in international cooperation when discussing adaptation-related themes as part of conservation issues, both at the level of international conventions and in the EU.

Adaptation issues have also been brought up in international health cooperation led by the WHO. In the transport sector, the theme of climate change has been promoted in the work of the "Group of Experts on Climate Change Impacts and Adaptation for Transport Networks and Nodes" under the UNECE.

The EU strategy on adaptation to climate change (2013) aims to ensure climate resilience of EU actions, among other things by mainstreaming adaptation in EU policies and programmes. In the interviews, government representatives brought up the visibility of goals related to the mainstreaming of adaptation, for example in the reform process of the Common Agricultural Policy (CAP) as well as the update of the EU Bioeconomy Strategy. The interviewees also mentioned that ministries promote the perspective of climate change adaptation in different EU-level working parties, including DG CLIMA's working group on adaptation (WG6), DG ENV's flood working group, DG ECHO's working group on civil protection, DG AGRI's working groups as well as the EU Committee on Invasive Alien Species.

As part of regional transboundary cooperation, adaptation questions have been discussed particularly within the framework of cooperation concerning transboundary waters with Sweden, Norway and Russia as well as conservation cooperation, including efforts to develop the Green Belt of Fennoscandia. Adaptation issues have also come up in the context of Arctic cooperation, especially during Finland's Chairmanship of the Arctic Council (2017–2019) in such areas as invasive alien species and resilience assessments<sup>36</sup>. Nordic cooperation has focused on such issues as forest fires, and adaptation has also

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36 Halonen & Sepponen (2018); Koivurova & Kähkönen (2018).

been visible in the work carried out in the Council of the Baltic States (CBSS) and Barents regional cooperation<sup>37</sup>. Finland is also involved in international regional cooperation projects that support adaptation. The Baltic Flows project (2012–2016) focused on the monitoring and management of stormwater in the Baltic region<sup>38</sup>, and a number of international projects associated with climate change adaptation as well as water courses and water resources are currently underway.

## 3.2 Objective B: Climate risk assessment and management methods

The second objective set out in the Adaptation Plan is that actors have access to the necessary climate change risk assessment and management methods. The plan stresses the importance of applying information efficiently and sharing practical experiences as well as identifying sectors where there is a special need for information in support of climate risk management. Besides developing and using current risk assessment and management tools, there is a need for impact assessment methods and tools that are suitable for the daily work of local and regional actors and companies. Training and advice on risk assessment methods and practices are also needed. This objective includes developing tools for managing financial risks.

### 3.2.1 Climate risk assessment and management

According to the National Adaptation Plan, the assessment and management of climate risks should be improved. While ministries carry out the main responsibility for the work on climate risks, government research institutes, higher education institutions as well as local and regional government authorities participate in these efforts. National and regional risk assessment work coordinated by the Ministry of the Interior also partly supports the management of climate change risks.

Climate risk assessment work in different branches of administration vary, and this work often takes the form of projects. For example, the ELASTINEN project<sup>39</sup> funded by the Government's analysis, assessment and research

37 Tennberg et al. (2017).

38 Baltic Flows (2016).

39 Gregow et al. (2016).

#### 6. CLIMATE RISK ASSESSMENT AND MANAGEMENT IS IMPROVED

- a) The current risk assessment and management procedures are reinforced in order to take better account of the impacts of climate change, including its international repercussions.
- b) The knowledge base on the risks and vulnerabilities relating to climate change is supplemented with regard to sectors where more information on the impacts of climate change is needed.
- c) Methods for the assessment of the impacts of climate change suitable for use by sectors, local and regional actors and enterprises and methods for risk and vulnerability studies are developed.
- d) Risk assessment and management competence and related education and training of actors in support of climate resilience assessments are promoted.

activities (2015–2016) evaluated risk management methods, different actors' roles in climate-related risk situations and transboundary repercussions of climate change, and investigated methods for assessing the costs and benefits of climate risk management. The SIETO<sup>40</sup> project (2017–2018) focused on assessing weather and climate risks and produced an operating model for future climate risk assessments. The TASAPELI<sup>41</sup> project (2018–2019) examined the effectiveness of nature-based solutions in climate change adaptation at the regional and local level.

The knowledge base relevant to climate risks and vulnerabilities has been improved through projects carried out by government research institutes. In addition to the information produced by ELASTINEN and SIETO, a project titled EXWE<sup>42</sup> studied weather phenomena critical for nuclear power plant operation and safety in a changing climate, sea level fluctuations at power plant sites and the impacts of successive solar storms, and produced emission diffusion models. Two projects titled RAIN<sup>43</sup> and FORBIO<sup>44</sup> developed methods for recognising extreme weather events and assessing the predictability and probability of damages associated with them in the current and future climate. The Finnish Meteorological Institute is also developing a database on weather and climate related impacts. The objective of the Säätö project (2018–) funded by the Ministry of Agriculture and Forestry is to produce new and more detailed weather and climate data sets, to develop new forecast products, and to promote the use of different weather and climate data sets and forecasts among forest bioeconomy actors<sup>45</sup>.

Research projects funded by the Strategic Research Council have also built up the knowledge base in support of adaptation. Parts of research project Winland focused on water resources and climate assessed the impacts of exceptional droughts on water resources and water sufficiency, as well as the impacts of climate change on drought<sup>46</sup>. The objectives of the IBC-Carbon project included combining an examination of forest biodiversity, carbon sequestration and other ecosystem services as well as methodological development<sup>47</sup>.

The State of Adaptation in Finland 2017<sup>48</sup> project studied climate risks, adaptation potential and vulnerabilities of all natural resources sectors and issued recommendations for actions. The ILMAPUSKURI<sup>49</sup> project produced an extensive study of key climate risks

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40 Tuomenvirta et al. (2018); Hildén et al. (2018).

41 Finnish Environment Institute (2018a).

42 Jylhä et al. (2018).

43 RAIN research project (2019).

44 University of Eastern Finland (2019).

45 Finnish Meteorological Institute (2018a).

46 Winland (2019).

47 IBC-Carbon (2019).

48 Peltonen-Sainio et al. (2017).

49 ILMAPUSKURI (2016).

affecting agriculture and issued recommendations for reducing the vulnerability of production and improving its capabilities for buffering and recovery. In the agricultural sector, the Development Fund of Agriculture and Forestry (Makera) has funded a number of research and development projects and studies in the agriculture and forestry sectors with close climate links.

The environmental administration has produced guides on the recommended building elevations and spatial planning that promotes climate objectives<sup>50</sup>. The knowledge base regarding flood risk areas is continuously improved; for example, updated estimates of future flood risk areas were published in 2018 under leadership of the Finnish Environment Institute<sup>51</sup>.

While the health risks caused by climate change have received little attention to date, they are being examined in current studies of the National Institute for Health and Welfare (THL). So far, THL has assessed the health risks of heat waves and ways of improving preparedness as well as the impacts of climate change on water-borne infections. Exposure assessment and risk management have been improved together with local water supply services. Water supply services are introducing comprehensive risk assessment and management systems. An assessment of changes in chemical exposure linked to warming of the Arctic regions is currently underway.

Activities related to risk assessment and management at the ELY Centres have mainly focused on water issues. In 2018, data on flood risk areas were updated. Work related to dam safety is coordinated by the ELY Centre in Kainuu, and the ELY Centre in Pirkanmaa is to pilot the ELY Centres' roadmap for climate change adaptation in 2019. The City of Helsinki has commissioned a study on the city's climate risks from the Finnish Meteorological Institute<sup>52</sup>. The Finnish Meteorological Institute is also involved in developing the EU's Copernicus Climate Change Service, which promotes the transboundary integration of European climate services and develops the availability and diversity of weekly forecasts.

Recommendations aiming to improve weather and climate risk management have been prepared in the ELASTINEN project of the Government's analysis, assessment and research activities. Additionally, the Ministry of Agriculture and Forestry has developed climate resilience tools for the public and the private sector, including for the use of water supply services. Climate resilience tools for companies have been developed in cooperation between Sitra and research institutes<sup>53</sup>, among other things, and promoted in cooperation

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50 Ministry of the Environment (2015); Parjanne & Huokuna (2014).

51 Parjanne et al. (2018); Ymparisto.fi (2018).

52 Pilli-Sihvola et al. (2018).

53 Climate risk tool (2016).

by Tapio, the Climate Leadership Coalition and the corporate responsibility network FIBS in 2016–2017<sup>54</sup>. The Finnish National Rescue Association SPEK has examined the role of NGOs in preparedness for climate change risks<sup>55</sup>.

In the interviews conducted for this evaluation, development needs associated with risk and vulnerability assessments emerged in a number of sectors. In the energy and manufacturing sectors, for example, shortcomings were found in private actors' vulnerability assessments. In the context of water supply services, the need for an overview extending beyond individual actors was identified, especially at the regional level. In the business sector, it was noted that the level of the available information is often too general from the perspective of developing operative activities and risk preparedness. A need for cross-sectoral risk assessments emerged especially in the interview with natural resources sector representatives.

### 3.2.2 Instruments for financial risk management

In addition to the ministries, parties responsible for developing instruments for managing financial risks include Finance Finland, the National Emergency Supply Agency and government research institutes. Studies have been conducted on financial risk management; for instance, the ELASTINEN project looked at methods used for assessing risk management costs and benefits and collecting financial data on damages caused by weather and climate phenomena. The Finnish Climate Panel has produced a report on the risks, costs and responsibilities related to crop losses and flood damages<sup>56</sup>. A report commissioned by Sitra on the risks and costs of climate change in Finland was completed in 2018. The report examines the magnitude of costs incurred from climate change in different sectors through eight examples<sup>57</sup>.

#### 7. INSTRUMENTS APPLICABLE TO THE MANAGEMENT OF FINANCIAL RISKS CAUSED BY CLIMATE CHANGE ARE DEVELOPED

- a) The sufficiency and development needs of financial risk management instruments such as insurance policies are studied.
- b) The development of the necessary management instruments for the financial risks caused by climate change is promoted.

A study commissioned by the Ministry of Agriculture and Forestry and the National Emergency Supply Agency investigated how disruptions in electricity supply affect the continuity of food production and how power cuts of different scales and durations affect

<sup>54</sup> For a description of the tools, see the publications Arnkil et al. (2016), Arnkil et al. (2018) and Tapio (2017).

<sup>55</sup> Nikkanen (2018).

<sup>56</sup> Juhola et al. (2016).

<sup>57</sup> Laine et al. (2018).



the food chain and especially primary production<sup>58</sup>. The Ministry of Economic Affairs and Employment commissioned a study on how an intelligent electricity system, or a smart grid, can serve as a platform for combining fluctuating production and consumption levels in a cost-effective manner. The purpose of the study was to assess and propose concrete actions through which smart grids could facilitate customers' possibilities for active participation in the electricity market and promote continuity of supply in general<sup>59</sup>.

While some studies have been produced on managing financial risks, the interviews showed that more information on the costs incurred from risks associated with climate change and, in particular, the role of insurance is required. The need for extensive assessments of climate change risks and their costs came up in the interviews focusing on themes that are relevant to the natural resources sectors and built environment. The need to develop insurance products was highlighted especially in agriculture. For example, the interviews referred to the Government's decision to investigate insurance premium tax reliefs in pest and crop yield loss insurance policies<sup>60</sup>.

### 3.3 Objective C: Adaptive capacity of society, innovative solutions and citizens' awareness of climate change adaptation

The third objective of the Adaptation Plan is that research and development work, communication and education and training have enhanced the adaptive capacity of society, developed innovative solutions and improved citizens' awareness of climate change adaptation. To support decision-making and practical development work, more information is needed on the impacts of climate change and climate policy on the society and environment as well as adaptation actions and their cost-efficiency. Based on research evidence and practical experiments, adaptation-related business and export opportunities for innovative solutions can also be developed. The aim of communication on adaptation is that sectors, companies, municipalities and private citizens are better able to understand and manage the risks caused by climate change. Education and training support the development of sufficient competence and general knowledge related to climate change in society.

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58 Kaustell et al. (2017).

59 Ministry of Economic Affairs and Employment (2019).

60 Government proposal (HE 317/2018) on a temporary amendment to the Act on tax paid on certain insurance premiums was adopted on 15 March 2019. Under this amendment, crop yield loss and pest insurance policies will be tax exempt on a temporary basis until the end of 2027.

### 3.3.1 Reinforcing adaptation research

Reinforcing adaptation research is vital in order to develop a better understanding of the key risks, vulnerabilities and opportunities brought about by climate change and to base decisions on required adaptation actions on scientific evidence. According to the Adaptation Plan, the main responsibility for promoting research in support of adaptation lies with the Ministry of Agriculture and Forestry and the Ministry of the Environment, while other ministries, government research institutes, higher education institutions and the national actors responsible for EU programmes support the action.

#### 8. ADAPTATION RESEARCH IS REINFORCED

- a) A research programme to produce information for the implementation of the Adaptation Plan is prepared. The decision on the research programme is made separately on the basis of broadly-based preparation.
- b) National, EU and international research and development funding is utilised in the adaptation research.

While the scope of research on climate change adaptation has in recent years expanded from natural sciences to an increasing number of other disciplines, shortcomings and knowledge gaps continue to be identified. A study on research and information needs related to adaptation completed by Tapio in 2018<sup>61</sup> laid the foundation for a potential research programme on adaptation by identifying key gaps in research, and its findings were passed on to the Academy of Finland. The study also identified potential funding sources for adaptation research. Finnish adaptation research has been promoted through national programmes and projects (the Government's analysis, assessment and research activities, the Academy of Finland, the Strategic Research Council) and international funding alike (including EU Horizon 2020, LIFE funding).

The study produced by Tapio contains a comprehensive list of recent research projects on adaptation. The latest National Communications for the UN Climate Convention also contains a full account of research carried out in support of climate change adaptation<sup>62</sup>. The interviews with government actors revealed that additional research is needed to complement the knowledge base of adaptation in all sectors. The sectors taking their first steps in implementing adaptation actions need information on the risks and impacts of climate change in their specific sectors to support them in initiating adaptation actions. The need for concrete information that can be applied at the practical level increases as a sector advances in its adaptation work. There is a shortage of information on financial costs in the context of both realisation of risks and investments aiming to limit the risks. The evaluation showed that further information helping to analyse the big picture, cross-sectoral assessments, analyses of direct, indirect and transnational impacts, and monitoring and modelling data are seen as necessary.

<sup>61</sup> Arnkil & Lahti (2018).

<sup>62</sup> Ministry of the Environment & Statistics Finland (2017), Chapter 8.

The interviews with government actors also showed that a great deal of information is already available, and the actors' access to the existing information should be improved by means of efficient communication. Plenty of information is produced in projects that should be made available more widely. Developing operational instructions for risk situations and disseminating information on the instructions were considered important, and tailoring the instructions to the needs of different target groups (such as older persons) was seen as a key task for communication activities. The interviewees would like to raise climate awareness especially among citizens and NGO actors, and communication directed at these groups should be improved. In general, more resources, strategic guidance and concrete messages were called for.

### 3.3.2 Business opportunities created by adaptation

The evaluation identified business opportunities related to adaptation in some sectors. The potential contained in the Blue Bioeconomy Strategy in the form of new species suitable for aquaculture, as well as developing solutions for managing floods and rising sea levels for cities, were mentioned in the interview with representatives of natural resources sectors. In addition, the interviewees identified opportunities associated with energy, including the use of wind parks in fish farming and seaweed in energy production. Digital solutions and expertise about dam safety were identified as export opportunities. Developing nature tourism also emerged as a key business opportunity, and Finland's attraction as a tourist destination was believed to increase as global temperatures rise. Possibilities for developing wildlife tourism were also examined in a project of the Government's analysis, assessment and research activities<sup>63</sup>.

A small-scale study on the business opportunities created by adaptation was commissioned by the Ministry of Agriculture and Forestry in 2016. Statements obtained from interest groups interviewed for the study showed that most companies find the impacts of climate change distant and difficult to perceive, which hinders the development of associated business solutions. It was concluded that in order to raise awareness, clear communication about the impacts of climate change and adaptation is needed. The struggle faced by actors in changing their identity from a customer of adaptation solutions to someone offering them was identified as another challenge<sup>64</sup>. In autumn 2017, two workshops on climate risk management in an enterprise's value chain

#### 9. BUSINESS OPPORTUNITIES RELATED TO ADAPTATION ARE DEVELOPED

- a) Business opportunities related to adaptation are studied and demonstration projects are promoted.
- b) Export opportunities of technologies related to adaptation are studied.

63 Pohja-Mykrä et al. (2018).

64 Arnkil et al. (2016).

were organised for companies. In total, representatives of 63 organisations took part in these events arranged in cooperation with the corporate responsibility network FIBS and Tapio Oy<sup>65</sup>.

### 3.3.3 Developing tools in support of adaptation work

Research institutes, including the Finnish Environment Institute, the Natural Resources Institute Finland and the Finnish Meteorological Institute, develop tools that support regional adaptation work. In addition to projects relevant to adaptation discussed above, information that supports the research institutes' work is produced in the PLUMES project<sup>66</sup> led by the Finnish Environment Institute and the Finnish Meteorological Institute's projects C3S (DECM) Data Evaluation for Climate Models<sup>67</sup>, ERA4CS<sup>68</sup> (several ERA-NET projects) and CLIPS<sup>69</sup> (Academy of Finland flagship project). Additionally, the SASSE<sup>70</sup> project studied the prediction of major power grid outages caused by weather. The Finnish Environment Institute has produced preliminary storm water flood maps for municipalities' storm water risk assessments pursuant to the Flood Risk Management Act<sup>71</sup>.

Municipalities play a major role, as the majority of practical adaptation actions must be implemented at the regional and local level. Cities of Helsinki, Turku and Vantaa have developed a green factor tool to support planning. The use of open spatial data sets related to green zones in planning has been promoted, and the SMART-MR project produced a tool for planning officers, which supports them in taking adaptation perspectives into account at the local detailed plan level. The international iWater project coordinated by the City of Riga (2015–2018), in which the Cities of Helsinki and Turku participated, developed integrated storm water management methods and solutions. In Lahti, an effort has been made to improve storm water management by using cost-effective hybrid solutions. The Association of Finnish Local and Regional Authorities has provided training related to this theme.

#### 10. TOOLS ARE DEVELOPED IN SUPPORT OF REGIONAL ADAPTATION WORK

- a) Regional estimates for changes in the climate variables are produced and their utilization in the regions is promoted.
- b) Tools are developed for the development of planning practices and processes for regional and local actors and these are made more readily usable and accessible (incl. advice, education and training).

65 Arnkil et al. (2018).

66 Finnish Environment Institute (2018b).

67 Climate Change Service (2019).

68 Finnish Meteorological Institute (2018b).

69 CLIPS (2017).

70 SASSE (2018).

71 Ymparisto.fi (2017).

The Ministry of Environment has produced guides to promote adaptation, for example on recommended building elevations and planning that promotes the achievement of climate objectives<sup>72</sup>. The Ministry of Agriculture and Forestry supported an update of forest management recommendations relevant to climate change adaptation in 2018. Researchers from the Universities of Eastern Finland and Helsinki, the Natural Resources Institute Finland, the Finnish Environment Institute and the Finnish Meteorological Institute participated in drawing up these recommendations, which were published in spring 2019. The Finnish Forest Centre has developed tools supporting preparedness for insect, wind and snow damages<sup>73</sup>.

Practical tools have also been developed as part of security of supply work. The water services sector pool, for instance, has prepared a guide on preparedness for incidents affecting a water services operator with the aim of supporting operators in securing the reliability of water supply services under all circumstances.

### 3.3.4 Communication

According to the Adaptation Plan, the main responsibility for developing communication is assumed by the Government climate communication group, while government research institutes, the Association of Finnish Local and Regional Authorities and municipalities also play an important role in communication on adaptation.

Commissioned by the Ministry of Agriculture and Forestry, a communication plan for climate change adaptation was formulated in collaboration with stakeholders in 2017. Adaptation was discussed at training events organised by the Association of Finnish Local and Regional Authorities and FCG for municipalities' technical committees in autumn 2017. Articles on storm water management have been published in professional journals targeted at municipalities. In the communication plan for climate change adaptation, NGOs were identified as an important partner. A communication network of NGOs coordinated by Tapio was convened by the Ministry of Agriculture and Forestry in 2018. The network implemented a theme week of communication on climate change adaptation for citizens on social media

#### 11. COMMUNICATION ON ADAPTATION IS DEVELOPED

- a) A communication plan for adaptation is prepared and implemented. The plan specifies the objectives, content and key target groups for communication on adaptation, communication channels to be utilized and production of the necessary materials.
- b) Climateguide.fi website is maintained and developed as an important communication channel for information on adaptation and for good practices. Climateguide.fi website is developed for communication on adaptation targeted to citizens. The websites and tools related to adaptation are made better known and more readily accessible to improve their effectiveness.

<sup>72</sup> Parjanne & Huokuna (2014); Ministry of the Environment (2015).

<sup>73</sup> Finnish Forest Centre (2017).

in autumn 2018<sup>74</sup>. The 72 hours project of the National Emergency Supply Agency and the Finnish National Rescue Association SPEK illustrated the importance of citizens' individual preparedness, for example during a storm, flood or extensive power outage<sup>75</sup>.

In autumn 2017, a more extensive update of adaptation-related contents on the Climateguide.fi website was launched. In this update led by the Finnish Environment Institute, the contents and structure will be updated to correspond better to the current status and future needs of adaptation work. Contents related to the Finnish climate on the Climateguide.fi web portal have been updated in connection with popularising the findings of national research projects. For example, a new article on adaptation was published as part of the VILMA project's information activities (Finnish Meteorological Institute and the Natural Resources Institute Finland). The Finnish Meteorological Institute has also published a selection of design rainfalls (ERDF OSAPOL), and the article discussing the impacts of climate change on water levels was updated by the Finnish Meteorological Institute and the Finnish Environment Institute. The articles on Finland's changing climate were updated according to the latest RCP scenarios as part of the Academy of Finland PLUMES project. The Finnish Meteorological Institute and the Finnish Environment Institute have also published map tools for cross-country skiing (ViVoTiVi) and vulnerability and adaptation of the elderly (PLUMES)<sup>76</sup>. A lack of resources has restricted the possibilities of maintaining the Climateguide.fi web portal and developing its functionalities into a service that would support both citizens and decision-makers. In particular, the need to maintain the different language versions of the service has been identified in the feedback received by the research institutes maintaining the Climateguide.fi portal.

Regardless of the efforts to develop communication actions related to adaptation, a need for further development and, in particular, awareness raising was brought up in the interviews and at stakeholder events. Clearer communication about the impacts of climate change and adapting to them is still needed. A need to target adaptation information and the use of different communication channels at various groups has been identified. To facilitate cross-sectoral communication about adaptation and on-going actions, better cooperation between the administrative branches is required. It has been observed that targeting communication on climate change adaptation at citizens is equally important and will require more efforts.

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74 Tapio (2019).

75 72 hours (2019).

76 Climateguide.fi (2019).

### 3.3.5 Developing education and training content

According to the Adaptation Plan, the Finnish National Agency for Education is responsible for including climate change impacts and adaptation in curricula and qualification requirements at all levels of education.

Taking the learners' ages into consideration, climate change and adaptation have been incorporated in national core curricula in the underlying values of education, transversal knowledge and skills, and different subjects. The National core curriculum for early childhood education and care came into force on 1 August 2017. The new National core curriculum for basic education was mostly introduced on 1 August 2016, while some parts of it are rolled out gradually by 2019. Introduction of an updated curriculum for general upper secondary schools began one grade at a time on 1 August 2016. A new National core curriculum for upper secondary schools is being prepared and will be adopted in 2019 and introduced in 2021. The impacts of climate change and adaptation will be taken into account in its preparation.

The qualification requirements of all vocational qualifications (vocational upper secondary qualifications, further qualifications and specialist qualifications) were updated in 2017–2018, and new qualification requirements for vocational upper secondary qualifications entered into force on 1 August 2018. All qualification requirements contain promoting sustainable development as a common theme, which covers the principles of sustainable development and ethics as well as life cycle thinking. In these principles, the impacts of climate change and adaptation have been addressed in natural resources and environmental sector qualifications and also in other sectors, including moisture management in the construction sector, sales of electric cars in the vehicle sector, and nature-based and experiential activities in the education and instruction sector. These themes have also been included in vocational qualifications in a broader sense from the perspectives of sustainable practices, responsibility and environmental protection, energy consumption, reducing losses and circular economy.

Universities have addressed the perspective of climate change in the teaching of their special fields, and the different aspects of climate change are quite well covered by course offerings across the country. Universities of applied sciences have also identified climate change as a driver of change in the operating environment. An open course on the basics of climate change is available for higher education institutions (Climate.now<sup>77</sup>). It

#### 12. EDUCATION AND TRAINING CONTENT ON ADAPTATION IS DEVELOPED

a) Impacts of climate change and adaptation to it are included in the curricula and degrees taken in basic and higher education, vocational basic and adult education, universities and continuing education.

77 Climatesnow.fi (2019).

comprises a multidisciplinary learning and teaching package about the basics of climate change.

### 3.4 Coordination, monitoring and evaluation of the plan's implementation

The implementation of the National Adaptation Plan was supported by a National monitoring group on climate change adaptation in 2015–2018. In addition to the ministries, key regional and municipal level actors, research institutes and other stakeholders have participated in the activities of this cross-sectoral group appointed and coordinated by the Ministry of Agriculture and Forestry<sup>78</sup>. At the beginning of 2019, a new monitoring group was appointed for 2019–2022.

The group met regularly every quarter and worked to raise awareness among wider circles by means of information activities and cross-sectoral cooperation in promoting adaptation. As the need for cross-sectoral cooperation was emphasised by both government actors and stakeholders in the evaluation, it is discussed separately in Chapter 4. Another key task of the group was ensuring that adaptation is monitored and evaluated.

#### 3.4.1 Developing the monitoring of adaptation

A framework for monitoring adaptation was developed in 2015–2017 in broad-based stakeholder cooperation coordinated by Tapio<sup>79</sup>. A set of indicators to support the monitoring of adaptation commissioned by the Ministry of Agriculture and Forestry was published in 2017<sup>80</sup>. However, so far no headway has been made in the introduction

#### 13. A NATIONAL MONITORING GROUP ON ADAPTATION

a) A national monitoring group is appointed to follow and evaluate the implementation of the Adaptation Plan. The group is responsible for the implementation, follow-up and communication relating to the Adaptation Plan and promotes the cooperation between sectors in adaptation actions and the overall awareness raising on adaptation.

#### 14. CONTINUOUS MONITORING OF THE PLAN IS ENSURED AND THE SCALE AND EFFECTIVENESS OF THE IMPLEMENTATION IS EVALUATED

a) The available systems, follow-up procedures and indicators are utilised to compile information suitable in view of the Adaptation Plan from the follow-up of the adaptation plans and action programmes of sectors, municipalities and other parties. Procedures are developed for evaluating the effectiveness of adaptation actions.

b) Action is taken to influence the development of the follow-up of the EU Adaptation Strategy with due account for the Regulation on reporting information relevant to climate change.

<sup>78</sup> Ministry of Agriculture and Forestry (2019c).

<sup>79</sup> Lilja-Rothsten et al. (2015).

<sup>80</sup> Arnkil et al. (2017).



of the indicators and organisation of monitoring at the practical level. Incorporation of indicator data in the Climateguide.fi website has been prepared in cooperation between research institutes. The Ministry of Agriculture and Forestry brought up the perspectives of adaptation in 2018 in the context of the work aiming to develop indicators for monitoring sustainable development, which was coordinated by the Prime Minister's Office<sup>81</sup>.

Putting indicator data that supports adaptation into use has proven a challenge, and the monitoring of the actual Adaptation Plan implementation has also been inadequate. The data on the implementation of Adaptation Plan actions in different administrative branches described in Appendix 1 to this report were collected during the evaluation process, as the annual progress reports referred to in the National Adaptation Plan were not available.

Monitoring of adaptation at the local level has been developed by the City of Helsinki and the Helsinki Region Environmental Services Authority HSY among others. In the administrative branches which have dedicated action plans for climate change adaptation or in which adaptation has been integrated in a larger climate or environmental programme, monitoring has been carried out to variable degrees depending on the branch's needs and resources.

The viewpoints of monitoring and evaluation received little attention in the interviews. In interviews focusing on the themes of defence administration and built environment, shortcomings were noted in indicators suitable for monitoring climate change adaptation.

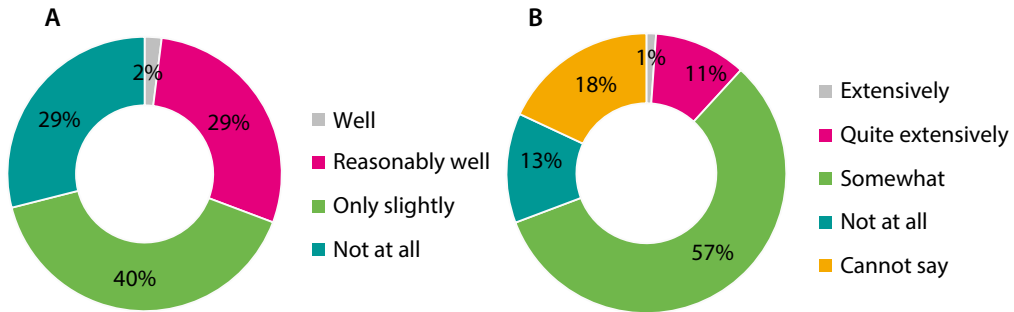
### 3.5 Stakeholder views of climate change adaptation

During the mid-term evaluation process of the Adaptation Plan, stakeholder views were collected through a survey and at regional events. For sector-specific results, see Appendix 3. General observations on the survey data were also made disregarding the sectoral divisions, in which the municipal and regional levels were taken into account.

The stakeholder survey showed that there is currently little or no awareness of the National Climate Change Adaptation Plan (Figure 2). Tracing actions that promote adaptation back to the Adaptation Plan or some other national steering instrument does not always serve a purpose, however, as many actions that promote adaptation are implemented without conscious links to such policy instruments as the Adaptation Plan.

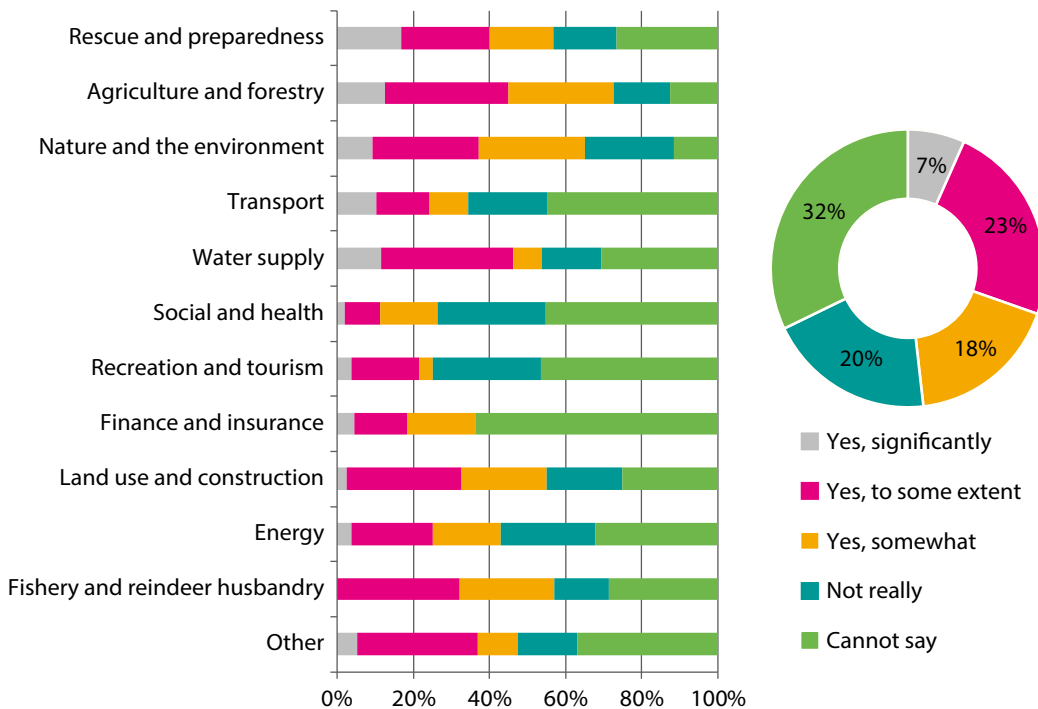
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81 Kestavakehitys.fi (2019).



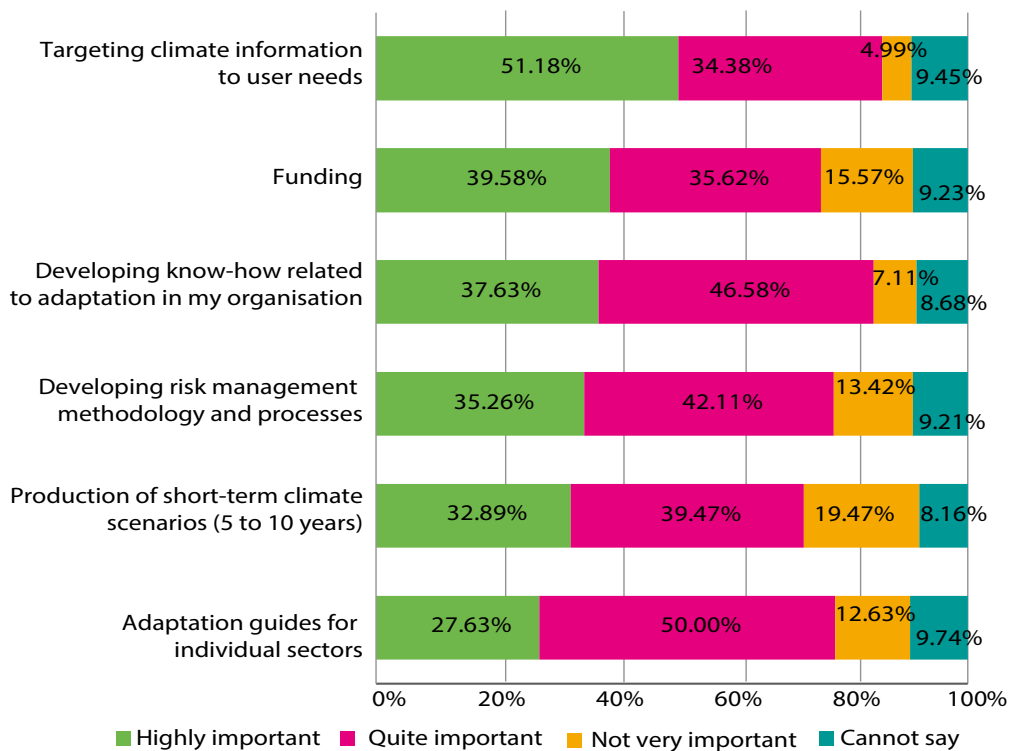
**Figure 2.** A. I know the National Climate Change Adaptation Plan. B. How widely do you think the plan is known in your sector? N=449. Stakeholder survey. For an itemisation by sector, see Annex 3.

Uncertainty about whether or not adaptation work is supported at the national level came up in the stakeholder survey (Figure 3). Additionally, as few as 30% of the respondents found that national organisations have supported regional climate change adaptation work significantly or to some extent.



**Figure 3.** Have national organisations supported adaptation work in your operating area? Column graph: division by sector; pie chart: total for all sectors, N=386. Stakeholder survey.

The stakeholders were also asked what type of support would best promote adaptation work in their organisations (Figure 4). The largest proportion of the respondents found targeting climate information to user needs either very or quite important, but developing know-how in their own organisation, adaptation guides for individual sectors, developing risk management processes and methods, funding, and short-term climate scenarios were also considered necessary in order to support adaptation work.



**Figure 4.** What type of support would promote adaptation work in your organisation the most? N= 381. Stakeholder survey.

The stakeholder survey also contained an open-ended question about ways of promoting adaptation, for which 434 responses were received. In keeping with the contents of the graph shown above, the following ways of promoting adaptation work were highlighted:

1. Stepping up, developing and targeting communication and thus raising awareness.
2. Producing objective, verified and concrete information targeted at individual sectors/regions.

3. Developing steering instruments towards incorporating climate change adaptation in the daily work of regional actors. The respondents would like to see strategies and plans but, in particular, instructions and norms describing in concrete terms what they should do in different situations. Based on the responses, climate change adaptation is seen as a very general and unfocused phenomenon, which also makes the actions impossible to grasp.
4. Training which emphasises the provision of operating instructions for field actors rather than general information on climate change.
5. Additionally, targeted funding and increasing the funding for existing actions in order to manage new adaptation tasks, and also for projects and research, were believed to promote adaptation.
6. Stepping up cooperation within and between sectors, between the national and regional level, and with the business sector and NGOs alike.

Better definition of responsibilities, monitoring of progress made with adaptation work, and supporting leadership were also cited by stakeholders as methods for promoting adaptation work.

### 3.5.1 Adaptation work in municipalities and regions

Municipalities and regions play an important role in adaptation, as a large part of practical adaptation actions are carried out at these levels. The National Adaptation Plan contains a number of actions aiming to support climate adaptation work in the municipalities and regions. At the local level, they include *regional assessments of the impacts of climate change, climate risks and factors relating to vulnerability and reinforcing the adaptive capacity, and developing tools in support of regional adaptation work*. For a more detailed description of the status of these actions, see sections 3.1.3 and 3.3.3 above.

For the assessment of progress made by municipalities and regions in adaptation work, the evaluation relied on group interviews with local and regional government representatives in the national adaptation monitoring group, and partly also on the stakeholder survey and information obtained at regional discussion events<sup>82</sup>. A total of 117 persons representing the local and regional government level responded to the survey (69 from municipalities, 27 from ELY Centres, 12 from Regional Councils and nine from Regional State Administrative Agencies). Responses from local government actors were received from almost all regions, and the respondents' regional organisations also

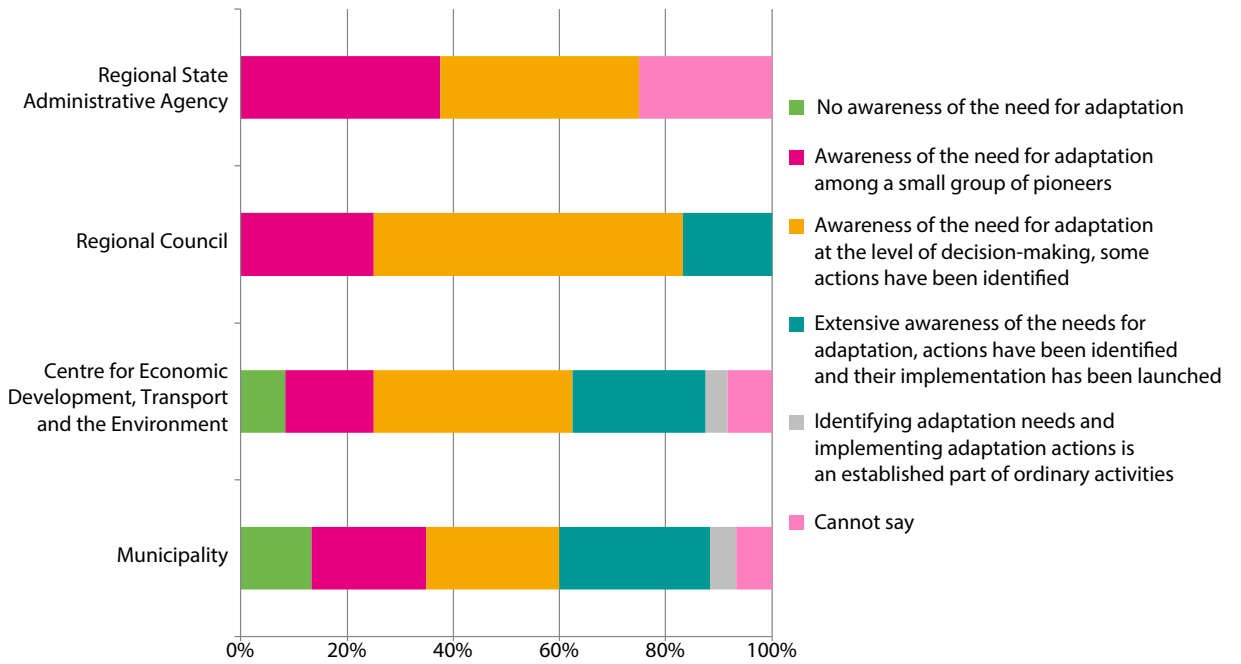
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<sup>82</sup> Of the respondents to the stakeholder survey, 52% represented either the entire country (29%) or Uusimaa region (23%). In areas where stakeholder events were organised, the response rates were between 5% and 10%, whereas in other areas, these rates were between 1% and 5%. Consequently, no regional level interpretations can be made based on the data.

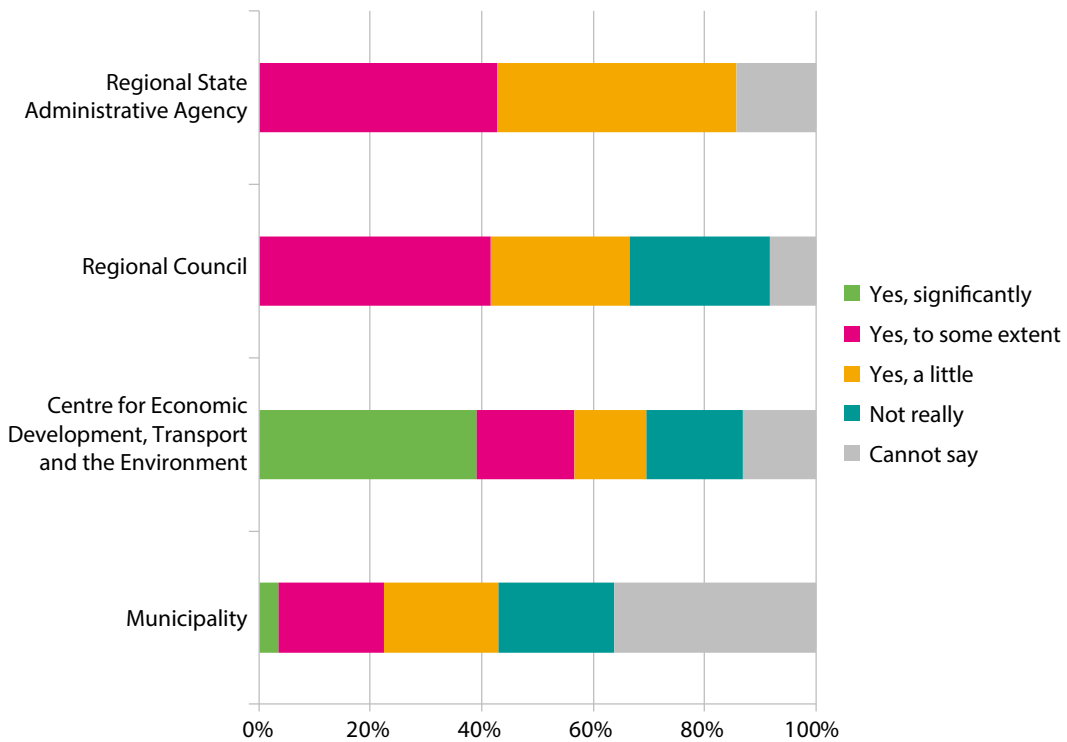
covered an extensive geographical area. In order to examine municipal and regional level views, these responses were also analysed separately from the full data set. Little information is available on adaptation work carried out by local and regional actors, and an extensive data set should thus be gathered for a closer analysis of these levels. However, general and indicative observations can be made on the basis of the data gathered in the stakeholder survey. Issues related to implementation at the regional and municipal level were additionally touched upon in about one half of the interviews with government actors. However, the mid-term evaluation did not produce a systematic review of the status of adaptation work in the regions and municipalities.

In the interviews with government actors, the municipalities' role was highlighted especially in land use and construction, transport, health and social services, water supply and rescue services. The status of municipalities is strong, and the interviewees mostly found the impacts of national steering on them limited. Municipalities carry on their adaptation work with a great deal of independence, and there are major differences between them. Several examples of active adaptation work in municipalities in the Helsinki region and Lahti, for instance, came up in interviews with regional and local government actors, but it was generally noted that adaptation work is not yet systematic in most municipalities, and especially smaller ones have little or no resources for it.

The level of awareness of the need for adaptation varies in the municipalities that responded to the survey: some municipalities have no awareness of the need for adaptation as yet or the awareness is limited to a small group of pioneers, whereas in others, adaptation needs have already been identified extensively (Figure 5). While the level of awareness also varies in regional organisations, especially in the case of the Regional State Administrative Agencies attention is drawn to the fact that while adaptation actions have been identified, a great deal of uncertainty remains. National support for local and regional adaptation work has so far been limited, especially regarding the implementation of adaptation actions in the municipal sector, which plays a key role (Figure 6).



**Figure 5.** Awareness of the need for adaptation and actions in my organisation, local and regional level N= 381. Stakeholder survey.



**Figure 6.** Have national organisations (ministries, government research institutes etc.) provided support for adaptation work in your operating area? Local and regional level N= 381. Stakeholder survey.

### 3.5.2 Regional risk assessment work and regional government reform

The regional risk assessments prepared in connection with the National risk assessment update in 2018 addressed threats caused by weather and climate risks for the first time. A large number of actors is involved in regional risk assessment work, and the work is coordinated by either the rescue services or the Regional State Administrative Agency, depending on the region. Linking climate risks to regularly updated regional risk assessments was seen as a key opportunity for disseminating information and increasing regional actors' awareness of weather and climate risks.

Perspectives related to preparations for the regional government reform, which was underway as the mid-term evaluation was in progress, sparked discussion in almost every sector. While the reform was ultimately not submitted to Parliament in March 2019, the viewpoints brought up by the actors during the evaluation process concerning the challenges and opportunities related to the potential regional government reform from the perspective of adaptation are also relevant in view of any future initiatives concerning regional government reform.

For example, the potential synergies that could be achieved by integrating certain functions during the regional government reform, thus preparing the ground for improved cooperation between sectors at the regional level, were seen as an opportunity. Combining the tasks of health protection, rescue services and many natural resources sectors under the umbrella of regional government was cited as an example. Improved consideration for regional special features and giving regions more authority to promote development actions were also seen as opportunities. Among other things, concerns were expressed over increasing interfaces and fragmentation in the operational field (for example in road maintenance) and, in general, the effectiveness of cooperation and challenges to information flows as the operational field changes. Risks were identified with the possible marginalisation of sectoral issues outside the core of the reform (including fisheries and environmental themes in general). The possibility that functions run on a voluntary basis could be side lined in the counties' internal competition for resources was seen as a risk if all tasks important for adaptation are not laid down as statutory duties for the counties. As a whole, a need for clear-cut roles and responsibilities in promoting adaptation at the regional level was highlighted in the discussions.

## 4 CROSS-CUTTING ISSUES IN ADAPTATION PLAN IMPLEMENTATION

### 4.1 Awareness of climate change risks and the need for adaptation

*"Adaptation is a difficult term, people do not always understand it. But talking about risk management and the types of risks we mean helps them understand the issue better. These things should be made more simple. We need more agility when faced with bigger challenges".*

*Interviews with government actors, a public servant in the natural resources sector.*

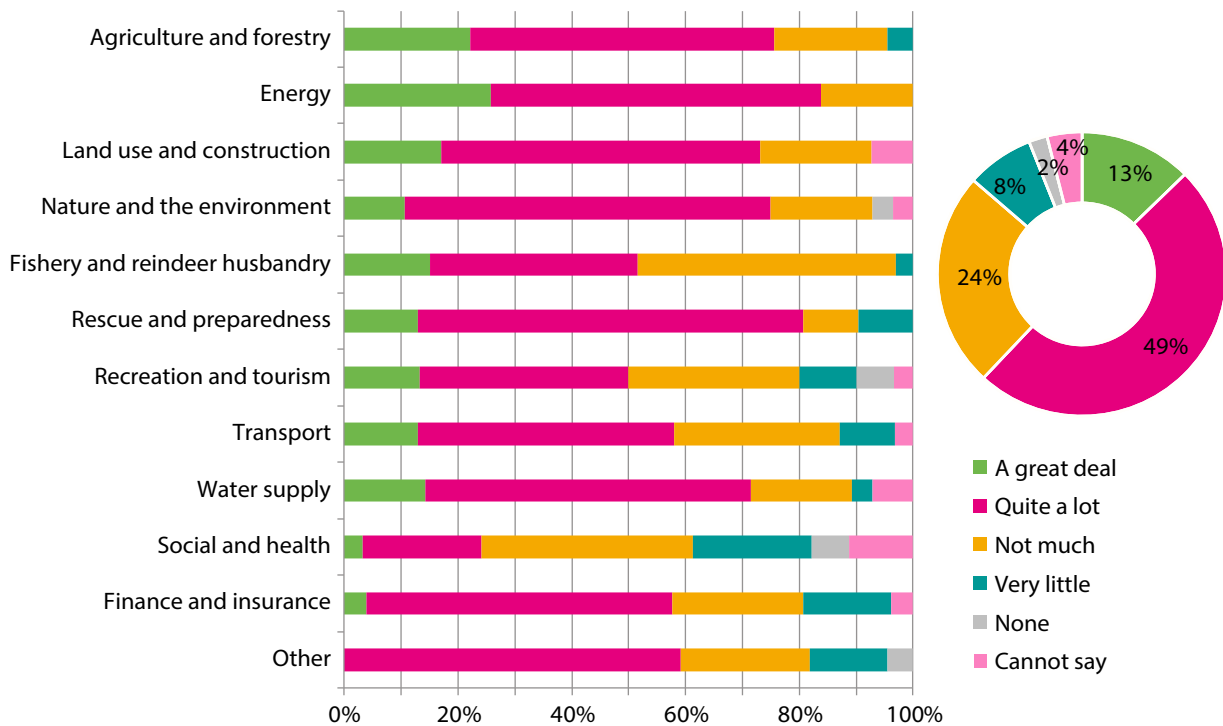
The estimated rate of climate warming will cause nature and society's functions changes, some of which may be rapid. These changes require anticipation and adaptation. The National Adaptation Plan details key premises for implementing adaptation actions. These include flexibility, giving priority to adaptation actions that secure functions vital to the society or reinforce risk management, promoting robust measures that should be taken independent of the exact progression of climate change, undertaking actions at the right time, and giving consideration to the vulnerable groups and livelihoods with the weakest adaptation capacity. The planning of adaptation actions should be based on impact and risk assessments and best available information. Earlier evaluations have indicated that there are major differences between the sectors regarding their awareness of the risks and need for adaptation. The current level of awareness was examined in group interviews with government actors from different administrative branches and the stakeholder survey.

Direct climate risks are generally identified relatively well based on both the interviews and the stakeholder survey. In the stakeholder survey, 62% of the respondents found that their organisations have either a great deal or quite a lot of information on weather and climate risks related to their sectors (Figure 7). The amount of information available on weather and climate risks varies greatly between the sectors. As few as approx. 20% of survey respondents representing the social and health sector said there was a great



deal or quite a lot of information. The energy, and rescue and preparedness sectors had the greatest levels of information about the risks (more than 80%). In interviews with government actors, general awareness was still found to be inadequate especially in the transport sector and the social and health sector. In some sectors, including the natural environment field, it was noted that information gaps have led to partial awareness of the risks only. The interviewees noted that while there is a good level of awareness of impacts and risks associated with invasive alien species, a great deal of uncertainty remains related to species and habitats, and information on climate change risks is lacking at the ecosystem level.

Based on discussions at the stakeholder events, information about the risks is often too general, and it does not lend itself to planning actions or resource allocations as such. This observation was particularly prominent among actors in the rescue and preparedness sector and also in the interview with government actors in the transport sector.

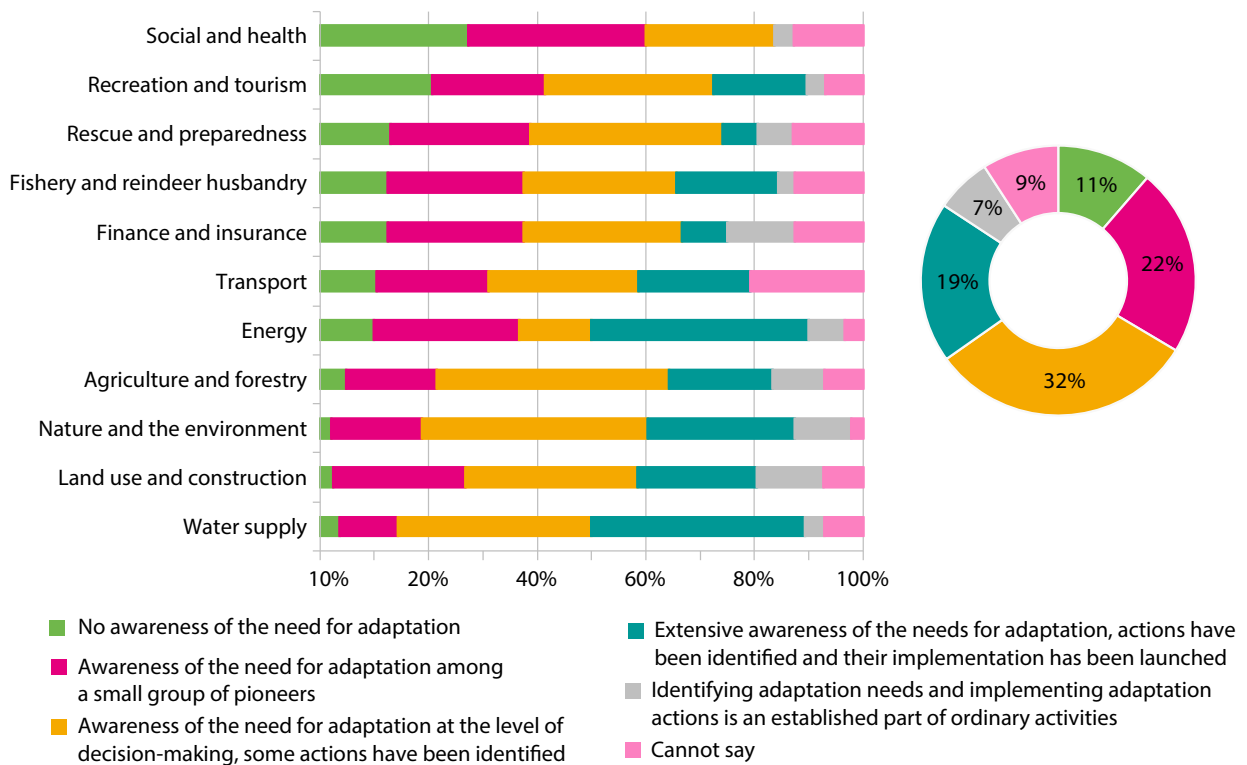


**Figure 7.** How much information does your organisation have on weather and climate risks relevant to your sector? Column graph: division by sector; pie chart: total for all sectors, N=430. Stakeholder survey.

Government actors in different sectors believed that few actors recognise the link between the risks and climate change, even if they do identify the actual risks. The defence administration and the energy sector, in particular, respond to the risks from the viewpoint of preparedness, and there is little awareness of their links to climate change.

These sectors also stressed the idea that emphasising the link with climate change is not essential as long as the actions are undertaken. Many interviewees additionally found that in their sectors (including defence and security, social and health sector and the built environment) adaptation remains mainly reactive rather than anticipatory.

The need to adapt to climate change remains poorly recognised among many non-government stakeholders. In the stakeholder survey, 20% of the respondents found that there was widespread awareness of the need for adaptation in their organisation and that implementation had been initiated. Only 7% of the respondents identified adaptation as an established part of the activities (Figure 8). When examined by sector, the track record of social and health sector is equally poor in adaptation as it is in risk identification. The status of adaptation is also poor in the recreation and tourism sector. The energy, water supply, nature and environment as well as land use and construction sectors had the best track record in identifying the need for adaptation, but even in them, the level of awareness of this need was less than 50% at best.



**Figure 8.** Awareness of the need for adaptation and actions in my organisation N=404. Stakeholder survey.

In addition to climate risks affecting a sector directly, impacts transmitted through other sectors and some international repercussions stemming from areas outside the Finnish borders came up in the interviews and discussions at the regional events. There were significant differences between the sectors in the extent to which they identified such indirect impacts and risks, which were referred to by a range of different terms. The following sections take a closer look at awareness of indirect cross-sectoral impacts and the international repercussions of climate change.

#### 4.1.1 Indirect impacts through other sectors

*“Adaptation is a cross-administrative issue, and taking other administrative branches and “neighbours” as well as global perspectives into account is very important in the context of this theme. We also have to look for new viewpoints on how we can work together in the future.”*

*Interviews with government actors, a public servant of the Ministry of Economic Affairs and Employment.*

Indirect impacts refer to impacts that, due to interconnections between sectors, affect operation in several sectors. They may be unidirectional (for example, transport network reliability affects the operation of logistic chains in different industries) or bidirectional (changes in agriculture and forestry affect the status of biodiversity, and respectively, the status of biodiversity affects the operating preconditions of several natural resources fields). Cross-sectoral causal chains are typically multidimensional, and their impacts can often be traced across sectoral boundaries. When sectors are interlinked, it is also typical for a sector to find itself in the middle of a causal chain: it depends on one or several other sectors, and in turn, some other sectors are dependent on it. Interviewees in the natural resources sector, for example, stressed the fact that factors affecting the reliability of deliveries and security of supply of energy, issues affecting transport and logistics, and partly also changes in tourism, for example growth in nature and wildlife tourism, have a major impact on operations in that sector. Similarly, interviewees noted that changes in this sector affect among other things the fields of health and water resources.

In addition to being aware of the direct impacts of climate change, identifying indirect impacts and causal chains stemming from interdependencies between sectors plays a key role for enabling efficient and anticipatory climate action. The inter-administrative nature of climate risks and networking between sectors influence the identification and processing of indirect impacts. While there are major differences between sectors regarding their awareness of indirect impacts, almost all sectors identified some. The interviewees experienced identifying and assessing cross-sectoral impacts rather challenging and, for example, the representatives of the water supply sector noted that indirect impacts have not been adequately dealt with. Identifying and discussing the

impacts is partly hampered by inconsistent terminology (the interviewees used different terms for cross-sectoral impacts, including indirect, consequential, cross-cutting and inter-administrative impacts as well as interdependency and multiplier effect). Several sectors also identified the silo effect of administrative branches as a key factor limiting the identification of indirect impacts and responding to them.

The greatest number of indirect impacts was identified in sectors critical for society's functions, including water supply, production and security of supply of electricity and energy, and transport and telecommunications. The interviewees found that risks posed to these areas by extreme weather events, including storms, droughts, floods and exceptional snow loads, rapidly affect various segments of business and industry as well as social welfare and health care. As society becomes increasingly dependent on technology, the need for uninterrupted power supply grows further and the system becomes more vulnerable to operational disturbances. The interviewees believed that changes related to climate change mitigation objectives, including electrification of vehicles and transition from fossil energy sources to bioenergy, may exacerbate the vulnerability of systems to disruptions caused by various extreme weather events. Safeguarding the security of food supply is also underpinned by adequately self-sufficient agricultural production, which is vulnerable to the impacts of extreme weather events. In agriculture, particular methods of preparedness were identified among possibilities of improving the climate resilience of plant species by means of plant breeding and using new species. The interviewees believed that thanks to security of supply work, preparedness for incidents affecting society's critical functions is at a relatively good level. Shortcomings were also identified, for example in preparedness for less frequent risks and the assessment of regional level risks extending beyond individual actors or sectors, in which looking at interconnections between sectors was considered vital.

The interviewees identified the impacts of climate change on species and habitats, and their multiplier effects on different sectors, as another key source of indirect impacts. The possibility of major financial risks also came up in the discussions, for example risks associated with the operating possibilities of the tourism sector and fisheries dependent on aquatic ecosystems. For agriculture, interviewees in the natural resources sectors brought up damages caused by both indigenous wild species (birds and mammals) and invasive alien species, new plant diseases, pests and weed species and veterinary diseases (including avian influenza and swine fever), and the risks they pose for production animals. In turn, the interviewees also identified mounting pressure on species and habitats as a consequence of the way changing climate conditions are affecting the operating conditions of different industries. Noted examples include an increase in water-borne traffic volumes as the ice-free season becomes longer (while the accident risk in sea areas also grows) and the development of agricultural and forestry activities as temperatures and precipitation, and thus growth conditions, change. The indirect

impacts of land use changes on safeguarding biodiversity were highlighted as a key issue in the interviews. The interviewees mentioned that we must look after areas and animal populations that are not necessarily currently at risk in order to preserve the total volume of declining organisms. Increasing the area of wetlands and protected areas was regarded as an adaptation solution related to land use that safeguards biodiversity and promotes the preservation of species.

It was noted that as forestry adapts to the changing weather and climate conditions, this also indirectly puts additional pressure on the transport sector. As the period during which the ground is frozen gets shorter, the logistics of timber harvesting will increase the pressure on the lower-grade road network, which already is in a poor condition. At worst, transportation of raw material from the forests will not be possible when road conditions are particularly bad, and changes in the load-bearing capacity of roads may have significant cost impacts as the repair and maintenance costs of the road network go up.

The interviewees pointed out that the indirect impacts of climate change on health remain relatively poorly known. In general, the interviews brought up increases in zoonotic diseases communicated from animals to humans by vectors, such as Lyme's disease and tick borne encephalitis. Changing precipitation levels and temperatures may increase moisture loads and mould problems in buildings, causing health effects. The interviewees believed that challenges related to the psychological impacts of climate change (climate anxiety and depression) as well as mounting challenges to elderly care (such as an increased risk of slipping and avoidance of going out as extreme temperatures become more common and the resulting loss of condition) will put social and health care under increasing pressure.

#### 4.1.2 Identification of international repercussions in sectors

*"The raw material market is extremely global, with the copper market and disruptions in mining operations as examples, and the way the volcano in Iceland messed up air traffic. An incident happening somewhere else may hit us really hard. A storm does not have to break out in Finland to affect us. For example, if we cannot get coffee, it's a national emergency. It's not enough just to keep an eye on the weather here. Storms in California, for instance, immediately affect oil prices. This is something that still feels distant to us, and people don't always see the impacts on us and local economies."*

*Interviews with government actors, a public servant  
of the Ministry of Economic Affairs and Employment.*

International repercussions refer to those impacts of climate change which are felt outside the Finnish borders but which, due to international interdependencies, ultimately extend to Finland through different impact chains. Such key causal chains for Finland include

international trade, infrastructure (energy, logistics, communication), human mobility as well as biophysical and geopolitical changes<sup>83</sup>. Similarly to the impacts described in the previous section, these repercussions are also indirect.

While the direct impacts of climate change are already relatively well recognised in the sectors and, on the other hand, an increasing number of indirect impacts is being identified, the international repercussions remain relatively poorly known. In the interviews conducted with representatives of administrative branches, some aspects related to international repercussions were cited, but this term was also often used when talking about indirect, cross-sectoral causal chains and risks communicated through other sectors within the national borders. The interviewees recognised the possibility of climate factors influencing the political risk around the world, in which case even major repercussions may be felt in Finland. What almost all sectors have in common is a failure to consider a chain of events outside the national borders unless a concrete and often alarming example can be cited. Nevertheless, some interviewees mentioned that the greatest impacts of climate change may be felt in Finland specifically through these international repercussions.

A few themes related to international repercussions came up in the interviews, of which the role of climate change in migration issues clearly sparked the most discussion. In discussions on climate change and migration, security aspects were stressed in particular. Finnish society's capabilities for adapting its functions, including water supply, housing construction and food production to a growing relative population pressure were also mentioned. In the context of this theme, the interviewees emphasised the significance of inter-administrative cooperation in the field of preparedness and security, as well as the role of the national risk assessment work coordinated by the Ministry of the Interior.

Another set of repercussions which was brought up by the representatives of several sectors in the interviews and which concerns a wide range of different sectors is associated with the interlinkage of energy and industries and their dependence on international markets. The interviewees noted that Finland is vulnerable to the impacts of world policy and global economy. Volatile situations and political imbalances in other countries also affect Finland, as do the economic impacts of international ecological catastrophes (including re-insurance premiums paid by Finnish insurance companies). It was also noted that changes in international energy and raw material markets (as a consequence of storms, volcanic eruptions or other stoppages, for example) will also affect Finland's energy security. The role of repercussions was also discussed in terms of the close links between the Finnish and Nordic electricity markets, and EU policy was considered to further international networking in the energy sector. However, the interviewees said that

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83 Hildén et al. (2016).

these impacts are still experienced as distant, and their impacts on local economies are not always seen at the level of society.

Not only the energy sector but also other fields identified repercussions relevant to them. In the health sector, for example, these repercussions include the arrival of different diseases and epidemics in Finland along with the warming climate and potential migration flows. The interviewees discussed ways of preparing for these risks, for example by means of vaccination programmes, and noted that assessing and anticipating the risks is very challenging. In the natural resources sector, repercussions related to plant and veterinary diseases were identified, for example those spread by invasive alien species. The experts interviewed for the evaluation expressed their concern over pests coming from outside Finnish borders (including tree pests) and their potentially serious consequences. Variations in prices caused by crop yield fluctuations resulting from extreme weather phenomena are currently seen in food trade, and in the future, repercussions may be caused if significant parts of current farmlands become unproductive.

In the discussions about repercussions, it was stressed that even if these impacts have been identified relatively well in some sectors, preparedness for them remains in a very early stage. The repercussions have been addressed to some extent as part of biodiversity issues, including multinational cooperation in developing the Green Belt of Fennoscandia, which also implements the UN Convention on Biological Diversity. In the future, monitoring the repercussions of floods and droughts occurring elsewhere was identified as important; it was noted that awareness of such events is currently low, but particularly risks associated with water and water supply were expected to play a key role in the future. The impacts of EU level and other international commitments were expected to be important for Finland, also from the perspective of climate change adaptation.

## 4.2 Reconciliation of adaptation with other policy objectives

*“In the big picture, it is something of a challenge that the country has conflicting strategies in place. People are confused and do not know what we really want here.”*

*Interviews with government actors, a public servant in the transport sector.*

*“Integration of mitigation and adaptation, these are two things we need simultaneously in any case.”*

*Interviews with government actors, a public servant in the natural resources sector.*

The premises of Action Plan implementation include avoiding conflicts and taking advantage of synergies with other policies and actions. While adaptation is mainly understood as compatible with and supportive of other objectives at the level of policy

objectives, experiences of practical-level implementation may reveal conflicts between different objectives. When, in keeping with the mainstreaming principle, an effort is made to integrate adaptation in the sectoral planning and steering processes, it is of primary importance to recognise any conflicts in order to provide better support for reconciling different objectives in practical implementation work.

One of the key types of synergies aimed for is reconciling climate change mitigation and adaptation to ensure that they are mutually supportive. Both government actors and stakeholders stressed the need for reconciliation at different levels from international talks to practical implementation work in municipalities. In some sectors, including transport, practical measures have to a great extent focused on climate change mitigation and it was experienced that adaptation had received less attention, even if in the administrative branch of transport, climate change originally emerged primarily as an adaptation issue. Another indication of the significance of mitigation work is the fact that adaptation to emission cuts was in many sectors considered a predominant trend, which is expected to shape the operating environment significantly. From operators' perspective, in particular, responding to and preparing for changes in political steering in different sectors is about adapting their activities. However, adaptation to climate change mitigation actions has not usually been understood as representing adaptation to climate change. This question is nevertheless worthy of consideration, as some mitigation actions may also influence exposure and vulnerability to the impacts of climate change.

Some objectives related to climate change mitigation were considered inconsistent with adaptation objectives. Through forms of energy use, fuels and other indirect links, mitigation actions in the transport sector have an impact on transport performances and thus the sector's adaptation needs. The Energy Efficiency Directive for the Seas, for example, will reduce engine power while vessel sizes increase, which means that vessels will be less efficient, at least with the current technology. Lower engine power may increase the need to use icebreakers, whose power and fuel consumption is considerably greater in comparison. According to the experts interviewed for the evaluation, this may hamper the effectiveness of shipping due to exceptional ice conditions typical for extreme weather events. The potential impact of a more concise urban structure on flood risks in urban areas was also identified as an inconsistency between adaptation and mitigation objectives.

The interviewees also identified potential for synergies in reconciling the protection of biodiversity and climate change adaptation. At the same time, it was noted that the silo effect of these two policy areas at the international, EU and national level has resulted in a situation where the discussion on synergies and reconciliation is in many cases only taking its first steps, and synergies are not yet achieved in practical work.



Biodiversity was also the sector in which the greatest number of opposing goals was identified. In the transport sector, for instance, conflicts of interest were identified between environmental goals and other transport policy objectives, which also are significant from the viewpoint of adaptation. Among other things, challenges of managing vegetation on the rail network and roads<sup>84</sup> brought about by a potential ban on glyphosates were mentioned. It has been estimated that vegetation will become more lush with changing growth conditions created by climate change. A glyphosate ban would make managing vegetation more difficult, hampering rail and road maintenance and increasing the maintenance costs, and thus possibly affecting transport and logistics.

Opposing objectives related to safeguarding biodiversity were also noted in the land use and construction sector. The interviewees said that the current changes and impacts on species and habitats caused by land use practices often are similar to the negative impacts of climate change. This is why the impacts of land use on the protection of biodiversity should also be taken into account in risk assessments. Northern species are particularly vulnerable to the impacts of climate change, and this situation can be influenced by land use policies (such as establishing conservation areas).

### 4.3 Cooperation within and across sectors in adaptation work

The cross-sectoral nature of climate change impacts and the management of indirect impacts and international repercussions highlight the need for cooperation across sectors in adaptation. Questions related to cooperation across sectoral boundaries were addressed in the evaluation in interviews with government actors, at the regional stakeholder events and through the national stakeholder survey alike.

Cooperation between actors was generally found to be effective, and many of the experts interviewed praised the cross-sectoral work at both national and regional level administrations. Among other things, cooperation in water resources management was regarded as advanced and effective. The division of steering duties between several ministries promotes inter-administrative cooperation in water issues. However, the data indicates that there is scope for improvement in the cooperation concerning adaptation issues, and the silo effect in administrative branches is experienced as a risk from the perspective of adaptation. In the built environment sector, for instance, it was noted that issues mostly continue to be handled within the sector. In the interview focusing on the natural environment, biodiversity and the silo effect in climate themes at the level of

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84 Small volumes of glyphosate are currently being used in paved road areas.

international conventions, EU institutions and Finnish political debate alike were seen as problems. The interviewees wished that actors such as the Finnish Climate Panel would tackle biodiversity issues and noted that international dialogue is also needed between the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Panel on Climate Change (IPCC). Another indication of the need to develop cooperation is that concrete examples of cooperation in adaptation themes were difficult to find. In the context of indirect impacts described in section 4.1.1 above, few interviewees were able to itemise how and with which parties cooperation is already ongoing or should be initiated.

In addition to the national adaptation monitoring group, the interviewees mentioned a few national forums identified as having an important role in developing cooperation concerning adaptation and preparedness. They included the Security Committee<sup>85</sup> and the networks of preparedness managers and secretaries at the ministries associated with its work, and the cross-administrative Health security steering group established in 2018<sup>86</sup>. The emerging cooperation between adaptation on one hand and general capability building and preparedness work on the other came up as an important theme in many sectors. For a more detailed description of this viewpoint, see section 4.3.1.

In addition to cross-sectoral cooperation, the need to develop cooperation within sectors featured strongly in the interviews. In the interview with defence administration representatives, the risk of a silo effect within the sector was noted, for example as the National Emergency Supply Agency's pool activities and the Defence Forces' sectoral development remain separate. Internal fragmentation within the sector, both internally between different modes of transport and at the level of the entire business sector, was also identified in transport. Interviewees in the social and health sector said that cooperation within the administrative branch in adaptation issues is only about to begin, and the representatives hoped that greater inputs would be made in it in the future.

In the stakeholder survey, cooperation in the field of adaptation was mainly looked at with reference to individual sectors. For more information on these results, see Appendix 3. In general, the findings indicate that cooperation concerning adaptation is not yet particularly systematic, and many sectors felt that it often relies on specific individuals or actors. Cooperation is typically incidental and takes the form of projects, seminars and other events. However, respondents also mentioned many examples of effective cooperation, especially in the context of preparedness for extreme weather events and their impacts. According to the survey data, they include cooperation related to preparedness for forest damages between the rescue authorities and forest owners as well

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<sup>85</sup> Security Committee (2019).

<sup>86</sup> Ministry of Social Affairs and Health (2018).

as cooperation and exercises in preparedness for extreme weather events, for example in the area of flood risk management. While permanent cooperation between peat producers and the rescue authorities in combating peat fires was mentioned, it was noted that no attempt is made in these activities to anticipate future changes in weather and climate conditions.

Certain challenges related to the cooperation also came up in the survey. For example, a lack of concrete actions and the fact that adaptation is understood as an excessively large theme from the perspective of inter-sectoral cooperation were mentioned repeatedly in the responses. In the finance and insurance sector, it was stressed that private operators engage in active cooperation, also at the international level, whereas there is little national collaboration between the public and the private sector.

A conclusion based on the stakeholder data is that developing cooperation is one of the key development needs in almost all sectors. The need to develop cross-sectoral regional and sub-regional cooperation was emphasised both in the stakeholder survey and at regional stakeholder events. In many sectors, stakeholders would also like to see stronger cooperation within the sector between national, regional and local actors. The responses received in the stakeholder survey indicate that many sectors have the capabilities for developing cooperation, and respondents would like to develop the role of existing networks and actors and engage them also in communication and cooperation related to adaptation. As examples were mentioned the Finnish Water Utilities Association and the responsible tourism network ICRT Finland.

#### 4.3.1 Links between adaptation and preparedness

***"Preparedness, incidents and emergency conditions are the business, never mind their causes. We are working on it, but not under the heading of climate change."***

*Interviews with government actors, a public servant in the defence administration.*

***"The typical feature in preparedness is that you prepare for what you have personal experiences of (e.g. floods) ... and when you have genuinely had significant impacts and bad consequences. Until the last minute, you keep waiting for something that hits you personally."***

*Interview with regional and municipal actors.*

The Paris Agreement and the Sendai Framework for Disaster Risk Reduction<sup>87</sup> have highlighted the need to reconcile climate change adaptation and preparedness for risks. At the EU level, this work has begun, and conclusions of the Evaluation of the EU

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<sup>87</sup> United Nations (2015b).

Adaptation Strategy published in 2018 stress cooperation between climate change adaptation, sustainable development and disaster risk management<sup>88</sup>. In Finland, threats associated with climate change which require preparedness were assessed in the update of the National risk assessment<sup>89</sup> led by the Ministry of the Interior in 2018 and the regional risk assessments prepared at the same time. The risk assessment work drew on the results of the SIETO project (assessment of weather and climate risks and operating models) funded by the Government's analysis, assessment and research activities completed in 2018. A special national defence course on climate change and comprehensive security organised in April 2018 was cited a good example of how future incidents caused by climate change have also been put on the agenda in the defence and rescue sectors. In the future, climate change will be one of the topics covered on all national defence courses. Cooperation between adaptation and preparedness was also reinforced at regional stakeholder events organised in cooperation with parties responsible for regional risk assessments as part of the mid-term evaluation process.

Efforts to prepare for different threats and risks have continued for an extended period. Legislation, administrative processes as well as responsibilities and activities are carefully planned and coordinated. Should the risks be realised, the authorities will act as indicated by their areas of responsibility, regardless of what caused the risk. The current system was designed for situations where a risk has already been realised, or it is obvious that it will be realised in the next few days (for example a fire, a winter storm or a flood). Effective cooperation between the authorities was stressed as a particular Finnish strength in the interviews with government actors and at the stakeholder events alike. Preparing for extreme natural phenomena has been a key part of preparedness for risks in municipalities and the rescue services' operation. A great number of exercises are organised, especially to prepare for power outages, and telecommunication and cyber risks have also come up in municipalities' preparedness work. Exercises promoting preparedness for special situations related to droughts has recently been developed in the Winland research project<sup>90</sup>. In connection with this project, the first large-scale exercise for drought conditions will be organised in Finland, and an operating model for drought exercises will be developed.

Compared to traditional preparedness, climate risk management requires planning and preparation over a longer time period. It is also expected that climate change may cause several problems occurring at the same time, and the current resources may not enable a fast and extensive enough response to them. The interviewees stressed not only a more

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88 European Commission (2018).

89 Ministry of the Interior (2019).

90 Winland (2019).

anticipatory approach but also that from the perspective of preparedness for climate change, the planning should look further than the risks of an individual actor and take into account regional risks and those that occur more rarely.

It is characteristic for preparedness activities that resources are allocated to managing and preventing a certain risk when it has been realised once on a large scale. The plans and practices related to receiving asylum seekers were updated after 2015 when 32,476 people had applied for asylum in Finland within a short period<sup>91</sup>. In the aftermath of the storm damages of 2010 and 2011<sup>92</sup>, amendments to the Electricity Market Act were drafted, as a consequence of which major investments in the storm resilience of the power grid were made in Finland by laying underground cables. The forest fires of 2014 and 2018 put fire prevention high on the political agenda in Sweden. It should be noted, however, that merely responding to actual events is not necessarily an effective strategy as climate change gathers momentum. In addition to reactive adaptation and preparedness work there are, however, signs of active development of preparedness efforts, for example extending them to forest damage caused by storms. Experiences of storm damage from both Finland (storms Asta, Hannu and Tapani) and neighbouring areas (storm Gudrun in Sweden) and the inadequacies observed in connection with them have been used to improve preparedness for storm damage.

Climate change adaptation, preparedness and contingency planning can be easily confused in discussions. The general view was that as long as actions are being implemented, the term used for them does not matter. Based on both the interviews and the stakeholder events, the meaning and content of climate change adaptation are difficult to perceive and little known except among those whose work focuses on climate issues.

The interviews revealed that attitudes towards climate work vary in different administrative branches. Some branches do not see a need for separate climate strategies or action plans, and the current preparedness work is understood as climate change adaptation. The interviews indicate that the integration of a broader adaptation perspective in preparedness functions is only taking its first steps in all sectors. While this issue has come up in discussions both at the national level and in the largest cities, concrete actions are still few and far in between. Municipalities are considered to play a key role in this, and there was a great deal of discussion at the stakeholder events about how this work should be initiated and what types of resources it would require. The

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91 Ministry of the Interior (2019).

92 Sorvali (2013).

energy sector, which is critical for society's functions, appears to be the most advanced in addressing climate change, also on the front of preparedness activities.

Security of supply was brought up in the interviews together with preparedness. The Security Strategy for Society<sup>93</sup> from 2017 defines the vital functions of society whose continuity must be secured in all circumstances. Climate change impacts have been taken into consideration in security of supply scenarios and service development. In the Security of supply: scenarios 2030<sup>94</sup> project, the impacts of climate change were taken into account in risk scenarios compiled for different sectors. A tool has been developed for monitoring security of supply scenarios and the phenomena they encompass. This tool is used annually to produce new information, which the security of supply pools use in their preparedness planning. The impacts of climate change are also taken into consideration in the Krivat service<sup>95</sup>, which intensifies cooperation between companies during major emergencies and speeds up recovery from them. A continuity management tool, which makes it possible to factor in climate change impacts, is also being developed for companies critical for security of supply.

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93 Security Strategy for Society (2017).

94 National Emergency Supply Agency (2018).

95 State Security Networks Group Finland (2019).

## 5 MID-TERM EVALUATION OF THE NATIONAL CLIMATE CHANGE ADAPTATION PLAN

### 5.1 Observations on Adaptation Plan implementation

*“We have got stuck in one place. We have knowledge and visions, but we are not making any progress in translating them into concrete actions. We should go out to various forums to explain how these things are going to affect them. Actors in individual fields probably give little thought to this issue, they are looking at their own sectors, if even that.”*

*Interviews with government actors, a public servant in the transport sector.*

Interviewees in administrative branches reported challenges encountered with implementing actions related to climate change adaptation. Such challenges were identified in great numbers and in each sector. These challenges are related to administrative structures and practices, information and expertise, low priority given to climate change, the economy and politics. The challenges to promoting adaptation work most frequently cited in the interviews are:

1. Problems arising from cross-sectoral challenges in sector-based government
2. Lack of information and expertise and challenges related to disseminating information
3. Low priority given to climate change and adaptation
4. Lack of financial resources for adaptation work
5. Lack of political consensus on adaptation as part of climate policy.

The interviewees were not asked to assess the magnitude of the challenges in comparison to each other, and no conclusions can thus be made on their relative importance based on the data.

In the stakeholder survey, a lack of financial resources or time, inadequate awareness of how significant the risks are, and a lack of information and associated uncertainties emerged as the greatest challenges to adaptation work. For information on key challenges itemised by sector, see Appendix 3.

### 5.1.1 Premises of implementation

The implementation of the Adaptation Plan is based on sufficient awareness of the risks and need for preparedness brought about by climate change. In addition to sufficient awareness and level of information and expertise, allocation of resources to Adaptation Plan implementation is linked to the priority given by society to adaptation as compared to other needs and investments.

#### Priority of climate work and adaptation

*“The problem is that adaptation actions have a lot of competition in budgets. We are so busy putting out fires that we are incapable of extensive anticipatory action. We cannot see the forest for the trees. We keep putting out small fires and cannot see the forest blazing behind us.”*

*Interviews with government actors, a public servant in the transport sector.*

Climate change adaptation often seems like a distant issue with no particular urgency. Unless the sector has a direct association with a risk strongly linked to climate change that has already been realised (flood, heat wave), actions are not prioritised at the political level and, consequently, also not in the administration. Structuring climate change as something that only concerns those who work with climate matters reinforces its secondary status. The long time horizon works against climate change actions as there always is something else that must be seen to. This long time span underlines uncertainty and challenges to assuming responsibility. Government representatives wished to know who would be brave enough to assume political (or administrative) responsibility for adaptation actions.

The interviews indicate that the national climate policy sets challenges to implementing adaptation actions from several viewpoints. The need for a sharper focus but also a broader view in climate work came up in the interviews. The interviewees felt that there currently is no political consensus on the direction in which the climate work should be taken in general.

In many sectors, mitigation was considered to overshadow adaptation. From the perspective of improving society's adaptive capacity, it is essential to understand that



preparedness for climate risks is an important part of climate work in addition to efforts to achieve mitigation targets.

### Lack of information and expertise

While a great deal of information is available on many aspects of climate change and this information is continuously built up by research, climate change is always associated with major information gaps and uncertainty. The financial costs of risk realisation and risk prevention, as well as the magnitudes of different risks as compared to each other, are all aspects on which information is lacking. In the area of biodiversity, in particular, studying the change is difficult as a starting point: the interdependencies of nature are complex, the number of species to monitor is high, and the lack of follow-up data prevents comparisons. The interviewees reflected widely on the importance of producing indicators to monitor climate change, and how measuring it is challenging but also important.

The interviews showed that even if information is available, it does not always reach all actors and decision-makers. While the work carried out in projects was regarded as valuable, the information produced by them should be disseminated more efficiently to the actors. Communication was considered to play a key role in this. However, the challenge lies in ensuring coherence in order to ensure that communication does not add to the actors' uncertainty. In many sectors, ways of ensuring sufficient expertise were also considered, especially in the context of commissioning different technological solutions and methods and the management of big data.

### Lack of financial resources

Based on the interviews, there is a lack of resources in terms of both time and money. Neither is available in sufficient quantities from the perspective of effective implementation. The interviewees noted that the development of climate risk assessment and methods supporting risk management also suffer from inadequate resources.

The interviewees reflected a great deal on the costs of adaptation in relation to the uncertainties and the long time span. Among other things, they speculated about what kinds of financial risks society is prepared to take in relation to a situation where a risk is never realised. The interviewees also asked what types of risks society is prepared to tolerate in the event that full adaptation is too costly (securing the energy supply in sparsely populated areas, for example).

### 5.1.2 Stakeholder participation

Comprehensive information on non-governmental stakeholders' participation in plan implementation is not available. At the national level, an effort has been made to promote their participation, for example in the development of indicators for monitoring adaptation together with producers of indicator data and data users. NGO actors have been activated in the area of communication on adaptation, in particular, which has contributed to raising awareness in society.

Relatively little information on stakeholder participation in different sectors emerged in the interviews. The results of the stakeholder survey indicate that as few as about one third of the respondents (N=447) had been actively or somewhat actively involved in adaptation work (Figure 2.3. in Appendix 3). Major differences were observed between sectors. According to the survey, the highest number of stakeholders had participated in adaptation work in the nature and environmental sector, and the lowest in the social and health sector.

The stakeholders expressed a wish for stronger cooperation between the central government and stakeholders operating at the regional and local level, especially in the transport sector and the social and health sector. Private sector actors, in particular, have little involvement in adaptation work so far. The stakeholders identified shortcomings in cooperation between the public and the private sector, especially in the finance and insurance sector.

### 5.1.3 Coordination of cooperation and adaptation

Cooperation between government actors was found effective both at the national and at the regional level. However, regional actors noted that no established operating models exist so far for cooperation concerning adaptation and its coordination. The fact that cooperation concerning adaptation is not yet particularly systematic emerged emphatically in stakeholder views. Stakeholders felt that in many sectors, the cooperation often relies on certain active individuals and mainly takes the form of projects.

The concrete contents of cooperation mostly remained unclear following this evaluation. The need for cross-sectoral cooperation, in particular, had only recently been identified in many sectors, and the forms of cooperation and actors had not yet assumed a concrete shape. The precondition for effective cooperation, even in a country with good governance, is knowing what must be done and with whom.

There is plenty of scope for improvement in the cooperation, both within and between sectors. The silo effects in administrative branches may be a challenge to promoting adaptation, whereas focusing on cooperation may help resolve some of the challenges

created by the siloes. In general, there is a willingness to step up and develop cooperation: the actors hoped that the ministry responsible for adaptation would coordinate the cooperation more, they would like to see more cooperation within and between sectors and international cooperation, and they wish to promote cooperation both between international organisations (e.g. IPCC<sup>96</sup> and IPBES<sup>97</sup>) and between the countries in the boreal zone. A need for close cooperation between NGOs and private sector actors also emerged in the evaluation.

### Challenges of solving cross-sectoral problems

*"The challenge is that the number of interfaces keeps increasing, for example as a result of incorporation. Responsibility, funding and authority become elusive. Too many cooks spoil the broth."*

*Interview with regional actors.*

The general development towards privatisation, which increases the number of interfaces, was identified as a challenge to promoting adaptation. Building cooperation between public and private actors came up as a particular challenge. A private actor cannot be obliged to collaborate, and contract-based activities were experienced as challenging in the context of preparedness for risks that will be realised over a longer term.

The current administrative tradition based on division into sectors is not helpful in managing the multidimensional and cross-sectoral entity of climate change. The sectors often lack clearly defined responsibilities, practices and operating instructions for their adaptation work, which hampers the implementation of many actions. The silo effect in government was also considered a major challenge to adaptation work, both within and between sectors. On the other hand, the cross-administrative nature of adaptation work may at best serve as a link between siloed structures.

#### 5.1.4 Lessons learnt

Based on the evaluation we can say that the possibilities offered by monitoring, which extend from implementation to lessons learnt and development, have not yet been fully exploited at the national level. For example, no annual reports on Adaptation Plan implementation referred to in the plan have so far been produced.

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96 Intergovernmental Panel on Climate Change (IPCC).

97 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

The evaluation indicates that systematic monitoring and evaluation of adaptation also remain rare in the sectors. However, it was observed that the mid-term evaluation process had encouraged some administrative branches to monitor the implementation status of their plans and programmes relevant to adaptation. Lessons learnt from the planning and implementation of adaptation actions may also be accumulated as awareness of the risks brought about by climate change and the need to adapt to it spread in different sectors.

The interviews and the regional stakeholder events that were carried out as part of the mid-term evaluation process offered opportunities to discuss questions related to adaptation in a larger group of actors and to learn from each other's experiences, which was widely appreciated. Participants at the regional events, in particular, expressed an emphatic wish for more extensive cooperation and exchange of experiences in the future.

## 5.2 Evaluation of progress in promoting a cross-cutting approach to adaptation (Objective A)

The National Climate Change Adaptation Plan has increased the administrative branches' awareness of the need for adaptation in general, and questions relevant to adaptation have been highlighted increasingly in the steering instruments of many sectors. The mainstreaming of adaptation in cross-administrative work has been promoted in such contexts as the preparation of the National risk assessment coordinated by the Ministry of the Interior in 2018.

Universally applicable guidelines on addressing the impacts of climate change in legislative drafting are not available as yet, however, and significant differences remain between the sectors in the extent to which the perspectives of adaptation have been mainstreamed in the steering instruments. So far, not all administrative branches have access to sufficient sector-specific information on climate risks or a plan for managing them. Shortcomings are also found in branches that have an action plan for adaptation based on the impacts of climate change and risk assessments, or which have integrated adaptation in a broader climate or environmental programme, especially in the areas of indirect cross-sectoral impacts and the international repercussions of climate change. Reconciliation of climate change mitigation and adaptation has also only progressed to some extent.

While various trial, study and development projects have been carried out at the regional and local level, the progress made by municipalities and regions in their adaptation work varies greatly. No comprehensive assessments of the impacts or effectiveness of such projects are available. The perspective of adaptation has also been taken into account in

the development of municipalities' continuity management as part of their preparedness efforts, but it is not clear how these perspectives have been made visible in their practical work. In the administrative branches of the ministries participating in steering the ELY centres, the perspective of adaptation has been taken into consideration in performance guidance. However, this perspective has only had a limited role in the ELY Centres' efforts to steer the municipalities, and cooperation between different areas of responsibility (such as the environment and transport) has not yet been promoted.

In international cooperation, perspectives of adaptation have been included in Arctic cooperation, transboundary water cooperation and cooperation in nature conservation as well as in the implementation of Finland's development policy. The different ministries have also drawn attention to adaptation issues in EU policy.

**Table 2. Objective A: Evaluation of progress in promoting a cross-cutting approach to adaptation**

Criterion	Evaluation
<b>Effectiveness</b>	The objective has increased the administrative branches' awareness of the need for adaptation in general, and questions relevant to adaptation have been increasingly highlighted in the steering instruments of many sectors. However, there still are significant differences between the sectors.
<b>Efficiency</b>	Integration has not drawn particular attention to the (economic) efficiency of adaptation actions. However, in such areas as flood protection, which may also involve the planning of large investments, an examination of efficiency is incorporated in planning. The economic efficiency of adaptation actions has also been discussed in the context of transport infrastructure planning when it has taken place as part of other infrastructure planning.
<b>Relevance</b>	The objective has been considered relevant, and integration in the sector's planning and practices has been emphasised in many sectors. While most sectors are only beginning to take the repercussions of climate change into account, it was noted that these repercussions will increase in importance.
<b>Coherence</b>	While the objective has not highlighted major conflicts between adaptation planning and other planning, some practical challenges were identified, for example in the reconciliation of mitigation and adaptation. Developments, in which implementing mitigation actions may impede climate change adaptation or increase its costs, were seen for example in the transport and built environment sectors. In addition to challenges, untapped potential for synergies was identified especially in the context of biodiversity.
<b>Institutional capacities</b>	The objective has promoted paying attention to weather and climate risks in national and regional risk assessments, which has increased awareness and capabilities for preparedness. However, not all administrative branches have yet produced sufficient assessments of the impacts and risks of climate change or prepared a plan for adapting to them. Many administrative branches and stakeholders noted that a lack of concrete information and uncertainties related to climate change hamper the planning of practical actions.
<b>Barriers</b>	A particular challenge to implementing the objective is insufficient awareness of the potential impacts of climate change. Achieving the integration objective is not a problem in sectors used to paying attention to weather and extreme weather events when planning their activities and investments. However, raising sufficient awareness is the first challenge in those sectors where weather has had little effect on planning the activities.
<b>Stakeholder participation</b>	The evaluation did not produce any observations of the integration objective having a significant effect on stakeholder participation.
<b>Collaboration of actors</b>	At the national level, the strive for integration has increased cooperation between administrative branches. At the regional and local level, cooperation has been developed within the framework of climate plans, but there are major variations in the breadth and scope of such cooperation between different regions and municipalities. While cooperation between authorities is widely considered effective, collaboration related to adaptation is not yet systematic.
<b>Lessons learnt</b>	The strive for integration has led to a new type of monitoring at the national level (Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Transport and Communications). Regional and local practices vary, and the number of systematic methods for collecting lessons learnt and transferring them between municipalities and regions is limited (e.g. survey of the Association of Finnish Local and Regional Authorities).
<b>Side effects</b>	As a side effect of the integration objective, references to adaptation may be made where the connection is tenuous. For example, a reference to adaptation was associated with as much as EUR 23.5 million of the regional development funding granted to actors. This amount is greater than the figure allocated to adaptation at the national level, and surprising because adaptation has not been emphasised specifically in the national regional development objectives. It is possible that the links to adaptation are indirect or tenuous in many projects. An in-depth examination of these 'adaptation projects' is called for, as they may also give indications of the challenges to integration.

### 5.3 Evaluation of development in climate risk evaluation and management methods (Objective B).

The importance of climate risk assessment and management methods has been identified at the national level, and the Adaptation Plan also recognises the importance of regional and local information. The volume of climate risk work in different branches of administration varies, and weather and climate risk assessment and management procedures have mainly been developed through projects. Projects financed by the Government's analysis, assessment and research activities have been justified by National Climate Change Plan implementation. In addition to risk assessments, these projects have also developed some methods (ELASTINEN, SIETO). However, the resources of these projects have been too scarce to allow any in-depth methodology development, and the Government's analysis, assessment and research activities are not as a rule suitable for a funding instrument for methodology development, as they mainly aim for producing studies on clearly defined topics.

While no systematic evaluation of the effectiveness of current or new evaluation methods has been carried out, the SIETO project collected information on sources of monitoring data and identified possibilities for intensifying data collection. Some long-term monitoring exercises have been discontinued without actively seeking new funding models for keeping up the monitoring in situations where the significance of monitoring data is expected to increase (SIETO). The emphasis on risk management methods has contributed to motivating other research projects to develop methods, including FORBIO, or to actively draw on the results of EU projects (such as the FP7 project BASE). However, the focus of actual research projects is partly determined on other grounds than the needs of operative methodology development. Methodology development requires time and resources, and the Adaptation Plan pays little or no attention to it.

The completed risk assessment projects have built up the research institutes' risk assessment capacity. They have also increased cooperation between research institutes, universities and other actors, and experiences of it have mainly been positive. At the same time, a need has been identified to improve cooperation between the private sector and research in the production and maintenance of data used for risk assessments (SIETO). Promoting this issue is a clear challenge to Adaptation Plan implementation, as the plan pays little attention to the dimensions of interaction between the public and the private sector in promoting adaptation.

Risk management is built up through concrete actions, for example in the operative work of the Flood Centre. In regional and local activities related to risk management, the role of the National Climate Change Adaptation Plan has been indirect at best, and capacity building has been motivated by concrete incidents. Learning related to management methods has been accumulated in different areas (including the Flood Centre, reviews

of the National Emergency Supply Agency), but a need for collective learning and the sharing of good practices still remains. Reports produced by research projects that participated in the development of evaluation methods and other communication, including Policy Briefs, also create preconditions for learning.

**Table 3. Objective B: Developing the assessment and management methods of climate risks – an evaluation of criteria fulfilment**

Criterion	Evaluation
<b>Effectiveness</b>	The objective has led to projects financed by the Government's analysis, assessment and research activities which, in addition to producing risk assessments, have also developed some methods. However, the resources of these projects have been too scarce to enable any in-depth methodology development. Risk management has been developed at the Flood Centre run jointly by the Finnish Environment Institute and the Finnish Meteorological Institute, for example.
<b>Efficiency</b>	While the objective has not led to systematic assessments of the efficiency of current or new evaluation methods, such projects as SIETO have collected information on sources of monitoring data and identified possibilities for intensifying data collection.
<b>Relevance</b>	The importance of climate risk assessment and management methods has been identified at the national level. The Adaptation Plan also recognises the significance of regional and local information.
<b>Coherence</b>	Some long-term monitoring exercises have been discontinued without actively seeking new funding models for keeping up the monitoring in situations where the significance of monitoring data is expected to increase (SIETO).
<b>Institutional capacities</b>	The completed risk assessment projects have built up the research institutes' risk assessment capacity. Risk management is strengthened through concrete actions, for example in the operative work of the Flood Centre. In regional and local activities, the role of the National Adaptation Plan has been small. Capacity building has taken place by responding to concrete incidents.
<b>Barriers</b>	Methodology development requires time and resources, and the Adaptation Plan pays little or no attention to it. As a rule, the Government's analysis, assessment and research activities are not suitable for a funding instrument for methodology development, whereas the focus of actual research projects is partly determined on other grounds than the needs of operative methodology development. Business Finland, on the other hand, emphasises export potential, which is not a primary objective in adaptation management and methodology development.
<b>Stakeholder participation</b>	Investments in stakeholder participation have been made in the development of risk assessment and risk management. Adaptation Plan implementation has promoted participation at the national level. At the regional and local level, the Adaptation Plan's impact has been indirect at best.
<b>Collaboration of actors</b>	The completed risk assessments have increased cooperation between research institutes, universities and other actors, and experiences of it have been positive. At the same time, a need has been recognised to improve cooperation between the private sector and research in the production and maintenance of data used for risk assessments (SIETO). Promoting this issue is a clear challenge to Adaptation Plan implementation.
<b>Lessons learnt</b>	As the development of assessment methods has relied on research projects, which have been required to produce research reports and other communication material including Policy Briefs, the preconditions for learning exist. Learning related to management methods has been accumulated in different areas (including the Flood Centre, assessments of the National Emergency Supply Agency), but a need for collective learning still remains.
<b>Side effects</b>	The emphasis on risk management methods has contributed to motivating other research projects to develop methods, including FORBIO, or to actively draw on the results of EU projects (BASE).



## 5.4 Evaluation of enhancement in society's adaptive capacity and improvement in citizens' awareness (Objective C)

Finnish adaptation research has been promoted through national programmes and projects (the Government's analysis, assessment and research activities, the Academy of Finland, the Strategic Research Council) and international funding alike (including Horizon 2020 and other EU funding). A study on research and information needs related to adaptation completed by Tapio in 2018 laid the foundation for a potential research programme on adaptation by identifying key gaps in research and possible funding sources. While the scope of research on climate change adaptation has in recent years expanded from natural sciences to an increasing number of other disciplines, shortcomings and knowledge gaps continue to be identified, and the production of information has been inconsistent when examined by sector.

The number of companies basing their business on climate change adaptation continues to be small in Finland. Preliminary studies on business opportunities created by adaptation showed that most companies find the impacts of climate change too distant and difficult to perceive to consider developing business based on it profitable today. An effort has been made to raise awareness among companies in cooperation with such actors as the corporate responsibility network FIBS. Some technology and expertise related to anticipation and warnings systems can be identified among other things, but the export potential has so far not been investigated comprehensively.

Tools in support of regional adaptation work are being developed especially in projects carried out by research institutes, including the Finnish Environment Institute, the Natural Resources Institute Finland and the Finnish Meteorological Institute. The Ministry of the Environment has produced guides to promote adaptation (on such topics as recommended building elevations and planning that promotes the achievement of climate objectives), and forest management recommendations have been updated with support from the Ministry of Agriculture and Forestry. The municipalities play a major role in this, as the majority of practical adaptation actions must be implemented at the regional and local level. Currently, especially large municipalities have been able to invest in developing tools to support regional adaptation work. It is obvious that smaller municipalities do not have resources for this work. However, comprehensive information about municipalities' climate change adaptation is not available.

Communication about adaptation has been developed by producing a communication plan, among other things, but stronger inputs should be made in its implementation. In the mid-term evaluation, the lack of general climate awareness and information about climate change adaptation was cited as one of the key challenges to adaptation by both government and non-government actors. Clearer communication about the

concrete impacts of climate change and adaptation to them is still needed. A need to target adaptation information and the use of different communication channels at various groups has been identified. To facilitate inter-administrative communication about adaptation and on-going actions, better cooperation between the administrative branches is required. Targeting communication on adaptation at citizens as well as decision-makers is equally important and will require more inputs. An effort has been made to keep the Climateguide.fi website up to date; the updates are mainly carried out by projects.

Education contents have been developed by including climate change adaptation in the curricula at all levels of education in the reform process of early childhood education and care and other education and training. Climate change has also been taken into account in future reform processes.

**Table 4. Objective C: Enhancement in society's adaptive capacity and improvement in citizens' awareness – an evaluation of criteria fulfilment**

Criterion	Evaluation
<b>Effectiveness</b>	The objective has supported the launch of projects funded by the Government's analysis, assessment and research activities, among other things, and the development of communication on climate change. It has contributed to the implementation of many projects related to climate change without a direct steering influence on the part of those responsible for Adaptation Plan implementation. In this respect, the effectiveness of the objective has been indirect. However, no information is available on the extent to which this has improved the adaptive capacity. As section 4.1 shows, however, more than one out of two respondents in the stakeholder survey considered that they have at least quite a lot of information on the weather and climate risks relevant to their sector.
<b>Efficiency</b>	No particular attention has been paid to the efficiency of achieving this objective, and its achievement has been promoted generally by many different means.
<b>Relevance</b>	In the light of the evaluation findings, the objective is considered relevant. A need for targeted communication and dissemination of information was stressed particularly in stakeholders' views.
<b>Coherence</b>	An effort has been made to increase awareness systematically in different sectors. While many sectors have striven to build up their adaptive capacity, the findings also show that progress made in this issue has varied. For example, approx. 60% of social and health sector respondents in the stakeholder survey felt that there is no awareness of the need for adaptation, or this awareness is so far limited to a small group of pioneers (section 4.1)
<b>Institutional capacities</b>	Actions to achieve this objective have been taken in various ways in different administrative branches. A link to the National risk assessment has increased general awareness, especially in the central government, and improved capabilities for building up adaptive capacity. Relatively little has so far been done within the framework of the Adaptation Plan to increase awareness among citizens.
<b>Barriers</b>	A key challenge to achieving the objective is its large scale. Consequently, the objective cannot be achieved merely by relying on centralised communication and coherent plans, and encouragement should also be provided for spontaneous creative communication, which is partly unanticipated and may also challenge the actors responsible for the Adaptation Plan.  As a barrier in the practical application of information, emerge the differing views of government actors and information users concerning the availability of information. The former believe that plenty of information is available and that the focus should be on its practical application, whereas the stakeholders claim that there is little information to be applied.
<b>Stakeholder participation</b>	In order to achieve the objective, an effort has been made to activate stakeholders by means of a few seminars and by preparing a communication plan, but significant resources have not been allocated to its achievement. NGOs have been involved in the planning and implementation of the communication campaign, and municipalities, in particular, have examined ways of improving their adaptive capacity independently. The participation of private actors has been limited.
<b>Collaboration of actors</b>	At the central government level, there are structures in place (such as the Monitoring group on climate change adaptation and the Security Committee), in which building up the adaptive capacity is a natural part of the work. Some municipalities and regions have such structures, but not all.
<b>Lessons learnt</b>	A precondition for achieving the objective is creating practices through which continuous improvement of the adaptive capacity is possible. Some of the ministries' action plans for adaptation follow the learning principles by offering a platform on which experiences can be recorded and which supports the preparation of new policy actions.
<b>Side effects</b>	The side effects of increasing awareness are seen as an improvement in general awareness of climate change, which can be seen in public discussion. It may be presumed, however, that only a small part of this is due to the achievement of the Adaptation Plan's objective.

## 5.5 General evaluation of Adaptation Plan implementation

*“The actions that we have completed would have been planned and implemented also without the National Adaptation Plan. They have been based on our own and the sectors’ needs, rather than depended on the Adaptation Plan. Adaptation is part of our own activities, and we work together with others. It has been part of the normal activities of the administrative branch. However, I can also see the value of the National Adaptation Plan.”*

*Interviews with government actors, a public servant of the Ministry of Economic Affairs and Employment.*

In keeping with the principle of mainstreaming, an effort is made to integrate adaptation in the sectors’ normal planning and activities. This means that specific actions aiming for adaptation cannot always be identified in many sectors. Built-in indications of the effectiveness of the policy steering adaptation can be identified, however, in sectoral steering instruments. Examples of these in the built environment sector include the national land use objectives and the reform of the Land use and Building Act, which is currently under way and in which the perspective of adaptation is examined as a cross-cutting theme together with climate change mitigation. The impacts of climate change and preparedness for them are also systematically accounted for in the legislation on water resources.

The Adaptation Plan has no links to resource allocations that could be monitored, which made its actual cost-effectiveness impossible to evaluate. The administrative branches have allocated some of their internal funding to plan implementation, for example to provide resources for expert activities related to adaptation, implementation of administrative branches’ own action plans for adaptation, and research and study projects. A total of approx. EUR 650,000 of funding from the Government’s analysis, assessment and research activities has been allocated to the following projects that support Adaptation Plan implementation: ELASTINEN (2015–2016), SIETO (2017–2018) and TASAPELI (2018–2019). An estimated EUR 23.5 million of public funding has been granted from the Structural Funds (ERDF and ESF) to projects linked to climate change in 2014–2020. This indicates that significant progress in climate change adaptation could be made by investing in peer learning.

All in all, the Adaptation Plan has a broad scope. The evaluation criteria throw light on different areas of the Adaptation Plan and its implementation. This section looks at the current implementation of the Adaptation Plan as a whole in the light of the evaluation criteria, drawing on the entire data set and especially sections 5.1–5.4.

**Table 5. General evaluation of Adaptation Plan implementation**

<b>Implementation process and fulfilment of evaluation criteria</b>	
<b>Institutional capacities</b>	<p>The sectors do not yet experience the level of awareness as sufficient. The resources for implementing actions are not considered adequate, which some sectors see as a prioritisation problem.</p> <p>The sectors have varying capabilities for responding to climate risks. Some sectors base their preparedness on plans and have developed warning and monitoring systems, while the operation of others is almost exclusively reactive when potential problems crop up. The poorest capabilities are found in the sectors whose operations have so far not been significantly affected by the weather and climate.</p>
<b>Barriers</b>	<p>Based on the evaluation, the most common barriers to plan implementation were inadequate identification of climate risks, low priority given to climate work and adaptation, a lack of financial resources, a lack of information and expertise, as well as the available information not being applicable to practical work.</p>
<b>Stakeholder participation</b>	<p>There has been a particular focus on stakeholder participation in the development of climate risk assessment and management, and partly also in promoting monitoring and communication in support of implementation. The levels and methods of stakeholder participation vary greatly in different sectors, and no broad conclusions can be made on this aspect based on the evaluation. Participation should be developed further.</p>
<b>Collaboration of actors</b>	<p>While cooperation between authorities is widely considered effective, collaboration related to adaptation is not yet systematic. At the central government level, such structures as the Monitoring group on climate change adaptation and the Security Committee are in place, in which building up the capabilities for adaptation and cooperation between adaptation and preparedness is a natural part of the work. Some, however not all, regions and municipalities also have structures supportive of cooperation, but their utilisation is partly inadequate.</p> <p>Climate risk assessments have increased cooperation between research institutes, universities and other actors. Private and public sector cooperation is limited in many sectors and, for example, there is a need to improve cooperation between the private sector and research in the production and maintenance of data used for risk assessments.</p>
<b>Lessons learnt</b>	<p>The implementation of the Adaptation Plan has not been monitored regularly. Indicators for monitoring adaptation have been developed, but they have been used little in steering the activities.</p> <p>At the national level, administrative branches' action plans for adaptation enable learning from experiences related to implementation within the framework of branch-specific monitoring, which supports the development of adaptation policy and actions. Regional and local practices vary, and sufficient systematic methods for collating lessons learnt and transferring them between municipalities and regions do not exist yet.</p> <p>The work aiming to develop climate risk assessment methods has created preconditions for learning through research projects' information activities. Learning related to risk management methods has taken place through practical work in different areas, but a need for collective learning still remains.</p>

<b>Evaluation criteria and questions relevant to Adaptation Plan effectiveness</b>	
<b>Effectiveness</b>	<p>At the national level, the Adaptation Plan has contributed to creating a framework for discussing climate change adaptation, regardless of the fact that the actual plan is not particularly well known among the stakeholders (see section 3.5). The sectors are aware of their responsibilities, and the branches of the central government have launched their actions. The differences between sectors remain great, however. Some of these differences are natural and justified, as the time span and significance of adaptation for the sectors vary, but there is also untapped potential for peer learning.</p> <p>The extent to which the Adaptation Plan has reached the regional and local level is limited. There also are differences between the sectors: in some sectors, national organisations have actively supported and steered regional and local adaptation activities; in the water supply sector, for example, almost one half of the respondents found in the stakeholder survey that national organisations have promoted this issue. In other branches, including the social and health sector, local and regional activities are completely independent in practice.</p>
<b>Efficiency</b>	<p>The Adaptation Plan is not associated with resource allocations that could be monitored, which made its actual efficiency impossible to evaluate. Only a handful of examples of perspectives related to the efficiency of adaptation actions came up in the context of flood risk management and transport infrastructure investments.</p>
<b>Relevance</b>	<p>The objectives and actions of the Adaptation Plan are still considered topical. Its implementation should be stepped up in the next few years, however, in order to achieve the objectives set for 2022.</p>
<b>Coherence</b>	<p>While no conflicts with other policy objectives can be identified at the level of objectives, challenges may arise in practical adaptation work. It is particularly important to promote the identified synergies with other objectives and to improve the coherence of climate change mitigation and adaptation in all sectors.</p>
<b>Side effects</b>	<p>The Adaptation Plan has influenced public discussion on climate change. On the other hand, the more prominent discussion on climate change in publicity has increased the demand for information, and the Adaptation Plan has assumed a larger role than it would otherwise have done. This self-perpetuating development has increased the number of references made to adaptation actions. As we noted before, an unexpectedly large share of projects implemented on regional development funds contains references to adaptation.</p>

## 6 ACTIONS IN SUPPORT OF ADAPTATION PLAN IMPLEMENTATION

This Chapter contains observations on actions that could help solve some of the challenges related to climate change adaptation which came up in the evaluation. Not all of these actions can be implemented at once, and some will require sustained work. The actions proposed in this Chapter will support the work of the Monitoring group on climate change adaptation in the planning and implementation of further actions. In order to promote adaptation, cooperation between different administrative branches and actors is required, and the Monitoring group plays a key role in developing this cooperation.

### 6.1 General actions for promoting the effectiveness of the plan's implementation

#### 1 Roles and responsibilities should be clarified at all levels of government and within sectors.

Different actors' roles in climate change adaptation should be clarified, and the responsibilities for Adaptation Plan implementation should be defined as clearly as possible both within the administrative branches and at different levels of government. As part of the efforts to clarify roles and responsibilities, the coordination of adaptation work should be improved.

The clarification of roles and responsibilities should be promoted particularly by developing steering instruments and government processes as well as integrating actors and networks better in adaptation work. The roles of non-government stakeholders in adaptation work should be strengthened. Particular attention should be paid to the sectors, regions and municipalities where no clear practices and responsibilities for the adaptation work have so far taken shape. Supporting the ownership of this work in the sectors, regions and municipalities is important.

## **2 Cooperation should be stepped up and developed at different levels of government across sectoral boundaries and between private and public actors.**

Dialogue and cooperation within and between sectors should be improved. Raising awareness and improving expertise related to indirect, cross-sectoral climate risks supports cooperation. In order to improve society's adaptive capacity, it is vital to support and develop private actors' and NGOs' preconditions for participating in adaptation work.

## **3 A cross-cutting approach to adaptation in different sectors should be ensured.**

All administrative branches should carry out adequate assessments of climate change adaptation and, if necessary, prepare action plans for adaptation by 2022. More consideration should be given to the repercussions of climate change in sectoral plans and various assessments. The aim of this work should be identifying concrete actions and, in particular, implementing actions that are justified regardless of how climate change will progress. Tools for practical work should be developed to support the implementation of steering instruments, including guides, anticipation and warning systems and communication materials.

## **4 Coherence between adaptation and other policy objectives should be improved.**

The synergy benefits and potential inconsistencies of different policy actions should be investigated from the perspective of adaptation, making an effort to find solutions that resolve conflicts and promote the achievement of several goals at once. Cooperation between administrative branches helps avoid objectives that guide development in opposite directions.

In the next update, the perspective of climate risk assessment and adaptation to these risks should be included in guidelines on impact assessments of legislative proposals. Projects completed on funding from the Government's analysis, assessment and research activities and other R&D projects related to adaptation have laid the foundation for developing the guidelines.

## **5 Weather and climate risks should be integrated in preparedness work at all levels of government from strategies to practical actions.**

Closer interaction should be promoted between experts on adaptation and preparedness at all levels of society. The link between climate change and the ensuing risks on the one hand and preparedness work on the other should be maintained. This also means integrating the longer time span needed to manage climate change risks in preparedness work from the Government level down.



## **6 Funding models for adaptation work should be developed.**

Anticipatory adaptation and preparedness for risks is in key role as the costs may increase considerably over the long term, and anticipating a situation is more cost-effective than responding to it.

More resources should be allocated to developing risk assessment and management methods, in particular, in order to secure a knowledge base that supports adaptation in different sectors and regions. The continuity of key data sets for risk assessment, including long-term monitoring, should be ensured. This may require the development of new funding models in which public and private actors join their forces to maintain and fund monitoring exercises and the data sets they produce.

To improve the resources available for regional and local work, Structural Funds projects and other projects supporting regional and local adaptation should be examined systematically, making evaluations of their effectiveness possible. A systematic examination of the projects will also enable new types of learning through sharing project results and identifying good practices.

## **7 Regional adaptation work should be supported by developing regional climate risk assessments and cooperation between the actors.**

Regional information about climate change risks enables the provision of support and information targeted at the regions' needs for the planning of activities. In order to promote regional adaptation work, it is crucial to identify the actors who play a key role in implementation, clarify the division of responsibilities for adaptation actions, and develop regional cooperation and its coordination. The possibilities of promoting cooperation should be investigated, for example regarding existing networks and cooperation structures and by organising regional workshops for broad-based brainstorming and co-design of concrete solutions to regional adaptation challenges.

## **8 Adaptation should be promoted actively as part of the EU Presidency themes in 2019.**

It is particularly important to work for strengthening climate change adaptation in the current reforms of the EU's sectoral policies affecting the national level and in the context of further work on the EU Adaptation Strategy. Focusing on collecting international good practices and learning from them will also be possible during the Presidency.

### **9 Tools for climate risk assessment and management should be developed especially to respond to sectoral and regional needs.**

The government should promote the production of weather and climate risk assessments in which regional sectoral aspects are taken into consideration. To ensure their usability, the assessments should be based on joint planning. The introduction of the operating model for weather and climate risk assessments created in the SIETO project should be promoted in cooperation between different actors.

Cooperation between sectors in identifying the causal chains of indirect impacts and means of managing them should be developed. Needs related to international repercussions affecting Finland and the neighbouring areas and the preconditions for preparing for them should be investigated. In risk assessments, an effort should be made to take the big picture of adaptation work into account, for example through network assessments and scenarios, to prevent incorrect inputs over the longer term. Methods for assessing the financial impacts and costs of climate risks should also be developed to support the planning of cost-effective adaptation actions.

### **10 Research should be targeted at filling identified information gaps, taking sectoral needs into account.**

Research funding should be targeted at implementing projects that support adaptation. This should be done in order to ensure that a knowledge base responding to the sectors' and actors' needs can be built up, to draw on the information produced by the fast-developing climate change research on the national scale, and to respond to the challenges brought about by the changing climate. The selection criteria of research and study projects should emphasise the identified information gaps, including the international repercussions of climate change affecting Finland and the neighbouring areas, as well as the sectors in which targeted sectoral information is needed to launch and promote adaptation work. In studies and assessments, interaction with information users should be underlined, and co-creation methods should be developed.

### **11 Inputs in developing information activities and communication should be made on all fronts.**

Sectoral needs and different actors' levels of awareness of climate risks should be taken into account in information activities, and the applicability of information from the perspective of different actors should be improved, for example by supporting service development and education. Information should be collected to a single location where it is easily accessible, for example in the web service [Climateguide.fi](http://Climateguide.fi).

Communication on adaptation should be developed on all fronts, while the various administrative branches should jointly agree on organising sufficient basic resources for it. Communication should be targeted at different groups, including policy-makers and citizens.

### **12 Teacher training should be developed in order to strengthen teaching and education related to climate change and adaptation.**

In addition to reforming curriculum contents, sufficient (continuing) training should be provided for teachers to ensure that awareness of climate change impacts and preparedness for them is developed at all levels of education and, through vocational education and training, promote competence development in different sectors. Additionally, information on climate change risks and preparedness for them should be developed to provide better support for education and training.

### **13 Possibilities for learning through implementation should be improved by ensuring the continuity of monitoring and developing the evaluation methods of adaptation.**

As part of the development work, the use of indicator data related to adaptation in practice should be promoted, as well as the use of monitoring data produced by the sectors and such actors as the municipalities in order to form a national big picture. In order to improve learning, methods should be developed for systematically collecting and transferring lessons learned about adaptation work in municipalities and regions. This could be done for example by strengthening the role of adaptation in the climate survey conducted by the Association of Finnish Local and Regional Authorities.

For a discussion on other identified actions related to developing the monitoring and evaluation of Adaptation Plan implementation, see section 6.2.

## **6.2 Actions for developing the monitoring and evaluation of adaptation**

### **14 Continuous monitoring of the Adaptation Plan should be ensured, among other things by producing the annual reports referred to in the plan.**

Producing monitoring reports is important in ensuring that administrative branches will not overlook adaptation. Monitoring doubles as plan implementation work, especially from the perspective of communication and prompt implementation of the actions. The

interviews conducted with administrative branches and the stakeholder events organised in connection with the mid-term evaluation were widely appreciated for offering opportunities to coming together and focusing on these issues.

### **15 Measuring effectiveness should be focused on when preparing for and carrying out the final evaluation of the plan.**

In addition to developing indicators for effectiveness, attention should be paid to evaluating the economic impacts, costs and benefits of the actions, thus also developing a knowledge base that will facilitate the evaluation of cost-effectiveness.

### **16 The monitoring and evaluation of sector-specific adaptation work should be developed and utilised better in the monitoring and evaluation of national adaptation work.**

At best, sectoral monitoring data may produce valuable information on the concrete progress of risk management and adaptive capacity regarding the substance issues of different sectors, thus enabling the creation of a more accurate big picture at the national level. Sector-specific work to develop the monitoring and evaluation of adaptation should be supported, among other things by disseminating good practices and supporting learning between sectors. In the most advanced sectors regarding adaptation work, in particular, developing monitoring and indicators is in key role for supporting further development.

### **17 Local level monitoring and evaluation should be utilised better in the monitoring and evaluation of national adaptation work.**

Local monitoring and evaluation data is currently not widely available, as few municipalities have advanced to the level of systematic monitoring and evaluation in their adaptation work. However, especially larger municipalities do have monitoring data which is reported internationally, for example within the Covenant of Mayors, and which could be utilised better also in national adaptation work.

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## APPENDICES

**Appendix 1** Table of Adaptation Plan actions

**Appendix 2** Participants and questions in branch-specific group interviews

**Appendix 3** Berninger, K., Kangasoja, J., Piila, N., Luoma, E., Peltonen, L. and Tynkkynen, O. 2018. Survey of stakeholder views. Tyrsky-Konsultointi Oy and Akordi Oy

## Appendix 1 Implementation in different administrative branches

### Finland's National Climate Change Adaptation Plan 2022:

#### Parties responsible for and implementing the measures, timing, and resourcing (2014-2018)

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
<b>1. STUDIES ARE CONDUCTED ON CLIMATE RESILIENCE ON THE NATIONAL LEVEL WHILE TAKING ACCOUNT OF THE INTERNATIONAL REPERCUSSIONS OF CLIMATE CHANGE</b>				
a) Assessment of the impacts of climate change is integrated in the <i>Government foresight scheme</i> .	<b>Prime Minister's Office</b>	2015–2016	as part of official duties	Prime Minister's Office: Climate change is one of the key issues in the Opportunities for Finland joint outlook of the Permanent Secretaries of the ministries for the government term 2019–2023. The following Government will define the future objectives and measures in more detail.
b) Guidelines concerning the impacts of climate change are included in the guidelines for the <i>impact assessment of legislative proposals</i> .	<b>Ministry of Justice</b>	As part of the reform of the guidelines for the impact assessment of legislative proposals	as part of official duties	Ministry of Justice: The aim is to reform the guidelines for the impact assessment of legislative proposals during the next parliamentary term. Reforming the guidelines involves examining and assessing what different impacts should be assessed in the preparation of legislative proposals.
c) Assessments on climate resilience are included in the <i>strategies, programmes and other steering instruments of individual administrative branches</i> (incl. financial steering). The impacts of climate change and climate risks are assessed in the legislative preparation and acts of the various sectors.	<b>ministries</b>	guidelines 2015-2016 ongoing	as part of official duties	<p>Ministry of Transport and Communications: The environmental strategy for the administrative sector 2013-2020 (2013) and the Finnish Transport Agency's (currently Finnish Transport Infrastructure Agency) environmental policy (2014) and the environmental programmes 2015-2018 (2015) and 2017-2020 (2017) that implement this include the perspective of climate change mitigation and adaptation. Additionally, guidelines and policies in such areas as drainage of roads and railways (2018), dimensioning of culverts, bridge arches and sewers, and winter maintenance of roads (2018) have been updated.</p> <p>Ministry of Agriculture and Forestry: Action plan for climate change adaptation (2011-2015) and updating the measures (2018) in the administrative branch. The State of Adaptation in Finland (2017), which contains the vulnerabilities of agriculture, forestry and game, fish and reindeer farming as the climate changes and sector-specific recommendations for measures to reduce vulnerability. National Forest Strategy 2015 (update 2018), the Climate Programme for Finnish Agriculture 2014 (revised in 2018), the Finnish Wildlife Consortium Strategy, an update to the Flood Risk Areas (2018), the Water Economy Strategy 2011-2020 (update 2019), the Ministry of Agriculture and Forestry's Genetic Resources Policy Guidelines (2018) and the Finnish National Genetic Resources Programme for Agriculture, Forestry and Fisheries (2018). In addition, as part of the drafting of legislation, the Act on Managing the Risk Caused by Alien Species 1709/2015 and the Government Decree 714/2015 on the grant for projects that improve the use and condition of the waterways and the water environment, in a cross-cutting manner.</p> <p>Ministry of Defence: The ministry's strategic plan 2035. The strategy work takes into account climate change and related adaptation.</p> <p>Ministry of Social Affairs and Health/Finnish Institute for Health and Welfare (THL): THL monitors the status of infectious diseases, and a THL department group responsible for health protection monitors the environmental health situation normally as part of its official duties.</p> <p>Ministry of the Interior: Preparation of a national cross-administrative risk assessment. Including the impacts of climate change on the national risk assessment in 2018.</p> <p>Ministry of Economic Affairs and Employment: Energy and climate policy network: a network between the authorities/ministries (parties involved in preparing political decisions), which also addresses issues related to climate change adaptation as necessary.</p> <p>Ministry of the Environment: Climate change adaptation is taken into account in the drafting of legislation, the preparation of strategies and the action plan of the Ministry of the Environment (including Cultural Environment Strategy, national land use guidelines). An overhaul of the Land Use and Building Act is underway, in which climate change adaptation and mitigation are a cross-cutting theme. The situation has also been examined as part of the SUMI project (Conservation areas in the changing climate).</p>

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	<i>responsible party, any other actor</i>	schedule, concrete actions	resources	
d) <i>Steering targeted to municipalities by the Centres for Economic Development, Transport and the Environment</i> concerning the assessment of climate resilience is developed in cooperation between the areas of responsibility concerning transport and the environment.	<b>M. of Economic Affairs and Employment / M. of the Environment / M. of Transport and Communications / M. of Agriculture and Forestry, other ministries</b>	guidelines 2015–2016,	as part of official duties	Finnish Transport Agency (currently Finnish Transport Infrastructure Agency): Efficiency in the implementation of climate measures in municipalities - A project on the dialogue between central government and municipalities (IlmastoKUNTO, Finnish Transport Agency's studies and reports 58/2017). Ministry of Agriculture and Forestry: Adaptation as a key objective in the performance guidance of the Centres for Economic Development, Transport and the Environment (ELY Centres) 2018. Ministry of Economic Affairs and Employment: For the time being, responsibility for steering related to the ELY Centres, as part of preparedness work. Ministry of the Environment: Involved in performance guidance. Guidance directed at municipalities is often channelled through the steering of town planning. ELY Centres' areas of environmental responsibility and, through these, the Ministry of the Environment, play an important role in this.
2. ACTION PLANS FOR SPECIFIC ADMINISTRATIVE BRANCHES ARE DRAWN UP AND IMPLEMENTED, TAKING ACCOUNT OF THE INTERNATIONAL REPERCUSSIONS OF CLIMATE CHANGE				
a) Adaptation plans or action programmes for individual branches necessary on the basis of the assessments of climate resilience are drawn up or updated as well as implemented, utilizing the most recent information on climate change.	<b>ministries</b> in cooperation with actors and stakeholders	as of 2014	preparation as part of official duties; more detailed resources for implementation are specified in the branches' action plans	Metsähallitus: An action plan on climate change adaptation and mitigation under preparation in 2018. Ministry of Agriculture and Forestry: Action plan for climate change adaptation 2011-2015, an update on the basis of the State of Adaptation in Finland 2017 report currently underway. Ministry of Defence: The Defence Force's Energy and Climate Programme, updated in 2018, contains goals and measures relevant to climate change adaptation. Ministry of Social Affairs and Health: The crucial aspects of affecting adaptation have been examined in cooperation: health protection infrastructure, favourable economic development and monitoring of health changes. Ministry of the Environment: Action plan for climate change adaptation updated in 2016, evaluation ongoing in 2018.
3. DRAFTING OF REGIONAL AND LOCAL ADAPTATION STUDIES IS PROMOTED				
a) Regional and local demonstration, research and development projects relating to adaptation are promoted.	<b>Centres for Economic Development, Transport and the Environment, Regional Councils, municipalities, Association of Finnish Municipalities, ministries, universities</b>	preparation in 2015–2016, 2017–	Funding for demonstration projects and surveys applied for from rural development, regional development, structural and LIFE+ funds.	Centres for Economic Development, Transport and the Environment: The activities of the ELY Centres have been very limited in some areas of responsibility. There have been some adaptation projects related to water issues. Helsinki Region Environmental Services Authority: In cities, several experimental and pilot projects in storm water management, e.g. Lahti, Helsinki, Vantaa (Hule S&C project), Helsinki and Vantaa pilot areas (Kuninkaantammi, Kivistö). Further development of the Green Area Factor method in the iWater project. Association of Finnish Municipalities: The report "Kuntien ja maakuntien ilmastotyön tilanne" (The status of climate work in municipalities and counties 2015) also contains material on adaptation and offers recommendations for future climate work in municipalities and counties. Ministry of Agriculture and Forestry: Rural Development Programme for Mainland Finland, 2014–2020. Within the framework of the programme, it is possible to promote adaptation, such as the Climate-wise solutions for the countryside (VILMA) project - a national communication project aiming to promote climate work based on rural needs, and climate change mitigation and adaptation to the impacts of climate change. A project on bioeconomy and climate resilience (BILKE) examined the vulnerability of water bodies due to climate change and developed tools for improving climate resilience through the means of the bioeconomy. Additionally, several regional projects on storm water and water resource management. Ministry of the Interior: Preparation of regional risk assessments based on a national risk assessment. Regional risk assessments will be prepared under the direction of rescue departments and Regional State Administrative Agencies so that these lay the foundation for the regional risk assessment. Climate change is also taken into account in this work. Ministry of Economic Affairs and Employment: In ERDF and ESF projects, 22 projects have been implemented and more than EUR 11 million of funding has been granted under the heading of adaptation (status on 30 May 2018).

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS			IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP	
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
b) Assessments of climate resilience are incorporated in the local government preparedness and emergency supplies planning.	Guidelines: <b>Ministries, National Emergency Supply Agency, Regional State Administrative Agencies</b> implementation: <b>Municipalities, Association of Finnish Municipalities</b>	guidelines in 2015, from 2016 ongoing	as part of official duties	<p>Ministry of the Interior: The perspective of climate change must be taken into account in the coordination of preparedness.</p> <p>Ministry of Defence: The Defence Forces participate in planning the preparedness and security of supply of municipalities within the framework of regional cooperation.</p> <p>Ministry of Economic Affairs and Employment: Security of supply scenarios and the Government Decision on the Objectives of Security of Supply. Some guidelines have been issued for preparedness work in municipalities, for example in connection with convenience goods services.</p> <p>Ministry of Agriculture and Forestry: Storm water guide (2012) and flood risk management plans by the Association of Finnish Municipalities.</p> <p>Helsinki Region Environmental Services Authority: In the cities of the Helsinki metropolitan area, preparedness for climate change and extreme weather phenomena has been taken into account in preparedness planning, and the City of Helsinki has investigated climate risks and related preparedness.</p> <p>Association of Finnish Municipalities: The Municipal Continuity Management (Kuja Project) carried out under National Emergency Supply Agency funding in 2014-2016, developed an evaluation model for municipal continuity management. A continuation project titled "Development of municipal and regional continuity management", funded by the National Emergency Supply Agency fund, is currently underway and involves taking into account the impacts of the regional government reform on the organisation of preparedness. Climate change adaptation has also been taken into account in both projects as one of the areas of preparedness.</p> <p>Ministry of Social Affairs and Health: Promoting the adaptation of municipalities from the perspective of health protection.</p>
<b>4. ADAPTATION IS PROMOTED IN INTERNATIONAL COOPERATION</b>				
a) Adaptation is promoted in the negotiations under the UN Framework Convention on Climate Change.	<b>M. for Foreign Affairs, M. of the Environment, M. of Agriculture and Forestry,</b> other ministries	2014–	as part of official duties	<p>Ministry of the Environment: The Ministry of the Environment is responsible for international climate negotiations with a separate international department dedicated to this work (ongoing).</p> <p>Ministry of Agriculture and Forestry: cooperation with the Ministry for the Environment, the Ministry for Foreign Affairs and the Ministry of Economic Affairs and Employment in the network. Cooperation with the Ministry of the Interior in the Sendai process.</p> <p>Ministry of Education and Culture: Participation in DRR work (Disaster Risk Reduction).</p> <p>Ministry of the Interior: This work is promoted in disaster risk management work, i.e. the implementation of the Sendai framework.</p> <p>Ministry for Foreign Affairs: Has participated in the EU's EGA climate change negotiation group and UN climate negotiations.</p> <p>Ministry of Agriculture and Forestry: Has participated in UN climate negotiations.</p>
b) Incorporation of climate change adaptation into national development plans is promoted.	<b>Ministry for Foreign Affairs,</b> other ministries	2014–	prepared as part of official duties, development cooperation funds	<p>Finnish Transport Agency: Has participated in the work of the "Group of Experts on Climate Change Impacts and Adaptation for Transport Networks and Nodes" subordinate to the UNECE. The aim is to identify the most critical points for climate change in transport networks in order to target further measures.</p> <p>Ministry for Foreign Affairs: The aim is to take account of adaptation aspects in the country strategies for the countries involved in development cooperation and to emphasise the importance of integrating adaptation in the UN climate negotiations.</p> <p>Ministry of Agriculture and Forestry: In cooperation with the Ministry for Foreign Affairs in a network of public officials responsible for water, in a network of responsible public officials from the Arctic region.</p> <p>Ministry of the Environment: Continuous international cooperation.</p>

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
c) Mainstreaming of climate resilience and the perspective of restricting environmental disasters and accidents in the Finnish development policy continues and actions in developing counties to reduce climate and catastrophe risks as part of development cooperation are supported.	<i>Ministry for Foreign Affairs, other ministries</i>	2014–	prepared as part of official duties, development cooperation funds	Ministry for Foreign Affairs: Climate change is a cross-cutting objective in the development policy programme, included in the process of clarifying the priorities of the Ministry for Foreign Affairs. Finland's bilateral development cooperation projects are required to apply the climate sustainability checklist, including reducing the risks for a disaster. Ministry of Agriculture and Forestry: In cooperation with the Ministry for Foreign Affairs in the Development Policy Committee.
<b>5. ADAPTATION IS INCLUDED IN EU POLICIES AND INTERNATIONAL REGION-BASED COOPERATION PROJECTS</b>				
a) Action is taken through work in both the EU institutions such as the EU Climate Change Committee and the various sectors to promote adaptation as a cross-cutting theme in the steering instruments of EU policies.	<i>Ministry of Agriculture and Forestry, other ministries</i>	2014–	as part of official duties	Ministry of Agriculture and Forestry: In addition to the EU Commission's adaption working group DG CLIMA WG6, groups such as the DG ENV's working group of floods and the DG AGRI and the EU's committee on invasive alien species. Metsähallitus: as part of continuous international cooperation (including EUROSITE, EUROPARC etc.). Ministry of Social Affairs and Health: The Commission's DG ECHO's working group on civil protection. Also 15 years of activity in the adaptation working groups of the WHO Europe's European Environment and Health Process, which is also connected to the EU Commission 's adaptation process.
b) Adaptation actions that should be addressed as multi-lateral, cross-border projects are promoted through active participation in international cooperation projects and processes and environment agreements.	<i>M. for Foreign Affairs, M. of the Environment, M. of Agriculture and Forestry, other ministries</i>	2014–	project preparation as part of official duties, exploring potential cooperation partners (funding by ministries, use of EU funding and Nordic cooperation funds)	Metsähallitus: as part of continuous international cooperation (including CBD, Ramsar etc.). Ministry of Agriculture and Forestry: – Arctic Council activities in the Arctic Resilience project of the SDWG working group 2017-2019 (IBA project) – Nordic and Barents cooperation e.g. in forest fires – Blue bioeconomy working groups – Arctic Invasive Alien Species Strategy – CBD, RAMSAR – Council of the Baltic Sea States CBSS: Baltic Leadership Programme (Agenda 2030). Ministry of Social Affairs and Health: Working group work under WHO. Ministry for Foreign Affairs: E.g. Arctic cooperation aiming to promote regional adaptation measures also within the framework of the Convention on Biological Diversity and the Convention to Combat Desertification. Ministry of the Environment: Ramsar Convention.

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
c) Nature protection cooperation between Finland, Norway and Russia in the Fennoscandia Green Belt is developed so that the connectivity of the protected areas improves and there is growing awareness of the threats to the ecosystem services of the region caused by climate change. Possibilities for cooperation with Russia in climate change adaptation are examined, with special focus on the management and use of transboundary waters, preventing the spread of invasive alien species and pests as well as on biodiversity.	<i>M. of the Environment, M. of Agriculture and Forestry,</i> other ministries	as of 2015	as part of official duties, funding for the project applied for e.g. from the regional cooperation funds	Metsähallitus: park pair and project cooperation with the new nature preservation areas in the local region, Hiipinä National Park, the Ladoga Archipelago National Park and the Eastern Gulf of Finland National Park. Ministry of the Environment: Projects and funding from the Ministry for Foreign Affairs, incl. IBA cooperation (internationally important bird habitats). More emphasis will be placed on connectivity in the future, Finland as part of the Green Zone and the European cooperation. Also preparing a joint LIFE project led by Metsähallitus with main focus on the examination of connectivity. Also engaging in cross border cooperation with EU funding (ENI). Ministry of Agriculture and Forestry: Joint Finnish-Russian commission for the use of transboundary waters and Finnish-Swedish Transboundary River Commission: water protection and total use of waters, incl. water regulation, flood risk management, dam safety, combating invasive alien species).
<b>6. CLIMATE RISK ASSESSMENT AND MANAGEMENT IS IMPROVED</b>				
a) The current risk assessment and management procedures are reinforced in order to take better account of the impacts of climate change, including its international repercussions.	<i>ministries,</i> state research institutes, universities	preparation 2014–2015; project 2016–2017; implementation 2017–	as part of official duties; funding applied for from strategic research programme of the Prime Minister's Office	Ministry of Agriculture and Forestry in ministerial cooperation: Government's analysis, assessment and research activities projects: Elastinen, SIETO, TASAPELI (implemented by e.g. Finnish Meteorological Institute, Finnish Environment Institute, THL), projects by the Strategic Research Council. Finnish Meteorological Institute: The state of weather and climate risk management in Finland has been studied and the risk management approaches and roles of actors have been assessed. The repercussions of climate change have been investigated. Ministry of the Interior: National and regional risk assessment work. THL: Health aspects also included in the SIETO project.

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
b) The knowledge base on the risks and vulnerabilities relating to climate change is supplemented especially with regard to sectors where more information on the impacts of climate change is needed.	<i>ministries, state research institutes, universities</i>	ongoing as of 2015	as part of official duties, project funding	<p>Finnish Meteorological Institute: National assessment of weather and climate risks based on literature and expert projections (SIETO). The incidence of extreme weather phenomena critical to nuclear power plants in the changing climate, fluctuations in sea water levels near power stations, the effects of successive solar storms and the modelling of the spread of emissions have also been studied (EXWE). Methods have been developed for recognising extreme weather events and assessing the predictability and probability of damages associated with them in the current and future climate (RAIN, FORBIO). Säätö project. Development of a database of weather and climate related impacts.</p> <p>Ministry of Agriculture and Forestry: State of Adaptation in Finland 2017. Update to the flood risk areas 2018.</p> <p>Natural Resources Institute Finland (LUKE), Finnish Meteorological Institute: The ILMAPUSKURI project, Mäkelä, completed on 31 March 2016. Extensive analysis of key climate risks in agriculture and prioritisation of risks.</p> <p>Natural Resources Institute Finland: The State of Adaptation project, Ministry of Agriculture and Forestry, completed in 2017.</p> <p>State of Adaptation in Finland 2017 report on climate risks, adaptation potential, vulnerability and recommendations for measures in all natural resources sectors. Reinforcement of national insect monitoring in 2018. The work will continue in cooperation with updating the Best Practices for Sustainable Forest Management, the FORBIO and Säätö project.</p> <p>Finnish National Rescue Association SPEK: Work by NGOs, such as a survey on power outages in the Kainuu region by SPEK, concerning citizens' experiences and coping methods.</p> <p>Ministry of Social Affairs and Health: Performance agreement has required that THL must invest in monitoring and evaluation.</p> <p>Finnish Institute for Health and Welfare: Has assessed the health risks related to heat waves and ways of improving preparedness and the impact of climate change on waterborne infections, currently assessing the preparedness of water plants; assessing the change in chemical exposure as a result of the warming of the Arctic areas.</p> <p>Ministry of the Environment: As part of activities. Incl. Guide on the lowest recommended building altitudes (2014), Guide on town planning promoting the climate targets, a publication on facades and balconies in a changing climate.</p>
c) Methods for the assessment of the impacts of climate change suitable for use by sectors, local and regional actors and enterprises and methods for risk and vulnerability studies are developed.	<i>ministries, state research institutes, regional and local government authorities, universities</i>	preparation 2014–2015, project 2015–2016, implementation (related to implementation of measure 1c) as of 2016	prepared as part of official duties; project funding	<p>Centres for Economic Development, Transport and the Environment: Update to the flood risk areas 2018. The activities of the ELY Centres have been very limited or there has been no such activity at all. The Kainuu ELY Centre coordinates dam safety. The Pirkanmaa ELY Centre pilots the ELY Centres' roadmap for the adaptation to climate change (2019).</p> <p>Helsinki Region Environmental Services Authority: The Finnish Meteorological Institute was commissioned by the City of Helsinki to prepare a report on the city's climate risks.</p> <p>Finnish Meteorological Institute: Involved in the development of the EU's Copernicus climate change services, promotes the integration of European climate services across borders, and develops the availability and diversity of weekly forecasts to support the activities of decision-makers, businesses, citizens and research institutions. C3S (DECM) Data Evaluation for Climate Models, ERA4CS (several ERA-NET projects) and CLIPS (key project of the Academy of Finland).</p> <p>Ministry of Agriculture and Forestry: Plans for water plants to prepare for disruptions (2014-). Development and use of disruption cards in drought situation 2018. Update to the flood risk areas 2018. Climate resilience tools developed for the public and private sectors in 2016–2017. Tools and materials described in Tapio publications on climate change adaptation in the private sector (2017) and climate risks in company value chains (2018).</p> <p>THL: Exposure assessment and risk management have been improved together with local water plants.</p> <p>Ministry of the Environment: As part of activities. Incl. Guide on the lowest recommended building altitudes (2014), a publication on facades and balconies in a changing climate.</p>

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS			IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources
d) Risk assessment and management competence and related education and training of actors in support of climate resilience assessments are promoted	<i>ministries</i> , local and regional government authorities, state research institutes, universities, Finnish National Agency for Education		prepared as part of official duties, project funding
Centres for Economic Development, Transport and the Environment: The activities of the ELY Centres have been very limited or there has been no such activity at all. Finnish Meteorological Institute: Recommendations have been drawn up to improve weather and climate risk management and support adaptation work. To implement the recommendations, proposals for measures have been made, and parties implementing the measures have been identified. The policy recommendations of the ELASTINEN project of the Government's analysis, assessment and research activities: 1) diversifying the production and use of information, 2) strengthening cooperation and develop operating methods, and 3) developing services and business opportunities. Ministry of Agriculture and Forestry: Climate resilience tools of companies were promoted in collaboration between Tapio and the corporate responsibility network (FIBS) in 2016-2017. The work was described in Tapio publications on climate change adaptation in the private sector (2017) and climate risks in company value chains (2/2018). THL: Introduction of a comprehensive risk assessment and management system in water plants.			
7. INSTRUMENTS APPLICABLE TO THE MANAGEMENT OF FINANCIAL RISKS CAUSED BY CLIMATE CHANGE ARE DEVELOPED			
a) The sufficiency and development needs of financial risk management instruments such as insurance policies are studied.	<i>Ministries</i> , Federation of Finnish Financial Services, National Emergency Supply Agency, Institute for Economic Research, Environment Institute, Meteorological Institute and Technical Research Centre	Survey in 2015 Project as of 2016;implementation as of 2016–2017	as part of official duties, project funding
b) The development of the necessary management instruments for the financial risks caused by climate change is promoted.			
Finnish Meteorological Institute: The institute has examined how the costs and benefits of risk management are assessed and how financial information on damage caused by weather and climate phenomena is collected. Finnish Climate Panel report: Ilmastomuutoksen riskit, kustannukset ja vastuut: tapaustarkastelussa sato- ja tulvavahingot (2/2016) (The risks, costs and responsibilities of climate change: a case examination of crop and flood damage). ELASTINEN project of the Government's analysis, assessment and research activities: Ministry of Agriculture and Forestry: (M. of Agriculture and Forestry/LUKE) Sähkönjakeluhäiriöiden vaikutukset elintarviketuotannon jatkuvuuteen (The effects of electric power outages on food production, completed in 2017). The effects of electric power outages on food production - information about what will happen in the food production chain and particularly primary production during power outages of various scope and duration. The Government has also decided to investigate insurance premium tax relief in pest and crop yield loss insurance policies. Ministry of Economic Affairs and Employment: Smart grid work 2017-2018. National Emergency Supply Agency*: In Security of supply: scenarios 2030 project, the impacts of climate change were taken into account in risk scenarios compiled for different sectors. These were used as the basis for planning preparedness measures that were not published (because some were confidential). A tool has been developed for monitoring security of supply scenarios and the phenomena they encompass. This tool is used annually to produce new information. The security of supply pools are provided with this information as a basis for the preparedness planning for the following and coming years. The adopted measures are recorded together with the Agency in the approved action plans for the pools, and funding is reserved for these. Krivat will improve the efficiency of cooperation between companies in case of a major disruption and speed up the related recovery process. Krivat will help companies better anticipate disruptions, such as storms and cyber attacks, and manage the division of labour during a crisis. A continuity management tool will also be developed for companies critical in terms of the security of supplies. The companies can access the tool via the Managing Authority's Extranet. This can also take into account the impacts of climate change. *) Information on the activities of the National Emergency Supply Agency was added to the table as a result of the draft report having been circulated for comments in 2019. The Agency commented on the report in its role as a monitoring group member appointed in 2019.			



OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actor	schedule, concrete actions	resources	
<b>8. ADAPTATION RESEARCH IS REINFORCED</b>				
a) A research programme to produce information for the implementation of the Adaptation Plan is prepared. The decision on the research programme is made separately on the basis of broadly-based preparation.	<i>Ministry of Agriculture and Forestry, Ministry of the Environment,</i> other ministries, Meteorological Institute, Environment Institute, Natural Resources Institute, other state research institutes, universities	Preparation of the research programme 2014–2015	Funding applied for from the Academy of Finland, strategic research of the Prime Minister's Office and EU programmes	Ministry of Agriculture and Forestry: Participation in the Strategic Research Council's stakeholder work and the VIIMA application process is used to plan research programmes. The Elastinen, SIETO and TASAPELI projects of the Government's analysis, assessment and research activities. Also Tapio's report on adaptation research needs 2017 (publication 2/2018), which identified the development needs of and potential funding instruments for adaptation research. The report was implemented through e.g. stakeholder interviews, and the monitoring group also participated in the preparation. Delivered to the Academy of Finland. Ministry of the Environment: Many projects Government's analysis, assessment and research activities projects concerning adaptation in collaboration with various ministries.
b) National, EU and international research and development funding is utilised in the adaptation research.	research institutes, universities, national actors responsible for EU programmes/ support groups, universities and research institutes, responsible ministries	2014–	as part of official duties, projects	Ministry of Agriculture and Forestry: Adaptation funding instruments were mapped in a study by a trainee from a higher education institution in 2015 (Eetu Virtanen). Potential funding channels were also identified in a Tapio study on the needs for adaptation research. Adaptation included in Horizon2020 and LIFE funding. Research has utilised EU research funding (incl. Modelling European Agriculture with Climate Change for Food Security (MACSUR) and Climate Change Adaptability of cropping and Farming systems for Europe), a Nordic plant breeding project and national funding for the development of pest identification, plant disease modelling and plant health risk assessment. THL: So far, national funding has been utilised. Funded by the Academy of Finland, Finnish Climate Panel, Ministry of Social Affairs and Health. Finnish Meteorological Institute: National and EU funding have been utilised. Funded by the Academy of Finland, the Government's analysis, assessment and research activities, Ministry of Agriculture and Forestry, EU.
<b>9. BUSINESS OPPORTUNITIES RELATED TO ADAPTATION ARE DEVELOPED</b>				
a) Business opportunities related to adaptation are studied and demonstration projects are promoted. b) Export opportunities of technologies related to adaptation are studied.	monitoring group on adaptation, Business Finland	survey in 2014–2015 survey in 2015–2016	prepared as part of official duties, making project funding possible	Ministry of Agriculture and Forestry: The business opportunities for adaptation have been charted as part of Tapio's 2016 project on adaptation in the private sector. Eevi Laukkonen, a university trainee at the Ministry of Agriculture and Forestry, carried out interviews of interest groups to examine the business opportunities available for companies. Research and competence building agenda on the blue bioeconomy.
<b>10. TOOLS ARE DEVELOPED IN SUPPORT OF REGIONAL ADAPTATION WORK</b>				
a) Regional estimates for changes in the climate variables are produced and their utilization in the regions is promoted.	<i>Meteorological Institute,</i> other research institutes, universities, ministries, municipalities	2015–2016	Project: Strategic research of the Prime Minister's Office, programmes of the Academy of Finland	Finnish Meteorological Institute: C3S and CLIPS and ERA4CS work is ongoing.

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actor	schedule, concrete actions	resources	
b) Tools are developed for the development of planning practices and processes for regional and local actors and these are made more readily usable and accessible (incl. advice, education and training).	<i>Finnish Environment Institute, Natural Resources Institute, Meteorological Institute, ministries, municipalities, monitoring</i>	2015–2018	As part of official duties, performance guidance, project funding	Helsinki Region Environmental Services Authority: – Developing a green factor tool (Helsinki, Turku, Vantaa). A storm water project in Lahti, Management of storm water with cost-effective hybrid solutions (Government key project). – IWater project (BCR funding), Helsinki as a partner, Riga coordinates (international partners) a green factor tool, development of a storm water programme, training at a seminar by the Association of Finnish Municipalities in May. – The Low Carbon District concept (SMART-MR project) involved developing a tool for town planners that enable them to take adaptation aspects into account in planning at the local town plan level. – Open spatial data material related to green areas has been developed to assist planning work. Finnish Meteorological Institute: C3S and CLIPS and ERA4CS work is ongoing. SASSE project (the prediction of major power grid outages caused by weather). Ministry of the Environment: Guides on the lowest building altitudes and town planning that promotes climate objectives.
<b>11. COMMUNICATION ON ADAPTATION IS DEVELOPED</b>				
a) A communication plan for adaptation is prepared and implemented. The plan specifies the objectives, content and key target groups for communication on adaptation, communication channels to be utilized and production of the necessary materials.	<i>government climate communication group, monitoring group on adaptation, Association of Finnish Municipalities/ municipalities, actors</i>	plan drafted 2014–2015	plan prepared as part of official duties, resources for communication according to the plan and available funding	Association of Finnish Municipalities: – Adaptation presented as a topic at the training events aimed at municipalities' technical committees in autumn 2017. – Articles on storm water management have been published in professional journals. – Information about adaptation was provided as part of a municipal preparedness campaign at the Kuntamarkkinat municipal fair in September 2017 and a campaign on the impacts of extreme weather phenomena in September 2018. Ministry of Agriculture and Forestry: A communication plan for climate change adaptation was developed in stakeholder work (2017), and a communication campaign on climate change adaptation and a related video were carried out in 2018 in cooperation with NGOs.
b) Climateguide.fi website is maintained and developed as an important communication channel for information on adaptation and for good practices. Climateguide.fi website is developed for communication on adaptation targeted to citizens. The websites and tools related to adaptation are made better known and more readily accessible to improve their effectiveness.	<i>Meteorological Institute, Environment Institute, Aalto University, Natural Resources Institute, other state research institutes and universities, ministries, Association of Finnish Municipalities</i>	planning 2014–2015 implementation 2015–2018, ongoing action over a long term	information produced as part of official duties, performance guidance in line with other available funding project funding	IFinnish Meteorological Institute: – The content discussing the Finnish climate on the Climateguide.fi web service has been only partly updated, primarily in connection with popularising the findings of national research projects, for example: – The articles on Finland's changing climate were updated according to the latest RCP scenarios as part of the SA PLUMES project. – The Finnish Meteorological Institute and Natural Resources Institute have produced a new article on the adaptation of agriculture (as part of the VILMA project). The Finnish Meteorological Institute and Environment Institute have updated the article on the impacts of climate change on water quantity (a Government's analysis, assessment and research activities project). – The Finnish Meteorological Institute has published a Database of design storms (ERDF OSAPOL). – The Finnish Meteorological Institute and the Finnish Environment Institute have published a map tool for cross-country skiing (ViVoTiVi) and the vulnerability and adaptation of older people (SA PLUMES). Finnish Environment Institute: Reform of the adaptation section of the climate guide ongoing 9/2017- >. The content on climate change adaptation included in the section on the reasons and impacts of the change will be updated and the structure of the section will be updated to better reflect the current state and future needs of climate change adaptation.

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	responsible party, any other actorst	schedule, concrete actions	resources	
<b>12. EDUCATION AND TRAINING CONTENT ON ADAPTATION IS DEVELOPED</b>				
a) Impacts of climate change and adaptation to it are included in the curricula and degrees taken in basic and higher education, vocational basic and adult education, universities and continuing education.	<i>Finnish National Agency for Education</i> , universities, Ministry of Education and Culture, universities	as part of the development of curricula and syllabi	as part of official duties in developing curricula and syllabi and examinations and degrees	<p>Ministry of Education and Culture: Taking the learners' ages into consideration, climate change and adaptation to it have been incorporated in national core curricula in the underlying values of education, transversal knowledge and skills, and different subjects. The National core curriculum for early childhood education and care 2016 was introduced on 1 August 2017. The National core curriculum for basic education 2015 was mostly introduced on 1 August 2016, while some parts of it are rolled out gradually by 2019. The introduction of an updated 2015 curriculum for general upper secondary schools began one grade at a time in 1 August 2016. A new National core curriculum for general upper secondary schools is being prepared, and will be adopted in 2019 and introduced in 2021. The impacts of climate change and adaptation will be taken into account in its preparation.</p> <p>New qualification requirements for vocational upper secondary qualifications entered into force on 1 August 2018. All qualification requirements contain Promoting sustainable development as a common unit, which covers the principles of sustainable development and ethics as well as life cycle thinking. The qualification requirements of all vocational qualifications (vocational upper secondary qualifications, further qualifications and specialist qualifications) were updated in 2017–2018. In these principles, the impacts of climate change and adaptation have been addressed in natural resources and environmental sector qualifications and also in other sectors, including construction sector (moisture management), vehicle sector (sales of electric cars), and the education and instruction sector (nature-based and experiential activities). These themes have also been included in vocational qualifications in a broader sense from the perspectives of sustainable practices, responsibility and environmental protection, energy consumption, reducing losses and circular economy.</p> <p>Universities have addressed the perspective of climate change in the teaching of their special fields, and the different aspects of climate change are quite well covered by the course offering across the country. Universities of applied sciences have also identified and responded to climate change as a driver of change in the operating environment. An open course on the basics of climate change in higher education institutions: <a href="http://www.ilmastonyt.fi/">http://www.ilmastonyt.fi/</a>.</p> <p>Finnish Meteorological Institute: The Finnish Meteorological Institute has participated in the organisation of courses and lectures. The institute has also contributed to the planning of education materials.</p> <p>Ministry of Social Affairs and Health/Finnish Institute for Health and Welfare (THL): The agents provide information on key pillars of adaptation as necessary, also through training and education.</p>
<b>13. A NATIONAL MONITORING GROUP ON ADAPTATION</b>				
a) A national monitoring group is appointed to follow and evaluate the implementation of the Adaptation Plan. The group is responsible for the implementation, follow-up and communication relating to the Adaptation Plan and promotes the cooperation between sectors in adaptation actions and the overall awareness raising on adaptation.	<i>Ministry of Agriculture and Forestry</i> , other ministries, research institutes, local, regional and other relevant actors, associations	follow-up group appointed in 2014, term 2014–2018	as part of official duties, funds of the Ministry of Agriculture and Forestry	Ministry of Agriculture and Forestry: A monitoring group was appointed for the period 2015-2018 and a new monitoring group will be set up for the period 2019-2022 at the beginning of 2019. .

OBJECTIVE A: ADAPTATION HAS BEEN INTEGRATED INTO THE PLANNING AND ACTIVITIES OF BOTH THE VARIOUS SECTORS AND THEIR ACTORS				IMPLEMENTATION STATUS IN 2018, MEASURES BY THE PARTIES REPRESENTED IN THE MONITORING GROUP
MEASURES TO BE LAUNCHED	<i>responsible party, any other actorst</i>	schedule, concrete actions	resources	
<b>14. CONTINUOUS MONITORING OF THE PLAN IS ENSURED AND THE SCALE AND EFFECTIVENESS OF THE IMPLEMENTATION IS EVALUATED</b>				
a) The available systems, follow-up procedures and indicators are utilised to compile information suitable in view of the Adaptation Plan from the follow-up of the adaptation plans and action programmes of sectors, municipalities and other parties. Procedures are developed for evaluating the effectiveness of adaptation actions.	<i>Ministry of Agriculture and Forestry, monitoring group on adaptation, other relevant actors</i>	ongoing	as part of official duties	Ministry of Agriculture and Forestry: The monitoring of adaptation has been developed in Tapio in 2015-2017 in extensive stakeholder work by describing national indicators for adaptation (2015 report on organising the monitoring of climate change adaptation and 2017 report on the indicators for adaptation as a monitoring tool). The introduction of indicator data into the Climate Guide has been prepared in cooperation between research institutes (Finnish Environment Institute, Natural Resources Institute and Finnish Meteorological Institute). The Ministry of Agriculture and Forestry brought up the perspectives of adaptation in 2018 in the context of the work aiming to develop indicators for monitoring sustainable development, which was coordinated by the Prime Minister's Office. Ministry of the Environment: Agenda 2030 indicators.
b) Action is taken to influence the development of the follow-up of the EU Adaptation Strategy with due account for the Regulation on reporting information relevant to climate change.	<i>Ministry of Agriculture and Forestry, other ministries, sub-committees for EU affairs, monitoring group on adaptation</i>	2014–	as part of official duties	Ministry of Agriculture and Forestry: Exerting influence in the Commission's DG CLIMA working group WG6.

## APPENDIX 2 Participants and questions in group interviews of individual administrative branches

**Theme:** The built environment

**Time and place:** 17 April 2018, Ministry of the Environment

**Participants:**

Irjala Antti, Ministry of the Environment

Keto Antton, Ministry of the Environment

Maijala Juha-Pekka, Ministry of the Environment

\*\*\*

**Theme:** Regional and municipal level

**Time and place:** 2 May 2018, Association of Finnish Municipalities

**Participants:**

Kankaanpää Susanna, Helsinki Region Environmental Services

Kunnaskari Mia, Finnish National Rescue Association

Luoma Kalevi, Association of Finnish Municipalities

Pihlaja Aki, Association of Finnish Municipalities

Rosberg Eija, City of Lahti

Taipale Paavo, Association of Finnish Municipalities

Tähtinen Tapio, Central Uusimaa Rescue Department

In addition:

Frisk Tom, Pirkanmaa ELY Centre (interview 30 April 2019)

\*\*\*

**Theme:** Water

**Time and place:** 17 May 2018, Ministry of Agriculture and Forestry

**Participants:**

Ekblom Jan, Ministry of the Environment

Hanski Minna, Ministry of Agriculture and Forestry

Laitinen Jyrki, Finnish Environment Institute

Lilja-Rothsten Saara, Ministry of Agriculture and Forestry

Lähteenoja Pentti, Ministry of Agriculture and Forestry

Parjanne Antti, Finnish Environment Institute

Veijalainen Noora, Finnish Environment Institute

Verta Olli-Matti, Ministry of Agriculture and Forestry

\*\*\*

**Theme:** Natural resources

**Time and place:** 21/05/2018, Ministry of Agriculture and Forestry

**Participants:**

Husaari Nora, Ministry of Agriculture and Forestry

Kaipainen Jaana, Ministry of Agriculture and Forestry

Lilja-Rothsten Saara, Ministry of Agriculture and Forestry

Paanukoski Saana, Ministry of Agriculture and Forestry

Peltonen-Saunio Pirjo, Natural Resources Institute Finland

Rahkonen Riikka, Ministry of Agriculture and Forestry

Sievänen Risto, Natural Resources Institute Finland

Survonen Mika, Ministry of Agriculture and Forestry

Torniainen Tatu, Ministry of Agriculture and Forestry

Ukkonen Riitta, Ministry of Agriculture and Forestry  
Vainio-Mattila Birgitta, Ministry of Agriculture and Forestry

\*\*\*

**Theme:** Defence administration

**Time and place:** 29 May 2018, Ministry of Defence

**Participants:**

Heikkilä Sami, Ministry of Defence

Huttunen Kari, Construction Establishment of Finnish Defence Administration

Kettunen Kati, Defence Command

Svanström Terhi, Defence Command

\*\*\*

**Theme:** Energy

**Time and place:** 30 May 2018, Ministry of Economic Affairs and Employment

**Participants:**

Aaltonen Riikka, Ministry of Economic Affairs and Employment

Klemm Kari, Ministry of Economic Affairs and Employment

Mäkitalo Jukka, Ministry of Economic Affairs and Employment

Pohjolainen Jyrki, Ministry of Economic Affairs and Employment

Tirkkonen Juhani, Ministry of Economic Affairs and Employment

\*\*\*

**Theme:** Transport

**Time and place:** 31 May 2018, Finnish Transport Agency

**Participants:**

Holm Olli, Finnish Transport Agency

Hovi Arto, Finnish Transport Agency

Kallio Katri, Finnish Transport Agency

Knuuti Soile, Finnish Transport Agency

Lohko-Soner Katja, Trafi

Säämänen Tuula, Finnish Transport Agency

Tourula Tapio, Trafi

Tuomenvirta Heikki, Finnish Meteorological Institute

\*\*\*

**Theme:** The natural environment

**Time and place:** 14/09/2018, Ministry of the Environment

**Participants:**

Aapala Kaisu, Finnish Environment Institute

Niikkonen Kristiina, Ministry of the Environment

Virkkala Raimo, Finnish Environment Institute

\*\*\*

**Theme:** Social and health sector

**Time and place:** 13 November 2018, Ministry of Social Affairs and Health

**Participants:**

Ekholm Sari, Ministry of Social Affairs and Health

Forsström Tomas, Ministry of Social Affairs and Health

Ilkka Lasse, Ministry of Social Affairs and Health

Kankaanrinta Monika, Ministry of Social Affairs and Health

Kivimäki Anna, Ministry of Social Affairs and Health

Kollanus Virpi, Finnish Institute for Health and Welfare  
Latvala Markus, Ministry of Social Affairs and Health  
Lillsunde Pirjo, Ministry of Social Affairs and Health  
Lähdepuro Kaisa, Ministry of Social Affairs and Health  
Mattila Pii, Ministry of Social Affairs and Health  
Meriläinen Päivi, Finnish Institute for Health and Welfare  
Nygren Päivi, Ministry of Social Affairs and Health  
Palola Elina, Ministry of Social Affairs and Health  
Paunio Mikko, Ministry of Social Affairs and Health  
Rapeli Merja, Ministry of Social Affairs and Health  
Salonen Leena, Ministry of Social Affairs and Health  
Tuokas Pekka, Ministry of Social Affairs and Health  
Vuorinen Sari, Association of Finnish Municipalities

\*\*\*

### **Interview themes and questions used in the discussions**

#### 1. Identified weather and climate risks

*Discussion and questions based on the National Assessment of Weather and Climate Risks (SIE-TO), 2018*

- Are the risks identified in the sector? What about outside the administration?
- Do you co-operate with other sectors?

#### 2. Implementation of the adaptation plan

*Discussion and questions based on information filled out by a representative of the monitoring group on the implementation of adaptation plan measures in the administrative branch*

- Are the measures (that have been identified in relation to adaptation) sufficient?
- How have repercussions and cross-sectoral risks been taken into account?
- Why has the work not progressed (if this was observed)?

#### 3. Further measures

- Are the measures and investments sufficient?
- What will happen in the future?
  - Barriers to implementation?
  - Necessary follow-up measures, needs for resources and preconditions?
  - Cooperation between actors?





## **APPENDIX 3 Finland's National Climate Change Adaptation Plan – A Mid-term Evaluation**

### **Survey of stakeholder views**

**Kati Berninger, Jonna Kangasoja, Noora Piila, Emma Luoma, Lasse  
Peltonen and Oras Tynkkynen**

**Tyrsky Consulting and Akordi**



**November 2018**

## Abstract

The national climate change adaptation plan 2022 was adopted in Finland in 2014. This report explores the knowledge and readiness of stakeholders in the field of adaptation as well as views to support implementing and developing the national adaptation plan.

The work was carried out by Tyrsky Consulting and Akordi and it consisted of two parts: stakeholder events in five areas and an online survey with responses from 450 people. The respondents represented 11 sectors, different organisations and all regions in continental Finland.

The results indicate that climate risks and the need to adapt are already fairly well known in different sectors. However, the work to promote adaptation still remains fairly limited. Sectoral adaptation plans are partly missing, or they do not reach the users on all levels.

There are large differences in knowledge and readiness between sectors. On a five-step ladder describing the status of adaptation work, the furthest – fourth step – has been reached by the following sectors: nature and the environment, agriculture and forestry and water supply. Social and health services and recreation and tourism rank lowest on the second step.

Respondents consider risk assessment and co-operation to be the most important tools in adaptation work. However, co-operation within one's own sector or between sectors still remains rare. The work is impeded by e.g. lack of resources and uncertainties in risk assessment. Adaptation is still quite rarely approached systematically and on a long-term basis, and the division of responsibilities between different actors can be unclear.

Respondents hope to get information, tools and examples of best practices especially in their own sector and area. The information should be in the right format and reach the right actors. There is also a need for platforms for dialogue and funding.

Based on the results, the report proposes five measures to develop adaptation work:

- 1) climate impacts and risks and adaptation to them should be disaggregated from the point of view of different sectors and regions
- 2) when producing and sharing information, particular attention should be paid to sectors and issues in which the current state is recognised to be particularly weak
- 3) existing information should be packaged and communicated to actors in a useable format
- 4) national adaptation work should be complemented with regional and sectoral tools such as adaptation plans or panels
- 5) dialogue between sectors and regions should be promoted in e.g. annual national adaptation fora

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## 1. Introduction

Finland's National Strategy for Adaptation to Climate Change was drawn up already in 2005. Since then, the strategy and its implementation have been evaluated in 2009 and 2013 (Ministry of Agriculture and Forestry 2009, Ministry of Agriculture and Forestry 2013). Finland's National Climate Change Adaptation Plan 2022 was adopted by the Government at the end of 2014 (Ministry of Agriculture and Forestry 2014). The adaptation plan is part of the system for the planning of climate change policy in accordance with the Climate Change Act. The aim is to include climate change adaptation as one of the objectives of the planning systems in all sectors.

This report was commissioned by the Ministry of Agriculture and Forestry. The work included an external review of the stakeholder views of the ongoing mid-term review of the National Climate Change Adaptation Plan. The aim was to examine the effectiveness of the adaptation plan and to obtain stakeholder views to support the implementation and development of the adaptation plan. The evaluation contributed to producing views on which tasks should be particularly promoted and emphasised in the implementation of the adaptation plan.

During the work, particular efforts were made to identify how adaptation is manifested in different sectors and regions, and to discover possible topics and gaps that stakeholders believe should be given special attention in the future.

The work was carried out in collaboration by Tyrsky Consulting and Akordi. It consisted of two parts: stakeholder events in five towns and an online survey. Tyrsky was responsible for the coordination, reporting and the online survey, while Akordi was in charge of the stakeholder events.

## 2. Methods

### 2.1 Survey

#### 2.1.1. Preparing the survey and collecting responses

The survey was prepared based on the following preliminary questions in collaboration with the commissioner:

- How has Finland's National Climate Change Adaptation Plan promoted adaptation?
- What is the current state of adaptation in the sector and how should climate change adaptation be promoted?
- What kind of co-operation do various actors engage in related to climate change adaptation?
- How do the actors wish to be supported in the adaptation?

The planning of the survey and analysis of the results (see section 2.1.23) utilised the levels of climate change adaptation developed in the assessment of the National Strategy for Adaptation to Climate Change. (Ministry of Agriculture and Forestry 2013)

A draft version of the survey was tested with test respondents belonging to the target group and modified based on the comments received. Two test respondents per each sector were asked to test the survey. A total of 14 people responded to the test survey. The survey is attached to this report as Appendix II.

The following sectors were initially defined as the target groups for the survey: energy, water supply, transport, nature and the environment, agriculture and forestry, fishery and reindeer husbandry, finance and insurance, land use and construction, rescue and preparedness, health, and recreation and tourism. As the work progressed, it became clear that social services was also an important sector. As a result, the survey was expanded to include actors in the social sector. The social and health care sector became a new target group. The aim was to obtain at least 30 responses from each target group.

The survey was carried out electronically using the SurveyMonkey platform in September and October 2018. The survey was mainly distributed by an email that included background information and a link to the survey. Respondents' email addresses were collected through the consultant's and the client's networks, and by making internet searches concerning different sectors. The email included a request for the respondents to forward the survey to other potential respondents. The survey was also distributed on paper at stakeholder events, and the electronic version was advertised in materials sent to the participants after the events.

### 2.1.2. Survey respondents and their background information

A total of 453 people responded to the survey. Table 2.1 presents the distribution of respondents between different sectors. Not all respondents answered all questions. The sector titled "Other" included e.g. persons working in the central administration of municipalities, education and research, companies representing various fields, and a wide variety of sectors.

*Table 2.1. Number of respondents per sector*

<b>Sector</b>	<b>Respondents</b>
Nature and the environment	54
Agriculture and forestry	49
Fishery and reindeer husbandry	35
Recreation and tourism	31
Land use and construction	43
Transport	34
Energy	33
Water supply	27
Finance and insurance	29
Rescue and preparedness	33
Social and health	62
Other	23
<b>Total</b>	<b>453</b>

The most common organisation types among the representatives were companies and municipalities. (Figure 2.1) There were respondents from all regions in continental Finland. The largest number of responses came from organisations operating in the entire country and the Uusimaa region. The second largest group of respondents represented organisations operating in Lapland.

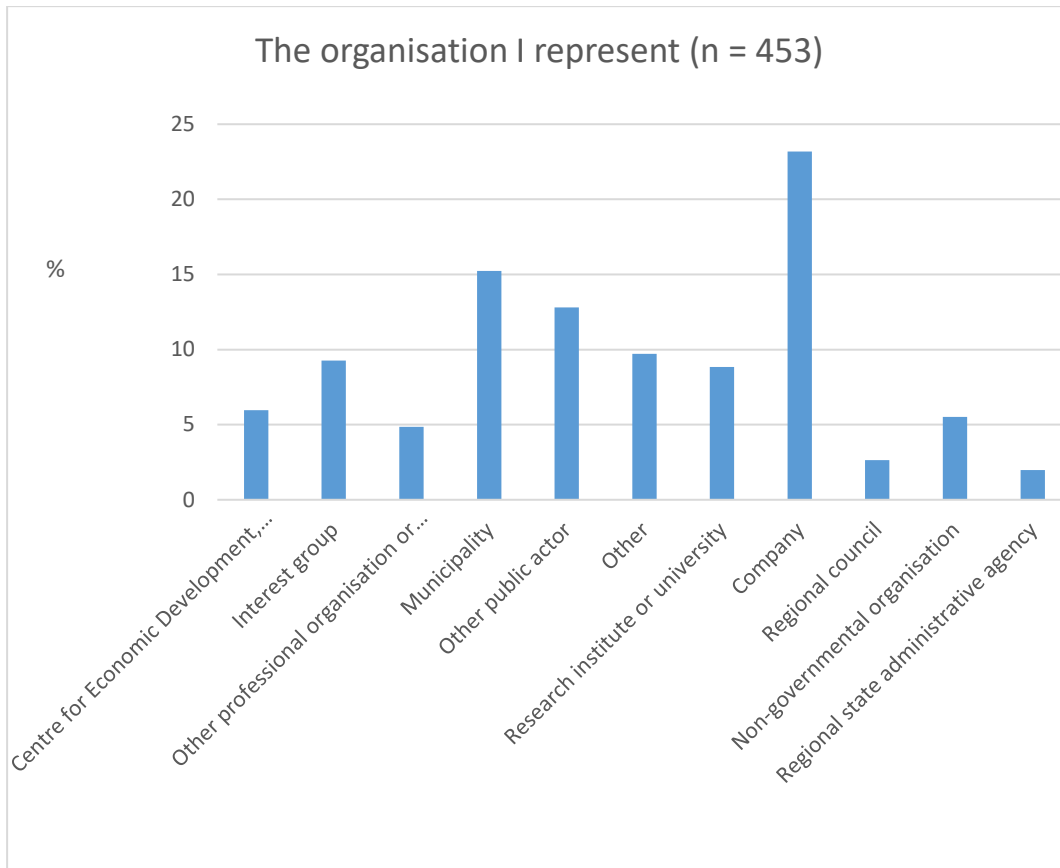


Figure 2.1. Division of respondents per different organisation types

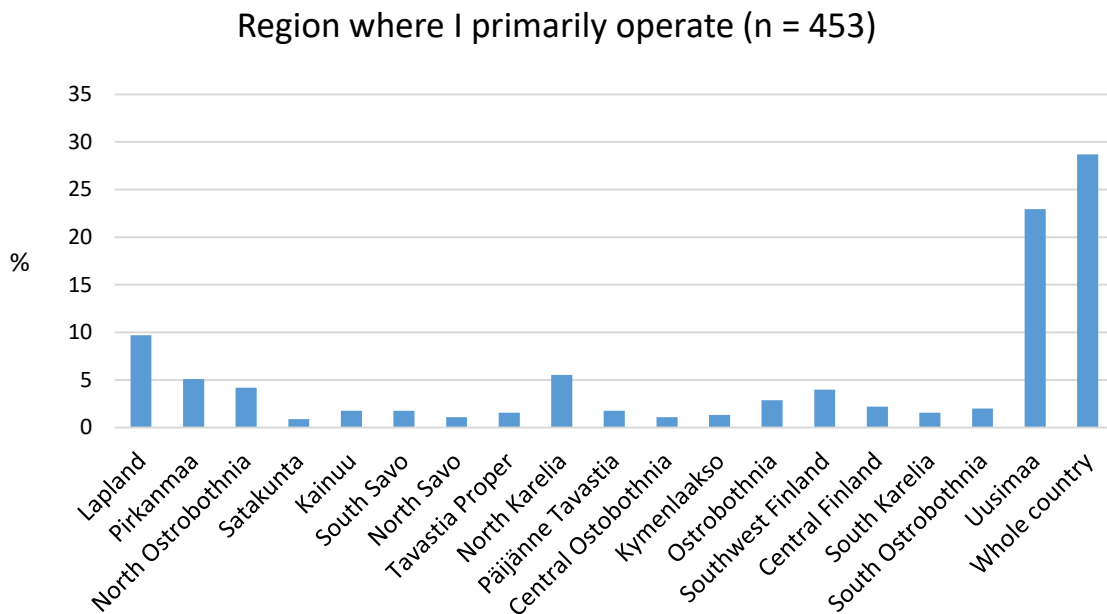


Figure 2.2 Regional distribution of respondents

Around one third of the respondents had been actively or somewhat involved in adaptation work. There were major differences between the sectors. Participating in adaptation work was

most common in the nature and the environment sector, which includes environmental organisations and representatives of municipal environmental administration. Those representing the social and health sector were the least involved in adaptation work. (Figure 2.3)

Slightly under one third of all respondents knew Finland’s National Climate Change Adaptation Plan 2022 well or relatively well. The largest share of them represented the nature and the environment and land use and construction sectors. (Figure 2.4). Overall, the respondents estimated that the plan is not particularly well known in their sectors (Figure 2.5).

I have been involved in adaptation work

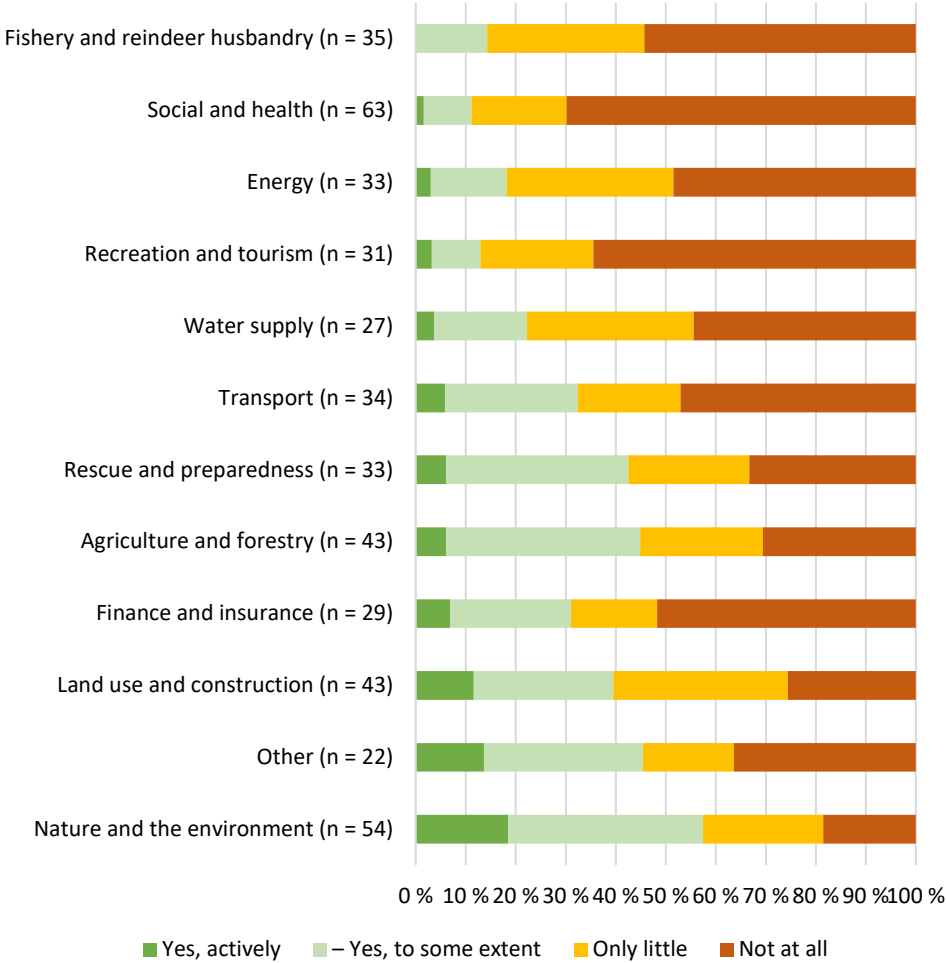


Figure 2.3. Respondents’ involvement in adaptation work



## I know Finland's National Climate Change Adaptation Plan

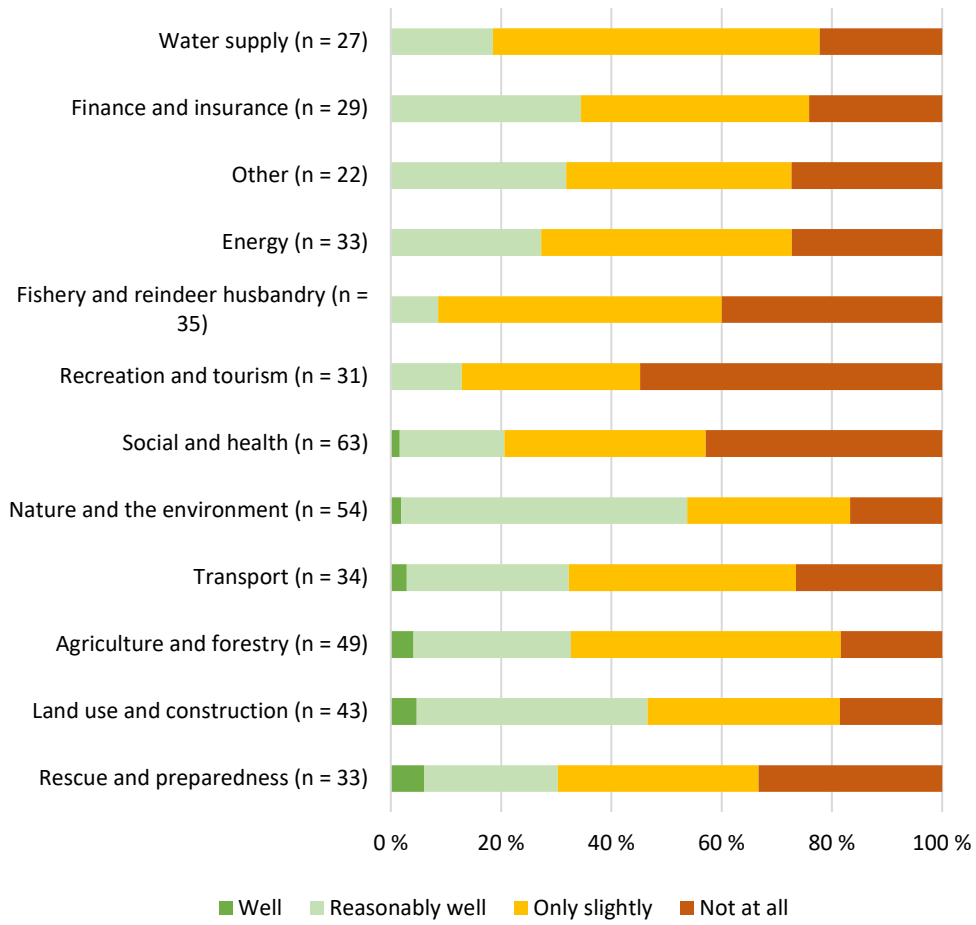


Figure 2.4. Awareness of the adaptation plan among respondents

## How extensively do you feel the plan is generally known in your sector?

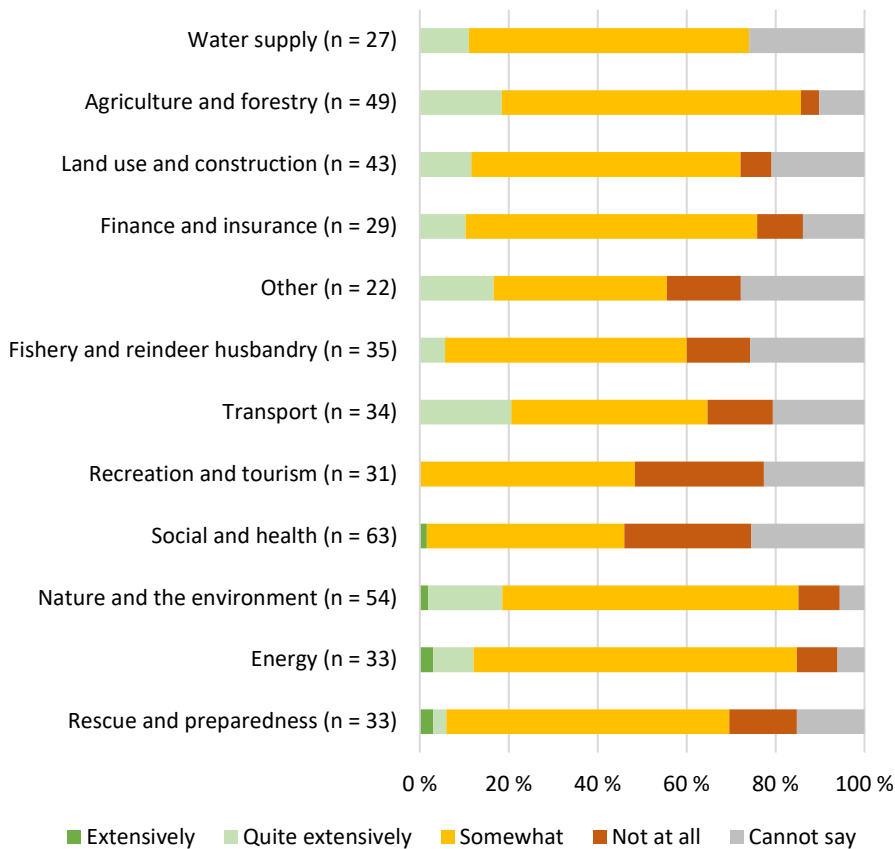


Figure 2.5. Awareness of the adaptation plan in the sector in general

### 2.1.3. Adaptation ladder variable

We used the climate change adaptation levels prepared in the assessment of the National Strategy for Adaptation to Climate Change (Ministry of Agriculture and Forestry 2013) as a basis for forming the adaptation ladder variable comprising four questions. The variable enables assessing the degree of the progress of adaptation in each sector. Table 2.2 presents the questions used in forming the variable and the values used in the classification.

Table 2.2. Forming the adaptation ladder variable. Q15, Q19, Q17 and Q22 refer to question numbers. The questions and response alternatives are presented in Appendix 2. The response alternatives (RA) are scored on a scale of 1–5 (Q15), 1–3 (Q19), and 1–4 (Q17) based on the number of response options available for each question. The numbers given in the “Step” column” refer to the average of all responses from the sector. In cross-sectoral co-operation, the classification was made according to the share of respondents reporting about cross-sectoral co-operation in each sector.

Step	Identifying the need for adaptation = Q15	Assessing climate risks and vulnerability = Q19	Launching adaptation measures = Q17	Cross-sectoral co-operation = Q22
1	RA 1 ( $X \leq 1.8$ ) No awareness of the need for adaptation	RA 1 Climate risks and vulnerability in the sector have not really been addressed ( $X \leq 1.4$ )	RA 1 No adaptation work taking place ( $X \leq 1.6$ )	
2	RA 2 ( $1.8 < X \leq 2.8$ ) A small group of pioneers is aware of the need for adaptation	$1.4 < X \leq 1.8$	RA2 Adaptation occurs sporadically, responsive to individual situations ( $1.6 < X \leq 2.2$ )	$X \leq 10\%$
3	RA3 ( $2.8 < X \leq 3.2$ ) Some degree of awareness of the need for adaptation	RA2 Climate risks and vulnerability in the sector have been assessed/identified to some extent ( $1.8 < X \leq 2.2$ )	RA3 Adaptation is taken into account in some areas of operation ( $2.2 < X \leq 2.8$ )	Cross-sectoral co-operation has been launched ( $10\% < X \leq 20\%$ )
4	RA 4 ( $3.2 < X \leq 4.2$ ) Fairly common awareness of the need for adaptation	$2.2 < X \leq 2.6$	$2.8 < X \leq 3.4$	Cross-sectoral co-operation has become established ( $20\% < X \leq 30\%$ )
5	RA 5 ( $\leq 4.2$ ) Common awareness of the need for adaptation	RA 3 Climate risks and vulnerability in the sector have been systematically assessed/identified ( $X \leq 2.6$ )	RA 4 Adaptation is taken into account in all areas of operation ( $X \leq 3.4$ )	$X \leq 30\%$

## 2.2 Stakeholder events

Five regional stakeholder events were organised in autumn 2018. Local themes reflecting regional special features had been selected for each event (Table 2.3). The events were held in Joensuu, Tampere, Helsinki, Rovaniemi and Vaasa. The lists of participants for the events are included in Appendix I. In addition to the participants, representatives of the Ministry of Agriculture and Forestry, the Finnish Environment Institute and Akordi were present at the events.

*Table 2.3. Stakeholder events and their themes reflecting special regional features.*

<b>Event</b>	<b>Date</b>	<b>Special themes</b>
Joensuu	28 September 2018	Agriculture and forestry, biodiversity, preparedness and risk management, and water resources and water supply
Tampere	1 October 2018	Transport, the built environment, rescue and preparedness
Helsinki	2 October 2018	Finance and Insurance, social and health sector, water supply and water management, rescue and preparedness
Rovaniemi	10 October 2018	Agriculture and forestry, fishery and reindeer husbandry, the bioeconomy, tourism and administration
Vaasa	31 October 2018	Energy, rescue and preparedness

The aim of the events was to chart the state of climate change adaptation and related gaps at the local level. Those invited to the events included stakeholders significant to adaptation and the selected local themes, and representatives of rescue services, Regional State Administrative Agencies and research organisations.

The events started by presenting the objectives of the mid-term evaluation and an address by a local representative. In all of the events, these presentations were followed by a section of individual work, during which the participants considered the state of adaptation in their own work or field of operation by answering the following questions:

How is your organisation/reference group prepared for climate risks?

- What is the level of knowledge and risk awareness in your organisation?
- Has preparedness become part of the organisation's activities?
- What has changed in practice? Concrete actions
- How is information provided about the issue?

At a workshop stage, the state of adaptation was discussed in sectors significant to the region by considering vulnerabilities and factors critical to adaptation planning in the area from the perspective of the participants' field of work. This was followed by a further stage that involved forming cross-sectoral groups and in-depth discussions about the identified gaps and the measures that are still needed to promote adaptation in the region. Akordi facilitated the events and prepared summaries of them, which were later distributed to the participants.

## 3. Survey results

### 3.1 Overall results

#### 3.1.1. Knowledge

There was a strong variation in the level of knowledge related to climate change and climate risks both between respondents' organisations within each sector as well as between sectors. In the rescue and preparedness sector and the energy sector, over 80 per cent of the respondents found that their organisation had a lot or quite a lot of knowledge of weather and climate risks in the sector, whereas in the social and health care sector, only a little over 20 per cent reported that there was at least moderate knowledge. (Figure 3.1) In the recreation and tourism sector, in the fishery and reindeer husbandry sector and the transport sector, around half of the respondents reported that there was at least a moderate amount of knowledge and the other half that there was little, very little or no knowledge.

Only 42 per cent of all respondents felt that their organisation had access to reliable projections of climate change in their field of operation (Figure 3.2). The least knowledge was available in the social and health sector, finance and insurance sector, and fishery and reindeer husbandry sector. Some respondents emphasised that there was particularly a lack of regional knowledge about climate change and its impacts.

For all respondents, the most common sources of information supporting adaptation were experts, articles and reports and research institutes (Figure 3.3). Particularly in the social and health sector, and recreation and tourism sector, the media is an important source of information. Industry events held in the respondents' own sector were particularly important sources of information in the recreation and tourism, and energy sector.

### How much knowledge does your organisation have of the weather and climate risks related to your sector?

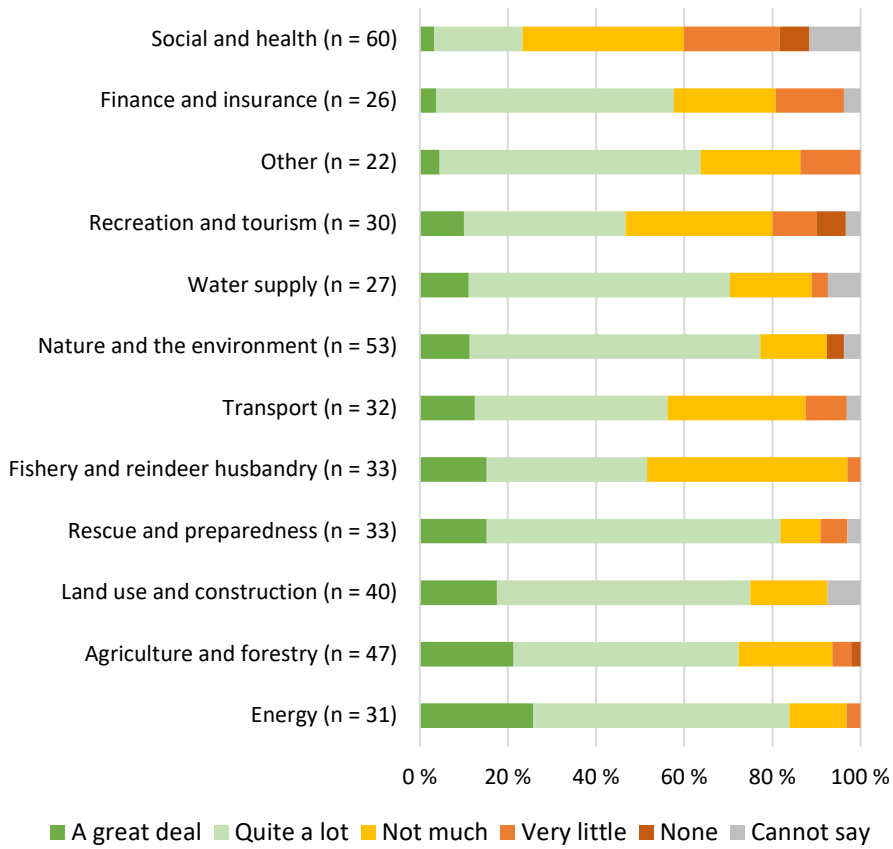


Figure 3.1 The level of knowledge related to weather and climate risks in the organisation.

Does your organisation have access to reliable projections of how climate is expected to change in your area of operation?

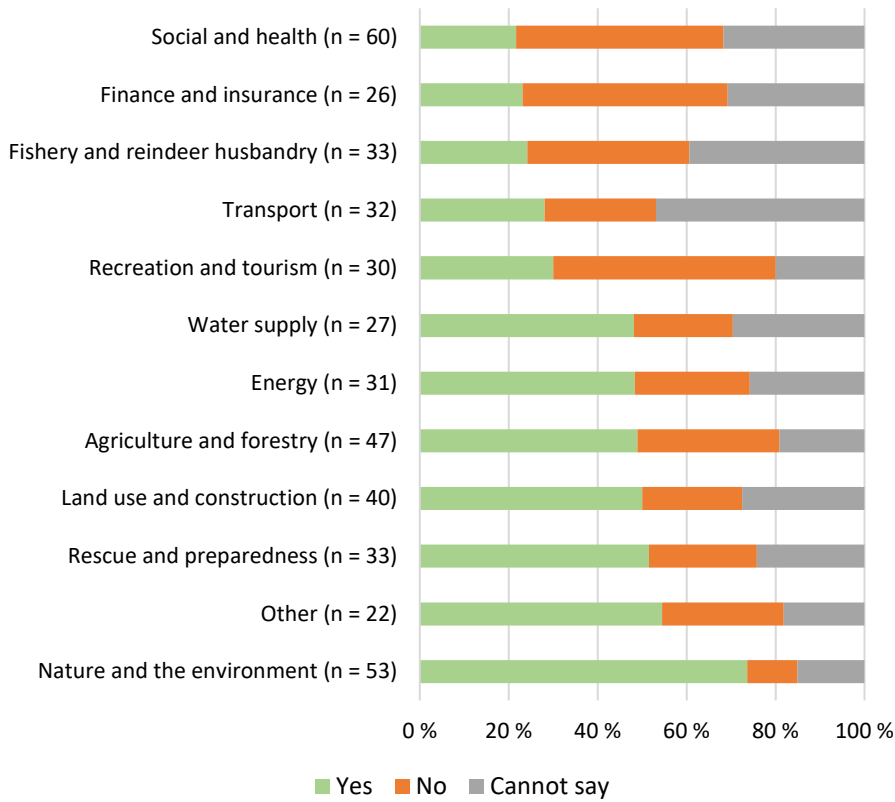


Figure 3.2. Availability of reliable climate change projections in the field of operation.

### What are the most important information sources supporting adaptation in your organisation (choose at most three)?

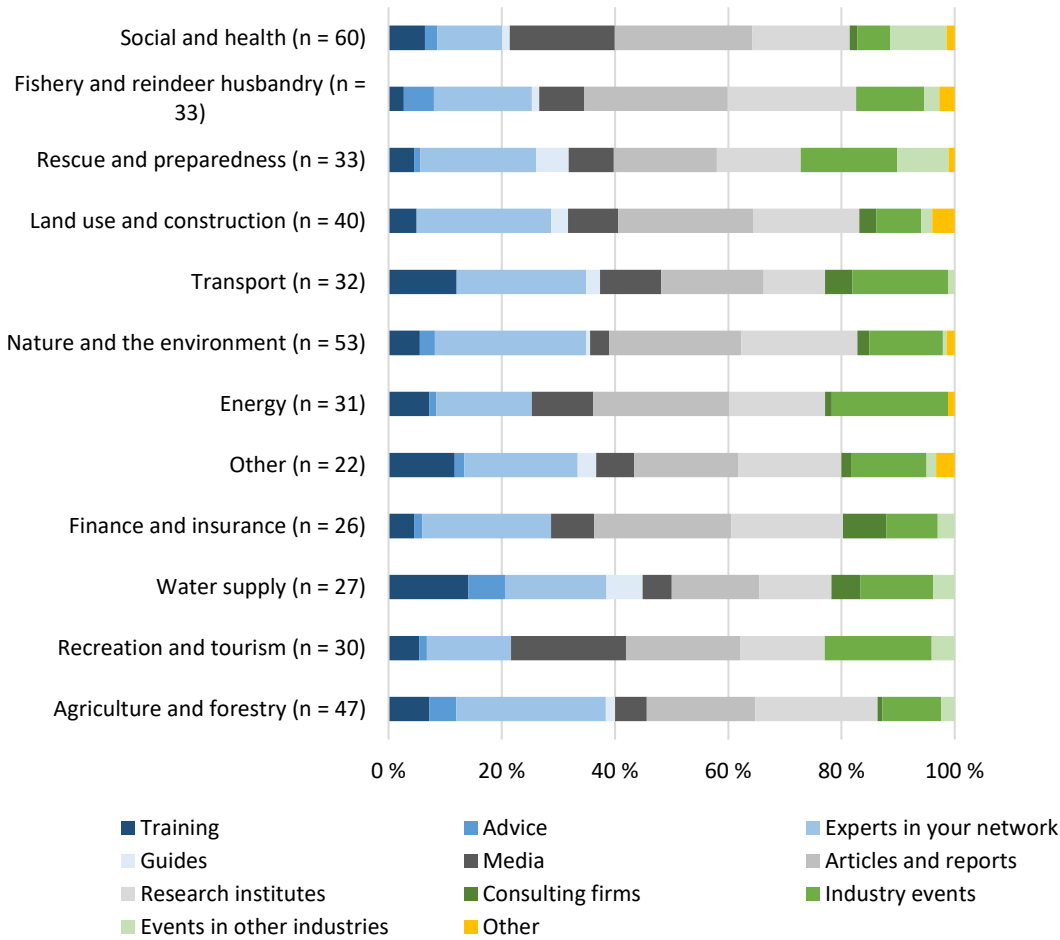


Figure 3.3. Information sources supporting the adaptation of organisations. The item titled “Other” includes the following categories (numbers refer to the number of responses): expert organisations and their materials 4, co-operation 3, personal activities 2, projects 1 and peer-reviewed scientific studies 1.

In the survey, the open answers on the knowledge base of climate change and vulnerability revealed that while information is usually available, finding and structuring appropriate information is difficult. In addition, there is little regional knowledge about adaptation and the impacts of climate change. There is less knowledge about technical risks, even less about social aspects, not to even mention the repercussions. The information may also not have become concrete in people's minds, and many have no idea what adaptation could mean in practice. Some of the respondents felt that translating knowledge into action was the problem.

There is a need for easily accessible and understandable information. This should be provided in concrete guides and websites as well as training. Good examples and guidelines could be included in the materials. There is a particular need for sectoral and regional information and assessment methods.



### 3.1.2. Awareness of adaptation needs and adaptation work

There is still room for work in all sectors in the awareness of adaptation needs and adaptation work. While the level of awareness and adaptation work varies between different sectors, they all still have a long way to go. Only a very small proportion of the respondents felt that adaptation had become an established part of the organisation's ordinary operations (Figure 3.4). On the other hand, at least half of all sectors with the exception of the social and health sector reported that the need for adaptation had been at least acknowledged at the decision-making level and that some actions had been identified. Many of the organisations of a large number of respondents from the social and health sector and the recreation and tourism sector had not identified the need for adaptation.

The status of the awareness of the adaptation need in the sectors reflects that of the respondents' organisations, i.e. at least half of the respondents from sectors other than social and health reported that the need for adaptation had been identified at least to some extent (Figure 3.5).

While organisations carry out various kinds of work related to adaptation, the amount of such work carried out in most organisations is small (Figure 3.6, Table 3.1). Assessing risks and vulnerabilities was the most commonly used tool.

Organisations do not yet carry out particularly systematic adaptation activities; instead, this is generally only taken into account in some areas of adaptation or in a sporadic manner (Figure 3.7). It is particularly common in the social and health sector and recreation and tourism sector, that no adaptation work at all is taking place.

## Awareness of the need for adaptation in my organisation

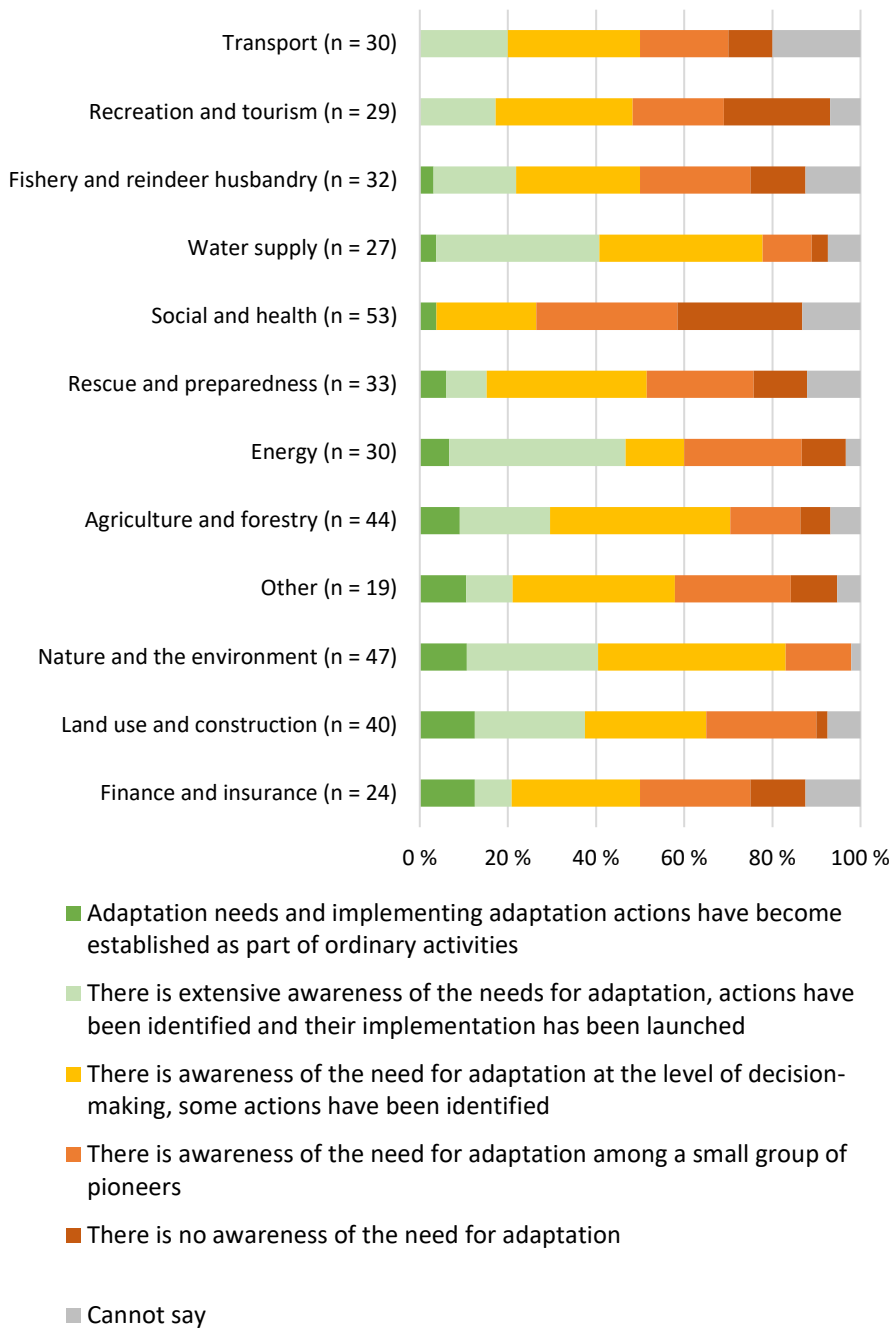


Figure 3.4. Awareness of the need for adaptation in the organisation.

## Awareness of the need for adaptation in my sector

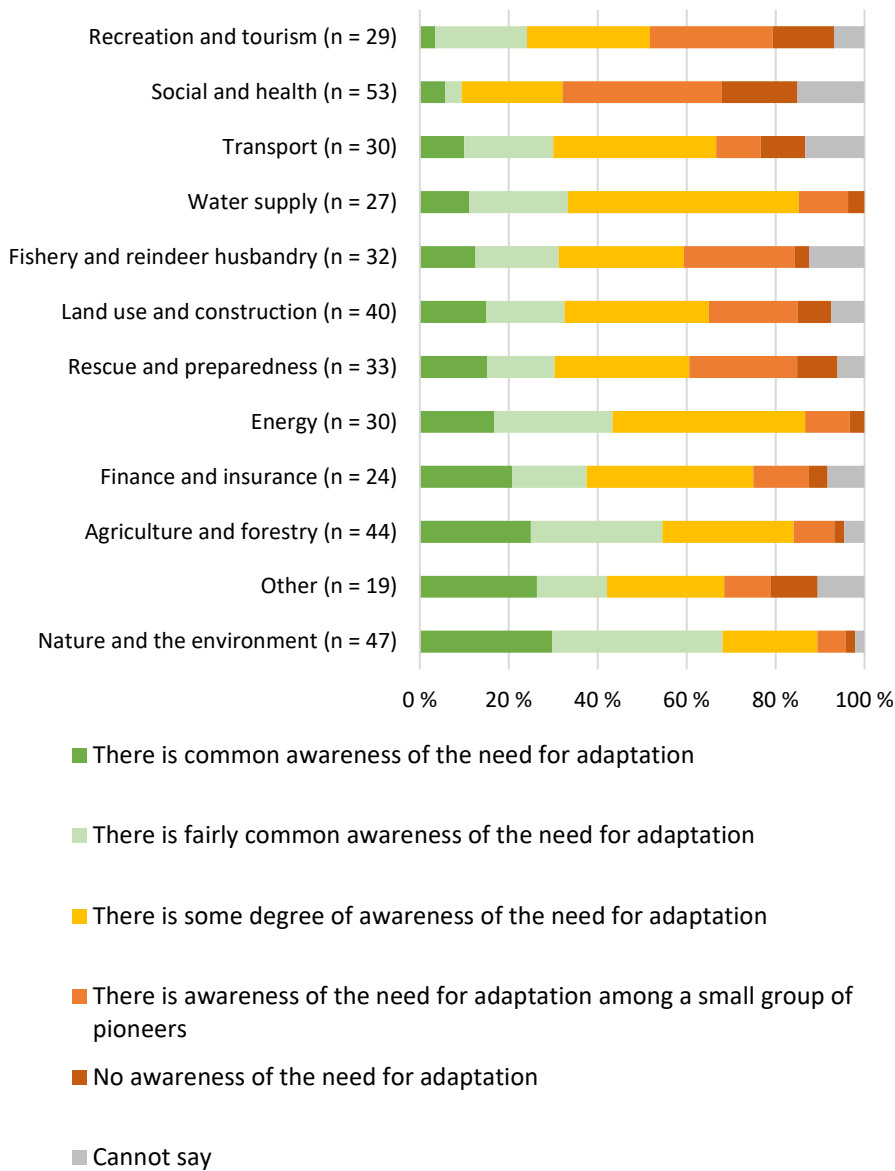


Figure 3.5. Awareness of the need for adaptation in the sector.

### What kind of work does your organisation carry out related to climate change adaptation?

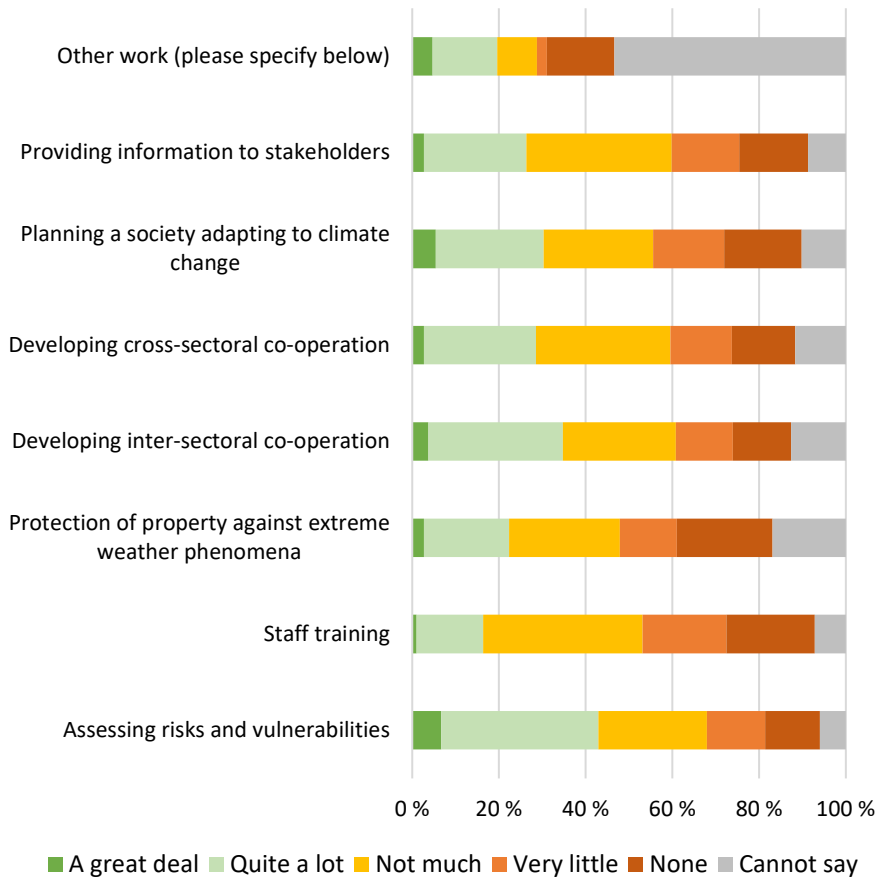


Figure 3.6. Work carried out by the organisation related to climate change adaptation.

*Table 3.1. Work carried out by the organisation related to climate change adaptation, classification of responses by the respondents in the category “others”*

Research, R&D activities, assessment	12 respondents
Information provision and advice, preparation of instructions and recommendations, guides	13 respondents
Climate change mitigation measures	10 respondents
Risk mapping, assessment and management	10 respondents
Project work	7 respondents
Collaboration	7 respondents
Preparedness and continuity management	6 respondents
Teaching	6 respondents
Development of operations, new operating models or products	5 respondents
Taking adaptation into account in planning, instructing operations	5 respondents
Strategies and action plans	3 respondents
Exerting influence	3 respondents
Providing customers with solutions, promoting the adaptation of others	3 respondents
Reacting to emerging problems	1 respondent
Implementation of acts	1 respondent

## How systematically is adaptation taken into account in your organisation?

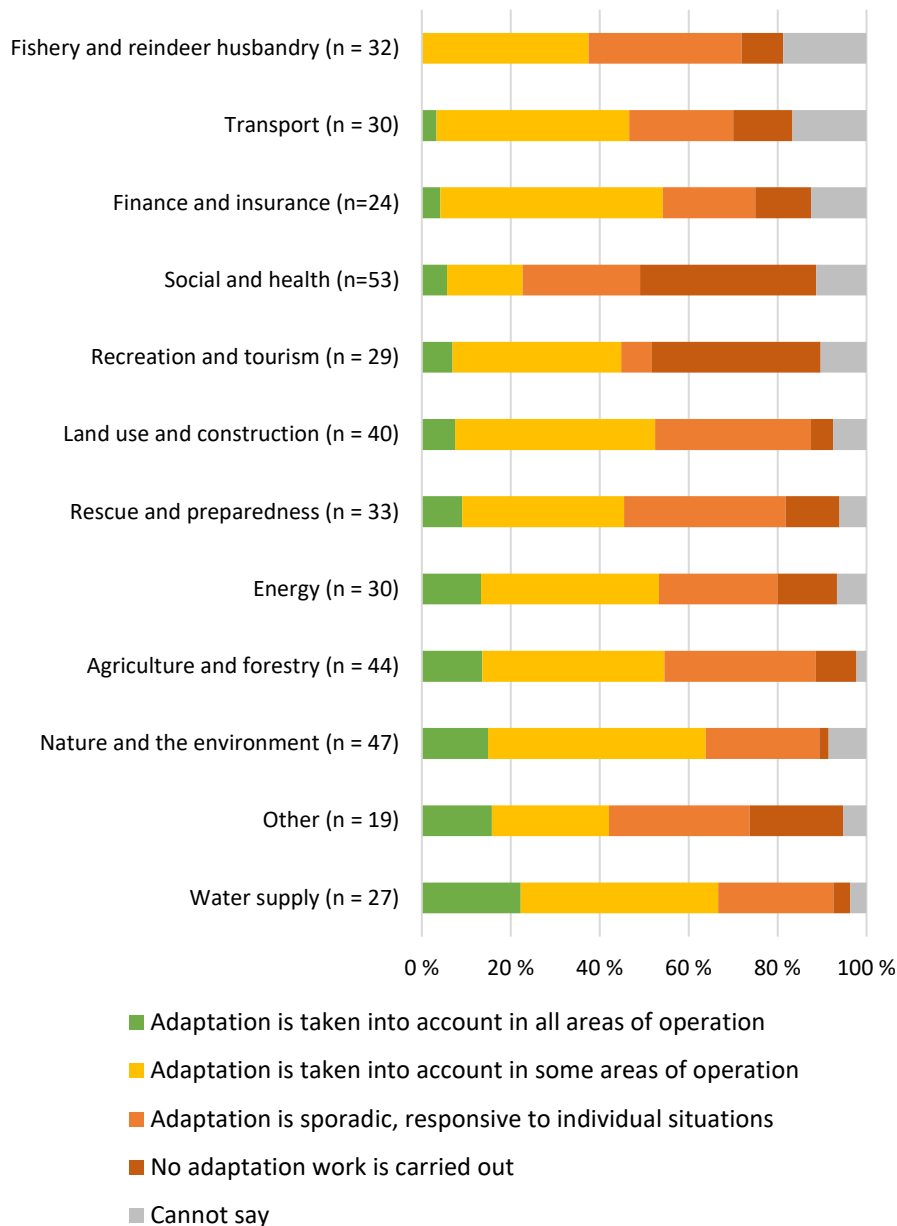


Figure 3.7. The use of a systematic approach in the organisation's adaptation work

The open answers concerning the awareness of the need for adaptation and the work completed in the organisations revealed that, while adaptation is included in practical planning work, the extent of considering the matter may depend on the attitudes and professional skills of individual persons, who may be either the employees planning the activities or the organisation's clients. Some organisations may not have sufficient human resources for adaptation work.

### 3.1.3. Climate risks and vulnerability assessment, and adaptation plans

The majority of the respondents estimated that the climate risks had been assessed to some extent in the sector they represent (Figure 3.8).

A climate change adaptation plan prepared for the sector was used in only few respondents' organisations, even though such plans are available in many sectors (Figure 3.9). The administration branches that already have adaptation plans, programmes or reviews either separately or as part of an overall review of climate change include, at least, the Ministry of Transport and Communications (Ministry of Transport and Communications 2009), the Ministry of Agriculture and Forestry (Ministry of Agriculture and Forestry 2011, Peltonen-Sainio et al. 2017) and the Ministry of the Environment (Ministry of the Environment 2008, 2011, 2016). In addition, the climate risk analysis of the financial sector has highlighted the importance of climate change adaptation as part of climate risk management (Finance Finland 2018).

#### Have climate risks and the vulnerability of the sector been assessed in your sector?

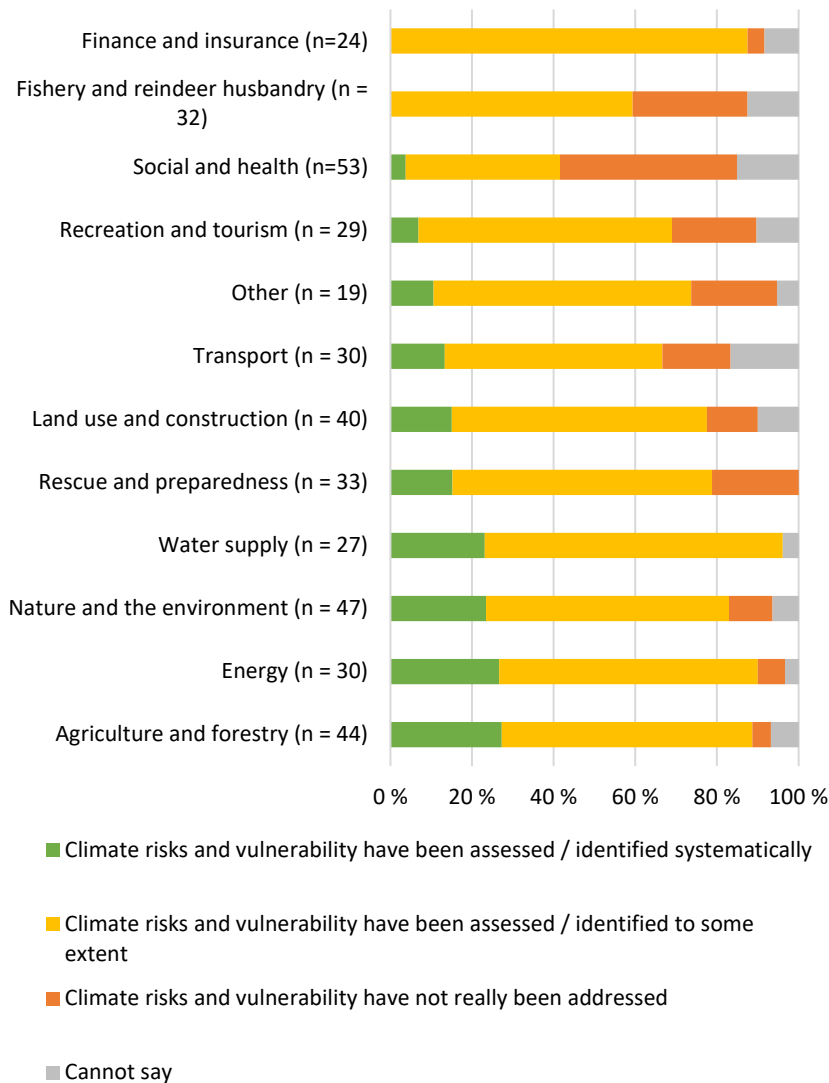


Figure 3.8. Climate risk and vulnerability assessment in the sector.

## Do you have access to an adaptation plan / action plan for adaptation concerning your sector?

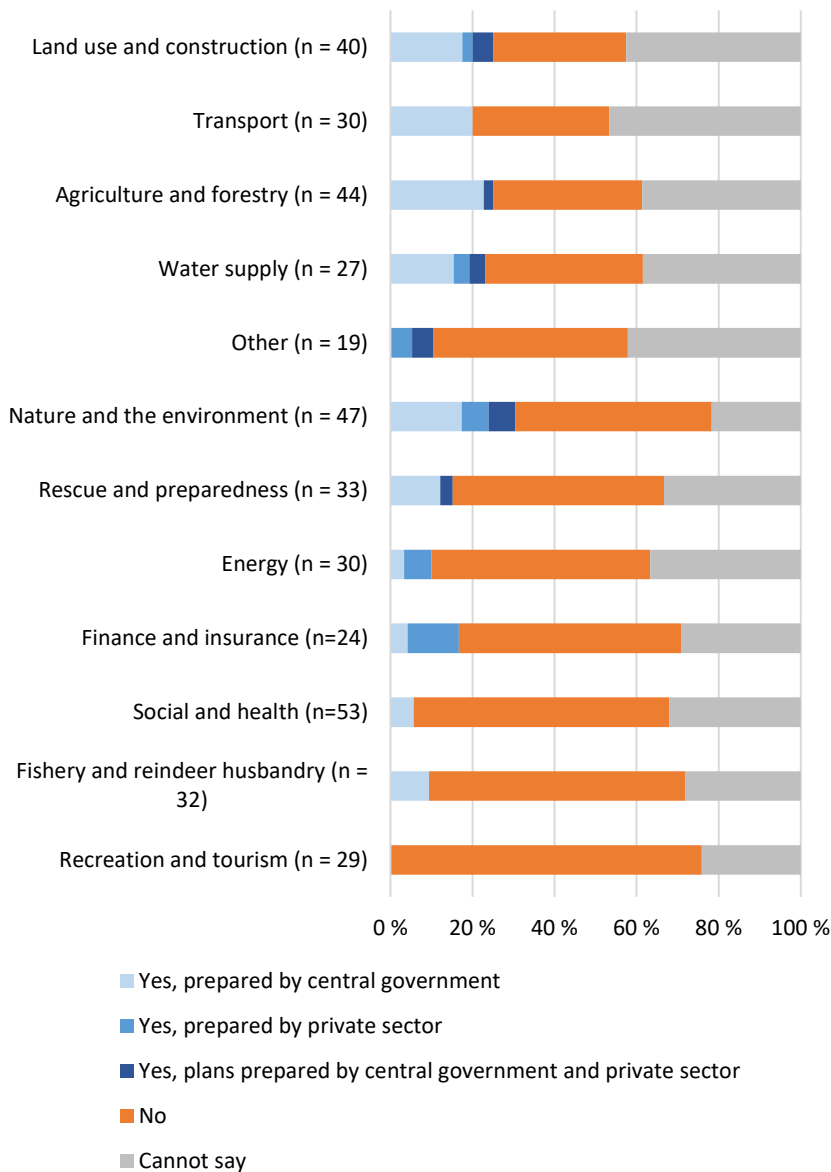


Figure 3.9. Action plan for climate change adaptation.

### 3.1.4. Co-operation

The survey respondents reported that their most significant partners in the adaptation work were ministries; 50% of the respondents reported co-operating with these either within their own sector or across sectoral boundaries. The second most common partners were universities and municipalities, with both of which 49% of the respondents had co-operated. Co-operation with state's research institutes and interest groups, associations and networks was nearly as common. (Figure 3.10)



## Do you co-operate with the following actors in issues related to climate change adaptation?

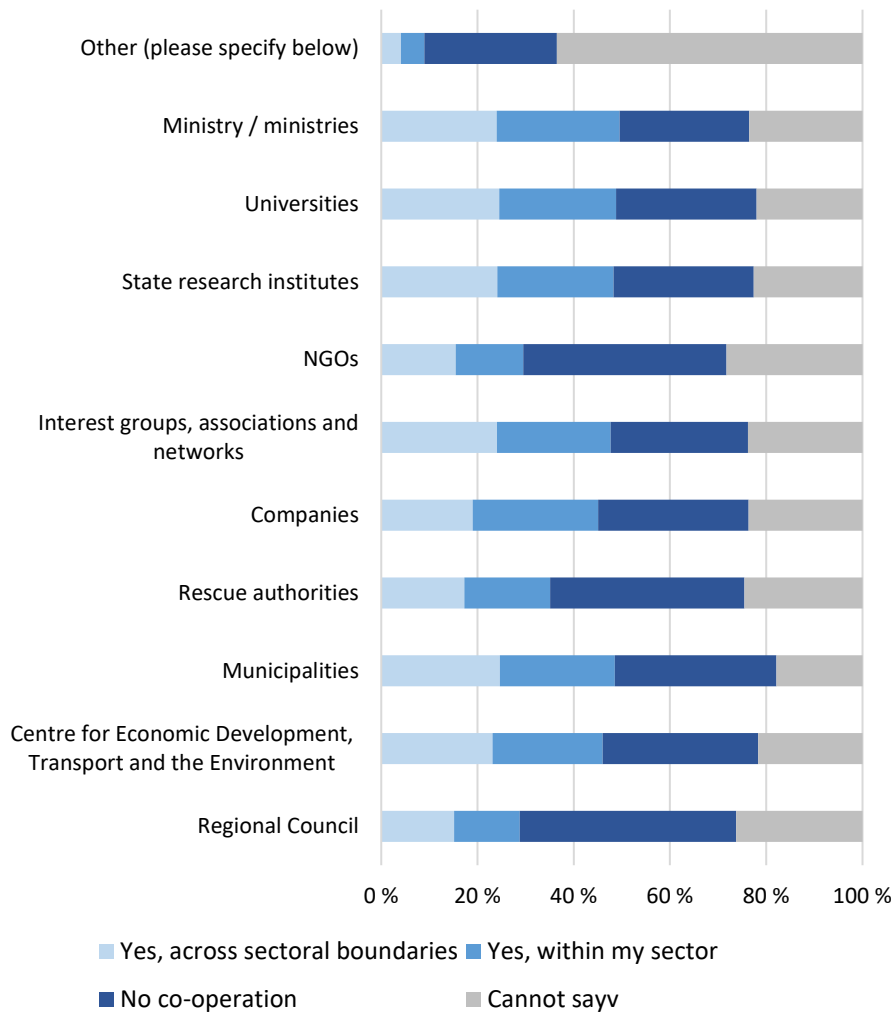


Figure 3.10. Co-operation with different organisations. The category “Others” includes international organisations, networks and projects.

The open answers revealed that while many organisations engaged in extensive co-operation, this is not necessarily directly related to climate change adaptation. In connection with co-operation, the respondents hoped for systematic forums and a joint agenda that could help dividing adaptation up into suitable sub-themes. Networking across sectoral boundaries was considered highly important.

### 3.1.5. Challenges and support related to adaptation

While organisations face a variety of challenges in adapting to climate change, the most common ones appear to concern different deficiencies in systematic and available information, and uncertainties related to information (Figure 3.11).

What are the greatest challenges faced by your organisation in climate change adaptation (choose at most three)?

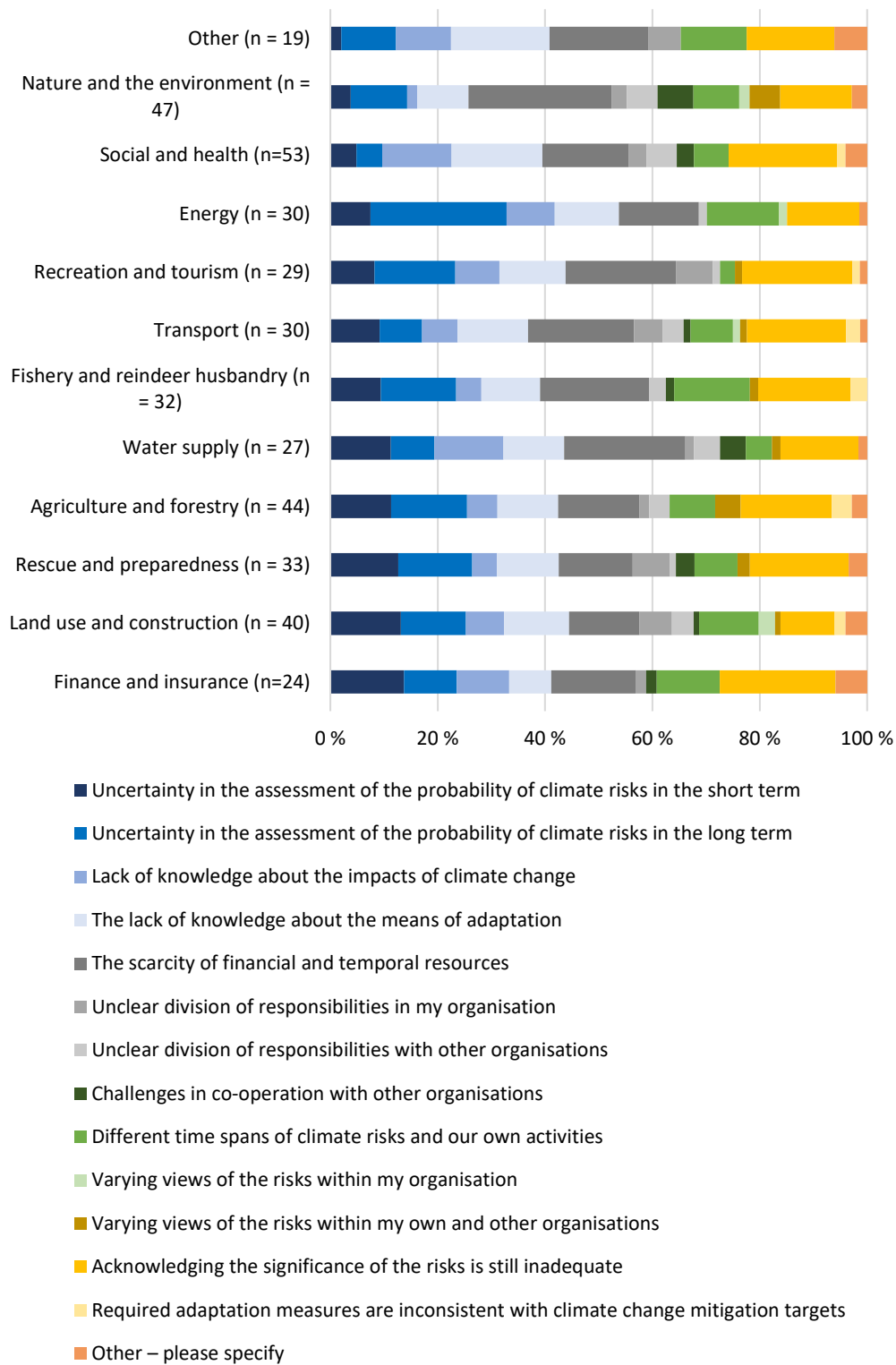


Figure 3.11. The greatest challenges faced by the organisation in climate change adaptation.

*Table 3.2. The greatest challenges, classification of responses by the respondents in the category “others”*

Translating risks into practical work, how to proceed from knowledge to action	3 respondents
Poor legal basis, lack of incentives	3 respondents
Conflicts in politics	2 respondents
Awareness of the significance of risks is still inadequate	2 respondents
The focus should rather be on mitigation	2 respondents
The huge scale of the problem, slow implementation of changes	2 respondents
Scarcity of financial, temporal or human resources	2 respondents
Unclear division of responsibilities in one's own organisation, lack of internal co-operation	2 respondents
Lack of a national adaptation plan aimed at the individual sector	1 respondent
Focus and resources have been on mitigation	1 respondent
Inadequate identification of risk areas	1 respondent
Not included in degree programmes	1 respondent
Priorities of activities lie elsewhere	1 respondent
Overreacting	1 respondent
Lack of tools	1 respondent
Extensive impacts have not been identified	1 respondent
Perceiving risks in euros	1 respondent
Lack of co-operation and steering at the national, regional and local level	1 respondent

Only few respondents reported that national organisations have significantly or to some extent supported adaptation in their field of operation (Figure 3.12). On the other hand, many responded that they cannot say. Most commonly support was received to a significant or some extent in the agriculture, forestry, water supply, and nature and the environment sector.

The organisations would need most support related to targeting climate information to users' needs (51% considered it highly important), funding (39% considered it highly important) and developing know-how related to adaptation (38% considered it highly important) (Figure 3.13).

## Have national organisations supported the adaptation work in your area of operation?

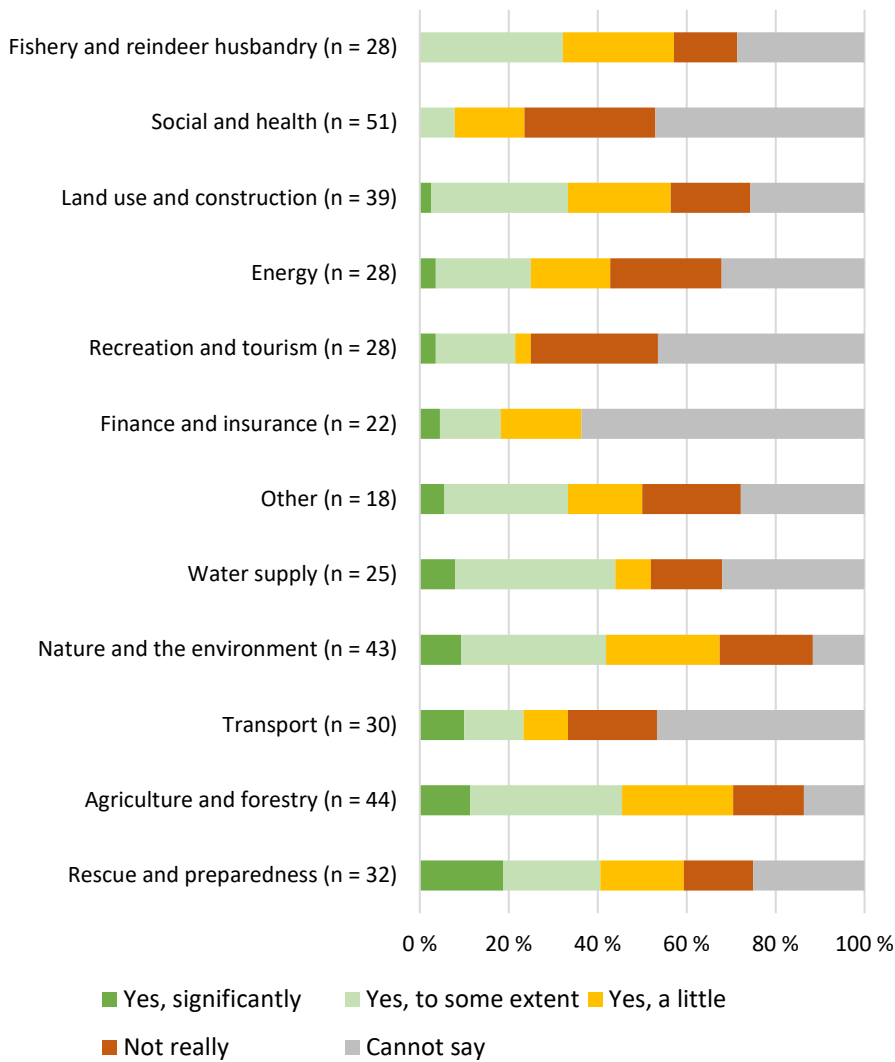


Figure 3.12. Support from national organisations

## What kind of support would promote adaptation work the most in your organisation?

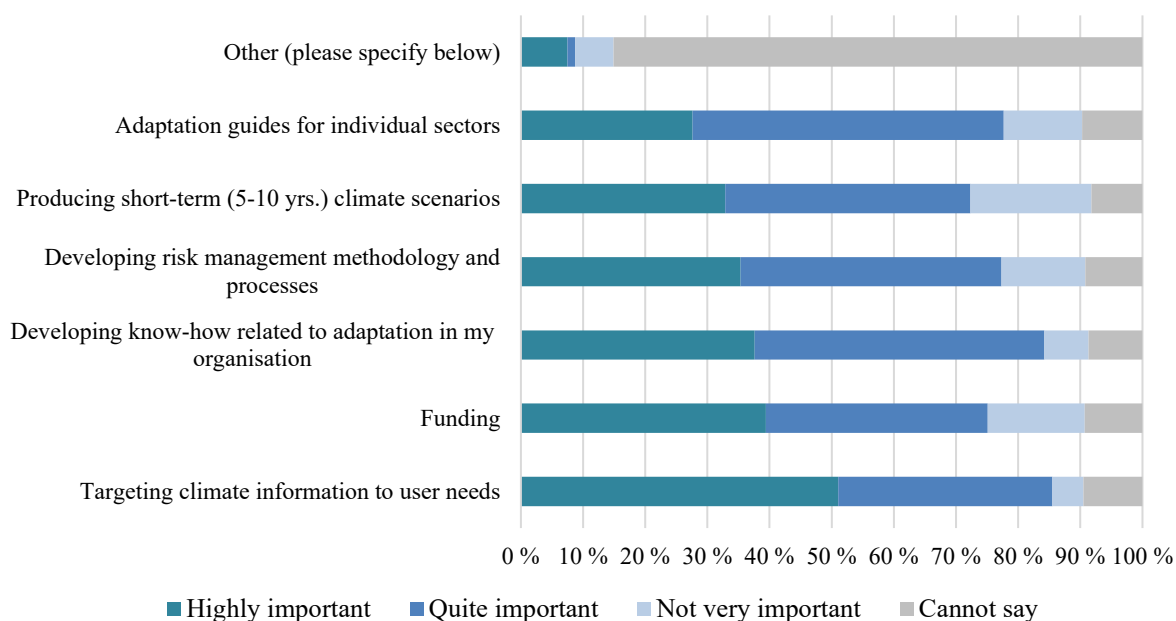


Figure 3.13. Support needed for adaptation work.

Table 3.3. Support needed for adaptation work, classification of responses by the respondents in the category “others”.

Reliable forecasts of changes in temperature and rainfall, regional scenarios	4 respondents
Taking climate change into account in regulation, stricter regulation and monitoring	3 respondents
Regional and cross-sectoral co-operation	2 respondents
Communicating about what climate change means in practice	2 respondents
Practical tools	2 respondents
Teaching climate issues in all fields of study of higher education institutions, developing expertise	2 respondents
Including ICT, logistics and construction in adaptation work	1 respondent
Information about climate-related risks and opportunities for companies	1 respondent
Research projects	1 respondent
Including concrete aspects to mitigation	1 respondent
Funding	1 respondent

### 3.1.6. Adaptation ladder

The adaptation ladder describes the progress of climate change adaptation work in different sectors. The sum variable includes responses related to identifying the need for adaptation, assessing climate risks and vulnerability, launching adaptation measures, and co-operation between sectors (for more information on forming the variable, see section 2.1.3.). The higher a sector ranks on the ladder, the further it has progressed its adaptation work.

None of the sectors have yet reached the highest, fifth step. The sectors reaching the highest – fourth step – of the ladder are nature and the environment, agriculture and forestry, and water

supply (Figure 3.14). Social and health services and recreation and tourism rank lowest on the second step.

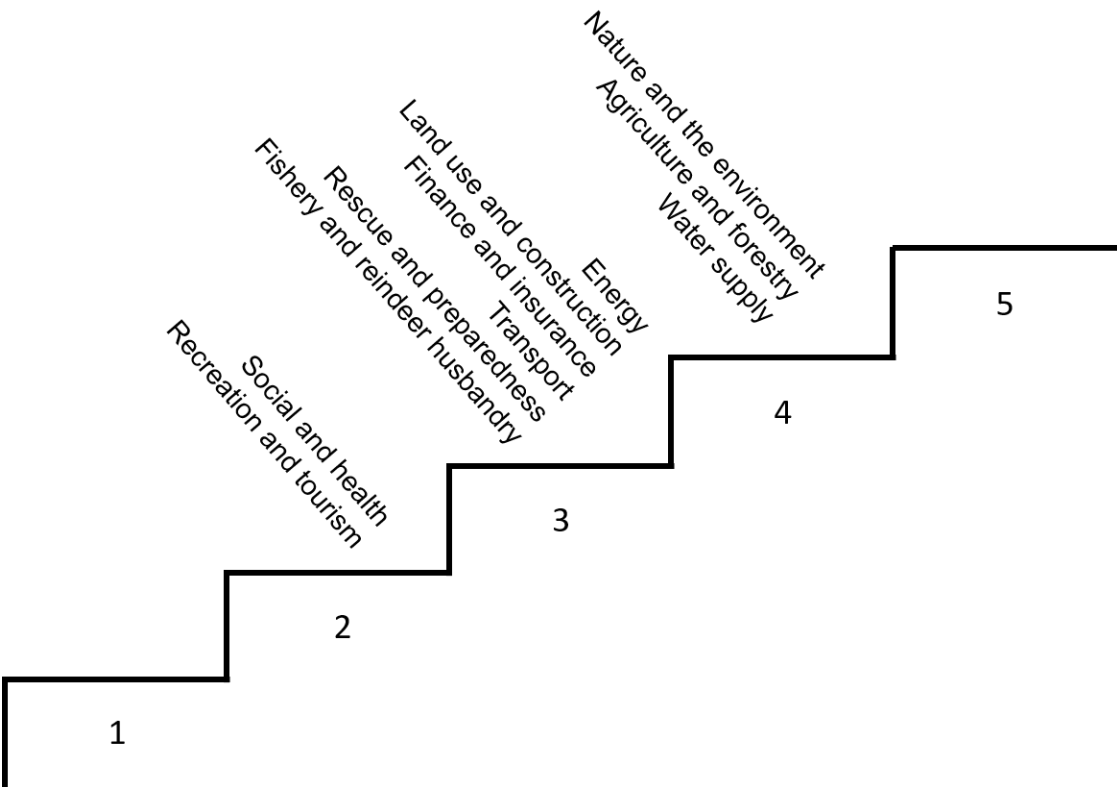


Figure 3.14. Adaptation ladder.

### 3.2 The results of individual sectors

#### 3.2.1. Agriculture and forestry

Of the respondents in agriculture and forestry, 21% (n=49) estimated that their organisation had a great deal of information on weather and climate risks related to the sector, while half of the respondents felt that there was quite a lot of information. Around half of the respondents in the sector reported that their organisation had access to reliable projections of how climate is expected to change in its field of operation. The corresponding share of total respondents was 42%. The respondents in the agriculture and forestry sector identified experts in their networks as the most significant source of information supporting the adaptation of their organisation; research institutes were considered the second most important. In their open answers in this the section, many of the respondents described the information as fragmented and partly contradictory even though the amount of information available was high. The distribution of special information related to adaptation concerning the individual sector was also considered to be limited in the field, and the information was not considered to be translated into practical actions.

40% of the respondents in the sector felt that, in their organisation, the need for adaptation has been acknowledged at the decision-making level and some measures have been identified. The respondents considered that there was fairly strong awareness of the need for adaptation at the sectoral level. One quarter of the respondents in the sector felt that there was common awareness of the need for adaptation in the sector and 30% that there was fairly common

awareness of this. 40% of the respondents in the sector estimated that their organisation takes adaptation into account in some areas of their operations. This is in line with the average share of total respondents (40%). The open responses revealed that while issues such as preparedness for extreme weather phenomena are included in agricultural advisory services and education, the respondents still felt that adaptation work has only just begun in the sector. Adaptation does not only concern preparing for threats, but also assessing new opportunities. The contingency plan for forest damage drawn up by the Finnish Forest Centre was mentioned as a concrete example of work carried out in the forest sector.

Of all the sectors examined, the respondents in agriculture and forestry felt that climate risks and the vulnerability of the field had been assessed most comprehensively in their sector. As many as 27% of the respondents in the sector estimated that climate risks and vulnerability had been systematically assessed or identified in the sector. The corresponding share of total respondents was 14 %. Up to 23% of the respondents had access to an adaptation plan for the sector drawn up by central government. 36% did not have an adaptation plan at their disposal.

### Agriculture and forestry: Do you co-operate with the following actors?

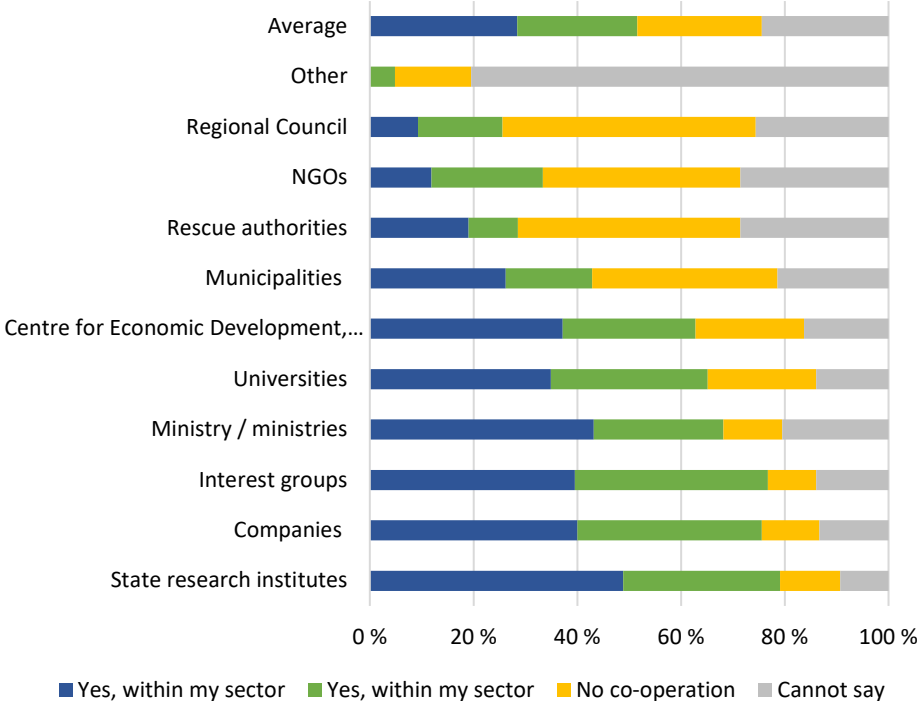


Figure 3.15. Co-operation in agriculture and forestry.

On average, compared to the other sectors, respondents from agriculture and forestry engaged in active co-operation with other actors. The most common partner was state research institutes, with which nearly half of the respondents had co-operated within their own sector, and about 30% across sectoral boundaries (Figure 3.15).

One of the biggest challenges facing the respondents’ organisations was that there was still a lack of awareness of the significance of risks. The scarcity of financial or temporal resources was also considered a significant challenge. The open answers of the section revealed concern and uncertainty about issues such as the expected amount of precipitation, storms and snow

damage in the future. Anticipation in connection with the selection of crops and the prevention of new pests was also considered challenging. 70% of the respondents in the sector felt that national organisations had supported the adaptation work in their operating area either significantly (11%), to some extent (34%) or little (25%). 16% felt that national organisations had not really provided any support. Respondents estimated that climate change adaptation in the sector could be promoted by providing and disseminating adaptation information as close to practical application as possible, particularly providing information about good practical examples of adaptation. The respondents felt that promoting adaptation in the sector needs to be supported with information, especially about good examples of practical adaptation measures, and assistance in integrating adaptation into all activities. Adaptation could also be promoted through financial support and by funding research projects concerning adaptation in individual sectors.

On the adaptation ladder (Figure 3.14), agriculture and forestry are among the only three pioneering sectors ranking on the fourth step. Based on the factors examined in the sum variable, agriculture and forestry should invest in initiating adaptation measures in the future, as the use of a systematic approach in the respondents' organisations in adaptation work was at a poorer level compared to the other variables examined.

### **3.2.2. Fishery and reindeer husbandry**

Of the respondents representing fishery and reindeer husbandry (n= 35), 46% felt that their organisation had fairly little knowledge about weather and climate risks related to the sector. This share is almost twice as high as the average for all survey respondents. Less than a quarter of the respondents in the sector reported that their organisation had access to reliable projections of how climate is expected to change in its field of operation. According to the respondents from the sector, the most important information sources supporting the adaptation of the respondents' organisations included articles and reports, while research institutes were considered the second most important source. The open answers of the section emphasised that while the respondents felt that a lot of information was already available, this was considered partly unreliable and contradictory, and overly speculative and uncertain to guide practical activities. Moreover, the information was not considered to be sufficiently easily accessible to everyone.

Respondents from the fishery and reindeer husbandry sector felt that awareness of the need for adaptation was slightly poorer than average in their organisation compared to other sectors. 28% of respondents in the sector felt that the need for adaptation has been acknowledged at the decision-making level and some measures have been identified, whereas a quarter estimated that awareness of the need for adaptation was limited to a small number of pioneers. At the sectoral level, awareness of the need for adaptation was also considered to be slightly poorer than average. 28% of respondents in the sector estimated that the need for adaptation had been acknowledged to some extent. Unlike in the other sectors, none of the respondents in the sector felt that their organisation took adaptation into account in all areas of operation. 38% of respondents in the field estimated that their organisation takes adaptation into account in some areas of operation and 34% felt that their organisation's adaptation was sporadic and responsive to individual situations. In the open responses, several respondents described that the resources of their organisation or sector were used to solving immediate problems, which meant that no resources were left for long-term systematic adaptation planning.



Respondents from the fishery and reindeer husbandry sector felt that the assessment of climate risks and the vulnerability of the sector was relatively weak in their sector. None of the respondents found that assessment of climate risks and vulnerability was carried out systematically, and as many as 28% of the respondents in the sector felt that the climate risks and vulnerability in the sector had been hardly addressed. The corresponding share of total respondents was 17%. Only 9% of respondents in the sector had access to an adaptation plan for the sector (prepared by the government); 63% did not have an adaptation plan at their disposal.

### Fishery and reindeer husbandry: Do you co-operate with the following actors?

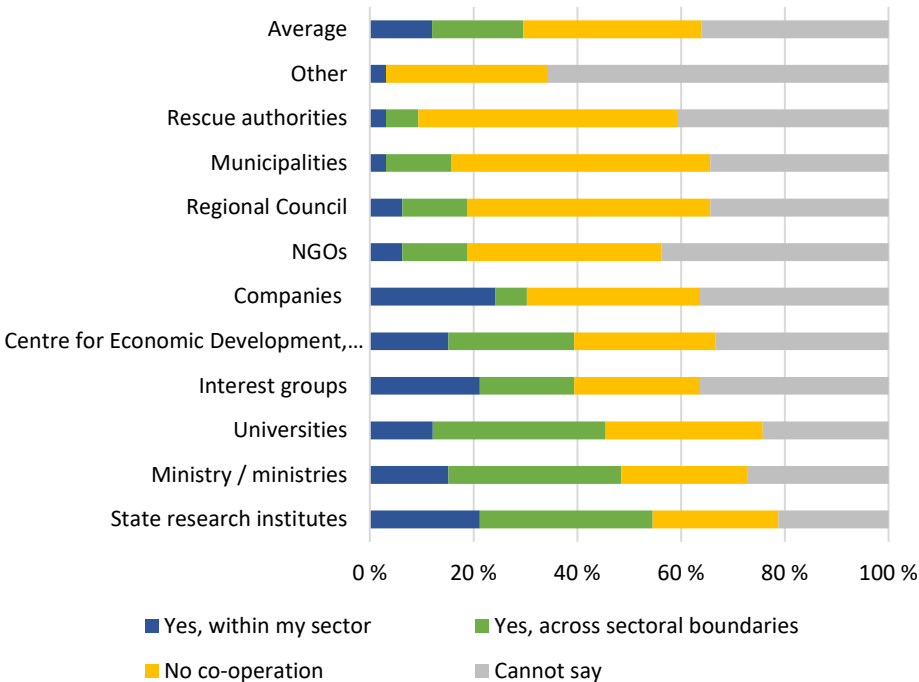


Figure 3.16. Co-operation in fishery and reindeer husbandry.

The state research institutes were the most common partner for respondents in the sector. Around one fifth of the respondents said that they co-operated with state research institutes within their own sector and around one third reported co-operating across the sectoral boundaries (Figure 3.16).

The respondents perceived the scarcity of financial or temporal resources as the most significant challenge for adaptation in their organisation. A lack of awareness of the significance of risks was also identified as a key challenge. The open answers in this section highlighted a concern related to all seasons concerning the direct impact of weather conditions and extreme phenomena on the sector and the profitability of operations. 57% of the respondents in the sector felt that national organisations had supported the adaptation work in their operating area either to some extent (32%) or little (25%). 14% of respondents in the sector felt that national organisations had not really provided support. In promoting adaptation, the respondents felt that the construction of a common and uniform knowledge base in the sector as well as state support and steering were particularly important. In

connection with fishery, the respondents also emphasised that fish stocks should be taken better into consideration in the planning of conservation areas and increasing the popularity of fish species that become more common as food fish as a result of climate change. In reindeer husbandry, the respondents put forward an idea for a project that would involve bringing together knowledge from the particular perspective of the industry, considering the methods of adaptation more extensively, and especially providing information to practical actors.

On the adaptation ladder (Figure 3.14), fishery and reindeer husbandry ranked on the third step. However, the sector was only just able to pass the border between steps two and three. In light of the results, the level of adaptation in fishery and reindeer husbandry is lower than average compared to the sectors examined. Adaptation research should be particularly developed in the sector in the future, as the respondents' view of the assessment of climate risks and vulnerability in their sector remained at a lower level compared to the other factors examined in the sum variable.

### 3.2.3. Nature and the environment

Of the respondents representing nature and the environment (n= 54), 66% felt that their organisation had quite a lot of information about weather and climate risks related to the sector. As many as 74% of the respondents in the sector reported that their organisation had access to reliable projections of how climate is expected to change in its field of operation. This share is clearly higher than in any other sector. The respondents identified experts in their networks as the most important source of adaptation information for their organisations. Articles and reports were also seen as a significant source of information. In the open answers to the section, many respondents stressed that the knowledge base should be further enhanced, even though there is already a lot of adaptation information in the sector. There was a particular need for more regional adaptation data and information about the combined effects of climate change and other forces of change.

Compared to most other sectors, the respondents from the nature and the environment sector felt that awareness of the need for adaptation in their organisation was fairly strong. 30% of respondents in the sector felt that adaptation needs have been widely acknowledged, related measures have been identified and their implementation has been initiated, whereas 43% estimated that the need for adaptation has been acknowledged at the decision-making level and some measures have been identified. The nature and environment sector also stood out as the sector in which awareness of the need for adaptation was identified most comprehensively. As many as 68% of the respondents estimated that the need for adaptation had been generally (30%) or fairly generally (38%) identified. Around half of the respondents in the sector felt that their organisation had taken adaptation into account in some areas of their operations.

In connection with adaptation work, it emerged that while there is awareness of issues and a lot of good work has been done, the used measures do not meet the needs. For example, a regional organisation stressed that adaptation had been introduced to the organisation's strategic level. On the other hand, it also emerged that, at the regional level, adaptation is not yet quite visible, and that dialogue between sectors and processes is often inadequate.

60% of the respondents in the sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent. 30% of the respondents in the sector had at their disposal an adaptation plan for the sector drawn up by the government or the private sector, or both. The corresponding average for all of the sectors is 16%.

## Nature and the environment: Do you co-operate with the following actors?

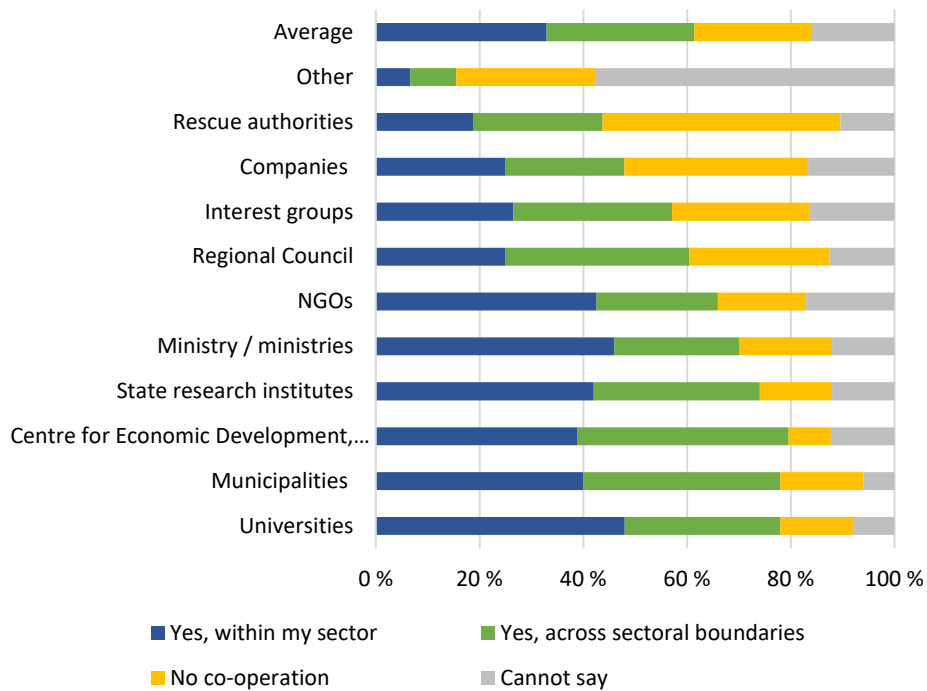


Figure 3.17. Co-operation in nature and the environment.

In the comparison between sectors, co-operation with other actors related to adaptation was most active in the field of nature and the environment. Co-operation within the sector was slightly more common than co-operation between sectors. Universities emerged as the most common partner, as almost half of the respondents said that they had co-operated with universities within the sector, while 30% had engaged in cross-sectoral co-operation (Figure 3.17).

The respondents had identified the scarcity of financial and temporal resources as the clearly biggest challenge to the adaptation work in their own organisation. In their open answers to the section, the respondents explained that the funding available for adaptation is usually provided on a project basis, which makes it uncertain. The respondents also stressed that the provided funding was decreasing, which further complicates allocating resources to adaptation in the sector. One third of the respondents in the field felt that national organisations had somewhat supported adaptation work in their area of operation. Around one quarter considered that adaptation work had received little support. When asked about ways to promote adaptation in the sector, the respondents emphasised the importance of research and education, increasing appropriations for research as well as other adaptation resources, and the need to plan and implement adaptation work on a cross-sectoral basis. The commitment of political decision-makers to adaptation work was considered necessary in the implementation of concrete adaptation measures at the municipal and national level.

On the adaptation ladder (Figure 3.14), the nature and environment sector ranks on the fourth step and has reached the furthest point of all the sectors. The sector is a major pioneer, particularly regarding cross-sectoral co-operation related to adaptation. In the future, the field

of nature and the environment should invest in research in adaptation, as the respondents felt that the sector's foundation for assessing climate risks and the vulnerability of the sector was not as strong compared to the other factors examined in the sum variable.

#### **3.2.4. Recreation and tourism**

The respondents representing the recreation and tourism sector (n=31) estimated that the level of sector-related knowledge concerning weather and climate risks was somewhat lower in their organisation compared to the sectors on average. 37% of the respondents felt that their organisation had quite a lot of knowledge, whereas one third estimated that it had fairly little knowledge. As many as half of the respondents in the sector reported that their organisation did not have access to reliable projections of how climate is expected to change in the organisation's field of operation. The corresponding average for all of the sectors is 31%. The respondents identified the media, and articles and reports as the most important sources of information supporting their organisation in adaptation. The open answers in the section emphasised the need for concrete scenarios depicting issues such as the future changes in snowfall, durability of ice, Arctic species and forest fires.

The respondents in the recreation and tourism sector felt that awareness of the need for adaptation was rather poor in their organisation compared to the average of all sectors. As many as a quarter of the respondents estimated that the need for adaptation had not been recognised, whereas the corresponding share of all respondents was only 11%. Regarding the awareness of the need for adaptation at the sector level, the majority of respondents in recreation and tourism felt that there was either some awareness (28%) or that the awareness was limited to a small group of pioneers (28%). Of the respondents in the sector, only around 3% estimated that the need for adaptation in the sector was generally acknowledged, whereas the corresponding share of all respondents was 16%. Similarly, the use of a systematic approach in adaptation in the respondent's own organisation was considered relatively rare in the recreation and tourism sector. As many as 38% of the respondents felt that adaptation work was not carried out in their own organisation. The corresponding share of total respondents was 15%. The open responses related to adaptation work mentioned that work related to the topic had only just begun and that people did not yet take the need for adaptation seriously. On the other hand, the theme was addressed in tourism education.

62% of the respondents in the sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent. In the survey, the recreation and tourism sector emerged as the only sector in which, as far as they knew, none of the respondents had access to an adaptation plan for the sector. 76% of the respondents did not have an adaptation plan at their disposal and the remaining 24% did not know if one was available.

## Recreation and tourism: Do you co-operate with the following actors?

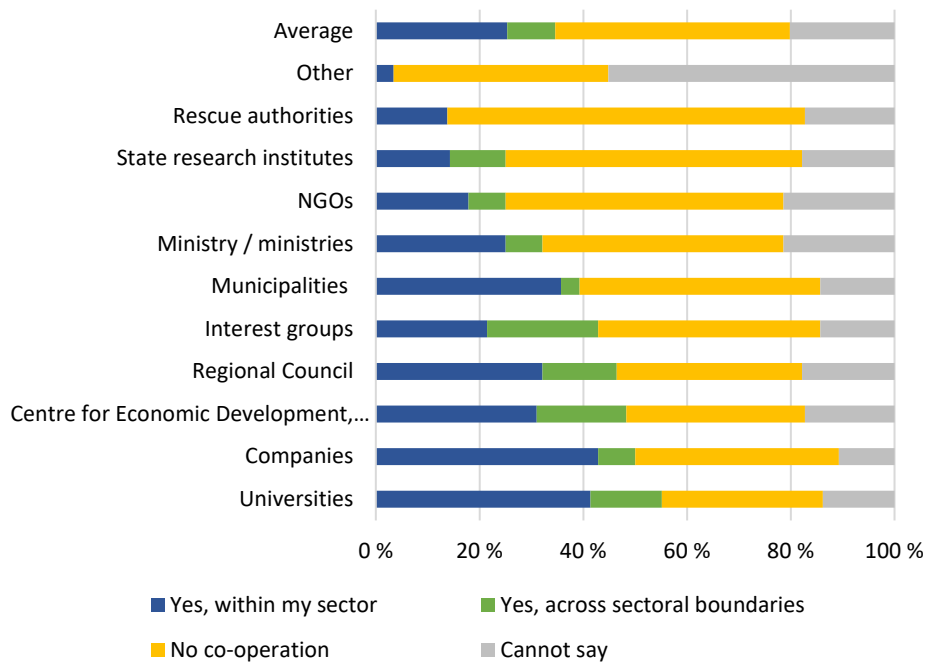


Figure 3.18. Co-operation in recreation and tourism.

Compared to other sectors, there was a significant lack of co-operation with other actors in recreation and tourism. The most common partner in the sector was universities, with which 55% of the respondents co-operated either within their own sector (41%) or across sectoral boundaries (14%) (Figure 3.18). Internal co-operation within the sector was clearly more common than cross-sectoral co-operation.

The respondents in the sector considered the biggest challenges related to the adaptation work of their organisation to involve the scarcity of financial and temporal resources and the still inadequate awareness of the significance of risks. The open answers of the section described how a large share of the actors in the sector either do not take climate change and the need for adaptation seriously or find the related objectives contradictory with their business objectives. The respondents stressed the need for targeted information to solve the challenge. Constructing cross-sectoral co-operation networks was also considered a factor that could be used to develop the adaptation of the sector. Particularly in connection with winter tourism, the respondents expressed a need for support related to creating new tourism products for potentially snowless conditions. 29% of the respondents in the sector felt that national organisations had not really supported adaptation work in their operating area. The corresponding share in the sectors on average was 19%. Respondents in the recreation and tourism sector estimated that adaptation in the sector could be promoted especially through providing information and training, concrete examples of threats and adaptation work, and by making the themes an integral part of the discussion in the sector.

On the adaptation ladder (Figure 3.14), recreation and tourism was one of the two sectors ranking on step two, the other being the social and health sector. In the light of the examined sum variable, the level of adaptation in the recreation and tourism sector is considerably lower than in the sectors on average. In the future, efforts should particularly be made to promote

the identification of the need for adaptation in the sector, as the respondents felt that awareness of the need for adaptation was particularly poor.

### **3.2.5. Land use and construction**

Respondents in the land use and construction sector (n=43) felt that, overall, knowledge of the weather and climate risks related to the sector was somewhat higher in their organisation compared to the average of all sectors. 18% of respondents in the field estimated that their organisation had a lot of information and 58% estimated that there was quite a lot of information. Half of the respondents in the sector reported that their organisation had access to reliable projections of how climate is expected to change in its area of operation. The respondents identified articles and reports, and experts in their networks as the most important sources of information supporting the adaptation work in their organisation. In their open answers to the section, many respondents emphasised that while there is a lot of information, identifying reliable information is challenging, and the information relies too much on theory and is often not sufficiently relevant to the region. The respondents also expressed a need for more information on the costs of adaptation measures.

On average, the respondents in this sector estimated that the awareness of the need for adaptation was stronger in their organisation compared to the representatives in most other sectors. As much as 13% of the respondents in the sector felt that the identification of adaptation needs and implementation of adaptation measures have become an established part of normal operations in their organisation. The percentage is twice as high as the average of the sectors. However, the respondents in the land use and construction sector did not feel that the awareness of the need for adaptation was on a strong basis. 15% of the respondents felt that there was a common awareness of the need for adaptation in the sector, and some 18% felt that the need was fairly commonly acknowledged. The percentages are slightly lower compared to the average of all sectors. 45% of the respondents in the sector considered that their organisation took adaptation into account in some areas of operation. In the responses related to adaptation work, it emerged that there is a need for concrete instruction on which issues should be taken into account aimed at properties. The respondents wished that the challenges of construction would be addressed more in the National Climate Change Adaptation Plan.

63% of the respondents in the sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent. This share is much in line with the average for all sectors. As many as 23% of the respondents had an adaptation plan prepared by the state administration. Around 36% of the respondents did not have access to an adaptation plan.

### Land use and construction: Do you co-operate with the following actors?

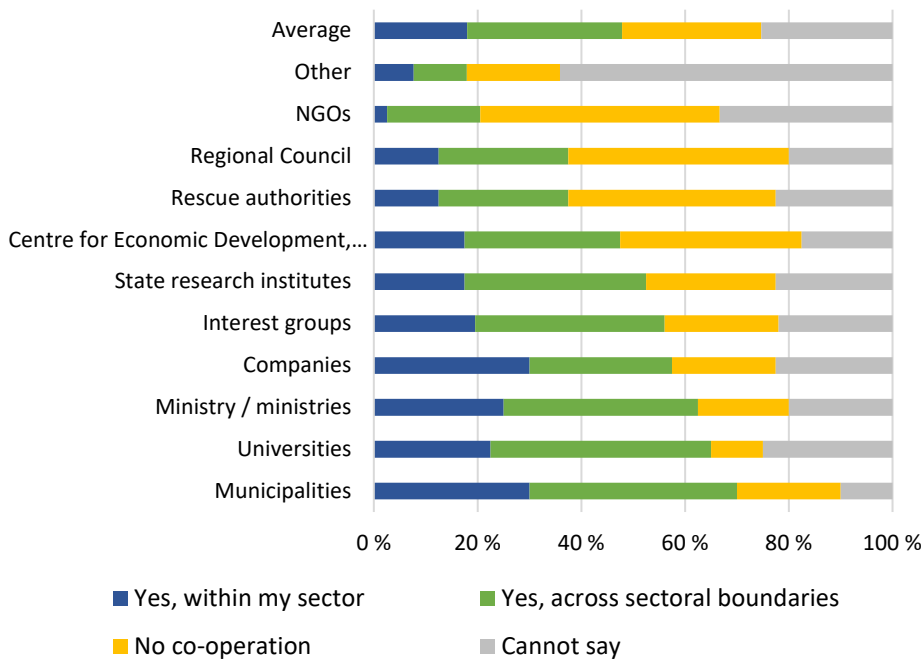


Figure 3.19. Co-operation in land use and construction.

Compared to most of the other sectors, co-operation with other actors was rather active in the land use and construction sector. Unlike in most of the other sectors, more co-operation was carried out across sectoral boundaries than within the sector. The respondents in the land use and construction sector reported co-operating most with municipalities: 30% of the respondents co-operated with municipalities within their sector while 40% engaged in cross-sectoral co-operation (Figure 3.19).

The scarcity of financial and temporal resources, and uncertainty in the assessment of the probability of climate risks in the short term were identified as slightly more significant challenges than the others for the organisation’s adaptation work. The open answers also emphasised the need for research knowledge concerning the sector and the region, and the internalisation of adaptation activities as a cross-cutting theme in the sector. Based on the open answers, many of the respondents were hoping to receive normative guidance and instructions on the level of central government to support the adaptation work. 31% of the respondents in the sector felt that national organisations have supported the adaptation work in their operating area to some extent. To promote adaptation in the sector, the respondents called for information and training aimed at the sector. It was also proposed that a sectoral co-operation group sharing information and long-term and short-term operational recommendations should be established.

On the adaptation ladder (Figure 3.14), the land use and construction sector ranked on step three, near the border between steps three and four. Of the factors examined in the sum variable, the land use and construction sector is among the pioneering sectors, particularly in cross-sectoral co-operation. With regard to other factors, the results of the sector are fairly equally strong and none of the factors stand out as a clear development target.

### 3.2.6. Transport

Respondents in the transport sector (n=34) felt that, overall, knowledge of the weather and climate risks related to the sector was slightly poorer in their organisation compared to the average of all sectors. Similarly, only 28% of the respondents in the sector reported that their organisation had access to reliable projections of how climate is expected to change in its area of operation. The corresponding average for all of the sectors was around 42%. The respondents considered experts in their networks, and articles and reports, as the most important information sources supporting the adaptation of their organisation. Industry events were also considered a significant source of information. The open answers in the section emphasised that although information is available, the work related to climate change in the sector is strongly focused on mitigation while adaptation is largely neglected. Other priorities, such as the needs of business life, were also considered to prevail over adaptation.

Compared to other sectors, respondents in the transport sector felt that awareness of the need for adaptation was rather weak in their organisation. None of the respondents felt that identifying the needs for adaptation and taking adaptation measures had become an established part of the organisation's ordinary operations. At the sector level, the respondents were more confident about awareness of the need for adaptation, even though the perceived level of awareness was still slightly lower than the average of all sectors. As many as 43% of the respondents in the sector considered that their organisation took adaptation into account in some areas of operation. The open answers in the section emphasised that, thus far, climate work in the sector has understandably been focused on mitigation.

More than half of the respondents in the sector felt that climate risks and vulnerability have been assessed or identified in the sector to some extent. By contrast, in the comparison of all sectors, the largest share of the respondents, as many as 17%, selected the response alternative “cannot say”. One fifth of the respondents had access to an adaptation plan prepared by central government for the sector; a third had no adaptation plan at their disposal.



### Transport: Do you co-operate with the following actors?

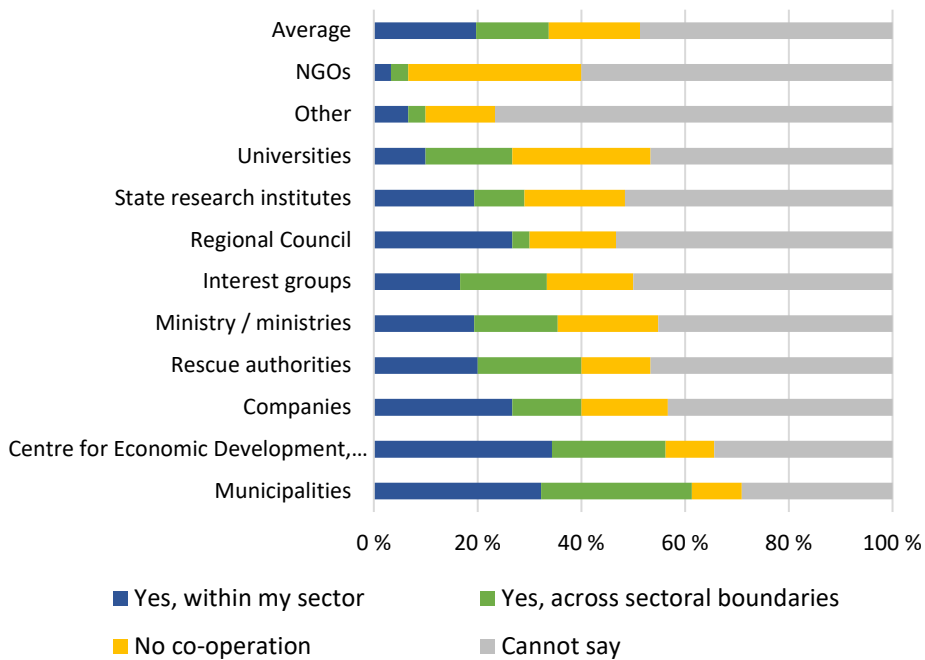


Figure 3.20. Co-operation in transport.

In terms of active co-operation with other actors, the transport sector was largely in line with the average of all sectors. However, the transport sector was distinguished as a sector in which a significant proportion of the respondents could not say whether there was co-operation with different actors. The greatest amount of co-operation in the field was carried out with municipalities - nearly a third of the respondents reported that they co-operated with municipalities within their own sector - while some 30% said that they engaged in cross-sectoral co-operation (Figure 3.20).

The respondents in the sector considered the most significant challenges faced by their organisation to include the scarcity of financial and temporal resources, and the still inadequate awareness of the significance of risks. The open answers revealed that the challenges also included the fact that climate work in the sector was exclusively focused on mitigation, and confusing the concepts of mitigation and adaptation. 10% of respondents felt that national organisations provided significant support in the adaptation work in the respondent's area of operation, while 20% felt that hardly any support had been provided. In addition to strengthening the knowledge base of adaptation, the respondents wished that adaptation work would also be supported by a clear division of responsibilities between the parties responsible for implementing adaptation measures. Reliable cost estimates related to climate risks were also considered important for the planning and implementation of practical adaptation measures.

On the adaptation ladder (Figure 3.14), the transport sector ranks on the third step and represents the average level of the degree of adaptation in all sectors. With regard to the factors examined in the sum variable, the results of the sector are fairly equally strong and no individual factor emerges as a clear development target. However, according to the respondents, the assessment of climate risks and vulnerability in the sector at a somewhat

poorer level compared to the other factors. The transport sector should therefore invest in more research on the topics in the future.

### 3.2.7. Energy

Compared to other sectors, the representatives of energy sector (n=33) felt that their organisation had considerable knowledge of the weather and climate risks related to the sector. More than a quarter of the respondents in the sector estimated that their organisation had very much knowledge and nearly 60% quite a lot of knowledge. Around half of the respondents in the sector felt that their organisation had access to reliable projections of how climate is expected to change in its field of operation. Articles and reports were seen as the most important source of information supporting adaptation in the respondents' organisation, and industry events were also considered a significant source of information. The open responses highlighted that while there was fairly extensive awareness of the direct impacts of climate change in the energy sector, more information of indirect impacts would still be needed in the sector. Some of the respondents also wished to receive more information about the impacts of climate change on Finland's forests.

The respondents from the energy sector felt that awareness of the need for adaptation was higher in their organisation compared to the average in all the sectors. At the sectoral level, awareness of the need for adaptation was also considered to be slightly better than average. 43% of respondents in the sector estimated that the need for adaptation has been acknowledged to some extent in their sector. 40% of the respondents in the sector considered that their organisation took adaptation into account in some areas of operation. In the open answers, several respondents considered the impact and risks of the gradual development of temperatures and precipitation as well as the increasing extreme weather phenomena from the perspectives of the electricity network and bioenergy production. The respondents wished for more reliable and regional information on the topic.

Compared to other sectors, the respondents from the energy sector nonetheless felt that climate risks and the vulnerability of the sector had been fairly extensively assessed. In line with the average rate of all sectors, 63% of the respondents from the energy sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent. Meanwhile, compared to the average of all sectors, the share of respondents who found that climate risks and vulnerability were systematically assessed in their sector was nearly twice as high (27%). 53% of the respondents in the sector did not have access to an adaptation plan for their sector, and 37% did not know whether this was available for them.

### Energy: Do you co-operate with the following actors?

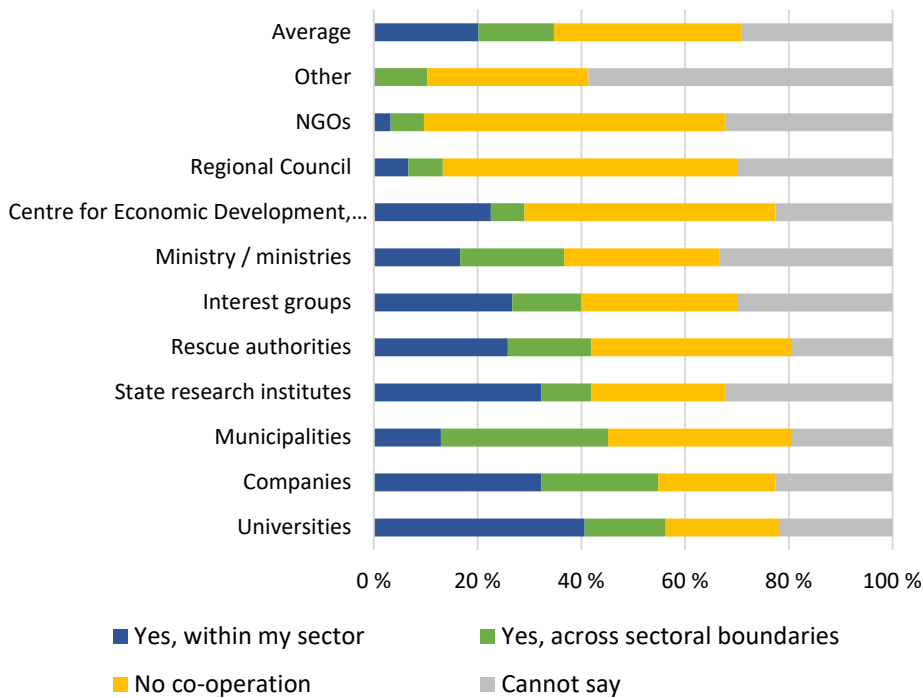


Figure 3.21. Co-operation in energy.

In the energy sector, co-operation with universities was particularly active. Some 40% of respondents in the field reported that they co-operated with universities within their own sector, while 16% of respondents engaged in cross-sectoral co-operation (Figure 3.21).

The uncertainty in long-term estimates of the likelihood of climate risks was clearly the most significant challenge to the organisation’s adaptation work. The challenges identified in the open answers also included the focus of the actors in the sector on short-term climate impacts while ignoring the long-term impacts. The lack of support in adaptation work was also considered a challenge. One quarter of the respondents felt that national organisations have not supported adaptation work in the respondent's area of operation. According to the respondents, adaptation to climate change could be promoted in the sector through means such as providing scenarios of forest growth and forest damage in a changing climate. Adaptation should also be taken into account more strongly in the planning and construction of electricity networks. The sector would also need systematic information available in plain language and support in developing an action plan concerning the sector.

On the adaptation ladder (Figure 3.14), the energy sector ranked on step three, near the border between steps three and four. In the area of the factors examined in the sum variable, the respondents particularly felt that the sector had done quite well in identifying the need for adaptation as well as assessing climate risks and vulnerability. Based on the responses to the survey, the energy sector should focus on launching adaptation measures and developing cross-sectoral co-operation.

### 3.2.8. Water supply

Of the respondents representing the water supply sector (n= 27), around 60% felt that their organisation had quite a lot of information about weather and climate risks related to the sector. Slightly less than half of the respondents reported that their organisation had access to reliable projections of how climate is expected to change in its field of operation. The respondents perceived the experts in their networks as the most important source of information supporting adaptation. Articles and reports as well as training were also identified as significant sources of information. While the open answers described that there was plenty of information on the direct impacts of climate change, the respondents felt that sector-specific information related to indirect impacts was still limited. More information and scenarios would also be needed on the direct and indirect impacts of climate change in the context of technological development and new needs related to cleaning.

As many as 37% of the respondents from the water supply sector felt that there was extensive awareness of adaptation needs in their own organisation, related measures had been identified and their implementation had been initiated. About one fifth of the total respondents had selected this response alternative. Compared to the average of all the sectors, a considerably small share of those working in water services estimated that the need for adaptation had not been taken into account in their own organisation. At the sector level, more than half of the respondents felt that the need for adaptation had been acknowledged to some extent. Regarding the use of a systematic approach in adaptation in the respondents' own organisation, the respondents in the water supply sector evaluated that their organisation's situation was better compared to other sectors. 22% of the respondents felt that adaptation was taken into account in all areas of operation in their organisation and 44% that adaptation was taken into account in some areas of operation. The open answers in this survey section indicate that the water supply sector is actively preparing for various exceptional situations. However, climate change is largely perceived as a future problem and preparedness for its long-term impacts is still in its initial stages.

More than 70% of the respondents in the sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent. It is worth noticing that, unlike in other sectors, none of the respondents in water supply felt that climate risks and the vulnerability of the sector had been hardly addressed. Compared to other sectors, a larger than average share of respondents in water supply had access to an adaptation plan on their sector. However, nearly 40% of respondents did not have an adaptation plan for the sector at their disposal, and a further 40% reported that they did not know if an adaptation plan was available.

### Water supply: Do you co-operate with the following actors?

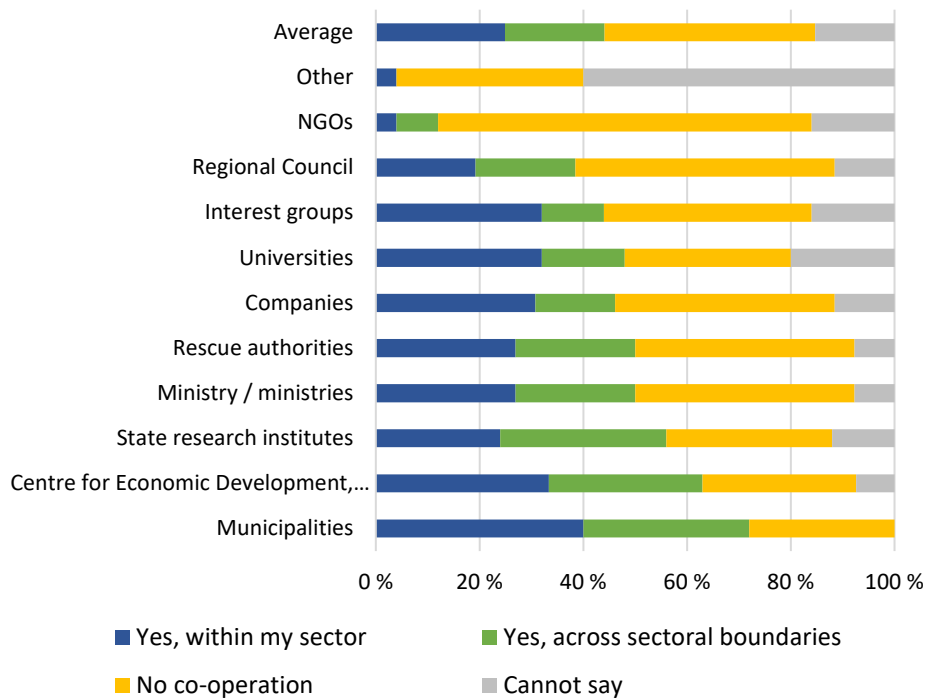


Figure 3.22. Co-operation in water supply.

Municipalities were clearly the largest partner for the respondents in the water supply sector. 40% of the respondents co-operated with municipalities within their sector while 32% engaged in cross-sectoral co-operation (Figure 3.22).

The respondents perceived the scarcity of financial or temporal resources as the clearly most significant challenge for adaptation in their organisation. The lack of awareness of the significance of risks and lack of knowledge of the impacts of climate change were also identified as key challenges. In the open answers to the section, many expressed concerns about the lack of resources at small water plants and water cooperatives and the weak knowledge base related to adaptation. The respondents from the water supply sector felt that the national organisations supported the adaptation work in their operating area rather actively compared to the average of the sectors. According to the respondents, adaptation in the sector could be promoted by introducing adaptation awareness to plants using clear and concrete examples and scenarios. The respondents also wished for more information to support proactive risk management, as they felt that, currently, learning primarily occurred as a consequence of crisis situations. Many respondents also hoped that legislation would require more active and systematic adaptation actions from the sector in the future.

On the adaptation ladder (Figure 3.14), water supply is among the three pioneering sectors ranking on the fourth step. The level of adaptation in the sector is therefore considerably stronger than in the sectors on average. Although the respondents from the water supply sector felt that all the factors examined in the sum variable were fairly equally strong in their sector, cross-sectoral co-operation emerged as somewhat weaker than the other factors. In the future, water supply should therefore focus on strengthening cross-sectoral co-operation.

### 3.2.9. Rescue and preparedness

Respondents in the rescue and preparedness sector (n=33) felt that their organisations had more knowledge about weather and climate risks related to their sector compared to the respondents in most other sectors. More than 80% of the respondents in rescue and preparedness estimated that their organisation had either a lot (around 15%) or quite a lot (around 67%) of knowledge on weather and climate risks in the sector. Around half of the respondents in the sector felt that their organisation had access to reliable projections of how climate is expected to change in its area of operation. The share is some 10 percentage points higher than the average of all sectors. The respondents named experts in their networks as well as articles and reports as the key sources of information related to adaptation. The open answers emphasised that while there is a lot of information, it is often fragmented and contradictory. There was also a need for more practical tools for adaptation activities.

In contrast with the knowledge base considered relatively strong, the respondents felt that awareness of the need for adaptation was poorer in their organisation compared to most other sectors. The respondents also felt that the prevalence of the awareness of the needs for adaptation at the sector level was also slightly poorer than average. The majority of respondents felt that, in their organisation, adaptation was either taken into account in some areas of operation (around 36%) or that adaptation was sporadic and responsive to individual situations (around 36%). The open answers related to adaptation work revealed that the sector has taken direct and short-term impacts into account, but there was still a lot of work to do in taking long-term impacts into consideration.

Similarly as in most other sectors, the majority (around 64%) of the respondents in rescue and preparedness felt that their sector had assessed or identified climate risks and vulnerability to some extent. More than half of the respondents did not have access to an adaptation plan for their sector. In this respect, the rescue and preparedness sector was in line with the average of the sectors. The open answers related to the issue revealed that although no actual adaptation plan had been drawn up, themes related to adaptation had been included in other preparedness plans. The respondents nonetheless considered adaptation planning important.

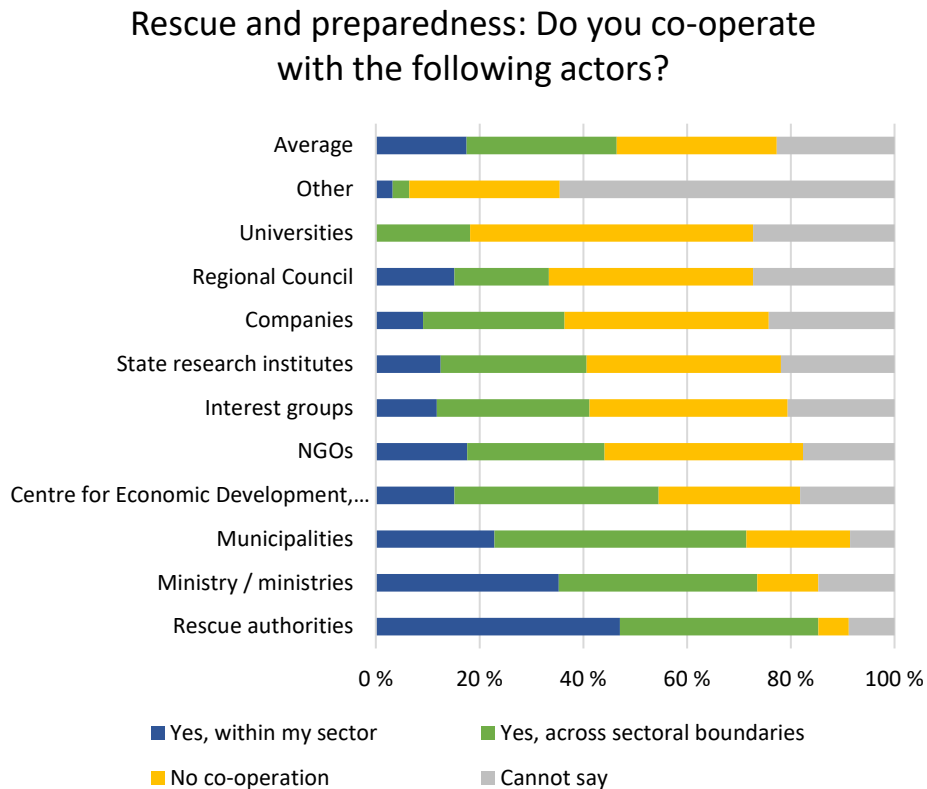


Figure 3.23. Co-operation in rescue and preparedness.

The most common partner for the respondents in the rescue and preparedness sector was the rescue authorities: nearly half of the respondents collaborated with the authorities within their sector and around 38% across sectoral boundaries (Figure 3.23).

The respondents felt that the clearly biggest challenge related to adaptation in their organisation was the fact that the awareness of the significance of risks was still inadequate. Uncertainty about the probability of climate risks in the long term and the scarcity of financial and temporal resources were also considered key challenges. The open answers also identified the lack of regional risk assessments and instructions for preventive action as challenges. The respondents called for a more active role of the Security Committee, the Meeting of the Heads of Preparedness, and the Meeting of Preparedness Secretaries in the adaptation of the sector. The question of the support provided by national organisations in the respondent's area of activity divided the respondents in the rescue and preparedness sector fairly evenly between the different response alternatives. However, of all sectors, the most significant share of respondents in rescue and preparedness felt that national organisations provided significant assistance in their area of operation. According to the respondents, adaptation in the sector could be promoted by building broader and permanent collaboration networks and by prioritising preparedness for different short-term and long-term risk scenarios based on the estimated probability and extent of impacts.

On the adaptation ladder (Figure 3.14), the rescue and preparedness sector ranks on the third step. Of the factors examined in the sum variable, cross-sectoral co-operation is on a particularly solid footing in the rescue and preparedness sector. Based on the respondents' views, launching adaptation activities was a slightly weaker area compared to the other factors, and the sector should therefore invest in this in the future.

### 3.2.10. Finance and insurance

Of the respondents representing finance and insurance (n= 29), slightly over half estimated that their organisation had quite a lot of information about weather and climate risks related to the sector. In percentages, this amount is fairly close to the average of all sectors. However, less than a quarter of the respondents in the sector felt that their organisation had reliable estimates of how the climate is expected to change in its area of operation. By contrast, the corresponding average for all the sectors was over 40%. The respondents perceived articles and reports as the key source of information related to adaptation. The respondents also considered experts in their networks and research institutes as significant sources of information. One of the open answers highlighted the gaps in risk awareness related to climate change in the context of investment.

In the section concerning the organisation's need for adaptation, around one in ten respondents assessed that the identification of adaptation needs and implementation of adaptation measures have become an established part of normal operations. Although this share is twice as high as the average of all sectors in terms of percentages, the majority of respondents in the finance and insurance sector also estimated that their organisation's awareness of the need for adaptation was limited to either a small number of pioneers or to the decision-making level, which was in line with the majority of other sectors. Half of the respondents in the sector considered that their organisation took adaptation into account in some areas of operation. In finance and insurance, awareness of the need for adaptation at the sectoral level was considered to have become slightly more widespread than in the sectors on average. The open responses revealed that bank regulation did not yet take climate change into account, which makes adaptation work more difficult.

Nearly 90% of the respondents in the sector estimated that climate risks and vulnerability in the sector had been assessed or identified to some extent in their sector. None of the respondents perceived the activities as systematic. Although more than half of respondents in the finance and insurance sector did not have access to an adaptation plan prepared for the sector, using an adaptation plan drawn up in the private sector was more common among the respondents compared to other sectors. More than 12% of respondents had an adaptation plan drawn up by the private sector at their disposal.



### Finance and insurance: Do you co-operate with the following actors?

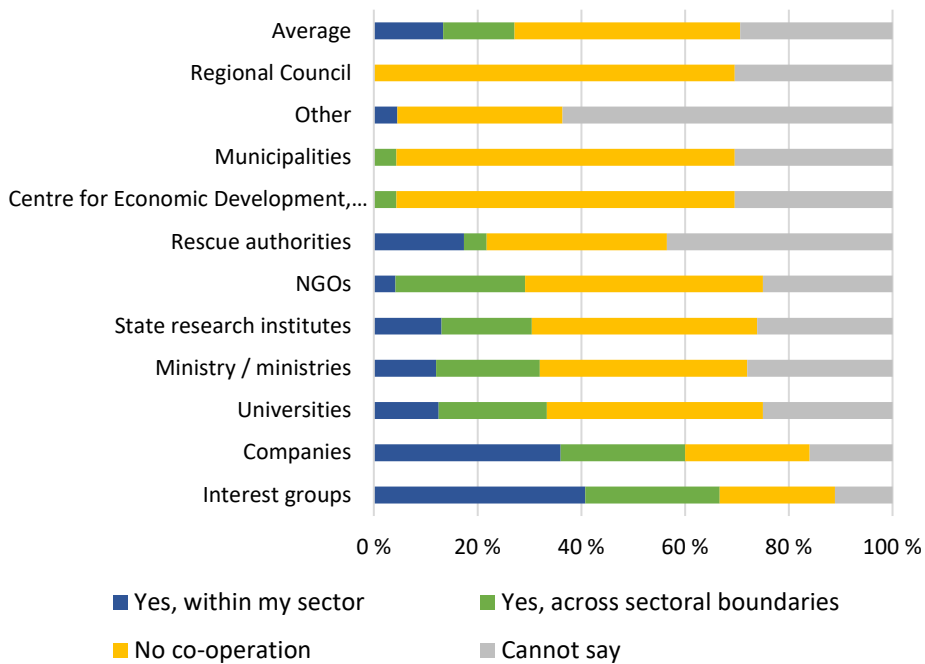


Figure 3.24. Co-operation in finance and insurance.

Compared to other sectors, the co-operation in the finance and insurance sector was more clearly concentrated on certain actors, while co-operation with regional organisations was significantly limited. The most common partner among the respondents in the sector was interest groups; slightly over 40% of the respondents had engaged in co-operation with these within their own sector and slightly over a quarter across sectoral boundaries (Figure 3.24).

The fact that awareness of the significance of risks is still inadequate was perceived as the most significant challenge. The scarcity of financial and temporal resources emerged as another key challenge. The open answers also highlighted the conflict between the short-term perspective guiding the business and the long-term examination required by adaptation. The respondents also felt that information on climate risks was insufficient in their sector. More than 60% of respondents in the finance and insurance sector were unable to say whether national organisations had supported the adaptation work in the sector. On the other hand, none of the respondents mentioned not really receiving any support. The respondents considered the development of the availability and quality of information an important development target in promoting adaptation in their sector. The respondents also emphasised the importance of the insurance sector in the promotion of adaptation through land use planning, as insurance practices can prevent construction in places that are particularly risky in terms of the impacts of climate change.

On the adaptation ladder (Figure 3.14), the finance and insurance sector ranks on the third step. With regard to the factors included in the sum variable, the respondents felt that identifying the need for adaptation was the strongest area in the sector. By contrast, the respondents felt that assessing climate risks and vulnerability and cross-sectoral co-operation were poorer areas. In the future, the financing and insurance sector should invest in active adaptation research and strengthening cross-sectoral co-operation.

### 3.2.11. Social and health

The social and health sector (n=62) clearly emerged as a sector in which the level of knowledge on climate change and vulnerability was perceived as the poorest by the respondents. Nearly 30% of the respondents estimated that their organisation had very little or no knowledge of the weather and climate risks related to the sector. Only one in five respondents felt that their organisation had access to reliable projections of how climate is expected to change in the organisation's field of operation. Articles and reports were identified as the key source of information related to adaptation. The second most important source was the media and research institutes. Within the sector, the respondents in the social sector felt that their organisation's level of knowledge related to climate change and vulnerability was significantly lower compared to those in the health sector. The open answers pointed out that the knowledge base is weak in the social sector and emphasised a need for concrete and clear information specifically aimed at the social and health sector. The respondents from the sector also recognised the two-fold nature of the need for adaptation: in addition to the direct health impacts caused by climate change, climate change has an impact on the functioning of critical services, such as electricity distribution. This, in turn, affects the operating conditions of the social and health care sector. In light of the direct and indirect climate impacts on the sector, more information would be needed to support continuity management.

Based on the responses, awareness of the need to adapt to climate change at both organisational and sectoral levels is also relatively limited in the social and health sector. In connection with their own organisation and the sector as a whole, around a third of the respondents felt that the need for adaptation had only been acknowledged by a small group of pioneers. In assessing whether a systematic approach was used in adaptation in their organisation, nearly 40% of the respondents said that no adaptation activities were carried out. This share is higher than in any other sector. In the open answers in this section, many representatives of the social and health sector described adaptation work as "marginal" or "has only just started".

Around 43% of the respondents felt that the social and health sector had not really addressed climate risks and vulnerability in the sector. This is the highest share in any of the sectors and as much as 15 percentage points higher than in the sector in which selecting this response alternative was second most common. More than 60% of the respondents did not have an adaptation plan for the sector at their disposal, while around one third of the respondents could not say whether this was available to them.

### Social and health: Do you co-operate with the following actors?

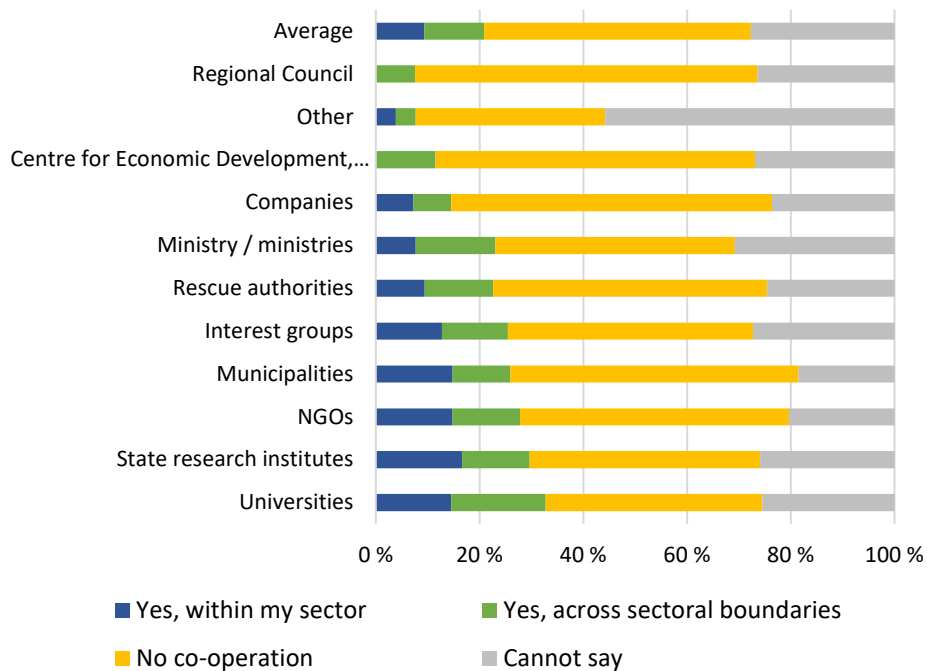


Figure 3.25. Co-operation in social and health sector.

Of all the sectors examined, co-operation related to adaptation with other actors is clearly the least common in the social and health care sector. The most common partner was universities, with which slightly under 15% of the respondents co-operated within their own sector and 18% across sectoral boundaries (Figure 3.25).

The fact that awareness of the significance of risks is still inadequate was perceived as the most significant challenge in the sector. The lack of information about the means of preparedness and adaptation and their functionality as well as the lack of financial and temporal resources were considered the second most significant challenges. The respondents' open answers in the section emphasised the need for clear scenarios aimed at the sector and wider information provision. A further challenge identified by the respondents was the increase in the workload of the sector as a result of health problems that will become more prevalent as a result of climate change. This challenge was particularly perceived from the viewpoint of the coping and well-being at work of staff. Around half of the respondents were unable to say whether national organisations had supported adaptation work in their area of operation. Some 30% of the respondents estimated that they had not really received any support. Many respondents felt that adaptation could be promoted in the sector through clear information primarily aimed at the sector, for example providing information on the expected health impacts of climate change in northern conditions. Communication related to major migration streams and changes in food supply from the perspective of the sector were also considered helpful.

The responses from the sector indicate that the health sector has made a lot more progress in climate change awareness and adaptation practices compared to the social sector, where many are still quite unfamiliar with adaptation.

On the adaptation ladder (Figure 3.14), the social and health sector ranks on the second step. Based on the examined sum variable, the level of adaptation is the lowest of all sectors in the social and health sector. Although cross-sectoral co-operation is also relatively limited in social and health care compared to the other sectors, cross-sectoral co-operation emerged as the factor that is on the strongest footing compared to other factors examined in the sum variable. By contrast, the respondents felt that assessing climate risks and vulnerability was the poorest of the examined factors. As a result, the sector should invest in research related to this topic in the future.

## 4. Results of stakeholder events

### 4.1 Results of individual events

#### 4.1.1. North Karelia, 28 September 2018

The stakeholder event held in Joensuu involved discussing four themes that were considered essential to the North Karelia region and illustrated regional special features: agriculture and forestry (bioeconomy), biodiversity, preparedness and risk management, and water resources and water supply.

The **agriculture and forestry** sector uses clear operating approaches in the event of certain accidents, such as forest damage, snowfall damage or storms. Preparedness planning has also been carried out in the region, especially between forest operators, and also with regard to biodiversity. Not all risks have been identified in the sector, and the participants hoped for more research knowledge to support decision-making.

**Nature and the environment (biodiversity)** were particularly considered to involve co-operation between research, citizen activities and non-governmental activities. While the participants recognised that there was a lot of information about biodiversity, research knowledge was still considered insufficient in relation to preparedness and adaptation. To support adaptation, the participants wished for more regional information to support decision-making and better identification of risks.

The strengths of **preparedness activities and risk management** in the North Karelia region were considered to particularly lie in the co-operation between the authorities and an open operating culture. The connection between the authorities and the third sector were also considered to be good and functional. Comprehensive and good preparedness has been implemented in North Karelia related to environmental health. The environmental health authority of North Karelia has been implementing its own action plan for disruptions, and the municipalities have established fixed connections. By contrast, local companies were considered to have varying degrees of awareness of climate risks. The participants called for the Chamber of Commerce to raise its awareness of issues related to combating climate change and take on a role in disseminating information on the issue. The participants felt that there were opportunities for civic participation ensured by statements and opinions.

Many of the participants felt that while the need to adapt to water resources and water supply had been identified in the organisations they represent, there was no certainty of the extensive awareness at the county level. Both the rescue services and the ELY Centre felt that issues related to climate change adaptation were constantly on the agenda of the organisations. The participants particularly hoped for more regional information on the means of adaptation.

#### Gaps in adaptation - what measures are needed?

At the stakeholder event, development areas identified in the adaptation measures used in North Karelia included increasing knowledge, better and more long-term planning, and increasing co-operation between different actors.

The participants wished to receive research knowledge on adaptation measures that could be easily understood and adapted to regional needs. They hoped that the knowledge would serve not only decision-makers but also the general public in the planning of adaptation measures. They also wished for more training and education related to climate change adaptation in the region.

The participants felt that certain risks could be reduced through the anticipation of risk areas and tailored action plans. They also hoped that obtaining funding for the road transport network and road renovation would be carefully planned. The shortness of the municipal council term was considered problematic, as the planning of adaptation measures was considered to specifically involve work carried out over a long term.

In addition to co-operation with the authorities, the participants considered strengthening the co-operation with business life as important. The participants perceived the stakeholder event as an important introduction for continuing discussion between different actors and identifying key adaptation partners. Municipalities were perceived as important actors in both mitigation and adaptation measures.

#### 4.1.2. Pirkanmaa, 1 October 2018

The stakeholder event organised in Tampere involved discussing three themes recognised to have importance in the Pirkanmaa region: transport, the built environment, and the rescue services and preparedness.

Regarding **transport**, the participants felt that different stakeholders generally acknowledged the need for adaptation measures. They felt that the work related to climate change was primarily related to mitigation measures in road maintenance and transport system processes, but also pointed out that various adaptation plans had also been partly launched. Changing weather conditions were particularly considered to cause concrete challenges to road maintenance. The participants wished that new services and products would be created for rising up to the challenges. For this purpose, the participants called for providing companies with more opportunities for experimentation and more flexibility in public procurements. They also hoped that any co-operation more extensive than that carried out with the authorities would be better coordinated. An overt focus on the rescue services in of risk management was perceived as a shortcoming in the region. The participants particularly considered political decision-making to bear the responsibility for making decisions that take climate change and related adaptation into account.

In the context of the **built environment**, climate awareness was considered to be widespread, but the concept of adaptation was still clearly less known to many. In particular, practical measures were still considered challenging. While the participants recognised that many measures related to weather and climate are already being carried out in the city organisation, these are more likely to be perceived as preparedness than adaptation. Determining which measures are specifically related to climate change adaptation may not always be unambiguous, as a result of which related communications should also be developed. The participants felt that green construction, park areas and urban wetlands should be taken into account as adaptation measures when increasing the density of the urban structure. Increasing local production and nature tourism were also seen as opportunities for developing adaptation in municipalities. In the context of co-operation, the participants considered extensive, cross-sectoral co-operation as important. They also called for a clearer division of responsibilities related to adaptation and risk management, especially in municipalities.

From the perspective of **rescue services and preparedness**, the participants felt that discussions on adaptation remained at a very generic level and were detached from practice. In the context of water, the participants felt that awareness had increased considerably within the past 20 years, and preparedness had also been taken into account in related legislation. However, preparedness had not been taken into account in the practical context of town planning and nature conservation. The identification of concrete adaptation measures was

considered important. In Pirkanmaa, this work is supported by working groups focused on preparedness, which consider extreme weather phenomena and an increase in related weather events from a cross-administrative perspective. In the area of agriculture, potential risks identified by the participants included new diseases such as swine fever and the difficulty in identifying potential risks.

#### Gaps in adaptation - what measures are needed?

At the stakeholder event, the areas of development related to the adaptation measures in Pirkanmaa identified by the participants included increasing knowledge and research, developing the division of responsibilities, and improving monitoring.

The participants felt that the knowledge and research related to adaptation were still lacking in Pirkanmaa. The participants considered charting the gaps in preparedness and the providing citizens with training by third sector actors as potential measures for improving the preparedness of the region. In the context of floods, crown snow-load and other factors causing harm to the infrastructure, the participants also considered it important to have up-to-date research knowledge available when planning the measures.

Clarification of the division of responsibilities between different actors emerged as another clear area of development in the event. While climate change adaptation was considered to affect everyone's tasks, the participants also wished that the responsibility for coordinating adaptation activities would be more clearly assigned to a specific actor or stakeholder. Their suggestions included the establishment of a national agency for the coordination of adaptation as well as a pan-European climate panel bringing together experts working on adaptation. Hazards and losses caused by climate change should also be identified to prepare for related costs. The participants also called for drawing a clearer line between the responsibilities of the private and public sector.

The actors would like to see better measurement and monitoring of the implementation of adaptation. Updating and planning the time spans for different preparedness scenarios would help to better anticipate the timeliness of adaptation measures. At the same time, the participants hoped that the measures would be coordinated and scheduled in a manner providing the Pirkanmaa region with a regional overall picture of the adaptation measures.

#### **4.1.3. Uusimaa, 2 October 2018**

Four sectors identified as central to the Uusimaa region were discussed at the stakeholder event held in Helsinki: the finance and insurance sector, the social and health sector, water supply and water management, and the rescue and preparedness sector.

From the perspective of the **finance and insurance sector**, the participants felt that many risks came together in Uusimaa as the region is located near the sea and has high asset value. Flood risks and heavy rainfall were particularly seen as factors that will cost a lot of money to insurance companies in the future. Another risk identified by the participants was that, for instance, as floods become more commonplace, the insurance sector may withdraw from insuring certain assets in the region. The participants called for better flood maps and water flow modelling to reduce costs. One of the measures that insurance companies have already taken is the addition of purchasing disaster protection. Co-operation between the insurance sector and other societal actors was considered very important. For example, changes in building regulations or forest management practices could help controlling the costs caused by storms or other weather phenomena. Indeed, the participants wished that municipalities

would provide information about their flood risk areas transparently. There is also need for planning to control floods.

In the **social and health sector**, climate change was not yet considered to be emphasised in the preparation for risky situations. However, the participants perceived climate change to also play a key role in the social and health sector, as research related to climate change adaptation has emphasised physical health. The participants called for more research on climate change and social wellbeing, and felt that awareness of service providers on the risks of climate change was still inadequate, particularly in the private and third sector. The participants felt that identifying risk groups was also inadequate, and hoped for more domestic and measurable information on the impact of climate risks on mental health. In Helsinki, the social and health sector is becoming more active in this context, and an internal working group is about to be established in the sector. However, the participants felt that there should also be more co-operation between different sectors. They called for including the expertise of professionals in the social sector in determining climate risks and assessing the social impacts at the national level. They also felt that the flow of information between different regions and at the national level was inadequate.

The **water supply** sector was considered to have strong awareness of the needs for adaptation. However, the participants believed that there was still room for improvement in the implementation and monitoring of practical measures. Some organisations felt that while risks had been acknowledged and measures taken, the measures had not necessarily been linked to climate change adaptation. For example, improving security of supply was considered one of these measures. The participants considered that the research and knowledge base were at a good level, but found that it was still difficult to predict which structural changes climate change would bring about. Further development of co-operation between different actors was considered important. In particular, division of responsibilities between the sectors was considered occasionally unclear.

In the **rescue and preparedness** sector, adaptation measures related to the electricity supply network were found to have improved considerably over the last decade. Among other things, the participants mentioned the Krivat system, which facilitates better charting of the disruptions in the electricity network in Uusimaa. The sector had also collaborated with the Finnish Meteorological Institute, which had helped forming a risk scenario. However, the discussion revealed uncertainty about how the risk scenarios should affect the allocation of resources, i.e. scaling the performance and service capacity of rescue services.

The participants noted that the city of Helsinki already had some necessary mechanisms for preparing for flood risks at its disposal. While some overhead electrical lines had already been replaced with underground systems, the participants felt that this should be done in greater amounts. There was also a lot of information available about risks, but this was considered somewhat generic. The participants particularly wished for an improvement to the communications related to forest fires and slippery conditions as well as the preparation for the challenges related to heat in the context of the care of older people.

#### Gaps in adaptation - what measures are needed?

At the stakeholder event, the areas of development related to the adaptation measures in Uusimaa identified by the participants included compiling and sharing information, raising awareness and determining the obligations related to preparedness.

There was a lot of discussion at the event about the availability and utilisation of information. It emerged in the discussion that many participants would like easily accessible information



on the best practices already available, which could also be shared across administrative boundaries, for example through working groups. In addition to experiential knowledge, the participants wished that different sources of information would also be better utilised. For example, they felt that the existing statistical data on insurances or the causes of accidents and data produced in the social and health sector was useful, especially when combined with spatial data. The participants also expressed a need for more knowledge and research on the financial costs of the timing of adaptation measures and the vulnerabilities of different groups of people.

In addition to collecting information, the participants called for more effective ways of introducing the knowledge to practice and using it as a basis for decision-making through national politics and committee processes. The participants also felt that adaptation was still perceived too narrowly and focused too much on rescue operations. The participants perceived improving citizens' awareness as one way of increasing the effectiveness of the measures.

Green construction and the development of stormwater drainage were seen as important ways of improving stormwater management. However, the legislation related to water resources management was considered to be in a partial conflict with the Land Use and Building Act. The participants also wished that services would continue running smoothly under exceptional circumstances. In the context of outsourced services, a question of possible preparedness obligations defined in procurement contracts emerged in the discussion.

#### 4.1.4. Lapland, 10 October 2018

Three themes identified as central to the region were discussed at the stakeholder event held in Rovaniemi: tourism, agriculture, forestry, fishery, the bioeconomy, and administration.

From a **tourism sector** perspective, responsibility and sustainability were seen as important future priorities for the development of the sector. Examples of this include the responsible tourism network and Visit Finland's project on sustainable tourism in the Arctic. Supporting modes of travel replacing air transport was considered as part of this trend. The participants felt that alternative modes of business travel could be supported by updating the travel rules and operating principles, and introducing emission compensations.

The Lappish way of life close to the nature was seen as a tourism asset and something to hold onto in the future. While the importance of tourism has been recognised in the climate strategy for Lapland, adaptation measures were not considered to be up to date. In the area of tourism, consideration of different products and the identification of new opportunities were considered key aspects. Overall, the participants considered the awareness of adaptation to be at a good level, and believed that different organisations and large tourism companies were committed to climate work.

At the stakeholder event, adaptation issues related to **agriculture, forestry, fishery and the bioeconomy** were discussed in a joint group at the group work stage. The participants generally felt that the state of adaptation varied considerably between the sectors. **Reindeer husbandry** is one of the key issues for Lapland. The vulnerability of the sector has been assessed by the Natural Resources Institute Finland in its report on the state of adaptation in 2017. By contrast, the **fishery sector** was not identified to engage in any sort of preparation, and no adaptation plan had been prepared. This was partly attributed to the fact that fish farming and fishing are heavily dependent on many different factors that affect the condition of water bodies. In **forestry**, the Finnish Forest Centre has a preparedness plan for forest damage, which enables better preparedness for storms and insect damage. The plan also

includes a clear division of responsibilities. On the other hand, the participants hoped that more attention would be paid to water management. The industry has prepared for changes in harvesting conditions by procuring suitable equipment. As power outages increase, Metsähallitus is prepared to remove trees that may pose a risk as a precautionary measure based on the mapping of risk areas. In **agriculture**, the participants felt that the impacts of climate change were well known, especially through participation in the SILMU programme on adaptation. However, they assessed that there was variation between farms in the utilisation of information. Farmers are moving towards an increasingly entrepreneurial approach, which also includes assessing the risks of their own farm in the long term. The participants expressed concern related to the challenges posed by the maintenance of private roads and the vulnerability of electricity and telecommunications connections.

The **rescue and preparedness sector** and other authorities present at the event collaborated in a joint working group for **administration**. From the perspective of co-operation between the authorities, it was noted that co-operation between actors is one of Lapland's strengths with long traditions. Partnerships increase everyone's resources in crisis situations. Indeed, the activities of the authorities were recognised as one of Finland's strength. While the culture of preparedness in the rescue sector was found to have prevailed for a long time, the participants were worried that voluntary fire brigade activities would decline in the future. Increasing electricity dependency was seen as a particular challenge for municipalities. Tourist seasons pose an additional challenge, as the demand for electricity grows during these periods.

Climate change was considered to have made the risks concrete, and one-off risks were considered greater than before. Global migration and displacement trends were also identified as a key issue for Lapland. The topic of preparedness for long-term crises raised a question of resources and the importance of preventive action. The participants considered a change in the management and operating culture as important for making activities increasingly network-like and flexible. They perceived village associations as a good example of network-like and agile activities that cover the entire region and safeguard local activities.

#### Gaps in adaptation - what measures are needed?

Areas for development identified in Lapland's adaptation measures at the stakeholder event included the development of co-operation between actors, and the implementation and anticipation of adaptation measures.

The participants in Lapland wished for more co-operation platforms and information sharing between different sectors. They hoped that representatives of sectors such as the natural products sector, tourism sector, the Sámi Parliament and the Reindeer Herders' Association would be involved in the regional discussion on adaptation. The co-operation was considered to increase trust between actors and therefore increase the resilience to change in the region. The participants hoped that economic and political decision-makers would also engage in more interaction with residents. Charting existing resources was also considered important to enable different actors to identify which resources the other agents use and which are available for utilisation.

The discussion also highlighted concrete adaptation measures and increasing anticipation. For example, limiting travel was seen as a potential consequence of new diseases. Other measures mentioned in the discussions included the construction of buildings self-sufficient in the production of electricity and food, financing of a road network improvement, increasing local energy production and increasing water protection and storm water management. The respondents also hoped for better preparedness for forest fires and problems in

telecommunications problems through means such as increasing competence related to controlled burning.

#### 4.1.5. Ostrobothnia, 30 October 2018

Two themes identified as central to the region were discussed at the stakeholder event organised in Vaasa: energy production and industry, and rescue and preparedness.

In the area of **energy production and industry**, the participants identified both awareness and scepticism towards climate change adaptation, which was also considered as one of the reasons for why related measures were still inadequate. For instance, freezing rains were seen as a future risk to the maintenance of electricity stations and electricity transmission lines. Increasing underground cabling was identified as one of the key solutions to the problem. The Finnish Forest Centre's contingency plan for forest damage and co-operation with electricity companies and forest contractors were considered important. The Finnish Forest Centre also grants aid for the maintenance of forest roads and has surveyed risky trees in the vicinity of electricity lines. One of the views that emerged in the discussion was that many issues related to adaptation are easier to resolve at the national level rather than at the regional level. While the participants considered Ostrobothnia as a pioneer thanks to the several cross-administrative committees and working groups in the region, they nonetheless found it important to increase regional co-operation.

From a **rescue and preparedness sector** perspective, the participants noted that adaptation had not yet become established as a common concept the sector. However, words such as preparedness and preparation were better recognised. The participants were used to linking adaptation to savings and were not used to using the term in connection with climate change. The participants were also curious about what exactly we are adapting to. The long-term impacts of climate change were considered particularly challenging, as the participants found it difficult to identify the corresponding adaptation measures and their effects on concrete field work. At the practical level, preparedness was considered easier to perceive in acute situations than in connection with long-term phenomena. The information related to the impacts of climate change, which is at time even conflicting, also emerged as a factor hindering adaptation. The participants felt that the joint planning and preparation of rescue departments and their collaboration with the authorities were working well. However, contingency plans are often drawn up annually and issues are progressed using a seasonal approach. The policy book and the Government Programme steering the activities were also considered as a fairly short-sighted starting point for adaptation.

#### Gaps in adaptation - what measures are needed?

At the stakeholder event, the development areas of adaptation measures identified in Ostrobothnia included increasing knowledge and competence, improving co-operation and implementing concrete measures.

During the event, it emerged that the regional actors felt that they needed more information about climate change and related adaptation. Concrete ways to increase knowledge in various sectors could include general seminars and training on the effects of climate change and their time perspectives. The participants also proposed introducing special adaptation coaching for municipalities, which would improve municipalities' readiness for adaptation as a result of increased competence. In turn, those representing the business sector found it important to increase communications, for example through websites and campaigns. The participants also

felt that the Association of Finnish Municipalities could provide information related to adaptation.

In addition to increasing knowledge, concrete actions were considered important for adaptation activities. These were considered to include action plans, scenario work, applying for EU funding for projects related to adaptation, and offering methods for risk assessment carried out by companies. Funding related to climate action was also discussed. The participants wished to receive support and resources, particularly for long-term activities. They hoped that tenders and contracts would be made to include direct entries concerning climate issues.

The development of co-operation between different actors also emerged as a central regional area of development. In addition to the development of co-operation relationships between the private, public and third sectors, the participants also considered co-operation beyond national borders important. The third sector was identified to play a very important role and the participants wished that it would be involved in adaptation planning. They also came up with idea on an open forum where different actors could share their successes and good practices.

## 4.2 General results

Based on the stakeholder events, there appears to be a lot of regional and sector-specific variation in the current state of climate change adaptation in different sectors. The regions also have their own special strengths.

The need for **increasing and collecting knowledge** related to climate change adaptation as a cross-sectoral activity emerged at all the stakeholder events in the context of gaps related to adaptation. At all the events, the participants felt that information played a key role in the planning and implementation of adaptation measures. The participants called for not only an increase in research knowledge but also collecting existing information for utilisation by the actors. In the context of many adaptation measures, the participants felt that the concrete implementation of the measures requires more information on both climate change as well as adaptation and concrete measures.

In addition to increasing knowledge and improving its availability, the events highlighted the need for **raising awareness** in the sectors as well as among citizens and decision-makers. Not all sectors were familiar with the concept of adaptation, and the link between preparedness measures and climate change was not always recognised. The participants wished for more training related to adaptation aimed at the sectors, which could improve competence related to adaptation.

The participants at the events also hoped for a clearer division of responsibilities and labour between the national and regional authorities concerning who is responsible for the activities. They noted that by making everyone responsible, no one will actually take the responsibility for the activities. The participants called for **more flexible and clear structures** and co-operation between different actors for supporting and funding concrete adaptation measures. The inflexibility of the administration and the slowness of changes were seen as a problem in the face of unpredictable development trends. For example, the duration of council terms were considered too short for planning long-term adaptation measures. The participants also wished for concrete tools and measures to curb the costs of climate change.

At all the events, the participants recognised that climate change adaptation is work that is clearly carried out across sectoral boundaries and requires **cross-administrative and cross-sectoral co-operation**. The participants pointed out that the workshops organised in the

regions were the first to bring together different actors to discuss climate change adaptation, and perceived the workshops as important discussion forums. They hoped that similar work would continue in the future. The participants wished that the public, private and third sectors alike would be strongly committed to the adaptation measures. They also perceived the collection and sharing of existing good practices as an important way of developing adaptation.

## 5. Summary of the results and recommendations

### 5.1 Current state: level of preparedness varies, support required

The results of the survey and workshops describe the level of knowledge related to adaptation to climate change in Finland in general as well as in different regions and particularly sectors. They also revealed several needs related to knowledge and support.

**Climate risks are reasonably well known.** With the exception of one sector, a clear majority of the respondents in all sectors estimated that climate risks and vulnerability had been identified, at least to some extent. With the exception two sectors, the majority of respondents in all sectors estimated that their organisation had at least quite a lot of knowledge of weather and climate risks related to the sector. On the other hand, the respondents' views varied considerably on whether there are reliable estimates of climate change in their own sector: in five sectors, around half of the respondents answered “yes”, whereas in three, only one fifth chose this response alternative. The respondents' familiarity with the National Climate Change Adaptation Plan was still relatively poor.

**The need for adaptation is recognised fairly widely.** In nearly all sectors, the majority of respondents estimated that the awareness of the need for adaptation extends beyond a small group of pioneers in their organisation. In only a few sectors, a significant minority estimated that this need was not acknowledged at all. Interestingly, the respondents mainly estimated that the need for adaptation was better identified in their sector than in their organisation.

**Adaptation work remains limited.** In all sectors, only a small minority of the respondents considered that adaptation was taken into account in all areas in their own organisation. Worryingly, in two of the sectors, around one third of the respondents estimated that no adaptation work was carried out at all. In one sector, more than half of the respondents reported that they had participated in at least some adaptation work, whereas in three, the share was clearly less than one fifth.

**There are no sectoral adaptation plans.** Even in the sector with most plans, just over a fifth of the respondents reported that their sector had an adaptation plan. A considerably higher share of the respondents in all the sectors considered that no plan had been drawn up, and in most sectors around two fifths were unable to respond to the question.

**Major differences between the sectors.** No sector has yet reached the highest level (Figure 5.1) on a scale that assesses the identification of climate risks and adaptation needs, adaptation measures and co-operation. The sectors reaching the highest – fourth step – of the ladder are nature and the environment, agriculture and forestry, and water supply. Social and health services and recreation and tourism rank lowest on the second step.

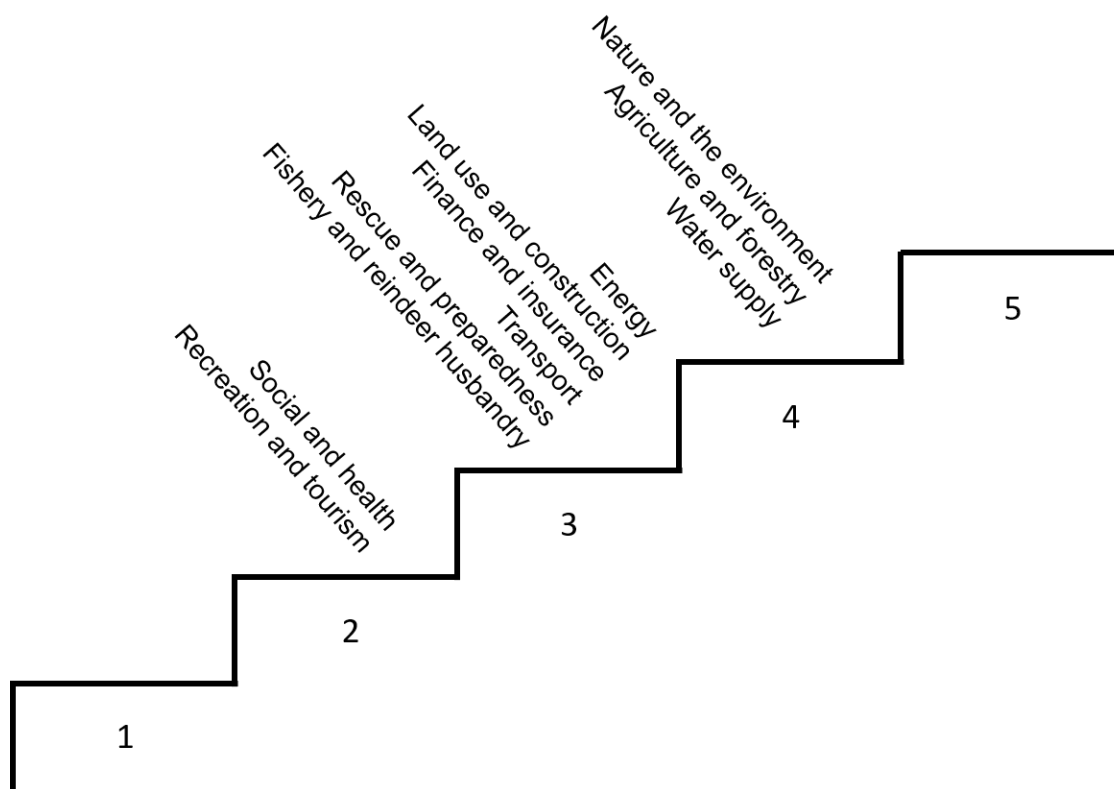


Figure 5.1. The ranking of the sectors on the adaptation ladder.

**Assessment and co-operation are the most important tools.** The respondents considered that, in their organisation, adaptation is promoted most by assessing risks and vulnerability, developing co-operation within and between sectors, and by planning a climate resilient society. Staff training seems to play a smaller role. The most important sources of information identified by the respondents included experts in their own networks, articles and reports, and research institutes.

**Co-operation is still fairly rare.** Around two out of five respondents reported that they engaged in co-operation within their own or other sectors. In many sectors, a higher share of the respondents estimated that there was no co-operation. In most sectors, the majority of respondents who were able to assess the issue felt that their area of operation had received support from national organisations. However, a large number of respondents in many sectors was unable to say whether support had been received.

**Shortage of resources and uncertainty in the estimates.** The biggest challenges related to adaptation work identified by the respondents included the scarcity of resources, shortcomings in the awareness of the significance of risks, and uncertainties in the assessment of the probability of climate risks. Adaptation work may depend too much on the initiative of individual stakeholders and be neglected without separate reminders. Conflicting policies, lack of guidance and short-sightedness of decision-making can slow down work.

**Need for more knowledge.** The lack of knowledge of the impacts of climate change and the means of adaptation were also highlighted. While there is better knowledge of the direct impacts and risks of climate, their impacts (the impacts of impacts or repercussions) and their significance for activities are not known as well. A particular need for receiving information concerning individual regions and sectors emerged from the results.

**Information must be provided in the right format and reach the right actors.** A lack of information does not always appear to be the problem as such; instead, the problem lies in shortcomings in the availability of the right kind of information in a useful format. Information can be fragmented or conflicting, and there may be a lack of a structured overall picture. The information may not reach the actors or particularly citizens, and the distance from knowledge to action remains long.

**Platforms for dialogue needed.** Dialogue and collaboration between and within sectors as well as at the regional level are considered inadequate. There are no permanent and organised platforms for discussion related to adaptation work. On the other hand, some respondents felt that adaptation may be an excessively broad topic for general dialogue, and would rather require sectoral plans and structures.

**There is a need for adjusted information and funding.** Adaptation work would be best promoted by targeting climate information to user needs, developing the know-how in the organisations and introducing adaptation guides aimed at individual sectors. The development and funding of risk management would also be useful.

**Adjustment needs to be further clarified.** Based on the responses, it seems that there is still a need to further clarify the topic of adaptation. The impacts of climate change and the resulting need for adaptation may be understood narrowly, while ignoring indirect impacts that occur through, for example, the international economy, value chains or migration. Some still struggle with perceiving the differences between adaptation and mitigation, interaction and synergies.

## 5.2 Recommendations: more information and tools for regions and sectors

Based on the results, a set of measures for promoting adaptation can be identified. They can be grouped into the following five areas.

First, climate impacts and risks and related adaptation should be **disaggregated from the perspective of different sectors and regions**. Instead of national overall estimates and averages, information is needed from the perspective of each region and sector. When making a clear distinction is not logical or even possible, regional and sector-specific differences should be at least qualitatively assessed. This should be taken into account in contexts such as when commissioning research and review projects.

Second, when producing and sharing information, particular attention should be paid to **sectors and issues in which the current state is recognised to be particularly weak**. A separate project could be used in an aim to identify the most essential information needs in sectors that have fallen behind, and to produce new information for them if necessary. In addition to the direct impacts and risks of climate change, research should emphasise less well-known indirect impacts and repercussions.

Third, existing **information should be packaged and communicated to actors in a useable format**. In addition to simply describing impacts and risks, more information must be provided about their significance in different areas and sectors. The information must be easily available, compiled in one place (for example, [www.ilmasto-opas.fi](http://www.ilmasto-opas.fi)). The actors need practical examples, best practices, evaluation methods, tips and recommendations. The costs of the measures are also important for practical activities. In addition, understandable and easily approachable information on adaptation must also be provided directly to citizens.

Fourth, **national adaptation work should be complemented with regional and sectoral tools**. These could include regional and sectoral adaptation plans or adaptation panels. The



regions and sectors must have the ownership of the work, and operating approaches may vary according to their needs.

Fifth, **dialogue between sectors and regions should be promoted.** More permanent regional and sectoral structures would facilitate making arrangements for dialogue, for example in annual national adaptation forums. At the same time, the division of responsibilities in adaptation work should be clarified at the national and regional level.

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## APPENDICES

### Annex I Lists of participants in the stakeholder workshops

#### Stakeholder workshop in Joensuu, 28 September 2018

##### Participants:

1. Niina Mustonen, Chamber of Commerce
2. Marja Pulkkinen, ProAgria
3. Ville Leinonen, North Karelia Rescue Services
4. Pauliina Sorsa, North Karelia ELY Centre
5. Arto Kammonen, Metsähallitus Forestry Ltd
6. Jouni Korhonen, Pohjois-Karjalan Ympäristöterveys/health monitoring
7. Mikko Korhonen, Finnish Forest Centre
8. Janni Kunttu, European Forest Institute
9. Michael der Herder, European Forest Institute
10. Tommi Kauhanen, Fortum Power and Heat Oy
11. Janne Kärkkäinen, North Karelia ELY Centre
12. Jukka Nykänen, Regional Council of North Karelia
13. Paula Mononen, North Karelia ELY Centre
14. Anna Lehtinen, North Karelia District of the Finnish Association for Nature Conservation
15. Emmi Mäki-Petäjä, Joensuun Vesi
16. Saara Lilja-Rothsten, Ministry of Agriculture and Forestry
17. Kirsi Mäkinen, Finnish Environment Institute
18. Anna Lipsanen, Finnish Environment Institute
19. Liisa Kallio, Akordi
20. Jonna Kangasoja, Akordi

#### Stakeholder workshop in Tampere, 1 October 2018

##### Participants:

1. Ritva Asula-Myllynen, Tampere City Region
2. Ari Saarinen, Pirkanmaa Rescue Department
3. Eeva Palmolahti, City of Tampere
4. Kirsi Mäkinen, Finnish Environment Institute (SYKE)
5. Anniina Autero, Tampere Region Safety and Security Cluster
6. Tommi Mattila, Finnish Red Cross
7. Vesa Vanninen, Municipality of Pirkkala, environmental protection
8. Suvi Vainio, Pirkanmaa ELY Centre
9. Anne Värilä, Pirkanmaa ELY Centre
10. Tarja Viteli, City of Orivesi
11. Jukka Kohonen, Pirkanmaa ELY Centre
12. Anna Lipsanen, Finnish Environment Institute (SYKE)
13. Diar Isid, Pirkanmaa ELY Centre
14. Teemu Sorsa, WISE-project / Tampere University / University of Eastern Finland
15. Jonna Kangasoja, Akordi
16. Liisa Kallio, Akordi
17. Saara Lilja-Rothsten, Ministry of Agriculture and Forestry

## **Stakeholder workshop in Helsinki, 2 October 2018**

### Participants:

1. Susanna Kankaanpää, City of Helsinki
2. Timo Uola, Helen Sähköverkko Oy
3. Paula Nurmi, City of Helsinki, Urban Environment Division
4. Pasi Valkama, Water Protection Association of the River Vantaa and Helsinki Region
5. Andreas Schneider, Helsinki City Rescue Department
6. Sonja-Maria Ignatius, City of Helsinki
7. Aninka Urho, Helsinki Region Environmental Services Authority, Water Supply
8. Maaria Parry, Helsinki Region Environmental Services, Helsinki Region Environmental Services Authority:
9. Saara Olsen, City of Espoo, Environment Department
10. Jon Aalto, OP Insurance
11. Harriet Rabb, Perhehoitokumppanit Suomessa Oy
12. Petri Mero, Finance Finland
13. Päivi Meriläinen, Finnish Institute for Health and Welfare
14. Pekka Itkonen, Helsinki City Rescue Department
15. Antti Lallukka, Länsi-Uusimaa Rescue Department
16. Heikki Takainen, City of Helsinki
17. Annukka Kokkonen, City of Helsinki, social and health sector
18. Elina Kuusela, LähiTapiola
19. Kati Berninger, Tyrsky Consulting
20. Saara Lilja-Rothsten, Ministry of Agriculture and Forestry
21. Kirsi Mäkinen, Finnish Environment Institute (SYKE)
22. Anna Lipsanen, Finnish Environment Institute
23. Liisa Kallio, Akordi
24. Jonna Kangasoja, Akordi

## **Stakeholder workshop in Rovaniemi, 10 October 2018**

### Participants:

1. Heino Vasara, ELY Centre for Lapland
2. Markku Vierelä, wilderness services
3. Kaisa Kinnunen, Regional Council of Lapland
4. Elsi Malkki, Lapland Chamber of Commerce
5. Soile Veijola, University of Lapland
6. Ilona Mettiäinen, University of Lapland
7. Anna Bagge, Finnish Association for Nature Conservation, Lapland District
8. Kirsi-Marja Korhonen, Metsähallitus Forestry Ltd
9. Antti Hannukkala, Natural Resources Institute
10. Eero Liekonen, Lapin kalatalouskeskus
11. Ulla Huusko, Finnish Forest Centre Rovaniemi
12. Heikki Juntti, Finnish Meteorological Institute
13. Viljo Pesonen, Sodankylä
14. Pirkko Pirinen, AVI Lapland
15. Seppo Lehto, AVI Lapland
16. Sanna Leiviskä, Lapland Rescue Department
17. Jukka Lokka, Municipality of Sodankylä
18. Saara Lilja-Rothsten, Ministry of Agriculture and Forestry
19. Anna Lipsanen, Finnish Environment Institute

20. Jonna Kangasoja, Akordi
21. Emma Luoma, Akordi
22. Liisa Kallio, Akordi

### **Stakeholder workshop in Vaasa, 31 October 2018**

#### List of participants:

1. Reijo Malkamäki, Regional State Administrative Agency
2. Taru Ruutiainen, Regional State Administrative Agency
3. Kristian Mäki-Jussila, Kvarken Ports Vaasa
4. Seppo Ryttilä, Eltel Networks Oy
5. Keijo Kangastie, South Ostrobothnia Rescue Department
6. Johan Wasberg, Merinova Technology Centre
7. Jari Neulaniemi, Ostrobothnia Police Department
8. Ari Perämäki, South Ostrobothnia ELY Centre
9. Martin Sjölin, Finnish Forest Centre
10. Rolf Sund, Red Cross
11. Kirsi Mäkinen, Finnish Environment Institute
12. Anna Lipsanen, Finnish Environment Institute
13. Emma Luoma, Akordi
14. Liisa Kallio, Akordi

## Appendix II Survey

### FINLAND'S NATIONAL CLIMATE CHANGE ADAPTATION PLAN – A MID-TERM EVALUATION

Third-party examination of stakeholder views: survey

This survey is part of the mid-term evaluation of Finland's National Climate Change Adaptation Plan implemented by the Ministry of Agriculture and Forestry. The external survey is implemented by Tyrsky Consulting and Akordi.

This survey was sent to a targeted group of recipients, which makes your response highly important. We ask you to fill out the survey from the perspective of the organisation or enterprise you primarily work for.

Adaptation refers to the capacity of both natural systems and those created by people to function as the climate changes, and to people's preparedness to future climate changes and their consequences. Adaptation aims at preventing or alleviating the negative impacts caused by variation and changes in climate, and benefiting from the positive effects. Adaptation may involve reacting to, or anticipating, different situations.

The objective of Finland's National Climate Change Adaptation Plan is to ensure that Finland as a society will have the capacity to manage the risks related to climate change and to adapt to the changes in climate. We aim to use the survey to chart the progress of climate change adaptation in various sectors and to find out which development needs and wishes different stakeholders have concerning the central government. We ask you to consider the impacts of climate change from a broad perspective encompassing effects from the immediate (e.g. droughts and rising sea levels) to indirect (e.g. migration and economic transformation) impacts.

We ask you to provide your contact information so that we will be able to ask for further details about the thoughts you have expressed in your own words concerning issues such as how you would like to be supported in adaptation work. If you like, you can also fill out the survey without submitting your contact information. In addition to the mid-term evaluation, the results of the survey will also be used for research purposes. The results will be analysed and reported anonymously and your contact information or details about your responses will not be disclosed to third parties.

Filling out this survey takes around 10 to 15 minutes.

Thank you for your time!

Inquiries:

National climate change adaptation

Saara Lilja-Rothsten, Ministerial Adviser, Ministry of Agriculture and Forestry  
([saara.lilja-rothsten@mmm.fi](mailto:saara.lilja-rothsten@mmm.fi), tel. +358 29 516 2060)

Mid-term evaluation of National Climate Change Adaptation Plan and related survey:

Kirsi Mäkinen, Researcher, Finnish Environment Institute  
([kirsi.makinen@ymparisto.fi](mailto:kirsi.makinen@ymparisto.fi), tel. +358 29 525 1445)

Technical issues related to the survey:

Kati Berninger, Research Director, Tyrsky Consulting  
([kati.berninger@tyrskyconsulting.fi](mailto:kati.berninger@tyrskyconsulting.fi), tel. +358 40 879 8713)

## BACKGROUND INFORMATION (part 1/7)

Please note that the answers you provide on each survey page will only be saved once you click on the “next” or “finished” button. If you return to the previous page before saving the current part, your answers will be lost and you will have to fill out the section again.

1. Name of respondent
2. Organisation
3. Email address
4. The organisation I work in (Please select one alternative only. If you represent a multidisciplinary organization, you may fill out the questions concerning your organization based on the kind-of-activity unit you work for within the organization)
  - Non-governmental organization
  - Interest group
  - Research institute or university
  - Municipality
  - ELY Centre
  - Regional Council
  - Other public actor
  - Company
  - Other professional organisation or foundation
  - Regional State Administrative Agency
  - Other – please specify:
5. Region where I primarily operate (select one only)

Lapland  
North Ostrobothnia  
Kainuu  
North Savo  
North Karelia  
Central Ostrobothnia  
Ostrobothnia  
Central Finland  
South Karelia  
South Ostrobothnia  
Pirkanmaa  
Satakunta  
South Savo  
Tavastia Proper  
Päijänne Tavastia  
Kymenlaakso  
Southwest Finland  
Uusimaa  
Whole country

6. I primarily work in the following sector (select the most suitable alternative. If your job description covers several different fields, select “other – please specify” and provide more information in writing)

- Energy
- Water supply
- Transport
- Land use and construction
- Finance and insurance
- Agriculture and forestry
- Fishery and reindeer husbandry
- Nature and the environment
- Recreation and tourism
- Health
- Rescue and preparedness
- Other – please specify:

7. I have been involved in adaptation work

- Yes, actively
- Yes, to some extent
- Only a little
- Not at all

8. I know Finland’s National Climate Change Adaptation Plan

- Well
- Reasonably well
- Only slightly
- Not at all

9. How extensively do you feel the plan is generally known in your sector?

- Extensively
- Quite extensively
- Somewhat
- Not at all
- Cannot say

## KNOWLEDGE ABOUT CLIMATE CHANGE AND VULNERABILITY (part 2/7)

10. How much knowledge does your organisation have of the weather and climate risks related to your sector? (Weather and climate risks refer to the direct and indirect effects caused to your operations by weather and climate change. The risks include both exposure to the phenomenon and the sensitivity and vulnerability of the operations. For instance, an indirect effect may be the changing of economic structures.)

- A great deal
- Quite a lot
- Not much
- Very little
- None
- Cannot say

11. Does your organisation have access to reliable projections of how climate is expected to change in your area of operation?

- Yes
- No
- Cannot say

12. What are the most important information sources supporting adaptation in your organisation (choose at most three)?

- Training
- Advice
- Experts in your network
- Guides
- Media
- Articles and reports
- Research institutes
- Consulting firms
- Industry events
- Events in other industries
- Other, please specify:

13. Your comments on the knowledge base of climate change and vulnerability

## NEED FOR CLIMATE CHANGE ADAPTATION AND WORK CARRIED OUT IN THE ORGANISATION (part 3/7)

14. Awareness of the need for adaptation in my organisation

- There is no awareness of the need for adaptation
- There is awareness of the need for adaptation among a small group of pioneers



- There is awareness of the need for adaptation at the level of decision-making, some actions have been identified
- There is extensive awareness of the needs for adaptation, actions have been identified and their implementation has been launched
- Adaptation needs and implementing adaptation actions have become established as part of ordinary activities
- Cannot say

15. Awareness of the need for adaptation in my sector

- No awareness of the need for adaptation
- There is awareness of the need for adaptation among a small group of pioneers
- There is some degree of awareness of the need for adaptation
- There is fairly common awareness of the need for adaptation
- There is common awareness of the need for adaptation
- Cannot say

16. What kind of work does your organisation carry out related to climate change adaptation?

A great deal – Quite a lot – Not much – Very little – None – Cannot say

Assessing risks and vulnerabilities

Staff training

Protection of property against extreme weather phenomena

Developing inter-sectoral co-operation

Developing cross-sectoral co-operation

Planning a society adapting to climate change

Providing information to stakeholders

Other work (please specify below)

If your organisation is engaged in some other work, please specify what it is:

17. How systematically is adaptation taken into account in your organisation?

- Adaptation is taken into account in all areas of operation
- Adaptation is taken into account in some areas of operation
- Adaptation is sporadic, responsive to individual situations
- No adaptation work is carried out
- Cannot say

18. Your comments on the need for adaptation and work carried out:

## THE ASSESSMENT OF CLIMATE RISKS AND VULNERABILITY AND ADAPTATION PLAN IN THE SECTOR (part 4/7)

19. Have climate risks and the vulnerability of the sector been assessed in your sector?

- Climate risks and vulnerability have not really been addressed
- Climate risks and vulnerability have been assessed / identified to some extent
- Climate risks and vulnerability have been assessed / identified systematically –
- Cannot say

20. Do you have access to an adaptation plan / action plan for adaptation concerning your sector?

- Yes, prepared by central government
- Yes, prepared by private sector
- Yes, plans prepared by central government and private sector
- No
- Cannot say

Your comments on the assessment of climate risks and vulnerability and an adaptation plan in your sector:

## CO-OPERATION WITH OTHER ACTORS (part 5/7)

Do you co-operate with the following actors in issues related to climate change adaptation?

Yes, across sectoral boundaries – Yes, within my sector – No co-operation – Cannot say

Regional Council

ELY Centre

Municipalities

Rescue authorities

Companies

Interest groups, associations and networks

NGOs

State research institutes

Universities

Ministry / ministries

Other (please specify below)

If you selected “other”, please specify which:

23. Your comments on the co-operation with other actors

#### CHALLENGES AND SUPPORT IN CLIMATE CHANGE ADAPTATION (part 6/7)

What are the greatest challenges faced by your organisation in climate change adaptation (choose at most three)?

- Uncertainty in the assessment of the probability of climate risks in the short term
- Uncertainty in the assessment of the probability of climate risks in the long term
- Lack of knowledge about the impacts of climate change
- The lack of knowledge about the means of adaptation
- The scarcity of financial and temporal resources
- Unclear division of responsibilities in my organisation
- Unclear division of responsibilities with other organisations
- Challenges in co-operation with other organisations
- Different time spans of climate risks and our own activities
- Varying views of the risks within my organisation
- Varying views of the risks within my own and other organisations
- Acknowledging the significance of the risks is still inadequate
- Required adaptation measures are inconsistent with climate change mitigation targets
- Other – please specify

25. Have national organisations supported the adaptation work in your area of operation?

Yes, significantly

Yes, to some extent

Yes, a little

Not really

Cannot say

26. What kind of support would promote adaptation work the most in your organisation?

- Highly important – Quite important – Not very important – Cannot say

Targeting climate information to user needs

Developing know-how related to adaptation in my organisation

Producing short-term (5-10 yrs.) climate scenarios

Adaptation guides for individual sectors

Developing risk management methodology and processes

Funding

Other (please specify below)

If you selected “other”, please specify which:

27. How should climate change adaptation be promoted in your sector?

28. If you like, describe the challenges you have encountered and the support you have received and need in more detail below

RESPONDENT’S QUESTIONS AND REQUESTS FOR FURTHER INFORMATION (part 7/7)

29. I would like more information about climate change adaptation (write your questions and contact information below)

**Tyrsky Consulting** is a company established in 2014 to provide specialist services in the field of climate and sustainability. With our expertise, we produce the studies, training, workshops and development projects you need.

[www.tyrskyconsulting.fi](http://www.tyrskyconsulting.fi)



**Akordi** specialises in assisting different parties when it is necessary to reconcile different needs and interests. Akordi's role as a neutral party is to help build more high-quality participation and negotiation processes and therefore more sustainable solutions.

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- 12 Water management guidelines for agriculture and forestry**

## **Ministry of Agriculture and Forestry**

Hallituskatu 3 A , Helsinki  
FI-00023 Government, Finland  
mmm.fi

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