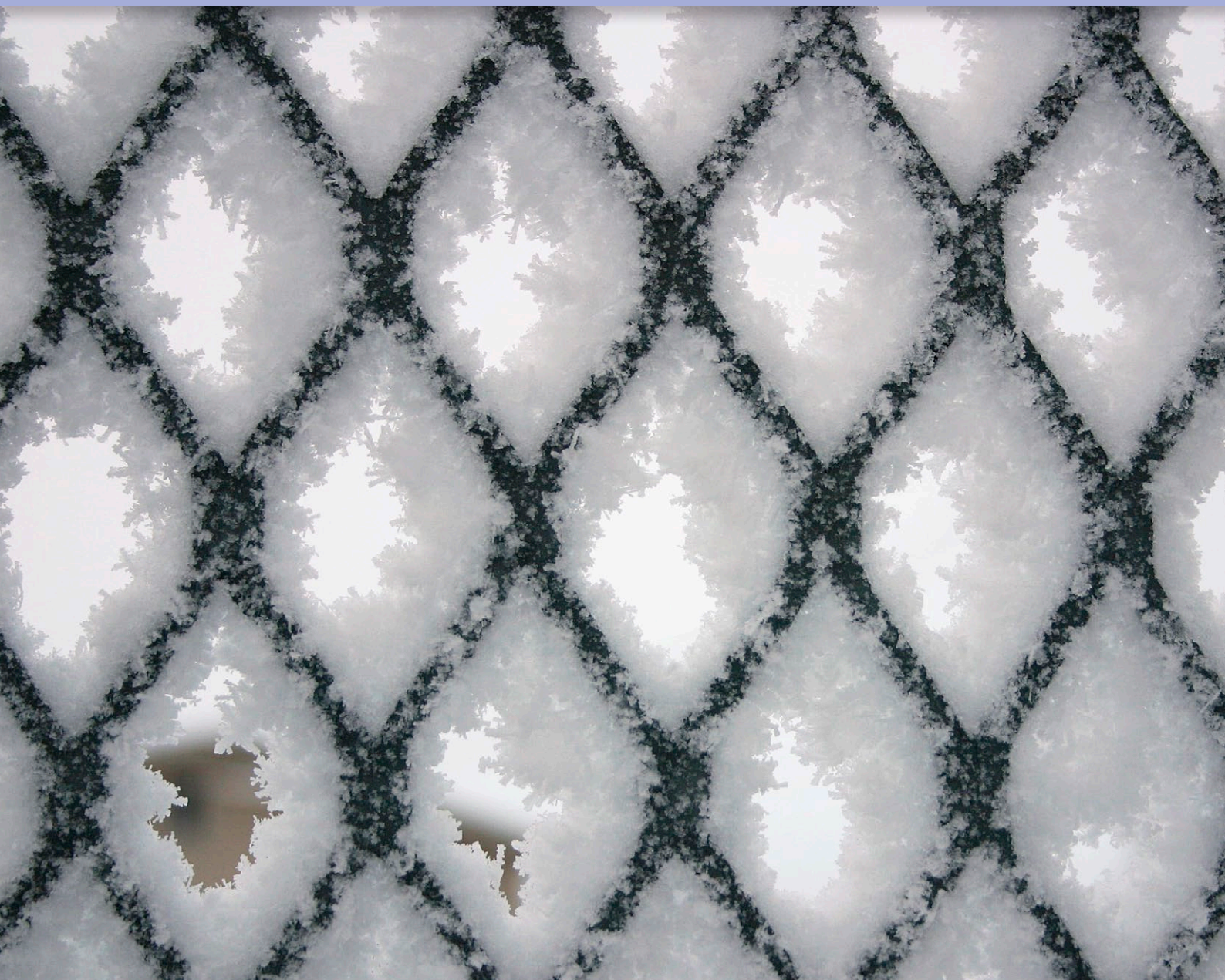


Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022



Action Plan for the Adaptation
to Climate Change of the
Environmental Administration 2022



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FOREWORD

The Action Plan for the Adaptation to Climate Change of the Environmental Administration contributes to the implementation of Finland's National Climate Change Adaptation Plan 2022. According to the national plan, the responsibility for the implementation, monitoring and reporting rests with the relevant ministries. The objective is for Finnish society to have the capacity to manage the risks relating to climate change and adapt to the changes. The aim of the implementation is for adaptation to be incorporated into the regular planning and activities of all sectors and actors.

Finland's national legislation concerning climate policy has developed gradually, reflecting the obligations imposed by international agreements and EU legislation. The Climate Change Act (609/2015), which entered into force in June 2015, lays down provisions concerning the climate change policy planning system, which consists of the medium-term climate change policy plan approved by the Finnish Government once every government term, as well as the long-term climate change policy plan approved at least once every ten years and the national climate change adaptation plan. Finland's international climate policy is steered by the post-2020 Paris Agreement formed under the United Nations Framework Convention on Climate Change, which requires all parties to increase their efforts to combat climate change and adapt to its effects.

The action plan of the environmental administration aims to identify the most important tasks in promoting adaptation in each sector in the next few years. The actions included are such that they can be considered to concern the whole administrative sector or to be ones that concern built environment, environmental protection, biodiversity, and water resources management and water protection. The measures concerning water resources management have been prepared in cooperation with the Ministry of Agriculture and Forestry.

The new action plan is based on the action plan prepared in 2008, which was updated in 2011, and the evaluation of the action plan conducted in 2012. The impacts of climate change will differ in different parts of Finland. This is why it is important to make sure that the objectives and measures relating to climate change adaptation are linked to the circumstances specific to each location. The preparation of the action plan was heavily based on the regional and local perspective.

The update to the action plan has been prepared and coordinated by the environmental administration's network on adaptation to climate change, consisting of Chairman Antti Irjala, Juha-Pekka Maijala (network secretary),

Jukka Bergman, Pirkko Heikinheimo, Laura Höijer, Riikka Lamminmäki, Kristiina Niikkonen, Hannele Nyroos, Ari Seppänen and Tuulia Toikka from the Ministry of the Environment, as well as Mikael Hildén and Kirsi Mäkinen from the Finnish Environment Institute. The action plan's section on water resources was prepared by Jaana Kaipainen and Ville Keskisarja from the Ministry of Agriculture and Forestry. The groundwork for the action plan, the organisation of regional events and the incorporation of the regional and local perspectives into the action plan were conducted at the Finnish Environment Institute by Kirsi Mäkinen, Juha Peltomaa and Mikael Hildén.

In addition to this, the update to the action plan has been enriched by the contributions of various experts from ELY Centres, municipalities and the Ministry of the Environment.

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1 Introduction

The Action Plan for the Adaptation to Climate Change of the Environmental Administration contributes to the implementation of Finland's National Climate Change Adaptation Plan 2022 (Government Resolution 20 November 2014)¹. According to the national adaptation plan, the responsibility for the implementation, monitoring and reporting rests with the relevant ministries. The national adaptation plans also contribute to the implementation of the policies of the EU adaptation strategy approved in 2013². At international level, the importance of adaptation to climate change has also been highlighted in the United Nations' Sustainable Development Goals updated in 2015³ and in the Sendai Framework for Disaster Risk Reduction⁴.

The aim of the National Climate Change Adaptation Plan is for Finnish society to have the capacity to manage the risks associated with climate change and adapt to changes in the climate. The aim in the implementation of the national plan is for adaptation to be incorporated into the regular planning and activities of all sectors and actors. Furthermore, the plan aims to ensure that actors have access to necessary climate change risk assessment and management methods, and that Finnish society's adaptability, innovative solutions and national awareness is increased through research and development activities, communication and education and training.

Increasing magnitudes of warming increase the likelihood of severe, pervasive, and irreversible impacts (IPCC 2014), and the key method for mitigating these impacts is the global reduction of greenhouse gases. However, these efforts need to be supplemented by preparation and adaptation efforts, which are already economically beneficial in the current climate. One example of this is the development of stormwater management in order to prevent flooding damage to the built environment. Other impacts include increased damage to forests due to shortening winters, as tree roots are no longer anchored to the ground by frost, and increasing agricultural nutrient loading, as snowless fields are flushed by winter rains.

Finland is part of a co-dependent international community. The warming climate affects the poorest countries the most, and the problems caused by climate change in regard to food security and regional stability, for example, can manifest rapidly. Because of this, one of the key focus areas of the adaptation plan is improving understanding of international impacts.

Finland's national legislation concerning climate policy has developed gradually, reflecting the obligations imposed by international agreements and EU legislation.

1 http://mmm.fi/documents/1410837/1516663/2014_5_lmastonmuutos.pdf/1716aa76-8005-4626-bae0-b91f3b0c6396

2 http://ec.europa.eu/clima/policies/adaptation/what/documentation_en.htm

3 Transforming our world: the 2030 Agenda for Sustainable Development <https://sustainabledevelopment.un.org/?menu=1300>

4 Sendai Framework for Disaster Risk Reduction 2015–2030 http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

The Climate Change Act (609/2015), which entered into force in June 2015, lays down provisions concerning the climate change policy planning system, which consists of the medium-term climate change policy plan approved by the Finnish Government once every government term, as well as the long-term climate change policy plan approved at least once every ten years and the national climate change adaptation plan.

Finland's international climate policy is steered by the post-2020 Paris Agreement formed under the United Nations Framework Convention on Climate Change, which requires all parties to increase their efforts to combat climate change and adapt to its effects. The Paris Agreement and the related national reports concerning each participating country's national climate efforts already cover 189 countries. The goal of the Agreement is to keep the increase in global average temperature below 2°C, aiming to limit the increase to 1.5°C. In regard to adaptation to climate change, the Agreement sets the goals of strengthening societies' ability to deal with the impacts of climate change, building resilience and decreasing vulnerability.

The impacts of climate change will differ in different parts of Finland. This is why it is important to make sure that the objectives and measures relating to climate change adaptation are linked to the circumstances specific to each location. The preparation of the action plan was heavily based on the regional and local perspective. Although the timescales of climate change are long, adaptation should also focus on preparing for rapidly developing extreme weather phenomena, which manifest in the form of floods, periods of drought, variations in the amount of ice and snow, or storms.

One of the starting points of the action plan is the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) on the risks posed by climate change, which was published in 2014. This report was used as the basis for identifying the impacts of measures on reducing exposure, increasing resistance or facilitating adaptation to new situations, where applicable. In connection to this, the report was also used to identify so-called adaptation pathways, meaning the best possible combinations of different adaptation measures for each point in time.

In addition to direct impacts, the programme also considers potential repercussions, meaning mechanisms by which the impacts of climate change may end up spreading to a wider area than in which bio-physical changes can be observed. For example, a flood that severs a major traffic route may cause disturbances far from the flood itself, affecting numerous other sectors in addition to traffic. Such repercussions may also be international in nature.⁵ Due to potential repercussions the connectivity of different areas of society should be taken into account in the planning of measures related to adaptation.

Examples of these types of connections can be seen between the protection of biodiversity and the management of invasive alien species, as well as in land use planning and construction in regard to measures related to green corridors, water resource management, water protection and biodiversity. Similarly, the recreational use of land areas and the management of cultural environments, for example, are areas where defining precise areas of responsibility is challenging, as the impacts of climate change may affect water management, biodiversity, the built environment and land use alike.

⁵ <http://www.klimatanpassning.se/hur-paverkas-samhallet/klimatforandringar-i-omvarlden/sa-paverkas-sverige-av-omvarldseffekter-1.91079> ; Groundstroem, F. ym. (käsikirjoitus)

The prioritisation of adaptation measures is supported by national vulnerability and risk assessments. In addition to this, the division of responsibilities between the private and public sector must also be taken into consideration. Finding a balanced division of work and responsibilities requires increasing awareness of risks.

The adaptation measures focus increasingly on solutions offered by the local environment (so-called nature-based solutions). The benefits of these types of solutions are based on the fact that they also offer other benefits, such as recreational opportunities and other ecosystem services. In Finland, these types of solutions emphasise the importance of blue-green infrastructure in both urban environments and sparsely populated areas. Nature-based solutions form an area experiencing strong growth at international level as well, and their development is being encouraged by various EU funding programmes.

2 The approach of the action plan

The action plan of the environmental administration aims to identify the most important tasks in promoting adaptation in each sector in the next few years. The actions included are such that they can be considered to concern the whole administrative sector or to be ones that concern built environment, environmental protection, biodiversity, and water resources management and water protection. The measures concerning water resources management have been prepared in cooperation with the Ministry of Agriculture and Forestry. The new action plan is based on the action plan prepared in 2008, which was updated in 2011⁶, and the evaluation of the action plan conducted in 2012.⁷

The action plan was prepared in 2015–2016 in the following stages:

1. Review of the measures of the existing action plan and examination of policy measures currently being prepared in regard to climate change and adaptation in particular.
2. Identification of new adaptation measures.
3. Examination of adaptation measures at regional level.
4. Finalisation of the action plan

In stage 1, interviews were conducted with the environmental administration's experts on adaptation to climate change. In stage 3, an examination of the implementation of adaptation measures at regional level was conducted by organising three regional events (in Northern Finland, Central Finland and Southern Finland) in October 2015, which allowed the measures to be concretised and examined in regard to how the implementation of the action plan would be affected by regional perspectives.

Some of the ways in which policy measures and decisions are connected to adaptation to climate change include:

1. Policy measures steer and regulate operations with long time spans, such as land use and infrastructure.
2. Policy measures affect operations that are sensitive to extreme weather phenomena, such as mines, waste management facilities, water treatment plants and water intake plants.
3. Changes in the climate change the key presumption behind policy measures, such as the ranges of different species in nature conservation.

⁶ Ilmastonmuutokseen sopeutuminen ympäristöhallinnon toimialalla. Ympäristöministeriön raportteja 20/2008; Ilmastonmuutokseen sopeutuminen ympäristöhallinnon toimialalla. Toimintaohjelman päivitys vuosille 2011–2012. Ympäristöministeriön raportteja 18/2011

⁷ Hildén, M. & Mäkinen, K. 2013. Ympäristöministeriön hallinnonalan sopeutumisohjelman arviointi Ympäristöministeriön raportteja 3 | 2013.

4. The impacts of climate change may result in the need to make decisions through exceptional procedures, such as rapid decisions on measures to combat a new invasive alien species.
5. The choices made may improve adaptability or open up new adaptation pathways, one example being so-called green infrastructure in promoting adaptability.

One of the key issues in regard to the progress of climate change adaptation is how the chosen policies are implemented at regional and local level, and how local and regional adaptation measures affect national policies.

3 The built environment

3.1

Challenges, current state and adaptation needs

In construction and land use, the need to adapt to climate change is caused by changes in rainfall, floods, average temperatures, soil and groundwater conditions, as well as the increasing occurrence of extreme weather phenomena. Changing conditions set new kinds of boundary conditions for building design and affect the use and maintenance of buildings. Adaptation to climate change in the built environment sector is characterised by connections to water resource management and biodiversity. The design of the built environment can prevent and reduce damage caused to buildings and infrastructure by extreme weather phenomena, such as heavy rains, floods and storms.

In recent years, several studies and reviews have been conducted that have expanded the knowledge base related to adaptation to climate change. Issues related to construction, land use and the functionality of the associated steering system have been studied in several different projects⁸. A comprehensive assessment of the Land Use and Building Act, which also included a climate change adaptation perspective, was completed in 2013⁹. Projects that have been completed so far have looked at town planning that contributes to climate objectives¹⁰ and developed methods for supporting the planning of adaptation to climate change in cities, for example.¹¹ The guide on lowest building elevations has been updated, taking into account scenarios for sea level rise.¹² Climate change adaptation has also been discussed in the guide on land use planning that promotes climate objectives, which was published in 2015.¹³ The stormwater guide published in 2012¹⁴ has become a frequently used tool in planning. For the most part, stormwater issues have been taken into consideration well in the planning of new areas, and most major problems related to stormwater affect older built areas. The Cultural Environment Strategy (2014–2020)¹⁵ prepared under the direction of the Ministry of the Environment and approved by the Govern-

8 Kaupunkiseutujen kehysalueiden ja maaseudun alueidenkäytön ohjaaminen (KAMA), Alueidenkäytön suunnittelujärjestelmän ja sen soveltamisen kehittäminen (KAASO), Kansainvälinen vertailu yleispiirteisen alueidenkäytön ohjauksen toimivuudesta kaupunkiseuduilla (YLKÄ)

9 Ks. esim. Arviointi maankäyttö- ja rakennuslain toimivuudesta 2013. Suomen ympäristö 1/2014. https://helda.helsinki.fi/bitstream/handle/10138/42827/SY_1_2014.pdf?sequence=2

10 Ilmastotavoitteita edistävä kaavoitus. Suomen ympäristö 3/2015. <http://hdl.handle.net/10138/154436>

11 Ilmastokestävän kaupungin suunnitteluopas, <http://ilmastotyokalut.fi/>

12 Tulviin varautuminen rakentamisessa. Ympäristöopas 2014. https://helda.helsinki.fi/bitstream/handle/10138/135189/YO_2014.pdf?sequence=1

13 Ilmastotavoitteita edistävä kaavoitus. Suomen ympäristö 3/2015. <http://hdl.handle.net/10138/154436>

14 Hulevesiopus, Kuntaliitto 2012 <http://shop.kunnat.net/download.php?filename=uploads/hulevesiopus-2012.pdf>

15 Kulttuuriympäristöstrategia 2014–2020 ja Kulttuuriympäristö yhteisenä voimavarana – Kulttuuriympäristöstrategian toimeenpanosuunnitelma 2014–2020, <http://www.ym.fi/kulttuuriymparistostrategia>.

ment Resolution in 2014 states that climate change and its consequences also affect the cultural environment, though research data on this issue is as of yet insufficient.

In the built environment sector, the legislative steering of adaptation to climate change is based on the Land Use and Building Act (5 February 1999/132, LUBA). Another important method for steering land use in regard to adaptation has been the national land use guidelines (Government Decision 2008), one of the main focus areas of which is adaptation. According to the Land Use and Building Act, the national land use guidelines must be taken into account in regional level planning, municipal land use planning and in the operations of the authorities. The national land use guidelines are currently being updated.

Adaptation has also been taken into account in legislation in recent years, for example through the amendment of the Land Use and Building Act with provisions on stormwater in 2014. Increasing rain levels have been taken into consideration through the issuing of a decree on the preparation of moisture control plans in construction in 2014 (YMa 216/2015 Section 15). The Flood Risk Management Act (620/2010) also covers urban floods. The flood hazard and risk maps maintained by SYKE are utilised in planning and as tools in the design of buildings and municipal flood protection.

Property-specific preparations are based on predictive maintenance, so that changing climate conditions can be responded to in the property-specific management of rainwater, for example. For now, there is no need to revise the load values related to weather conditions that steer construction.

3.2

Objectives and measures

The general objective is that the significance of climate change is widely understood and that the changing climate is taken into consideration in steering, planning and decision-making concerning the built environment. The specific objectives presented below steer measures in the built environment sector:

1. The latest information on the impacts of climate change in Finland has been taken into consideration in steering methods concerning the built environment.
2. Flood risks have been taken into account in the planning and implementation of land use, buildings and other infrastructure.
3. Solutions that utilise the green structure and the green environment are being implemented to an increasing extent.
4. Other objectives concerning the built environment, such as the protection of the cultural environment, have been taken into account in the planning and implementation of adaptation measures.

Table 1. Adaptation measures concerning the built environment.

1. Ensuring that steering methods are up-to-date		
Measures	Schedule	Responsible parties and other key actors
Climate objectives and adaptation to climate change are taken into account in the development of land use and building legislation.	2016 →	Ministry of the Environment
The stormwater guide is updated to correspond to changes in regulations, utilising the latest data on changing climate and weather conditions.	2017 →	The Association of Finnish Local and Regional Authorities, the Ministry of the Environment, the Ministry of Agriculture and Forestry and other actors in the sector
Previous adaptation objectives are evaluated and, if necessary, developed as part of the updating of the national land use guidelines.	2016 →	Ministry of the Environment
Measures to promote and develop the systematic property management of buildings are continued.	continuous	Ministry of the Environment
The development of the management and sustainable use of the cultural environment is supported in the implementation of the Cultural Environment Strategy (2014–2020).	2016 →	Ministry of the Environment, Ministry of Education and Culture, National Board of Antiquities and other actors
2. Taking flood risks into account		
Measures	Schedule	Responsible parties and other key actors
Information on flood risk areas and the lowest building elevations is accessible in permit procedures and in municipal flood protection, and the use of the information is supported.	continuous	SYKE/ELY Centre, Ministry of the Environment, Ministry of the Environment
The consideration of the lowest building elevations is ensured in land use and construction. The latest research findings are followed and the consideration of flood risks is ensured at different planning levels.	continuous	ELY Centres, regions, municipalities, Ministry of the Environment
Self-directed preparation is encouraged in regard to properties and the adaptation awareness of actors is raised.	continuous	ELY Centres, municipalities, Ministry of the Environment
3. Green structure and the utilisation of the green environment		
Measures	Schedule	Responsible parties and other key actors
The green structure and ecological connections are taken into account in national land use guidelines, land use planning and construction.	2016 →	Ministry of the Environment
The application and implementation of provisions is promoted through information-based steering.	continuous	Ministry of the Environment
Regional and local-level adaptation pilots and projects are conducted for the purpose of gathering and sharing experiences that support learning and development.	continuous	Municipalities, ELY Centres, regions, Ministry of the Environment
4. Connections between adaptation measures		
Measures	Schedule	Responsible parties and other key actors
Adaptation needs are taken into account in the development of cultural environment management and protection	2016 →	Ministry of the Environment
Biodiversity is taken into account in the steering of land use and its development	continuous	Ministry of the Environment, ELY Centres, regions, municipalities

4 Environmental protection

4.1

Challenges, current state and adaptation needs

In regard to environmental protection, the greatest risks posed by climate change are related to extreme weather phenomena and changes in the soil and groundwater. Changing conditions may increase various risks related to the contamination of soil, ground and surface waters and the air, which should be considered in planning and decision-making concerning the environment as well. In the area of environmental protection, adaptation to climate change is steered in accordance with procedures based on the Environmental Protection Act (527/2014) and the Act on Environmental Impact Assessment Procedure (468/1994), which also include the obligation to prepare for and react to changes.

The National Climate Change Adaptation Plan emphasises the improvement of climate risk assessment and management (key field of action 6). Risk assessment is particularly important in the field of environmental protection, as extreme weather conditions may cause significant environmental pollution. The practical measures related to adaptation emphasise issues of responsibility, on one hand between municipalities and the Government, for example, and on the other hand between the private and public sectors.

Certain special sites, such as mines and nuclear power plants, require special expertise and anticipation in regard to risk assessment. These types of special sites need to be identified not only as part of national reviews, but regionally and at municipal level as well.

4.2

Objectives and measures

The general objective is to achieve adequate awareness of the significance of climate change in regard to planning and decision-making related to the environment. This objective serves as the basis for setting the following specific objectives, which steer measures in the field of environmental protection:

1. Various risk management tools are implemented in the review of environmental protection scenarios.
2. Ways of increasing adaptability through collaboration between different authorities are explored in the planning of environmental protection measures.

Table 2. Adaptation measures concerning environmental protection

1. Preparation for special circumstances and risk management		
Measures	Schedule	Responsible parties and other key actors
The requirement of conducting an assessment of climate risks and adaptation to climate change are entered in an act/decree in connection with the amendment of the Act on Environmental Impact Assessment Procedure.	→ 2017	Ministry of the Environment
Risk awareness is increased among nationally and regionally critical partners and through general communication.	continuous	Ministry of the Environment, ELY Centres
The use and suitability of different risk management tools is examined.	2018	SYKE
2. Cross-sectoral measures		
The integration of water protection, agricultural, climate protection and adaptation objectives and measures is explored and promoted in communications and through other means.	continuous	Ministry of the Environment, Ministry of Agriculture and Forestry, ELY Centres

5 Biodiversity and ecosystem services

5.1

Challenges, current state and adaptation needs in regard to the conservation area network and other land use

The interim evaluation of the 2013–2020 action plan that implements the Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for the years 2012–2020 was completed in early 2016. In the interim evaluation, it is stated that climate change has taken an increasingly prominent position as a new and growing source of pressure. In recent years, large amounts of new research data have been amassed on the impacts of climate change on Finnish nature.

In regard to biodiversity, the most substantial impacts of climate change relate to changes in habitats and the species dependent on them, as well changes in the ecosystem services maintained by them. While global warming may also improve the living conditions of some threatened species in herb-rich forests, as a whole, climate change presents more of a threat than an opportunity for Finnish nature. For example, the majority of the new species arriving in Finland from the south as a result of climate change are generalist species, which thrive in the changed conditions. At European level, climate change poses the threat of increasing the uniformity of species, which will reduce the diversity of species in the continent as a whole.

So far, the research, monitoring and measures related to climate change, its mitigation and adaptation conducted from the perspective of biodiversity have not been systematic and summary in nature. However, as the importance of climate research and the pressure of climate change continue to increase, it is also becoming increasingly important to strengthen existing research networks related to climate change in regard to the biodiversity perspective. At the same time, international cooperation should be increased in transboundary cooperation and through international environmental agreements, among other means. In regard to adaptation, it is crucial that measures are examined comprehensively, as their results are greatly affected by international measures and measures implemented in other countries as regards migrating species, for example. At international level, it is important to emphasise the connections between biodiversity and climate change in negotiations related to the Paris Agreement and environmental agreements alike. This requires good coordination between the representatives of Finland participating in different negotiations.

In regard to biodiversity, the most important measure is to evaluate the climate sustainability of the existing conservation area network. This evaluation should focus on providing a detailed account of the connectivity, ecological representivity and geographical coverage of the conservation area network by habitat and species group. The evaluation should then be used as the basis for preparing proposals for measures necessary for the long-term development of the conservation area network. The total costs of the project as a whole would be in the range of EUR 2–5 million, with an implementation period of approximately four years. The realisation of the project is dependent on the reallocation of research and development funds, as well

as funding from outside the state budget. The possibilities of using the EU's funding instruments, for example, must also be investigated.

Implementing the proposed measures is essential for adapting to climate change. By 2020, the sub-measures could provide an overall picture that would be sufficient as a basis for long-term (approximately 10 years) development work. It should be emphasised that this involves an extremely significant change in the point of view in the standard approach to the ecology of nature conservation, from theory to practice. It has been estimated that the progression of climate change will be relatively rapid in northern areas in particular, and its effects can already be detected in the changes in the distribution of species. The first symptoms related to changes in habitats are already visible in palsa mires, among other areas. In order to make adaptation possible as the impacts of these changes begin to escalate, an extremely challenging knowledge gap must first be filled.

It is important to continue evaluation work and to identify which species, habitats and biotopes are most threatened by climate change, as well as the critical factors related to climate change in ecosystems. This data will be used to prepare more detailed follow-up measures for improving conservation and adaptation possibilities. The preparation of action plans concerning threatened species is currently underway. Species-specific programmes are being prepared in stages, and adaptation will be taken into consideration in the updating of each plan. This work will also help predict the adaptation potential of species, habitats and biotopes threatened by climate change.

One of the difficulties in the evaluation and planning of measures is that climate change is only one of many factors threatening biodiversity: the various challenges related to the number, quality and fragmentation of natural habitats have to be managed alongside those related to adaptation to climate change. The management and restoration of ecosystems and biotic communities also promotes their ability to adapt to climate change along with other pressures for change. Because of this, it is crucial to ensure that the effectiveness and impact of the management and maintenance of the conservation area network can be evaluated from the perspective of adaptation to climate change in the future. The Ministry of the Environment's Working Group on Improving the Status of Habitats in Finland (ELITE) has recommended that the selection of restoration measures should be based on their ability to simultaneously support local livelihoods, mitigate climate change and support adaptation to climate change. The majority of Finland's conservation areas are administered by Metsähalitus, and the management of these areas and related decision-making are steered by the Principles of Protected Area Management in Finland, which were updated in 2014¹⁶. Detailed measures specific to each conservation area are defined in dedicated maintenance and use plans.

As a measure related to adaptation, the aim is to protect threatened species in particular as effectively as possible.

It is likely that existing conservation areas will become inadequate as the ranges of different species continue to change due to climate change. This will increase the importance of the maintenance and sustainable use of areas outside of the conservation area network. Maintaining and increasing diverse landscapes and high-quality habitats is crucial for maintaining adaptability, as is the reduction of harmful impacts.

In the future, it may become possible to apply various compensation mechanisms in measures related to safeguarding biodiversity. Such compensation mechanisms have already been preliminarily tested, examined and studied from legislative, financial and biological perspectives. Related small-scale experiments, such as ecosystem banks, have also been conducted in collaboration with business actors. It is important

¹⁶ <https://julkaisut.metsa.fi/assets/pdf/lp/Bsarja/b203.pdf>

that adaptation is taken into account in these mechanisms, along with adequately flexible conservation networks.

Ecosystems are facing many changes as a result of climate change, and these changes will also affect resources and services provided by natural environments that are crucial to humans. Biodiversity supports the preservation of many ecosystem services.

When biodiversity decreases, an ecosystem's capacity for providing ecosystem services may also diminish. Diverse biotic communities are better equipped to withstand disruptions and recover from them than less diverse communities, which means that biodiversity also supports the availability of ecosystem services. Some ecosystem services are also dependent on the preservation of specific habitats, species and the genetic diversity of certain species. Diminishing biodiversity may affect the usability and availability of suitable crops, production animals and medicines, for example. Climate change is expected to cause changes in the services provided by ecosystems, and these changes will not only impact natural environments, but also affect different types of land use, from agriculture to forestry, fishing, infrastructure and housing.

The need to facilitate adaptation to climate change and the connectivity of conservation areas has been acknowledged in the Strategy for the Development of the Fennoscandian Green Belt, which has been prepared trilaterally between Finland, Norway and Russia. Continuing the safeguarding and development of the Green Belt as an ecological corridor is a key measure for facilitating adaptation, the development of which must be safeguarded.

Peatlands play a significant role in climate change mitigation and adaptation. The total combined amount of carbon bound to layers of peat in Finnish mires is roughly equivalent to the total amount of carbon in the Earth's atmosphere. The trenching of mires lowers water levels in mires, introduces oxygen into surface peat, increasing its decomposition and the release of carbon dioxide into the air. Peatlands also play a significant role in compensating for hydrological variations. The importance of restoring peatlands in regard to climate change has been examined within the framework of the Nordic-Baltic Wetlands network of the Ramsar Convention. The conclusions of the examination emphasise the potential of restoration in regard to promoting climate change mitigation and adaptation, as well as the achievement of biodiversity objectives.¹⁷

Finland's National Strategy on Invasive Alien Species was approved in 2012. One of the key objectives of the strategy is to prepare for the additional threats posed by climate change in regard to invasive alien species.

The strategy identifies species whose harmful impacts are expected to escalate as the climate continues to change in Finland as well. The action plan included in the strategy also defines measures for anticipating and preventing threats caused by invasive alien species. These measures place particular emphasis on communication and making sure that local actors are committed to objectives.

¹⁷ Alexandra Barthelmes, John Couwenberg, Mette Risager, Cosima Tegetmeyer and Hans Joosten 2015. Peatlands and Climate in a Ramsar context A Nordic-Baltic Perspective. TemaNord 2015:544 <http://www.norbalwet.org/assets/Documents/Project-documents/peat/PEATLANDS-AND-CLIMATE-IN-A-RAMSAR-CONTEXT-FULLTEXT02.pdf>

Objectives and measures

The general objective is to achieve a high level of awareness of the importance of biodiversity in regard to climate change mitigation and adaptation, and to ensure that climate change and its anticipated development are taken into account in all planning and decision-making affecting it. This objective serves as the basis for setting the following specific objectives, which steer measures as regards biodiversity:

1. The adaptation perspective has been taken into consideration in the development of the conservation area network and species protection.
2. The evaluation and management of climate risks and the adaptation of biodiversity to climate change in border areas is supported by international cooperation, the Green Belt of Fennoscandia and transboundary cooperation.
3. Developing the quality of habitats and the climate sustainability of ecosystems outside of the conservation area network requires the development of green infrastructure and connectivity. Connections to climate change mitigation as well as other sectors and objectives, such as the prevention of harmful impacts caused by invasive alien species and the development of nature tourism, recreational use and the protection of cultural heritage sites, have been taken into account in adaptation measures.

Table 3. Adaptation measures concerning biodiversity

I. Climate sustainability of the conservation area network, species and habitat protection		
Measures	Schedule	Responsible parties and other key actors
The adaptation perspective is incorporated into the interim evaluation of the strategy and action plan for the conservation and sustainable use of biodiversity in Finland.	2016	Ministry of the Environment, monitoring working group
Preliminary study of the climate sustainability of the conservation area network (including opportunities for international cooperation).	2016	Ministry of the Environment
Establishment of the environmental administration's climate cooperation network.	2016	Ministry of the Environment
Evaluation of the climate sustainability, risk assessment and development of management methods of the conservation area network.	2017–2020	Ministry of the Environment, cooperation network
Development needs of the bird species conservation network are identified based on studies on the impacts of climate change on bird species.	2017–2018	Ministry of the Environment
Examination of climate risks in the assessment of threatened species.	2015–2016	Ministry of the Environment, SYKE
Examination of climate risks in the assessment of threatened habitats.	2016–2018	Ministry of the Environment, SYKE
Adaptation needs are taken into account in the updating and preparation of nature conservation and action plans.	Continuous	Ministry of the Environment
Adaptation needs and the promotion of adaptability are taken into account in the maintenance and use plans of conservation areas and in the updating and preparation of other plans (including those concerning restoration).	Continuous	Parks & Wildlife Finland
The need to update species-specific conservation programmes is reviewed and adaptation perspectives are taken into account in the updating of the programmes.	2016 →	Ministry of the Environment

2. International cooperation, the Green Belt and cooperation in border areas		
Measures	Schedule	Responsible parties and other key actors
Climate cooperation related to international nature conventions (CBD, Ramsar, CMS, AEWA, EUROBATS, ASCOBANS) and environmental panels (including IPBES) is increased, while natural disasters and population movements are avoided in development cooperation	Continuous	Ministry of the Environment, Ministry for Foreign Affairs
Climate cooperation is increased in the EU and in regional international cooperation projects (physical geography processes, bilateral environmental cooperation between countries)	Continuous	Ministry of the Environment, SYKE, Parks & Wildlife Finland
Promotion of the ecological connectivity of conservation areas and access to geographic information system materials in transboundary and regional cooperation and projects (Green Belt of Fennoscandia)	2015 →	Ministry of the Environment, interest groups
Development of the forest protection and the protected area network of the Barents region (Barents Euro-Arctic Council, BPAN project)	2015 →	Ministry of the Environment, SYKE
Cooperation related to adaptation as regards Arctic nature (the Arctic Council, CAFF and the PAME Working Group)	Continuous	Ministry of the Environment, Ministry for Foreign Affairs

3. Development of the quality of habitats and the climate sustainability of ecosystems outside of the conservation area network		
Measures	Schedule	Responsible parties and other key actors
Promotion of ecological connections and connectivity (green infrastructure, EU Green-TEN initiative)	2016–	Ministry of the Environment
The conservation of biodiversity is incorporated into national land use guidelines as they are updated.	2016	Ministry of the Environment
As part of efforts to improve the quality of habitats, the possibilities of generalising the ecosystem hotel and other compensation trials conducted with the Habitat Bank of Finland and business actors will be examined from the perspective of adaptation as well (ex situ conservation).	2016	SYKE
International examples of compensation methods that promote adaptation to climate change are mapped in order to identify good practices.	→ 2016	SYKE
Reduction of harmful impacts on habitats and species and promotion of sustainable use	Jatkuvaa	Ministry of the Environment, interest groups, ELY Centres

4. Identifying connections between adaptation measures		
Measures	Schedule	Responsible parties and other key actors
Measures for preserving and restoring the carbon reserves of mires, the creation of an international carbon compensation system and access to funding from international companies and investors for restoring Finland's mires will be promoted.		Ministry of the Environment
The action plan of Finland's National Strategy on Invasive Alien Species is evaluated as regards the 2012–2015 period.	2016	Ministry of the Environment, Ministry of Agriculture and Forestry
The spread of new protected species in the conservation area network is anticipated.	2018–	Ministry of the Environment
Knowledge regarding biodiversity connections in the field of water and flood protection and the significance of wetlands is deepened.	Continuous	SYKE
Identification of risks and possibilities related to the climate as well as adaptation in regard to ecosystem services (including regulation services and carbon binding of mires), can be conducted in connection with the updating and preparation of the climate and energy strategy and other climate policy plans, for example.	2016–	YM, SYKE
Adaptation needs are taken into account in the development of nature tourism, recreational use and the protection of cultural heritage sites.	Continuous	Ministry of the Environment, Parks & Wildlife Finland
The status of indigenous people (Sami) is taken into account in planning related to adaptation.	Continuous	Ministry of the Environment
Communication and training is increased.	Continuous	Ministry of the Environment, interest groups

6 Management of waters and marine areas, protection of waters and water resource management

6.1

Challenges, current state and adaptation needs

The impacts of climate change on Finnish waters are apparent particularly in the increasing occurrence of extreme weather phenomena, such as floods, as well as increased droughts and changes in the variation of seasonal runoff.

Climate change causes both positive and negative changes. Negative changes can be prevented or mitigated through adaptation measures. Spring floods are becoming less widespread, while the shortening of the ice season may improve the oxygen situation of water bodies. Changes in the state of waters may create preconditions for increasing hydropower production in the future. Meanwhile, negative impacts are caused by the increasing occurrence of winter flooding, dry periods in the summer and extreme weather conditions. Changing winter conditions may also increase the occurrence of flooding resulting from the accumulation of frazil ice. Increasing precipitation may increase the runoff of nutrients, harmful substances and solids. The salinity of the Baltic Sea is also expected to decrease. The quality of groundwater may deteriorate as a result of droughts or the percolation of large amounts of surface waters into groundwaters. Problems associated with stormwater and meltwater and the occurrence of various disturbances and accidents may increase as extreme conditions become more common. Changes in the snow and hydrological situation, as well as frost, will also affect watercourse regulation.

In the Baltic Sea, the warming of the climate will result in the lengthening of the iceless period, which will endanger the procreation of species that breed on the ice. The warming climate and the increased runoff of fresh water may both increase the stratification of waters, which may lead to the further deterioration of the oxygen situation in deep basins. Furthermore, changes in the salinity and the increasing temperature of waters may result in significant changes in species composition, which will affect the operation of the entire food web. Increasing temperatures, changes in salinity and oxygen depletion affect the internal processes and nutrient circulation of the sea, while also increasing eutrophication. According to forecasts, climate change will slow down the restoration of the state of the sea, even if external loads are successfully reduced. Because of this, estimates indicate that the achievement of the load reduction objectives set by HELCOM will not be sufficient for reaching a good environmental status of waters.¹⁸ According to the average climate change scenario of the VEMALA watershed model developed by the Finnish Environment

¹⁸ Meier et al. (2012). Comparing reconstructed past variations and future projections of the Baltic Sea ecosystem—first results from multi-model ensemble simulations. *Environ. Res. Lett.* 7 <http://iopscience.iop.org/1748-9326/7/3/034005>

Institute, the phosphorous load from arable land into the Baltic Sea will increase by 5% in the 2020s due to the effects of climate change.

The objectives concerning the state of the Baltic Sea environment and nutrient load reduction needs as regards eutrophication need to be adapted based on the impacts of climate change. The need to adapt policies concerning the protection of the Baltic Sea based on the effects of climate change has been acknowledged in HELCOM's Ministerial Declaration issued in 2013, for example.

In the long term, climate change will alter the operating environment, affecting the implementation and effectiveness of the measures included in the action plan and making the achievement of environmental objectives even more challenging.

Areas in which adaptation measures are particularly crucial include the prevention of floods and the prevention and minimisation of their impacts, such different types of water damage and the runoff of hazardous substances. Reduced snow cover in the winter may have unpredictable consequences concerning nutrient loads in water bodies if, for example, the use of pesticides concurrently increases in response to the increasing occurrence of pest insects due to climate change. Nutrient loading from forests may also change. The challenge is to identify solutions that limit loading while also reducing periods of peak flooding in catchment areas. Important adaptation measures include various methods for retaining water in catchment areas and reducing flow rates. Alongside traditional methods, solutions that utilise green-blue infrastructure may offer new and innovative adaptation methods.

In Finland, river basin management, the marine strategy and the protection of waters are administered by the Ministry of the Environment, while the Ministry of Agriculture and Forestry is responsible for tasks related to the use and management of water resources. Key provisions concerning the steering of adaptation measures are provided in the Act on the Organisation of River Basin Management and the Marine Strategy, the Flood Risk Management Act, the Environmental Protection Act and the Water Act. Other important legislation includes the Dam Safety Act, the Land Use and Building Act and the Water Services Act.

In accordance with the Flood Risk Management Act, Finland has prepared flood risk maps for significant flood risk areas. In addition to this, ELY Centres have also regionally identified other important flood areas, which facilitate the planning of regional preparation and adaptation. Furthermore, population numbers living in flood areas have been evaluated regionally. In regard to flood risk compensation procedures, in 2014 Finland moved from a system under which compensation is paid by the state towards private insurance mechanisms, and the role of the private sector in providing commercially viable warning services, for example, may continue to grow. Regional flood risk management plans and river basin and marine resources management plans for 2016–2021 were completed in 2015. The plans examine the impacts of climate change while also mapping and prioritising potential adaptation measures that support the achievement of objectives. The impacts of climate change will also be evaluated in connection with the updating of the plans, based on which objectives and measures will be changed in order to promote adaptation.

The river basin management plans include evaluations of the effects of climate change on the load on water bodies and identify the climate sustainability of different measures. Adaptation to climate change has also been taken into consideration in the planning of the measures included in the plans. All measures that improve the water retention of catchment areas are important. Key adaptation measures include measures that reduce erosion and improve drainage conditions in the field of agriculture and forestry, such as protective strips, wetlands and sedimentation basins, as well as measures for improving the management of runoff waters in peat production. The aim is to study the effects of climate change on agricultural load in different parts of the country and the resulting changes in regard to adaptation.

Important measures in communities include measures concerning preparations for special circumstances, the reduction of sewer leakages and the decommissioning of mixed sewerage systems. In regard to industry and mining operations, the plans emphasise the importance of preparing risk management plans in case of accidents and disruptions.

The impacts of climate change on the effectiveness of measures is evaluated in the programme of measures of Finland's marine strategy.

The new Flood Centre, which is jointly administered by SYKE and the Finnish Meteorological Institute, began operation in 2014. As a result, the timely provision of information concerning floods and the preparation efforts of different parties have improved significantly, and flood warnings have been successfully incorporated into weather forecasts, for example. Changes in the level and flows of water bodies, as well as groundwater levels and other related changes are forecast using the country-wide hydrological modelling system developed by SYKE.

The probable decrease in the occurrence of spring floods will result in the need to develop more flexible permit procedures for watercourse regulation.

The Water Act (1193/2013) was amended with a provision concerning backwater and drainage assessments. According to this provision, a state supervisory authority may, if necessary, draw up a report on measures for reducing the harmful impacts resulting from a flood or drought, and explore possibilities for coordinating projects in river basin areas.

The increasing occurrence of temporary dry periods may create regional and local problems in regard to water resources management, agriculture and fisheries as well as ecosystems and the recreational use of water bodies. These problems may also result in significant financial losses, for example due to the loss of hydropower or reduced capacity for transporting cargo through inland waters. Droughts may also cause problems for hydropower plants due to the drying up of water sources and the deteriorating quality of groundwater bodies.

The amendment of the Water Services Act introduced the obligation for water supply plants to assess risks concerning the supply and quality of raw water and to take necessary measures based on a preparation plan in case of disruptions (681/2014). Finland has implemented a risk management system for domestic water, a key part of which is an assessment of the risks threatening the quality of water, which is prepared by supply plants that supply domestic water. The assessment covers the entire domestic water production chain from the areas in which the water is formed all the way to consumers' taps.

The risk management system is based on the Water Safety Plan (WSP) introduced by the World Health Organisation in 2003. The amendment of the Water Services Act has facilitated the consideration of stormwater by requiring facilities to prepare stormwater plans in accordance with the Land Use and Building Act when necessary (682/2014, Section 103). The separation of stormwater from waste water as well as the decommissioning of mixed sewerage systems also facilitate the quality control of stormwater¹⁹. The management of stormwater emphasises natural solutions, through in some areas particular attention must be paid to the quality of stormwaters.

19 Esimerkiksi SYKEssä Hulevesien hallintamenetelmien toimivuus vihreänä infrastruktuurina (HULEGREEN) -tutkimushanke (2012–2016) <http://www.syke.fi/hankkeet/hulegreen-paneutuu-asiaan>.

Objectives and measures

The general objective is to achieve a high level of awareness of climate change in the field of the water resource management and the protection of waters and marine environments, and to make sure that climate change and adaptation to it are taken into account in planning and decision-making concerning the management of waters and marine areas. This objective serves as the basis for setting the following specific objectives, which steer measures in regard to the management of waters and marine areas and water protection. The measures are implemented in collaboration with the Ministry of Agriculture and Forestry in accordance with the division of authority.

1. Risks related to floods, drought and fire safety have been comprehensively understood and are managed, adequate flexibility has been ensured in watercourse regulation permits and flood maps are utilised in the planning of adaptation measures.
2. The objectives and measures of river basin management and the marine strategy have been planned in a sustainable manner in regard to climate change.
3. The connections between river basin management plans and flood risk management plans, as well as catchment area-specific planning have been strengthened.
4. Solutions that are effective in changing climate conditions have been implemented in the management of the load on water bodies.
5. Preparation for stormwater floods has improved.
6. The adaptability of water supply plants has been increased in case of extreme weather conditions.
7. International issues regarding the management of water resources are part of Finland's adaptation planning and the development of adaptation preparedness.

Table 4. Adaptation measures concerning water resource management and water protection

1. Watercourse regulation permits		
Measures	Schedule	Responsible parties and other key actors
Hydrological models and the assessment of the impact of watercourse regulation are developed and the related knowledge base is expanded through the application of the latest international emission scenarios (IPCC) to Finnish conditions.	Continuous	SYKE
Drainage and backwater assessments are prepared as necessary, and related measures are taken. Trials for increasing the flexibility of watercourse regulation permit procedures are implemented.	→ 2019	ELY Centres, operators, SYKE, Ministry of Agriculture and Forestry
Watercourse regulation is developed based on the needs identified in river basin management plans, taking into account the requirements of water protection.	→ 2018	Ministry of Agriculture and Forestry and Ministry of the Environment
2. Catchment area-specific planning		
Measures	Schedule	Responsible parties and other key actors
Hydrological modelling tools are developed and a knowledge base is prepared for serving catchment area-specific planning through the application of the latest international emission scenarios to Finnish conditions.	Continuous	SYKE
The adaptation measures of river basin management plans are developed and implemented in catchment areas in cooperation with regional cooperation groups and other regional actors.	2015 →	Ministry of the Environment, Ministry of Agriculture and Forestry, ELY Centres

Connections between river basin management plans and flood risk management plans, as well as catchment area-specific planning, are strengthened through the promotion and initiation of flood water retention projects, among other means.	2016 →	Ministry of the Environment, Ministry of Agriculture and Forestry, ELY Centres
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3. Management of nutrient loading

Measures	Schedule	Responsible parties and other key actors
Means of managing nutrient loading, particularly from agriculture, are developed and trialed as discharges increase.	Continuous	Ministry of the Environment, Ministry of Agriculture and Forestry, ELY Centres
Measures that utilise and develop natural nutrient retention, such as alluvial meadows, wetlands and forest overland flow fields, are promoted.	Continuous	Ministry of the Environment, Ministry of Agriculture and Forestry, ELY Centres

4. Fluvial, sea water and stormwater floods

Measures	Schedule	Responsible parties and other key actors
The possibilities of mapping significant stormwater flood risk areas to supplement current flood risk mapping is examined.	2017	Ministry of Agriculture and Forestry, Ministry of the Environment, SYKE, ELY Centres, municipalities
Flood risks in regard to critical infrastructure (power plants, roads, railways, bridges) are systematically determined. The risks of sites located in underground facilities are assessed regionally and locally.	→ 2017	Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications, Finnish Transport Agency, ELY Centres, municipalities, rescue departments
The guidelines for assessing stormwater risks are updated and the planning of municipal stormwater flood risk management is promoted, in addition to which guidance and training is organised to support this.	2016	SYKE, Ministry of Agriculture and Forestry, property rescue plan
The measures detailed in flood risk management plans are launched, the achievement of objectives and flood risks are re-assessed (2017–2018) and the plans are updated.	2017 →	

5. Adaptability of water supply plants

Measures	Schedule	Responsible parties and other key actors
The domestic and waste water safety planning software created for water supply plants is put into operation.	2016 →	Ministry of Social Affairs and Health, Ministry of Agriculture and Forestry, Ministry of the Environment
Water supply plants are encouraged to manage sewer leakages and to decommission mixed sewerage systems, in addition to which the risk awareness of small water cooperatives in particular is promoted.	Continuous	Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health, Ministry of the Environment, water supply plants

6. International water issues

Measures	Schedule	Responsible parties and other key actors
A hydrological special situations management programme is implemented for the Vuoksi water system.	Ongoing	Ministry of Agriculture and Forestry
The coordination of the Torniojoki flood risk management plan and river basin management plan with the corresponding Swedish plans is examined.	→ 2018	Ministry of Agriculture and Forestry, Ministry of the Environment
The conducting of studies on climate change adaptation needs, particularly as regards eutrophication, is promoted nationally and as part of HELCOM's Baltic cooperation in the setting of marine protection policies and objectives.	Open	Ministry of the Environment, SYKE

7 The environmental administration's shared adaptation measures

In addition sector-specific measures, adaptation is also emphasised in the environmental administration's shared measures, such as communication and research activities. A significant number of the objectives and measures of different sectors are connected in one way or another to the objectives and measures of other sectors. This not only necessitates shared measures, research and communication, but also requires Finland's positions to be coordinated in international cooperation.

7.1

Research activities

Adaptation is an area that requires multilevel examination, as well as broad and strategic research and specific studies. The knowledge base on climate change, its impacts and the ways in which the challenges posed by it can be met is constantly expanding. Research and experimentation activities produce new information and solutions for achieving the objectives of the national adaptation plan. In Europe, research on climate change adaptation has in recent years been conducted under the 7th EU Framework Programme in numerous research projects, in many of which Finnish research institutions have also played an active role (SYKE, VTT, Finnish Meteorological Institute)²⁰. National adaptation research has in recent years been conducted under the ISTO²¹ and FICCA²² research programmes, for example. Key information regarding adaptation has been collected in the Finnish Climate Guide²³, for example, while information and experiences from Europe are collected and relayed through the ClimateADAPT portal²⁴ maintained by the European Environment Agency.

At national level, it is crucial that ministries are jointly coordinated in order to ensure the effectiveness of research findings. In regard to identifying national adaptation pathways, it is also important to follow and actively participate in international discussion. While the role of research is emphasised particularly in the preparation of international adaptation policies, the planning of national and local measures is also an important area of R&D&I activities.

The Finnish Climate Panel also creates the preconditions for making new comprehensive syntheses of the latest research.

20 BASE (<http://base-adaptation.eu>), RAMSES (<http://www.ramses-cities.eu>), ToPDAd (<http://www.topdad.eu>)

21 ISTO synteesiraportti: http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/2012/67Wke725j/MMM_julkaisu_2012_6.pdf

22 <http://www.aka.fi/ficca>

23 <http://ilmasto-opas.fi>

24 <http://climate-adapt.eea.europa.eu>

The available funding instruments for research and development activities can be divided into five categories:

1. Major international instruments, such as the EU's Horizon 2020 research programme or the LIFE programme, which offer new opportunities and emphasise international networks and cooperation.
2. National R&D funding, in which adaptation to climate change is one area of the 2016 strategic research programme 'Security in a Networked World'.²⁵ The development of new adaptation solutions is also made possible by R&D funding provided by the Academy of Finland and TEKES.
3. The Finnish Government's analysis, assessment and research activities funding (VN TEAS), which emphasises cross-administrative approaches and immediate information needs, such as those arising from the implementation of the Government Programme, for example. In 2015, one of the themes was adaptation to climate change, and this theme is included in 2017 as well.
4. Small-scale funding allocated by ministries and regional actors for specific research and surveying needs.
5. Support for development projects that promote adaptation measures, for example from structural funds.

The sections of the EU's Horizon 2020 research programme have begun to increasingly emphasise the perspective of nature-based solutions. This also opens up new possibilities for conducting R&D&I projects focusing on adaptation in Finland, and requires research institutions and universities to actively promote internationalisation. Many new calls for R&D&I proposals also require administrations to have business partners and for these partners to have an active role in the projects. SYKE participates in many European networks, serves as the European Environment Agency's (EEA) Topic Centre for Climate Change and Adaptation, and has contributed significantly to the work of IPCC Working Group II (Impacts, Adaptation, and Vulnerability).

The application of nature-based solutions may promote the practical application of the concept of ecosystem services. The Ministry of the Environment can influence the direction of the Horizon 2020 programme at the EU level, ensuring that adaptation remains a topic of discussion.

In projects that support adaptation, the Ministry of the Environment aims to coordinate the entire Ministry with the help of the Ministry's internal adaptation network. Information needs in regard to decision-making are also satisfied through the Finnish Government's shared VN TEAS funding. The adaptation perspective can also be emphasised in the calls for proposals of the Strategic Research Council, TEKES and the Academy of Finland. Shared funding instruments may prove crucial in comprehensive risk and safety assessments and in studies on the importance of blue-green infrastructure, for example, as these matters are closely tied to the core competencies of different ministries. The effectiveness of these projects is increased with the help of cross-administrative steering groups.

While the Finnish partnership programme and structural funds do in general provide opportunities to also support adaptation measures, Finland has not systematically promoted adaptation measures in its structural fund programmes. Because of this, the utilisation of structural funds requires different actors to actively contribute to the areas of the programmes in order to facilitate the identification of suitable projects.

²⁵ <http://www.aka.fi/fi/strategisen-tutkimuksen-rahoitus2/ohjelmat-ja-hankkeet/ohjelmat-2016-2019/turvallisuus/>

R&D&I activities that promote adaptation measures require the combination of different areas of expertise. The development of joint projects is supported by the development towards closer forms of cooperation between research institutions (LYNET²⁶, SOTERKO²⁷, Fintrip²⁸).

Objectives and measures

The general objective of the research activities supported and conducted by the Finnish environmental administration is to increase understanding of the impacts of climate change and produce information that makes it easier to take the adaptation perspective into account in all planning and decision-making. This objective serves as the basis for setting the following specific objectives:

1. Interaction between ministries and research institutions has been increased within the framework of new funding instruments by organising dialogue concerning research needs, as well as the interpretation and utilisation of research findings in the implementation of adaptation measures.
2. Inputs have been made to trials that promote adaptation measures in R&D&I activities
3. R&D activities have been directed towards identifying and supporting synergies between different provisions and their implementation, and the removal of inconsistencies.

Table 5. Measures concerning the promotion of research activities

Research activities		
Measures	Schedule	Responsible parties and other key actors
Potential ways in which the administrative sector of the Ministry of the Environment can support trials that promote adaptation and increase adaptation capacity are explored.	2016 →	Ministry of the Environment
The adaptation perspective is integrated into different national research funding instruments and the promotion of related research activities is ensured.	Continuous	Ministry of the Environment
Dialogue concerning adaptation is increased between parties preparing policies, implementing them and conducting research by way of dedicated workshops, among other means.	2016 →	Ministry of the Environment, SYKE
SYKE and its cooperation partners actively apply for European R&D&I funding for assessing the impacts of climate change and for supporting and developing adaptation measures.	2016 →	SYKE, LYNET, SOTERKO, universities
The work of the IPCC, IPBES and Nature Panel are actively contributed to through participation in their operations and the conducting of research relevant to the IPCC and UNFCCC that analyses and supports adaptation.	2016 →	Ministry of the Environment, SYKE

²⁶ <http://www.lynet.fi/>

²⁷ <http://www.soterko.fi/>

²⁸ <http://www.fintrip.fi>

Communication

The need for reliable information on the different aspects of climate change is constant. Information regarding the impacts of climate change, how to adapt to them as well as the connections between adaptation and mitigation needs to be effectively communicated. Mitigation and adaptation measures are intertwined in numerous ways, due to which communication regarding adaptation and mitigation should be integrated with each other. We must adapt to mitigation measures, and take mitigation objectives into account in adaptation.

Tightening emissions reduction targets result in the need to not only change tried and tested operating methods, but to also develop new kinds of technological solutions. Preparations for such changes minimise their potentially negative impacts and costs while also helping us find potential new benefits in the changing situation. Adaptation measures must be implemented in ways that do not needlessly increase the energy or material consumption of communities. Increasing recognition of the concept of adaptation and highlighting the connections mentioned above are essential parts of modern climate communication.

The key target groups of communication efforts include national and municipal decision-makers, regional administration, citizens, organisations, the business sector and the media. Communication aimed directly at citizens is nowadays conducted by many non-profit organisations, for example. As a result, the environmental administration communicates with citizens primarily in an indirect manner through non-profit organisations and the media, for example. However, information about climate change can also be effectively disseminated through social media, for example.

Communication concerning adaptation matters is conducted based on the expertise of each sector as part of the administration's climate change communications and communications concerning the built environment in particular. The Ministry of the Environment's communication concerning adaptation is characterised by cooperation with different actors, especially SYKE and the Ministry of Agriculture and Forestry. Examples of this cooperation include the production of the infographics included in the Climate Guide²⁹ and a brochure on adaptation to climate change in Finland published in 2009, the focus points of which were the requirements for new plant species in food production, flood risk management and invasive alien species.

As regards the different media events focusing on adaptation to climate change, the Finnish Meteorological Institute's regular media days have proven to be an effective channel for relaying information concerning adaptation. Similarly, the Ministry of the Environment's media events on adaptation have in recent years focused on specific themes related to adaptation, such as the latest changes in recommendations or recently published guides. These have included the results of the land use planning that promotes climate objectives project in 2015, changes in the lowest recommended building elevations in 2014 and the publication of the stormwater water guide in 2012. Climate change adaptation perspectives are also included in communication regarding guides related to property management³⁰ and general online communication. The Finnish Government's Steering Group for Climate Communications, which includes representatives from ministries and research institutes and institutions, publishes the online Klimaatti magazine³¹ focusing on climate matters four times a year. The publication of each new issue is announced via a newsletter sent to approximately

29 https://ilmasto-opas.fi/fi/ilmastonmuutos/videot-ja-visualisoinnit/-/artikkeli/721d3a24-7aba-43da-9b63-6add5dc74e5d/ipcc_infografiikat.html

30 Esim. Julkisivujen ja parvekkeiden kestävyys muuttuvassa ilmastossa, Suomen ympäristö 17/2010. <https://helda.helsinki.fi/handle/10138/37980>

31 www.klimaatti.fi

4,000 readers. One of the themes of the online magazine is adaptation to climate change. Adaptation to climate change is also one of the themes of the Climate Guide online portal³², which includes basic information on the topic related to land use and construction, for example. The Climate Guide is directed in particular at municipalities and citizens, providing research as well as illustrative and practical information on climate change mitigation and adaptation, while also offering tools to facilitate the climate work of municipalities, for example. In addition to this, SYKE's website contains up-to-date information on a variety of topics, such as the accumulation of snow, water content, snow warnings and the water and flood situation.

The communications plan for adaptation to climate change updated in 2009 set the objective of mainstreaming adaptation and making it a permanent part of climate communications. This objective is assessed as having been achieved, and now the challenge is to communicate practical means for adaptation, the impacts of adaptation and the connections between mitigation and adaptation. Climate communicators engage in close cooperation with each other. A communications plan for supporting the national adaptation plan is set to be jointly prepared during 2016.

Changes that affect people's housing, everyday life and local environments draw particular interest, due to which this perspective should be visible in communications related to adaptation. Regional level actors could also be encouraged to focus increasingly on direct contacts with companies and citizens. This way the adaptation matters that different actors are responsible for could be highlighted in connection with land use planning and permit processes, for example. The importance of adaptation measures could also be emphasised in connection with special circumstances, such as floods, in the form of background communications.

Nature-based solutions in adaptation to climate change have been a rising theme in the EU as well. These solutions emphasise the connectivity of adaptation to other environmental areas in regard to communications as well, increasing the importance of various methods of visualising information.

Objectives and measures

The general objective of the environmental administration's communications is to raise awareness of the significance of climate change and support the inclusion of the adaptation perspective in all planning and decision-making. This objective serves as the basis for setting the following specific objectives, which are implemented in cooperation with various subject-matter experts:

1. The administration's general adaptation communication is continuous and integrated into all relevant communications.
2. The effectiveness of communications is monitored as part of other media monitoring.
3. Online communication is topical and promotes innovative adaptation measures.

³² <https://ilmasto-opas.fi/fi/> <https://ilmasto-opas.fi/fi/>

Table 6. Communication measures concerning adaptation

Communication		
Measures	Schedule	Responsible party and other key actors
The national adaptation communication plan is updated as part of the comprehensive plan for climate communication.	2016	Ministry of Agriculture and Forestry, Ministry of the Environment, SYKE
The coordination and topicality of adaptation communication on websites administered by the environmental administration is ensured.	2016	Ministry of the Environment and SYKE
The topicality of the ClimateGuide.fi portal is ensured, efforts are made to increase recognition of the portal and the portal is utilised to meet the information needs of different actors, for example through the collection of examples of the adaptation measures of municipalities.	Continuous	SYKE, Finnish Meteorological Institute and other Climate Guide content providers
Information about the adaptation research of different research institutions is communicated in an active and coordinated manner to regional level actors.	Continuous	SYKE in cooperation with other LYNET institutions

7.3

International cooperation

The Paris Agreement is the first time that adaptation to climate change has been considered equally important as reducing emissions. The Paris Agreement sets out global objectives for strengthening adaptability, and all parties are required to contribute. For Finland, the international dimension of adaptation will start to increasingly emphasise issues concerning the Arctic, for example, which will in turn increase the importance of transboundary cooperation. This development is significant for Finland especially in regard to the Arctic Council, which will be chaired by Finland from 2017 to 2019. The Arctic Council's Adaptation Actions for a Changing Arctic report will be published in 2017, and the information and recommendations presented in it should be taken into account both nationally and in regard to Finland's chairmanship of the Arctic Council. In 2013, the Barents Euro-Arctic Council approved the Action Plan on Climate Change for the Barents Cooperation, the implementation of which Finland is participating as part of the cooperation in the Barents region. The Barents Euro-Arctic Council focuses on transboundary cooperation, which is also crucial in operations related to border waters with Russia and other Nordic countries. Relevant operating environments in the Baltic area include the Council of the Baltic Sea States (CBSS), the EU's Baltic strategy and the Baltic Earth research community. The Nordic countries form a natural whole in regard to climate and societal structure, also supporting the development of adaptation cooperation, in which it is important to utilise existing forums and means of cooperation.

Adaptation cooperation related to the protection of the marine environments of the Baltic Sea should be promoted in HELCOM.

Work in support of adaptation is also conducted as part of the work of the Intergovernmental Panel on Climate Change (IPCC). The IPCC Working Group II (Impacts, Adaptation, and Vulnerability) in particular examines topics such as the development and application of scenarios on different regional scales for the purpose of supporting adaptation and adaptability. In addition to this, the Baltic Earth research network processes and develops Baltic regional climate models and conducts status assessments.

In the export of Finnish cleantech related to adaptation, the focus is on measurement technologies and automation. In addition to this, Finland has potential in regard to the export of expertise, as the know-how of SYKE, the Finnish Meteorological Institute and Natural Resources Institute Finland in particular is internationally renowned. One potential area for this is the utilisation of Natural Water Retention methods. Furthermore, various water-saving solutions in waste and waste water processing show potential in areas where drought and lack of water are growing problems.

Objectives and measures

The general objective of the environmental administration's international cooperation is to strengthen the position of Finland in international work supporting adaptation to climate change and to facilitate the implementation of good adaptation measures outside Finland's borders as well. In national adaptation solutions, Finland also takes into account international matters, transboundary connections and cooperation, and best practices implemented elsewhere.

1. Finland's objectives and special issues important for Finland are taken into account in the working programmes and implementation decisions of the international climate agreement.
2. Climate change mitigation and adaptation in the Arctic has been integrated into Finland's international cooperation.
3. The promotion of Finnish environmental expertise is included in the programmes of high-profile international visits.

Table 7. Adaptation measures related to international cooperation

International activities		
Measures	Schedule	Responsible party
The adaptation perspective is highlighted during Finland's chairmanship of the Arctic Council.	2017–2019	Ministry of the Environment/international affairs unit
Participation in the implementation of the Barents Euro-Arctic Council's Action Plan on Climate Change. Schedule 2015–, responsible party, Ministry for Foreign Affairs and Ministry of the Environment as well as other ministries and actors participating in the Barents cooperation nationally and regionally.		
Concrete actions are promoted in cooperation related to the Baltic area and its adaptation issues, and the possibilities of EU funding for supporting measures are explored.	Continuous	Ministry of the Environment
Coordination between Finland's representatives in international negotiations in regard to questions related to adaptation is ensured.	Continuous	Ministry of the Environment, other ministries and actors

8 Follow-up of the action plan

The general objective of the action plan is to promote adaptability and strengthen risk management. In general, the objective of the follow-up is to evaluate the development of adaptability and risk management and the effectiveness of measures. The follow-up helps ensure the implementation of adaptation measures and the collecting of experiences in regard to implementation for the purpose of the further development of adaptation measures. Moreover, the follow-up of the action plan is coordinated with the follow-up of the national adaptation plan.

The implementation of the action plan is monitored annually by the Ministry of the Environment's adaptation network in collaboration with other parties. In the spirit of the follow-up of the national adaptation plan, the monitoring efforts aim at mainstreaming and the utilisation of the administrative sector's general operational monitoring, including performance management.

DOCUMENTATION PAGE

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<i>Author(s)</i>		
<i>Title of publication</i>	Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022	
<i>Publication series and number</i>	Reports of the Ministry of the Environment 25en 2016	
<i>Parts of publication/ other project publications</i>		
<i>Abstract</i>	<p>The Action Plan for the Adaptation to Climate Change of the Environmental Administration contributes to the implementation of Finland's National Climate Change Adaptation Plan 2022. According to the national plan, the responsibility for the implementation, monitoring and reporting rests with the relevant ministries. The objective is that the Finnish society has the capacity to manage the risks relating to climate change and adapt to the changes. The aim in the implementation is that adaptation is incorporated into regular planning and activities of all sectors and actors.</p> <p>The action plan of the environmental administration aims to identify the most important tasks to promote adaptation in each sector in the next few years. The actions included as such that they can be considered to concern the whole administrative sector or ones that concern built environment, environmental protection, biodiversity, and water resources management and water protection. Measures concerning water resources management have been prepared in cooperation with the Ministry of Agriculture and Forestry.</p> <p>The new action plan is based on the action plan prepared in 2008, which was updated in 2011, and the evaluation of the action plan conducted in 2012. The impacts of climate change will differ in different parts of Finland. This is why it is important to make sure that the objectives and measures relating to climate change adaptation are linked to the circumstances specific to each location. The preparation of the action plan was strongly based on the regional and local perspective.</p>	
<i>Keywords</i>	climate change adaptation, climate policy, environmental administration, built environment, buildings and construction, land use, environmental protection, biodiversity and ecosystem services, water and marine management, water protection and water resources management	
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KUVAILULEHTI

Julkaisija	Ympäristöministeriö Rakennetun ympäristön osasto		Julkaisu-aika Huhtikuu 2017	
Tekijä(t)				
Julkaisun nimi	Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022 (Ympäristöhallinnon ilmastonmuutokseen sopeutumisen toimintaohjelma 2022)			
Julkaisusarjan nimi ja numero	Ympäristöministeriön raportteja 25en 2016			
Julkaisun osat/ muut saman projektin tuottamat julkaisut				
Tiivistelmä	<p>Ympäristöhallinnon ilmastonmuutokseen sopeutumisen toimintaohjelma toteuttaa osaltaan Kansallista ilmastonmuutokseen sopeutumis suunnitelmaa 2022. Sopeutumis suunnitelman mukaan ministeriöt vastaavat hallinnonalalla suunnitelman toimeenpanosta, seurannasta ja arvioinnista. Päämääränä on, että yhteiskunnallamme on kyky hallita ilmastonmuutokseen liittyviä riskejä ja sopeutua ilmastossa tapahtuviin muutoksiin. Toimeenpanon tavoitteena on sopeutumisen sisällyttäminen osaksi kaikkien eri toimialojen ja toimijoiden normaalia suunnittelua ja toimintaa.</p> <p>Ympäristöhallinnon toimintaohjelman tavoitteena on tunnistaa kunkin sektorin tärkeimpiä tehtäviä sopeutumisen edistämiseksi lähivuosina. Ohjelma sisältää toimia, joiden voidaan katsoa koskevan koko hallinnon alaa sekä erikseen toimia, jotka koskevat rakennettua ympäristöä, ympäristönsuojelua, luonnon monimuotoisuutta sekä vesitaloutta ja vesiensuojelua. Vesitaloutta koskevat toimenpiteet on valmisteltu yhdessä maa- ja metsätalousministeriön kanssa.</p> <p>Toimintaohjelman perusta on aikaisemmissa vuonna 2008 laaditussa toimintaohjelmassa ja sen päivityksessä 2011 sekä vuonna 2012 toteutetussa toimintaohjelmien arvioinnissa. Ilmastonmuutoksen vaikutukset painottuvat Suomessa alueellisesti eri tavoin. Näin ollen on tärkeää varmistaa, että ilmastonmuutoksen sopeutumiseen liittyvät tavoitteet ja toimenpiteet on sidottu paikallisiin olosuhteisiin. Tämän toimintaohjelman valmistelun keskeisenä lähtökohtana on ollut alueellinen ja paikallinen näkökulma.</p>			
Asiasanat	Ilmastonmuutokseen sopeutuminen, ilmastopolitiikka, ympäristöhallinto, rakennettu ympäristö, rakennukset ja rakentaminen, alueiden käyttö, ympäristönsuojelu, luonnon monimuotoisuus ja ekosysteemipalvelut, vesien- ja merenhoito, vesiensuojelu ja vesitalous			
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PRESENTATIONSBLAD

Utgivare	Miljöministeriet Avdelningen för den byggda miljön	Datum April 2017
Författare		
Publikationens titel	Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022 (Miljöförvaltningens handlingsprogram för anpassning till klimatförändringen 2022)	
Publikationsserie och nummer	Miljöministeriets rapporter 25en 2016	
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Sammandrag	<p>Miljöförvaltningens handlingsprogram för anpassning till klimatförändringen 2022 bidrar till att genomföra den nationella planen för anpassning till klimatförändringen. Enligt anpassningsplanen ska ministerierna ansvara för verkställandet, uppföljningen och utvärderingen av planen inom respektive förvaltningsområde. Det övergripande målet är att vårt samhälle ska kunna hantera de risker som är förknippade med klimatförändringen och anpassa sig till förändringar i klimatet. Målet för verkställandet är att anpassningen ska inkluderas i alla sektorer och aktörers normala planering och verksamhet.</p> <p>Målet med miljöförvaltningens handlingsprogram är att inom respektive sektor identifiera de viktigaste uppgifterna med tanke på anpassningen. Programmet innehåller åtgärder som kan anses gälla hela förvaltningsområdet och särskilda åtgärder som gäller den byggda miljön, miljövärd, biologisk mångfald, vattenhushållning och vattenskydd. De åtgärder som gäller vattenhushållning har beretts i samarbete med jord- och skogsbruksministeriet.</p> <p>Grunden till handlingsprogrammet är det tidigare handlingsprogrammet från 2008 och tillhörande uppdatering 2011 och den utvärdering av handlingsprogrammen som genomfördes 2012. Klimatförändringens konsekvenser kommer till uttryck på olika sätt i olika regioner i Finland. Därför är det viktigt att säkerställa att målen och åtgärderna för anpassningen till klimatförändringen är kopplade till de lokala förhållandena. Det regionala och lokala perspektivet har varit en central utgångspunkt i beredningen av handlingsprogrammet.</p>	
Nyckelord	Anpassning till klimatförändringen, klimatpolitik, miljöförvaltning, byggd miljö, byggnader och byggande, områdeanvändning, miljövärd, biologisk mångfald och ekosystemtjänster, vatten- och havsvärd, vattenskydd och vattenhushållning	
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The action plan of the environmental administration aims to identify the most important tasks in promoting adaptation in each sector in the next few years. The actions included are such that they can be considered to concern the whole administrative sector or to be ones that concern built environment, environmental protection, biodiversity, and water resources management and water protection. The measures concerning water resources management have been prepared in cooperation with the Ministry of Agriculture and Forestry. The Action Plan for the Adaptation to Climate Change of the Environmental Administration contributes to the implementation of Finland's National Climate Change Adaptation Plan 2022.

The new action plan is based on the action plan prepared in 2008, which was updated in 2011, and the evaluation of the action plan conducted in 2012. The impacts of climate change will differ in different parts of Finland. This is why it is important to make sure that the objectives and measures relating to climate change adaptation are linked to the circumstances specific to each location.



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