Government Report on Finland's National Climate Change Adaptation Plan until 2030

Wellbeing, Safety and Security in a Changing Climate

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Abstract

The National Climate Change Adaptation Plan 2030 (NAP2030) presents a climate change risk and vulnerability assessment and sets out the vision and three aims for national adaptation work in Finland. The aims are elaborated further through ten themes for which targets and actions are specified. The Plan is part of Finland's climate policy planning system as stated by the Climate Law.

The vision of the National Adaptation Plan is "Wellbeing, safety and security in a changing climate". It aims for societal actors to have 1) a strong will to adapt to climate change, 2) access to efficient means to assess, prevent and manage climate change-related risks to nature and society, and 3) capacity to prevent, prepare for and manage climate change-related risks to nature and society.

Targets and actions are specified under ten themes: 1) National level strategic planning and foresight, 2) Comprehensive security and general security of supply work, 3) Food and nutrition security, 4) Infrastructure and the built environment, 5) Natural resources, biodiversity, nature-based solutions and drought risk management, 6) Health, 7) Cultural heritage and cultural environment, 8) Climate risk management at the regional and local levels, 9) International cooperation and 10) Knowledge base, communication and monitoring.

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Valtioneuvoston selonteko kansallisesta ilmastonmuutokseen sopeutumissuunnitelmasta vuoteen 2030
Hyvinvointia ja turvallisuutta muuttuvassa ilmastossa

Valtioneuvoston julkaisuja 2024:11

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Kieli	englanti	**Sivumäärä**	154

Tiivistelmä

Kansallinen ilmastonmuutokseen sopeutumissuunnitelma 2030 esittää vision, kolme päämäärää, tavoitteet ja toimenpiteet sille, miten Suomi sopeutuu ilmastonmuutokseen vuosina 2023–2030. Suunnitelma on osa ilmastolain mukaista ilmastopolitiikan suunnittelujärjestelmää. Se sisältää riski- ja haavoittuvuustarkastelun.

Sopeutumissuunnitelman visio on ”hyvinvointia ja turvallisuutta muuttuvassa ilmastossa”. Päämäärät ovat 1) Yhteiskunnan toimijoilla on vahva tahto sopeutua ilmastonmuutokseen, 2) Yhteiskunnan toimijoilla on käytössään tehokkaat keinot sekä luontoon että yhteiskuntaan kohdistuvien ilmastonmuutokseen liittyvien riskien arvioimiseksi, ennaltaehkäisemiseksi ja hallitsemiseksi, ja 3) yhteiskunnan toimijoilla on kyky ennaltaehkäistä, varautua ja hallita sekä luontoon että yhteiskuntaan kohdistuvat ilmastonmuutokseen liittyvät riskit.

Tavoitteet ja toimenpiteet on jaoteltu 10 teemaan: 1) Kansallisen tason strateginen suunnittelu ja ennakointi, 2) kokonaisturvallisuus ja huoltovarmuus, 3) ruoka- ja ravitsemusturva, 4) infrastruktuuri ja rakennettu ympäristö, 5) uusiutuvien luonnonvarojen käyttö ja hoito, luonnon monimuotoisuus, luontopohjaiset ratkaisut sekä kuivuusriskien hallinta, 6) terveyden suojelu ja edistäminen, 7) kulttuuriperintö- ja ympäristö, 8) alue- ja kuntatason ilmastoriskien hallinta, 9) kansainvälinen yhteistyö ja 10) tietopohja, viestintä ja seuranta.

Asiasanat	ilmastonmuutokset, sopeutuminen, suunnitelmat, selonteot, ilmastopolitiikka		
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Välbefinnande och säkerhet i ett föränderligt klimat

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Referat

Den nationella planen för anpassning till klimatförändringar 2030 anger en vision, tre strategiska mål, delmål och åtgärder för hur Finland anpassar sig det föränderliga klimatet under 2023–2030. Planen är en del av planeringssystemet för klimatpolitiken enligt klimatlagen och innehåller en risk- och sårbarhetsgranskning.

Visionen är ”välbefinnande och säkerhet i ett föränderligt klimat”. De strategiska målen är 1) Det finns en stark vilja bland samhällets aktörer att anpassa sig till klimatförändringarna, 2) Samhällets aktörer förfogar över effektiva metoder för att såväl i fråga om naturen som i fråga om samhället bedöma, förebygga och hantera de risker som anknyter till klimatförändringarna, och 3) Samhällets aktörer har förmåga att såväl i fråga om naturen som i fråga om samhället förebygga, skapa beredskap för och hantera de risker som anknyter till klimatförändringarna.

Delmålen och åtgärderna är indelade i 10 teman: 1) Strategisk planering och framsyn på nationell nivå, 2) övergripande säkerhet och försörjningsberedskap, 3) livsmedels- och näringstrygghet, 4) infrastruktur och den byggda miljön, 5) användning och förvaltning av förnybara naturresurser, biologisk mångfald, naturbaserade lösningar samt hantering av riskerna för torka, 6) hälsoskydd och hälsofrämjande verksamhet, 7) kulturarv och kulturmiljö, 8) hantering av klimatrisker på regional och kommunal nivå, 9) internationellt samarbete samt 10) kunskapsbas, kommunikation och uppföljning.

Nyckelord	klimatförändringar, anpassning, planer, redogörelser, klimatpolitik		
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Contents

1 Introduction

This Government Report presents the national plan on how Finland will adapt to the impacts of the changing climate in 2023–2030. The National Climate Change Adaptation Plan is part of the climate policy planning system under the Climate Act. The plan also implements Finland's international climate obligations, in particular the Paris Agreement[1] and the European Climate Law (EU) 2021/1119[2].

This plan contains a scenario-based assessment of risks and vulnerabilities related to climate change as well as a vision and three aims towards which adaptation action is taken. The aims are specified in more detail by 24 targets grouped under ten themes and implemented by means of the actions presented in the plan. The plan does not cover adaptation to the consequences of climate change mitigation policy, that is, reducing greenhouse gas emissions and strengthening carbon sinks.

As laid down in the Climate Act, the National Climate Change Adaptation Plan is published as a government report. No separate programme of actions will be drawn up in addition to the plan. This is why the plan also contains more specific entries related to actions, such as the responsible actors and a timeline, as well as the preliminary means of monitoring. Under the Climate Act, the measures set out in the plan primarily obligate central government authorities. The Ministry of Agriculture and Forestry leads the implementation of the plan as a whole, with each ministry responsible for implementation and monitoring in its own administrative branch.

The drafting of the plan began in autumn 2021 when the previous Climate Change Act (609/2015)[3] was still in force. The new Climate Act (423/2022)[4] entered into force on 1 July 2022 and, under the new Act's transitional provisions, this plan was

1 Paris Agreement 2015
2 European Climate Law (EU) 2021/1119
3 Climate Change Act (609/2015)
4 Climate Act (423/2022)

formulated in accordance with the requirements laid down in the repealed Climate Change Act. However, the requirements of the new Climate Act were taken into account in the drafting of this plan where possible.

The climate is changing regardless of mitigation measures. The impacts and consequences of climate change on nature, humans, the economy and society can already be seen today. It is therefore more important than ever to not only mitigate climate change but also to adapt to it: to prevent, reduce and prepare for the impacts and consequences of climate change and at the same time to strengthen society's climate resilience.

2 Finland's National Climate Change Adaptation Plan 2030 – NAP2030

2.1 Starting points

2.1.1 NAP2030 is part of the climate policy planning system under the Climate Act

Finland's National Climate Change Adaptation Plan is part of the climate policy planning system under the Climate Act. Under the new Climate Act (423/2022)[5], the Government adopts a National Climate Change Adaptation Plan at least every second parliamentary term. This means that the validity of this plan ends in 2030 at the latest, by which time the next adaptation plan must be formulated. In addition, during the parliamentary terms when there is no obligation to prepare a plan, the up-to-dateness of the plan in force and the need for new measures must be assessed. Accordingly, the up-to-dateness of this National Climate Change Adaptation Plan until 2030 (hereinafter NAP2030) and the need for any additional actions will be assessed in a mid-term review in 2026. This means that 2026 is the first deadline for reaching the targets and implementing the actions of NAP2030.

Under the Climate Act, climate change adaptation means measures taken to prepare for and adapt to climate change and its impacts, and measures that can be used to benefit from the impacts associated with climate change. The objective of the Climate Act and the climate policy planning system based on the Act is to contribute to ensuring that national measures are taken to adapt to climate change by promoting climate change resilience and the management of climate risks.

The Climate Act defines climate resilience only from the perspective of adaptation. In accordance with the Climate Act, climate resilience means informed and proactive capacity to act flexibly despite changes and disturbances occurring in weather and climate, to recover from them and to develop operations and preparedness after them. Climate resilience is linked with climate risk management so that the design of measures and solutions takes account of climate risks and seeks to prevent and mitigate them.

5 Climate Act (423/2022)

The most important way of reducing the impacts of climate change is climate change mitigation and, in particular, the global reduction of greenhouse gas emissions. Finland is also committed to strengthening carbon sinks as part of the country's climate change mitigation policy. Climate change adaptation is closely linked with the success of international climate change mitigation efforts: climate change mitigation aims to minimise climate change, while adaptation seeks to tackle the negative consequences of that change and benefit from the opportunities arising from it. The international success of climate change mitigation measures is the key factor determining the future trajectory of climate change and also determines the adaptation needs of Finland.

In many sectors, climate change mitigation and adaptation measures are closely interlinked. In agriculture and forestry, actions such as the choice of species cultivated or measures to improve soil condition can have positive effects on both mitigation and adaptation. By contrast, densifying urban areas may be efficient from the mitigation perspective but challenging in terms of risk management related to stormwater or heatwaves.

NAP2030 contains a scenario-based assessment of risks and vulnerabilities as well as a vision and three aims towards which adaptation action will be taken over the long term. In addition to these, the plan sets 24 targets related to climate change adaptation and outlines actions to achieve the targets by 2030.

Under the Climate Act (423/2022), the actions set out in the plan primarily obligate central government authorities, but successful implementation calls for broad cooperation with key stakeholders. Under the Strategy for Public Governance Renewal[6] adopted in 2020, a common strategy prepared for public governance and services to be able to respond to the changes in the society under the Prime Minister Sanna Marin's government programme, municipalities are also committed to bearing their responsibility for climate change mitigation and adaptation. Many other actors in society also have a key role, competence and resources to take part in adaptation action. Broad participation and cooperation of the various actors is indeed essential for society's adaptative capacity as a whole.

6 Strategy for Public Governance Renewal

2.1.2 NAP2030 implements international obligations

The preparation of NAP2030 has taken account of international and European Union (EU) obligations concerning adaptation. The plan implements the 2015 Paris Agreement[7] and the European Climate Law (EU) 2021/1119[8] that entered into force in 2021, both of which require member states to compile comprehensive national adaptation plans. In addition, the European Climate Law requires that Member States take into consideration the 2021 EU Strategy on Adaptation to Climate Change[9] in national adaptation plans. Linkages to other international agreements and commitments have also been identified.

The EU Adaptation Strategy has three aims, namely 1) Smarter adaptation: improving knowledge and managing uncertainty; 2) More systemic adaptation: support policy development at all levels and sectors; and 3) Faster adaptation: speeding up adaptation across the board. In addition to these, the objective is to advance international climate resilience measures. The European Commission has the primary responsibility for the implementation of the actions of the EU Adaptation Strategy. In addition to the Commission, the Member States play a key role in advancing some of the measures. The Commission also regards the Member States as important partners in the implementation of the strategy.

The measures of Finland's NAP2030 seek to respond to the EU adaptation strategy at the national level as appropriate to Finnish conditions. For example, in Finland issues related to availability and use of freshwater are not comparable with the challenges faced by Southern European Member States, and our regulatory requirements related to land use and building are different due to our northern conditions. This is why the national-level planning and implementation of, for example, actions included in the EU strategy, such as nature-based solutions, preparedness for health threats and drought risk management, will be driven by national needs.

7 Paris Agreement 2015

8 European Climate Law (EU) 2021/1119

9 EU Strategy on Adaptation to Climate Change 2021

2.1.3 NAP2030 follows on from many years of adaptation policy

Climate change adaptation has been promoted in Finland through national-level policies and actions for more than 15 years. In 2005, Finland was the first EU Member State to publish a National Strategy for Adaptation to Climate Change[10]. In 2014, Finland's National Climate Change Adaptation Plan 2022 was adopted as a government resolution[11]. The Ministry of Agriculture and Forestry is responsible for the coordination of climate change adaptation at the Government level. Adaptation is, however, relevant to all ministries and administrative branches due to the diversity and broad scale of the consequences of climate change.

The premise of Finland's adaptation policy has been integrating adaptation into the normal planning work and activities of administrative branches and sectors. Consequently, in addition to the national adaptation plan, adaptation has been strengthened and is being implemented under several administrative branch-specific plans and sector-specific regulation. This means that NAP2030 includes the administrative branches' prioritised adaptation targets and actions as well as targets and actions that cross the boundaries of administrative branches, and themes in which progress would otherwise not necessarily be made.

Compared to climate change mitigation, adaptation needs and actions foremost target national and regional and local levels – not forgetting the global dimension, either. In addition to central government, regional, municipal and other actors play a major role in adaptation, as the vast majority of practical adaptation actions take place at local and regional levels. Promoting adaptation in international cooperation is an important part of the whole as, when successful, it enables reductions in cross-border impacts on Finland from other countries. This is also an obligation under international agreements, such as the Paris Agreement, to which Finland has committed itself.

Published in 2014, Finland's first National Climate Change Adaptation Plan set the overall aim of Finnish society achieving enhanced adaptive capacity by 2022. This aim was specified by three objectives: A) integrating adaptation into the planning and activities of both the various sectors and their actors, B) developing the necessary climate risk assessment and management methods, and C) new, innovative solutions and improved citizens' awareness of climate change adaptation developed through research and development work, communication and education and training. A mid-term evaluation of the implementation of the

10 Finland's National Strategy for Adaptation to Climate Change 2005

11 Finland's National Climate Change Adaptation Plan 2022

National Climate Change Adaptation Plan 2022 was conducted in 2019, and a comprehensive evaluation of the current state of adaptation policy in Finland took place in 2021–2022.

It was noted in the mid-term evaluation[12] that awareness of climate change and the need for adaptation had increased among government actors during the period covered by the National Climate Change Adaptation Plan 2022, with the effects and risks associated with climate change being discussed more broadly. However, actions to manage climate-related risks were still partly lacking. Key development needs mentioned were increasing awareness of weather- and climate-related risks and the possibilities to adapt to them, clarifying the roles and responsibilities related to adaptation, and ensuring well-functioning coordination. The mid-term evaluation also pointed out the need to develop sectoral guidance and direction, along with tools and instructions that regional and local actors in particular can use.

Following the mid-term evaluation and the 2022 overall evaluation of Finland's adaptation policy[13], several legislative reform projects have been launched and plans have been drawn up to formulate adaptation objectives for various sectors. Most of the objectives are, however, of a general nature. They state the need to adapt to or prepare for climate change but do not set quantitative targets. The need to adapt has not yet been recognised in the legislation of all of those sectors that may be affected by climate change. Communication has taken place especially through the Climateguide.fi website, which is maintained by the Finnish Meteorological Institute, the Finnish Environment Institute, and Natural Resources Institute Finland and provides reliable, research-based information about climate change, its impacts, and adaptation and mitigation.

In the international context, the aim of climate change mitigation and adaptation is to promote a global transition to carbon-neutral and climate-resilient societies. Finland's advocacy on the various actors involves all available foreign policy instruments from bilateral diplomacy to partnerships as well as advocacy through the EU and international organisations. In 2019, the Finnish Ministry for Foreign Affairs published an Action Plan for Climate Smart Foreign Policy, which aims at mainstreaming climate change as a cross-cutting theme across the Ministry's activities, making Finland one of the first countries to do so. The level and predictability of international climate adaptation finance for developing countries

12 Implementation of Finland's National Climate Change Action Plan 2022 – A Mid-term Evaluation (2019)

13 Adaptation to climate change in Finland – Current state and future prospects

has become a major theme globally. Finland is an active member of the Champions Group on Adaptation Finance. The Group aims to improve the level, quality and accessibility of adaptation finance, particularly for Least Developed Countries and Small Island Developing States, through the Group's own funding and well as through global climate funding.

2.1.4 Resources for implementation of NAP2030

The EU Adaptation Strategy emphasises that financing adaptation is not solely a cost – it is an investment in a more climate-resilient society. Investments made today can help to reduce current as well as any future economic, human and environmental damage and to benefit from opportunities provided by climate change and adaptation. Allocation and appropriate scaling of resources for implementation are key conditions for the implementation of adaptation actions.

Part of the implementation of NAP2030 will take place as part of official duties, but the successful implementation of the plan calls for additional resources. The responsible actors specified in the plan undertake to implement the NAP2030 actions as efficiently and appropriately as possible and to the extent possible within the resources available. One of the key resourcing aspects is also the opportunities created by the actions from the economic and administrative perspectives. The actions are implemented depending on the spending limits and human resources available within the General Government Fiscal Plans and the Budgets, harmonising them with other general government spending needs. Each ministry is responsible for the reallocation of resources needed in their administrative branch as well as for proposals for additional resources in accordance with the general government planning processes.

One opportunity for the resourcing of the implementation of adaptation actions is created through the national coordination and repatriation of funding available from the EU. Some of the NAP2030 actions are linked with the national implementation of EU funding (such as the EU's Common Agricultural Policy (CAP)). During the current Structural Fund period, funding from the European Regional Development Fund (ERDF) can also be used for the promotion of climate change adaptation and disaster risk management at the regional and local levels.

To support the implementation of NAP2030, a proposal for a strategic EU LIFE project is prepared starting from 2023. The Ministry of Agriculture and Forestry will determine the key implementation areas in cooperation with the Ministry of the Environment and, on the basis of these, a separately designated coordinator

body will prepare a project package of around EUR 20 million with partners and supplementary projects. Finland's previous strategic LIFE applications have been successful, but the award of funding from the Commission is not certain. It is possible to support the implementation of the plan in some parts also by means of EU research and innovation funding (such as EU implementation funding for the Mission on Adaptation under Horizon Europe). Efficient utilisation of EU funding requires the active contribution of the various actors as well as national coordination and communication concerning funding opportunities.

2.1.5 NAP2030 will be implemented in a cost effective and just manner

Sensible adaptation policy is cost effective, as expressed in contexts such as the Finnish Climate Act. Policy is cost effective when the given or desired effect is achieved at a minimal cost or, to put it the other way around, when the given cost generates the maximum effect. In climate change mitigation policy, the cost-effectiveness requirement is often easier to assess than in adaptation policy, as it is not possible to use the same unit to measure all of the benefits of successful adaptation policy, unlike in mitigation, where tonnes of carbon dioxide equivalents are used.

Adaptation is increasingly required to have concrete, quantitative targets in the same way as mitigation policy. These could include targets for reducing damage, such as restricting the scope of flood damage or forest fires, or reducing the cases of ill health caused by heatwaves. However, there is no need in all cases to define the target through damage. Instead, regulation can set clear limit values to reduce damage by, for example, defining the highest permitted indoor air temperature. Concrete targets would also enable the evaluation of the cost-effectiveness requirement.

The starting point of Finland's adaptation policy – integrating climate risk management and adaptation into existing organisational structures, planning practices and approaches – contributes to cost-effective and appropriate implementation. This principle is supported by the NAP2030 measures, too.

One of the objectives of the Climate Act (432/2022) and the climate policy planning system under the Act is to ensure justice of climate measures. The justice-related objective can be regarded as including procedural and substantive aspects under the Climate Act. The procedural aspect would mean that the process to prepare a plan is just and transparent. The substantive aspect is based on the fundamental

and human rights obligations that are binding on Finland. The new European Climate Law also underlines that the transition to a more sustainable society should be just.

According to the Finnish Climate Change Panel, an independent advisory council of top-level Finnish scholars that promotes the dialogue between science and policy-making, the social justice dimension of climate measures covers five main elements. In the adaptation context, distributive justice focuses on issues including how risks related to climate change are distributed and how the benefits and disadvantages of adaptation measures are distributed between groups of people and livelihoods and between regions. Recognitive justice considers the sociocultural differences between people, groups of people and regions, their different positions in society, and specific needs and vulnerabilities born through these differences. The aim is to avoid the dominance of certain sociocultural groups and to advance the realisation of the rights of those who are in vulnerable positions. Procedural justice is about how the needs of different groups are taken into account in the decision-making process. The two final elements are global justice and the human rights perspective, which mean possibilities for a good life for all, the acknowledgment of different needs and participation by all. Justice issues have not been assessed as extensively in the adaptation policy context as in the mitigation policy context.

The Finnish Climate Change Panel has pointed out that climate policy cannot be expected to mend all existing inequalities. Many of the factors increasing the vulnerability of specific groups of people to climate change, mentioned in the assessment of risks and vulnerabilities found in section 2.2 below, such as socioeconomic status, cannot be solved by adaptation policy or, consequently, by NAP2030. However, when planning measures and allocating resources for climate change adaptation, it is essential to strive to prevent current inequalities from worsening or new ones being created without adequate compensation.

During the preparation of this plan, efforts were made to ensure procedural justice by maximising interaction with the various stakeholders, including young people, the Sámi Parliament, and the councils for older people and for people with disabilities. As regards to distributive justice, efforts were made to ensure that those groups of people and livelihoods that face risks related to climate change are taken into account in the planning of measures.

2.1.6 NAP2030 is based on extensive background work

Four significant sets of background material were produced during the preparation of NAP2030:

1. A sectoral and cross-sectoral risk and vulnerability assessment[14] and a regional vulnerability assessment[15], on the basis of which the summary found in section 2.2 was produced. The assessment results have been utilised in the definition of targets and actions.
2. The results of the KOKOSOPU project, which was funded by the Government's analysis, assessment and research activities and which conducted an overall evaluation of the national adaptation policy,[16] were utilised in the definition of targets and actions.
3. Science sparring conducted in collaboration with the Finnish Academy of Science and Letters that focused on an improved understanding of cost effectiveness and the concepts of vulnerability and justice in the context of adaptation. The synthesis[17] was utilised in the preparation of NAP2030.
4. A report by the Finnish Meteorological Institute and the Finnish Environment Institute on climate and socioeconomic scenarios in climate change adaptation planning[18], which was utilised in the risk and vulnerability assessment of section 2.2 in particular.

In addition, NAP2030 makes use of results from several projects funded by the Government's analysis, assessment and research activities, the Finnish Climate Change Panel (including the Climate Change Adaptation: Regional Aspects and Policy Instruments (SUOMI) project report[19]) and the mid-term evaluation of the

14 Risks and Vulnerabilities related to Climate Change in Finland (In Finnish, with an English abstract)

15 Review of Regional Characteristics and Vulnerabilities related to Climate Change in Finland (In Finnish, with an English abstract)

16 Adaptation to climate change in Finland: Current state and future prospects

17 Tiedesparraus osana kansallisen ilmastonmuutokseen sopeutumissuunnitelman 2030 valmistelua (*Science Sparring as Background for the NAP2030*, in Finnish)

18 Ilmasto- ja sosioekonomiset skenaariot ilmastonmuutokseen sopeutumisen suunnittelussa (*Climate and Socioeconomic Scenarios for Climate Change Adaptation Planning*, in Finnish)

19 Ilmastonmuutokseen sopeutumisen ohjauskeinot, kustannukset ja alueelliset ulottuvuudet (*Steering Methods, Costs and Regional Dimensions of Climate Change Adaptation*, in Finnish)

implementation of Finland's National Climate Change Adaptation Plan[20] published in 2014. Interaction during the project and the background material used are described in more detail in section 4.1.1.

2.2 Observed and projected future changes, risks and vulnerabilities

Under the Climate Act, the objectives and measures concerning climate change adaptation must be based on scientific evidence so that the progress of climate change, its probable positive and negative impacts, the risks and hazards associated with it, and the capabilities to prevent accidents and limit their adverse effects are taken into account.

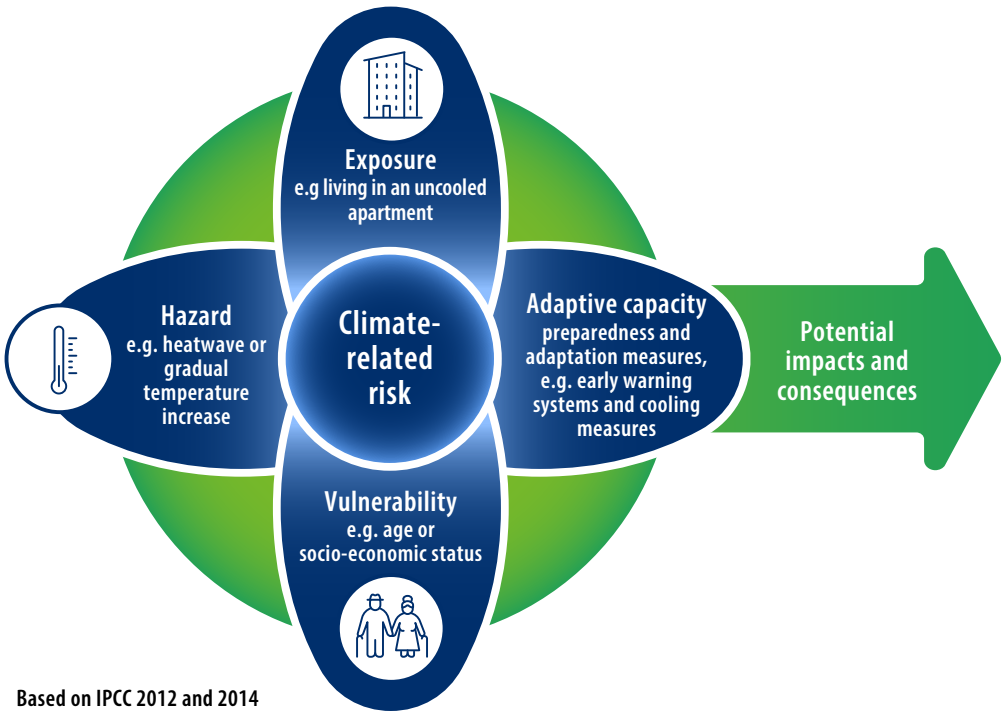
The risk and vulnerability assessment provided in this chapter is a summary of the sectoral and cross-sectoral risk and vulnerability assessment and regional vulnerability assessment produced to provide background material for NAP2030 and published separately. The risk and vulnerability assessment compiles the latest research on climate change risks and contains the original source references. The institutional vulnerabilities discussed in section 2.2.4.10 are mainly based on the results of the KOKOSOPU project funded by the Government's analysis, assessment and research activities that evaluated the implementation of the national adaptation policy. More detailed regional data can be found in sources including the SUOMI report of the Finnish Climate Change Panel and on the Climateguide.fi website.

2.2.1 Climate change-related risks

According to the Intergovernmental Panel on Climate Change (IPCC), climate-change related risks consist of three factors: the climate change-related hazard, exposure and vulnerability. In addition to these, the definition often also includes adaptive capacity, that is, the capacity to reduce vulnerability and exposure and to carry out short-term preparedness and long-term adaptation actions. Adaptive capacity plays an essential role with regard to reducing the risks related to climate change and benefitting from climate change. (Figure 1)

20 Implementation of Finland's National Climate Change Adaptation Plan 2022: A Mid-term Evaluation (In Finnish, with an English abstract)

Figure 1. Definition of climate change-related risks.



As a hazard, climate change manifests itself through both steadily changing phenomena and through changing, increasingly extreme temporary events relating to the hydrological cycle and weather. Steadily changing phenomena include rising mean temperature and sea level and increasing precipitation. Extreme, temporary events include hot, dry summers and, on the other hand, the intensification of heavy rains.

Exposure means the presence of people and communities, livelihoods, species or ecosystems, environmental functions, services and resources, infrastructure or assets in places and settings where they could be adversely affected by or where they could benefit from climate change. Assets may be economic, social or cultural. Exposure does not, however, necessarily mean that there are negative impacts or that potential benefits materialise. For this, the exposed unit is also in some way vulnerable or is planning or implementing ways to benefit from opportunities.

Vulnerability occurs at the individual, community and institutional levels. Individual-level vulnerability means the sensitivity of individual people and, as regards infrastructure or the natural environment, the sensitivity of individual sites to the impacts of climate change. Community-level vulnerability is examined in line with the individual-level definition at the level of groups of people, such as older people

or people with disabilities, and at the level of economic sectors, such as agriculture, and livelihood groups, such as farmers. Community-level vulnerability can also refer to inability to make use of the resources of individuals and institutions.

Institutional vulnerability means a lack of willingness, resources or means related to institutions or inability to anticipate, reduce and prepare for climate change-related risks. Institutions may mean both formal institutions, such as government organisations, legislation and other regulation, plans and strategies, and informal institutions, such as culture, traditions and customs that determine how people and organisations behave.

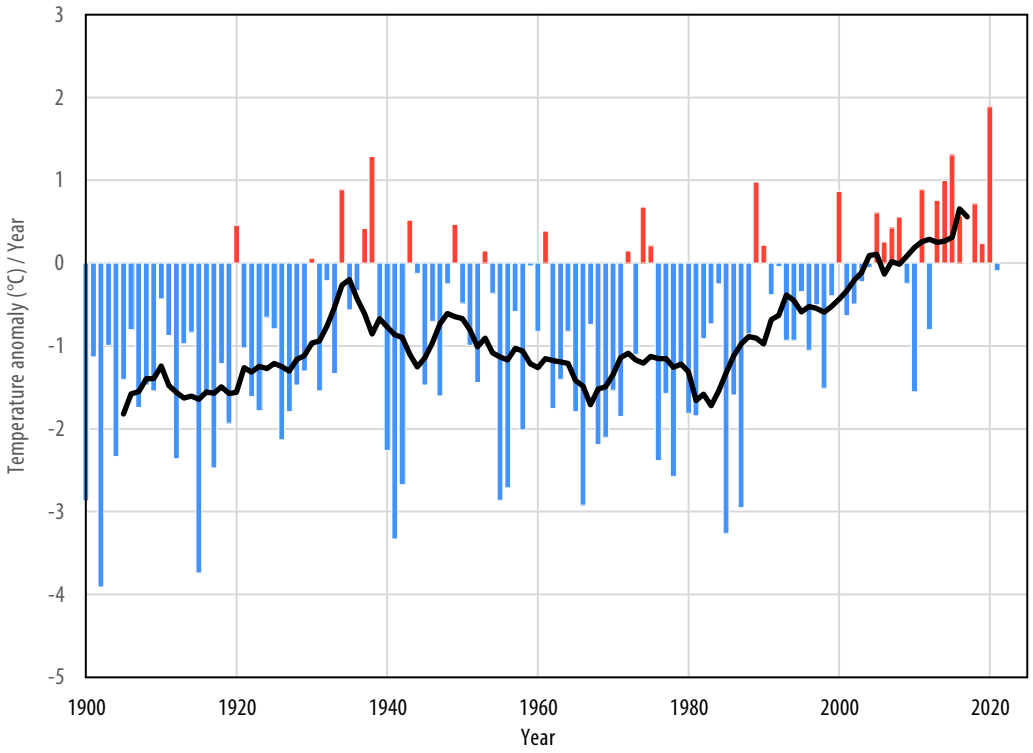
Research shows that Finland's climate has already changed in some respects compared to pre-industrial times. The future scale and impacts of climate change in Finland depend primarily on the success of global climate change mitigation efforts. This involves uncertainties that climate scenarios seek to assess.

The large-scale development and change of society, the economy and nature affect the development of exposure and vulnerability factors as well as adaptive capacity. This is why the climate change-related risk and its consequences will change over time due to changes in climate as well as in exposure and vulnerability factors and adaptive capacity.

2.2.2 Finland's climate has already changed

Finland's annual mean temperature has already risen (Figure 2) and is up by about 2 °C compared with the mid-1800s. This rate of warming is around twice as high as the global average. Over the most recent 30-year period, i.e., the statistical normal period 1991–2020, the mean temperature was 0.6 °C higher than the mean temperature of the previous reference period of 1981–2010. The biggest change has been seen for December and the smallest for June and October. Compared with 1961–1990, the mean temperature has risen by around 1.3 °C.

Figure 2. Finnish mean annual temperature anomaly from the 1991–2020 average in 1900–2021. The red bars represent years that are warmer than average and the blue bars years that are colder than average. The black line represents the 10-year rolling average of the mean temperature anomalies.



Climate change has, above all, affected winter conditions in Finland. Shorter winters have resulted in reduced snow cover in the south. Permanent snow cover, that is, the longest uninterrupted winter period with snow cover, has become 1–2 weeks shorter in southern and central parts of Finland compared with the 1981–2010 reference period. The change is even greater when compared with 1961–1990: the duration of permanent snow cover on the southern and western coast is now more than a month shorter.

An increase in the number and intensity of heatwaves has been observed in recent decades. Warm weather and long uninterrupted heatwaves also cause local droughts. With the climate warming, the thermal growing season (the period when snow has melted from open areas and the mean daily temperature exceeds +5 °C) has also become longer and the temperature sum has increased.

The changes in precipitation and drought are not as clear as the temperature changes. Slight increases over the long term have been observed in annual precipitation. The rate of increase has been highest in the winter months. Annual variability in precipitation is, however, considerably high in Finland compared with, for example, the variations in temperature between years, and changes are not as clearly observable as is the case with temperature. Drought is a relatively rare phenomenon in Finland, with no increase in drought periods observed yet. There is no comprehensive research on the topic, however.

Finland's wind and storm climate is characterised by major variation between years and decades. Based on weather observations, the average annual wind speeds have fallen slightly in recent decades. No statistically significant long-term trends can be observed in the number of windstorms. By contrast, an increase can be seen in conditions facilitating the occurrence of thunderstorms, but there is uncertainty as regards how this is reflected in changes in gusty winds.

2.2.3 Finland's climate is changing further in the future

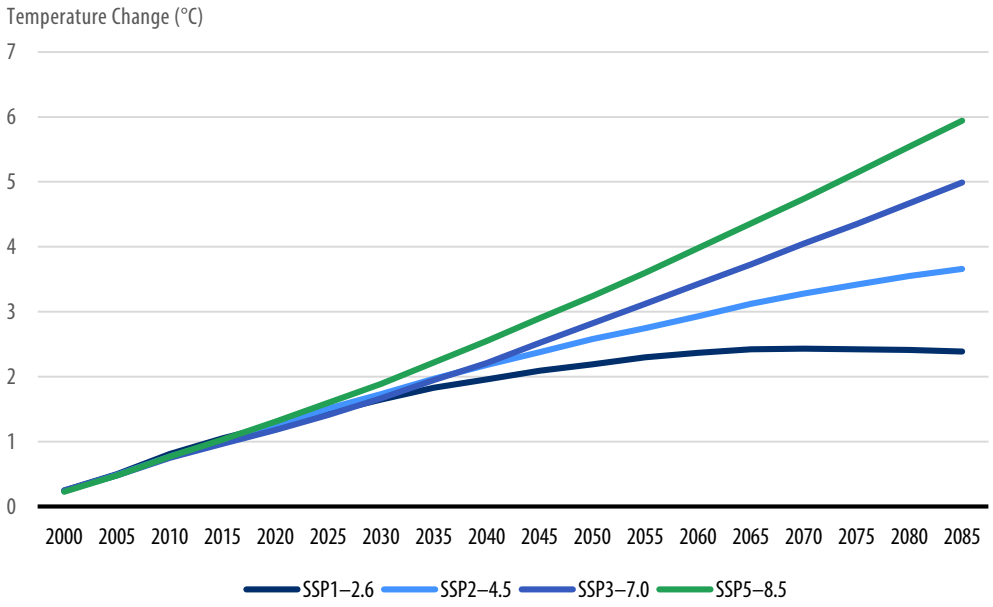
Impacts of climate change are studied using climate scenarios based on climate models produced by the Intergovernmental Panel on Climate Change (IPCC), with a number of different emissions scenarios underlying these. In 2021, the IPCC published a new framework for emissions scenarios, seeking to provide narratives for climate futures and socioeconomic futures, these being to some extent interlinked. There are four of these global Shared Socioeconomic Pathways (SSP). SSP1–2.6 represents the lowest, SSP2–4.5 intermediate, SSP3–7.0 high and SSP5–8.5 very high greenhouse gas (GHG) emissions.

Owing to current emissions development and mitigation policy, the chances of the very high emissions scenario materialising are estimated to have decreased during the years preceding the preparation of this plan. The impacts and consequences of climate change involve an abundance of uncertainties, especially over the long term, due to uncertainties relating to climate models, emissions developments and society's general futures-related developments.

Finland's climate scenarios regarding temperature and precipitation were updated in 2021 based on the latest IPCC scenarios. As regards temperature, the results of the latest climate scenarios are similar to those based on earlier scenarios. Figure 3 shows that Finland's mean annual temperature is projected to rise by around 2–6 °C by the end of the century, depending on the SSP scenario used. The most sunbstantial change in the results of the new scenarios is that the warming of

Finnish summers is projected to exceed the projections based on earlier scenarios. However, in the future, warming will still be stronger in the winter than in the summer. On a timescale of one hundred years, Finland's mean annual temperature will rise at a rate around 1.6 times the global average.

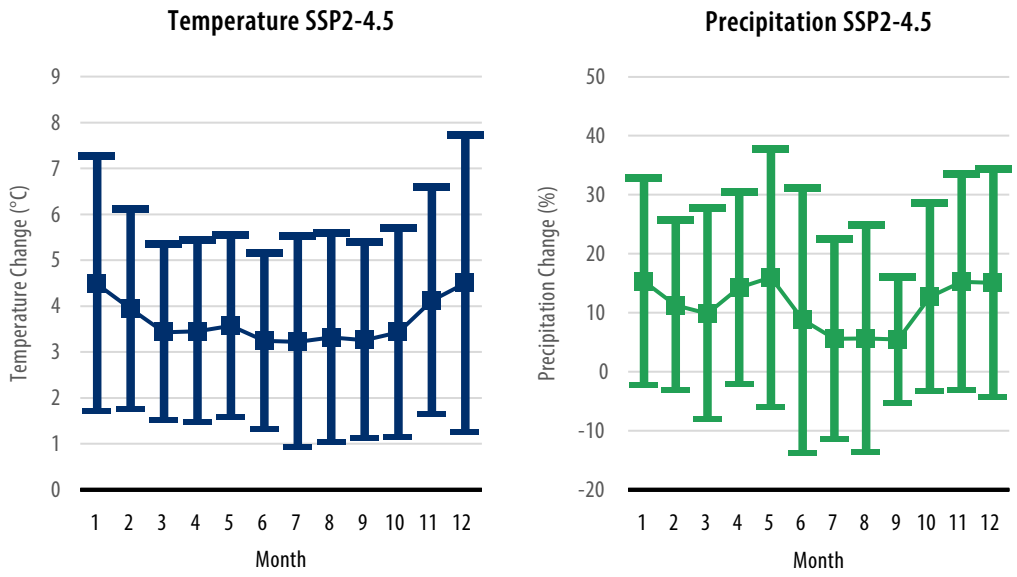
Figure 3. Temporal evolution of annual mean temperature in Finland in 2000–2085 compared with 1981–2010. Responses to the four different climate scenarios are based on the outputs of 28 global climate models.



Total precipitation is projected to increase as the climate changes. The increase will be higher in the winter than in the summer, although in southern Finland the change may turn out to be very minor. Heavy rains in the summer are expected to intensify. In addition, the amount of incoming solar radiation may decrease due to increased cloudiness.

Figure 4 shows the projected change in mean temperature and precipitation by month when moving from 1981–2010 to 2070–2099. The calculations for the figure are based on the "interim" GHG scenario of SSP2–4.5, the materialisation of which would mean the global mean temperature in 2081–2100 being an estimated 2.7 °C above the pre-industrial level.

Figure 4. Changes in Finland's (a) monthly mean temperatures (°C) and (b) precipitation (%) from 1981–2010 to 2070–2099. The curves represent the averages of the changes projected by the climate models and the vertical line segments denote the 90% confidence interval in accordance with the IPCC's SSP2–4.5 scenario.



The number of hot days (with temperatures exceeding 25 °C) in summer are expected to increase and heatwaves are anticipated to become longer and more intense. Regardless of increases in precipitation, the scenarios also project the increased prevalence of periods of drought due to the increased occurrence of severe weather events and the increased evapotranspiration caused by rising temperatures.

The warming of the climate will also lengthen the thermal growing season, and the effective temperature sum of the season will increase. On the other hand, the winter frost sum and temperature fluctuations will decrease, as the temperature change is proportionally greater with regard to the lowest sub-zero temperatures. The depth of soil frost will decrease and the soil frost period will shorten.

With the winters becoming milder, a greater share of winter precipitation will fall as rain. This will affect flow rates of rivers and streams and the occurrence of fluvial floods, mainly in the form of spring floods becoming reduced but winter floods becoming more common. The direction of change in fluvial floods varies from increase to decrease depending on location, the period examined and the characteristics of the river basin. The flood risk is projected to increase particularly

in the large water bodies of southern and central Finland as precipitation increases. By contrast, the changes seen in the near future in more northern parts of the country may be quite small and the direction of change is uncertain, depending on whether the increasing precipitation will be snow and whether the snow will melt all at once or gradually over the winter. The seasonal variation and increased intensity of floods will challenge the performance of current risk management methods.

The rise in sea level varies on the Finnish coast depending on the location. In eastern Gulf of Finland, the interim scenario shows an upturn in sea level, resulting in a 20–30 cm rise by the end of the century. If the highest scenario materialises, the sea level may rise by 70–80 cm from the current level in eastern Gulf of Finland by 2100. By contrast, in the Bothnian Bay, the rate of land uplift is high enough to counteract the rise in sea level at least until the 2040s or even until 2100, depending on the scenario used.

All in all, Finland's flood risk is projected to decrease slightly over the short term but to double or triple by 2100 if the current flood risk management measures are not continued and implemented as planned. The increase in risk is mainly due to the assumed steady economic growth increasing the value of damaged property. Over the short term, the risk is reduced in particular by climate change, as the flood risk may decrease in many river basins and the rise in sea level will not yet significantly increase the coastal flood risk over the short term. Over the long term, the mean sea level rise will clearly increase the probability of coastal floods too, particularly on Finland's southern coast.

The period of Baltic Sea ice cover will become shorter, but ice conditions may be challenging in the decades ahead, too. Cold and mild periods shifting back and forth create ice conditions that hinder shipping. The role played by changing sea ice conditions is greater in the northern part of the Baltic Sea, especially as regards shipping.

Windstorms have caused significant impacts, including electrical power outages, in recent years. No major changes are projected on the basis of climate scenarios in wind storms, however. Changes in mean wind speeds are also anticipated to be minor. There are, however, several uncertainties involved in the assessment of future changes in storm occurrence. The total number and intensity of strong wind storms are projected to decline in the North Atlantic Ocean.

In the light of current knowledge, phenomena related to thunderstorms, such as lightning, downbursts and tornadoes, are not anticipated to change in the next few decades. There are, however, major uncertainties involved in long-term scenarios in particular. Major variation between years and randomness are still emphasised in the occurrence of phenomena, particularly as regards the strongest phenomena. It should, however, be noted that, if global warming takes place according to the most pessimistic IPCC emissions scenario, there will be a considerable increase in thunderstorms specifically in Northern Europe.

2.2.4 Climate change-related risks and vulnerabilities related to nature and society

2.2.4.1 Finland is relatively safe from the most serious consequences of climate change

Action and measures to strengthen climate change adaptation have been carried out for a long time in Finland. Measures that generally improve society's functioning and preparedness for risks and various extreme conditions are not, however, always recognised as climate change adaptation regardless of them bolstering it.

In international comparison, the impacts of climate change seen within Finland's borders appear to be rather small, particularly during the decade ahead. In global comparison, Finland is well-prepared for additional challenges brought about by climate change. Finland's stable society, well-maintained infrastructure, well-functioning government and administration, high level of education, gender equality and societal service system improve the country's opportunities to prepare for and adapt to a rapidly changing climate.

Climate change does, however, involve major risks for Finland, too. In addition to the changing climate, these are affected by current and future societal and economic developments. The risks vary greatly from one part of the country to another and depend on specific regional characteristics, such as location as well as economic and population structure. Regional livelihoods, nature and other elements of society have adapted to the current climate, but climate change will result in risks growing around Finland, including the Arctic and Baltic Sea Regions.

At the regional level, the greatest differences are based on geographical location, which means the climate change-related risks will be very different in the north and the south. Whether a region is located on the coast, inland or close to the external border also affects the exposure and vulnerabilities of the region. In addition to

geographical location, the urban/rural distribution also has a major impact on the risk. In urban areas, the concentration of people, buildings and economic activity on a small area makes it difficult to manage stormwater, for example. In rural areas, climate change may have a more direct impact on livelihoods, and rural-to-urban migration may make it more difficult to implement adaptation measures due to declining economic resources at the regional and municipal levels.

Climate change increases risks posed to aspects such as nature and biodiversity, natural resource sectors, infrastructure and the built environment, industry and the economy, health, safety and security. It is therefore important to reduce climate change-related risks effectively. Risks are only rarely targeted at a single sector, and it is key to identify the indirect impacts and impact chains arising from the interdependence of sectors and administrative branches in efficient and proactive adaptation.

2.2.4.2 Risks to biodiversity and ecosystems

Impacts on biodiversity differ depending on local conditions, species and habitats. The rising mean temperature, fewer periods with considerable sub-zero temperatures and the temporal shift of the seasons have already caused large-scale changes in Finnish natural ecosystems and biodiversity. Climate change is anticipated to accelerate biodiversity loss, and biodiversity loss in turn intensifies climate change.

Climate change also affects the capacity of ecological networks and corridors to function, that is, it affects interactions between species. As species live in interaction with each other, changes in the abundance or, overall, the occurrence of one local population inescapably results in feedback to other species. Human activity has already had and will continue to have direct impacts on ecosystems and biodiversity loss in many ways, which in turn reduces nature's own capacity to adapt to impacts caused by climate change.

The temporal and spatial distribution of species has changed. As the climate changes, habitats suitable for species shift and many species follow this shift, resulting in a northward or north-eastward shift in species distribution. The situation is particularly challenging to species adapted to the Arctic conditions of Lapland, as they are unable to move further north. Changes in the distribution range of species have also taken place in protected areas, and climate change may result in species moving outside protected areas, too.

The impact of alien species on native species is currently most significant in southern Finland. It has, however, been anticipated that impacts are more broadly visible by the end of the century. As the climate changes and, especially as winters become milder, many alien species that so far have shown low reproductive and dispersal rates will increase in abundance and may become invasive alien species. Alien species may already today displace indigenous species in various habitats, and the impact is expected to increase in the future.

Climate change will have significant impacts on the conditions of the Baltic Sea. The clearest signals are that the sea level will rise, ice cover will decrease, sea water temperature will rise and sediment input from river water will increase, intensifying eutrophication and other changes in water chemistry. Changes can also be anticipated in the salinity and biogeochemical parameters of the sea, such as oxygen concentration, but these are still uncertain. On the west coast of Finland, there are nature values linked with the land uplift phenomenon that are unique even by international comparison. This process is jeopardised when the sea level rises due to climate change and relative land uplift decreases.

When biodiversity declines, the capacity of the ecosystem to provide ecosystem services – goods and services provided by the natural environment that are important for humans – may decline. Many ecosystem services are also dependent on the preservation of ecosystem, species and genetic diversity. In addition, the decline of natural habitats in terms of quality and quantity also increase the risk posed by climate change to natural ecosystems and to their diversity.

2.2.4.3 Risks to natural resources and natural resource sectors

The wellbeing-related and economic role of forests is significant in Finland. Forest health in Finland has so far remained mainly good, and issues such as tree deaths caused by the European spruce bark beetle (*Ips typographus*) have so far been localised. Forest damage risk is caused by both biotic factors (such as the elk (*Alces alces*), various fungal diseases and bark beetles (*Scolytinae*), and other mammals and insects) and abiotic factors (such as wind, snow, drought and forest fires). In recent years, most significant forest damage has been caused by abiotic factors, especially wind and snow. Wind damage is projected to increase in the future, primarily as the ground frost period is shortening and winter precipitation increasing, which makes trees less resistant to wind damage.

The changing climate increases risks to forestry and the forest industry, and not all negative impacts caused by climate change are currently fully known. Forestry plays a particularly important role for regional industry and economy as a whole in Kainuu, North Karelia and South Savo. The impacts of climate change on forests may have particularly significant effects on the economy of these regions.

When examining forest health, it is important to consider the combined effects of damage. In a changing climate, trees are increasingly exposed to drought stress, which is likely to result in combined effects: stress exposes trees to fungal diseases and further to pests such as bark beetles, while root rot fungi (*Heterobasidion* spp.) expose trees to wind damage. Increases in abiotic damage will increase the risk of insect damage: occurrence of bark beetles grows through wind damage and in drought-stressed Norway spruce (*Picea abies*) trees. The most vulnerable forest stands are aged Norway spruce stands, monodominant forests and edges of clear-cut sites. Snow damage also occurs in areas exposed repeatedly to crown snow load throughout Finland.

Increasing drought and heatwave periods increase the risk of extensive forest fires. Forest fires are a natural part of the life cycle of forests, but they cause financial losses to forest owners and potential threats to humans and require significant resources for rescue services. So far, extensive forest fires have been successfully controlled by means including the efficient fire protection and detection systems, dense forest road network and silvicultural measures. The structure of Finland's forests is also effective in reducing the risk of forest fires, as forest compartments are small, especially in southern Finland. Human activity in forests is a significant factor for the emergence of the forest fire risk. It should also be noted that the reduction in forest fires starting from the 1960s has resulted in a decline in many species and ecosystems that are dependent on them.

Climate change adds to the challenges faced in agricultural production, as production risks increase following an increase of weather variability. This causes fluctuations in crop yields and declines in crop quality. Arable farming faces challenges caused by increasing plant pest pressure, increasing heavy rains and excessively wet fields, southern Finland's shorter or absent ground frost periods and, in particular, coinciding high temperatures and drought and, consequently, increasing evapotranspiration during the growing season. The impacts of climate change on the operating conditions, profitability and competitiveness of agriculture will increase in the future. Over the long term in particular, climate change may affect Finland's food supply as well as food and nutrition security.

Extreme weather events, such as very hot spells in the summer, are the most important impacts of climate change on aquatic ecosystems. In overall terms, the tolerance of fish species to changing conditions varies, with some species and life stages being more vulnerable than others. The rising water temperature has adverse effects on the success of cold-water species, such as Atlantic salmon (*Salmo salar*) and common whitefish (*Coregonus lavaretus*), and benefits fish species that thrive in warmer and more nutrient-rich waters. The absence of winter ice cover may also reduce the reproductive success of fish species such as common whitefish and vendace (*Coregonus albula*).

So far, stocks of the most important target species are mostly in good shape. The biggest problems are seen in migratory fish stocks. The status of migratory fish is weak, as they are suffering from migration obstacles, with several species being threatened and unable to withstand fishing. The reproduction of many fishes that spawn in the spring or summer has benefitted from the temperature rise.

Flow-through aquaculture facilities suffer from increases in water temperature. For example, in the hot summers of 2014, 2018 and 2020, this resulted in extensive fish mortality. Increasing eutrophication has negative effects on aquaculture production in inland and coastal waters alike, partly due to any potentially stricter environmental permit procedures.

Reindeer husbandry is a livelihood that is sensitive to the negative impacts of climate change. Climate change and changing weather conditions have direct effects on the food access, health and wellbeing of reindeer and on reindeer husbandry. In addition, climate change has indirect impacts through changes in the grazing environment. Reindeer husbandry is an inseparable part of Sámi culture, which means climate change also has major sociocultural impacts.

Climate change affects game species by, for example, changing habitats and causing an earlier onset of spring. The courtship period of, for example, gallinaceous birds starts earlier, species with white winter camouflage suffer from the lack of snow and species benefitting from temporary wetlands are also adversely affected. Moreover, invasive and alien species may affect relationships between species.

2.2.4.4 Risks to infrastructure, the built environment and health

A functioning infrastructure and built environment, such as energy supply, power and data transmission, transport infrastructure and logistics, water services, and land use and the building stock play a key role in the emergence of risks in many

sectors that depend on them. Consequently, the management of weather and climate risks related to infrastructure and the built environment has a significant impact on society's robustness.

Extreme weather events have caused incidents in the Finnish energy sector and, in particular, damage to the electricity distribution infrastructure. To reduce the risk of damage, in recent years, overhead lines have been replaced with underground cables, especially in sparsely populated areas. In most urban areas, underground cabling has already been introduced earlier. Infrastructure upgrade is, however, a slow process due to the long-term nature of the investments, and this is why electrical power outages caused by weather events will still be seen in the future. To secure incident-free power transmission in the main grid, trees are regularly cleared from main grid transmission line areas and a sufficient distance of trees and shrubs from power lines is ensured. Society's electrification and dependence on technology increase society's exposure to climate change, as these result in increased requirements concerning the security of power production and distribution. The functioning of the power grid is also important for the functioning of information networks.

In the future, the consequences of climate change to the functioning of the energy system will depend partly on how the system changes following the currently ongoing green energy transition. Impacts are likely to affect energy production, transmission, distribution and consumption alike. The increased share of renewable energy sources, in particular wind and solar power, in the electricity mix also increases weather-related production variation. Long dry spells reduce the production of hydropower. This is of significance, as hydropower plays an important role as a source of balancing power and also more broadly because the price of electricity in the regional power market is largely determined by Nordic precipitation rates. Nuclear power plants may have to curb their power output during hot summers as cooling water becomes too warm.

The impacts of climate change on the transport and communications infrastructure have significant effects on society's robustness, as incidents in and degeneration of infrastructure have cascading effects on other sectors through the transport of passengers and goods and dissemination of information. The impacts of weather and climate on the transport system cause accident, damage and delay risks that result in costs, value losses and health effects. Climate change may cause increasing disturbances related to critical elements of the transport infrastructure, increase operating costs, exacerbate the infrastructure funding gap and cause major

spill-over effects on society and the economy. Climate change has has effects and needs to be taken in account in adaptation on all levels of transport system for example from railway and road structures to their maintenance.

With icy conditions becoming more common due to climate change, and with the population ageing, Finland is likely to see increases in the occurrence and seriousness of slipping accidents among pedestrians and cyclists. This will result in an increased burden on healthcare systems. The majority of slipping accidents requiring medical attention occur among the working-age population, and therefore the increasing risk of injury in the winter will be a significant work ability and occupational safety issue in the years ahead.

Water services provide access to clean water and well-functioning sewage treatment. The Finnish water services sector is, as a rule, well placed to adapt to climate change, but floods, increasing surface runoff, rise in mean temperature, changes in the ground frost situation and quality variation in raw water resources may cause problems to water utilities relating to technology and water quality. Drought may cause issues relating to the quality and sufficient quantity of water, and torrential rains increase nutrient leaching into raw waters. The consequences affect human wellbeing, health and the economy. The maintenance backlog of the water services infrastructure is a vulnerability that has already been identified, and the risks related to a network that is in poor condition may increase due to climate change.

The impacts of changes in moisture load on mould risk in structures is a complex issue and will materialise in different ways in different parts of Finland. The related challenges mainly concern the existing property stock that was not designed or constructed for the climate of the future. The impacts are also very different depending on when the buildings were constructed and which materials were used. An increased moisture load causes an indirect health risk. All risks to the building stock also have spill-over effects on built cultural environments and building heritage.

Climate change poses challenges to the built environment due to regional and seasonal variation. Finland will have to continue to prepare for current and, regionally, even increasing snow loads, with variation seen between years. The functionality of buildings is also related to health risks during heatwaves. As is the case with the increasing mould risk, the health effects of heatwaves mainly relate to the current property stock. The scale of health risks is highly dependent on the construction year and purpose of use of the building. In addition, the management of the risk depends greatly on the type of building. Prolonged heatwaves increase

the risk of heat-related morbidity and mortality, particularly in such vulnerable groups of people who live in urban heat islands in dwellings where the indoor temperature cannot be lowered or ventilation cannot be intensified.

Climate change also affects the durability conditions of certain structures. The frost weathering of concrete is affected by factors including changes in the rate and time of precipitation and in freeze-thaw cycles. The change in frost weathering will also show significant regional variation in Finland, with different impacts seen in different parts of Finland. With concrete being a very common material used in building exteriors, these impacts are mainly economic.

In urban areas, the increased intensity of torrential rains together with the increasingly dense urban structure will result in a growing stormwater flood risk, particularly in already built-up areas. Stormwater floods cause economic impacts and often acute high-capacity pumping operations for the rescue services. In the worst cases, large-scale stormwater floods may cause significant incidents and have adverse effects on the performance of duties such as prehospital emergency medical services. The adverse effects of heatwave periods are also greater in urban environments than in the surrounding areas due to the heat island phenomenon and partly due to the building stock. The mobility of people using assistive devices may be further restricted during extreme weather events.

2.2.4.5 Risks to other sectors

Climate change poses a threat to cultural heritage and cultural environments through factors including extreme weather events, increasing floods and rising sea level. Climate change has already had significant impacts on, for example, the environment, livelihoods, culture and cultural heritage of the Sámi.

National defence faces the same climate change impacts and risk factors as civilian society. In addition, climate change may have impacts on training, exercises and operational activities. The climate change-induced changes in the operating environment also affects the training, exercises and operational activities of the rescue services.

Floods and other extreme events associated with weather pose significant direct risks to industry, too. Loss or damage caused by floods may be substantial, particularly if floods cause long-term production disruptions. The increased occurrence of torrential rains in particular may increase water management risks in mining operations. In the light of historical data, water management issues have caused most of the disruptions experienced in mines.

Nature-based tourism and, in particular, tourism in northern parts of Finland, focuses on the winter and is therefore highly dependent on snow. December is the most important international tourism season in Lapland and highly dependent on snow.

As regards the recreational use of nature, opportunities for winter sports in particular will decline. Recreational winter ice fishing will become increasingly uncertain. Cross-country and downhill skiing will require increasing volumes of artificial snow, which in turn will increase costs and energy consumption. The maintenance of winter trails calls for a great deal of attention to safety when, for example, the ice situation becomes more uncertain.

2.2.4.6 Economic risks

The risks caused by climate change to the private sector and the economy can be divided into two categories: 1) transition impacts and 2) physical, direct impacts. Transition impacts are mainly caused by changes in asset prices due to the transition to a more carbon-neutral society and, consequently, these are not discussed in conjunction with this plan.

The economic impacts related to climate change are divided into acute and chronic impacts. Acute impacts and losses are caused by the direct impacts of damage-causing weather events and related incidents and disasters. Chronic impacts and losses are caused by long-term climate changes, such as rising sea level or changing winters. Both can result in changes in the efficiency of economic activity, as changes take place in economic productivity when operating conditions change. The change is mostly harmful and reduces productivity, but climate change may also provide opportunities for productivity improvements in, for example, agriculture. Acute and chronic risks may also result in a decline in the value of capital and factors of production if capital is fully destroyed or if the capability of capital to enable efficient activity is reduced.

Assessing the economic impacts of climate change is complicated because of the multiple uncertainties involved. Assessing the impacts on the national economy involves major uncertainties for reasons including the fact that the change is a unique event in modern societies. Due to the impacts being non-linear and the thresholds irreversible, historical observations have low capacity to predict the future, especially if climate change mitigation measures are unsuccessful.

Some of the uncertainties can be addressed by using scenario options. Although the trajectory of climate change and the socioeconomic trend (GDP, population) have been determined, there still remain several uncertainties related to climate change intensities, the material impacts experienced (harm or benefit) and the economic impacts (direct costs or benefits and (ultimately) macroeconomic impacts). Climate change impacts may result in consequences that may be distributed unevenly among the various actors and, for example, harm one but benefit another, even leaving the macroeconomic net impact close to zero. These impact chains are also affected by other issues, such as the condition of nature and economic capital and insurance coverage.

Despite the uncertainties, some economic impact chains can be assessed qualitatively. The rising temperature is expected to affect future production capacity and productivity particularly in agriculture and forestry, transport and energy production and to alter tourism flows. Changes in price ratios due to changes in supply and demand affect the profitability and investments of the various sectors. Slowing economic growth also affects the volume of international trade. Impacts take place in Finland and globally.

Private consumption declines if asset losses are great. Enterprises also experience financial losses, but the change in investments is more difficult to anticipate, as damage increases the need to rebuild production capacity.

The acceleration of forest growth may increase the productivity of forests, but the shortening of the ground frost period exposes trees to wind damage and complicates forest harvesting. The higher risk of diseases and pests may also result in sizeable impacts on forestry.

As regards transport conditions, climate change has two kinds of impacts in Finland. On the one hand, the need to remove snow may decrease as winters become warmer, but the repair and de-icing costs in road transport may increase considerably. The decline of the road infrastructure may also have economic impacts on other sectors.

The rise in mean temperature will reduce winter construction costs, but climate change may cause disruptions in goods deliveries and deterioration in working conditions. The repair backlog and maintenance need of buildings will increase due to increased winter rainfall and increased prevalence of temperatures close to zero.

As regards tourism, the net impacts are likely to be positive, even though the decline in snow cover especially in southern and central Finland will hit winter tourism. Lapland's relative status as a tourism destination may improve both nationally and internationally. Finland's attractiveness as a summer tourist destination may improve compared with more southern countries where drought, heat and shortage of clean water will be a growing problem.

The need for heating energy will decrease, but the consumption of energy used for cooling will increase. The net impact is a decrease in average energy consumption, which will worsen the position of producers and but improve the position of consumers. The rise in mean temperature may improve opportunities for bioenergy production.

For Finland, the impacts of sea level rise will remain low for a long period of time, as they are to be reduced by the land uplift phenomenon and by flood risk management measures. The rockiness of Finnish coastal areas also improves resistance to erosion. Over the very long term, the rising sea level may cause major problems and significant economic harm, especially in low-lying coastal areas.

The net impacts of climate change on health and work ability will be limited in Finland. Finland is currently among the countries with the lowest mean temperatures in the world. The challenge may be that Finns have adapted to cold temperatures, which means rapid changes in particular are problematic. The rise in mean temperature will improve conditions for working outdoors and reduce cold-related health problems. The increased occurrence of hot spells will reduce the productivity of work on hot days.

New diseases may emerge and the occurrence of some existing (such as tick-borne) diseases will increase, leading to higher healthcare costs. Finland's high standard of living and relatively good state of public health and healthcare will enable adaptation to these.

A major economic issue is how the costs of the ensuing damage will be distributed between the private and public sectors. For example, the deterioration of transport connections will cause improvement costs for the public sector and costs for the private sector arising from delays in deliveries or the use of alternative routes.

The private economic impacts of extreme weather events will depend considerably on whether the damaged item is insured. Damage to insured items will naturally also have implications for the insurance sector. The biggest impacts on the stability of the financial market and economic development will, however, arise from uninsured loss or damage. Loss or damage related to uninsured items may double or triple from the original level due to actors' insufficient capacity to recover from

the adverse effects. Some of the uninsured losses may be experienced by banks, for example in cases where a disaster affects loan repayments and/or real assets used as collateral.

Unlike in many other EU countries, in Finland the state does not compensate at all for damage caused by exceptional weather conditions. This means the private insurance sector is highly exposed to the impacts of climate change in Finland. From the beginning of 2014, compensation for damage caused by exceptional flooding to buildings and movables has only been available under flood cover included in home insurance policies. Likewise, a switch was made at the beginning of 2016 from a state-funded compensation system to an insurance-based system in compensation for crop damage in agriculture. The risk to insurance companies arising from climate change depends not only on the changing climate and the ensuing increases in uncertainty but also on insurance coverage and the duration and other terms of insurance policies.

Weather events have been reflected in Finnish non-life insurance. For example, the thunderstorms of 2010 caused major economic impacts. Although no significant changes are projected for thunderstorms in the decades ahead, climate change may have impacts through other ways on issues covered by property and life insurance.

It is estimated that in Finland the gradual changes in temperature and precipitation will have greater impacts on the economy than any occasional extreme weather events, as Finland is capable of rapid recovery from the consequences of extreme weather events. The direct impacts of climate change on the national economy will emerge gradually. The long-term costs of the impacts will depend materially on the level of success in the global mitigation of and local preparedness for and adaptation to climate change. The impact of climate change on Finland's GDP over the short term will be limited but not insignificant. The impact may also increase significantly if the tipping points of climate change are crossed.

Climate change may result in significant economic impacts and chronic macroeconomic losses for Finland, particularly if mitigation policy is unsuccessful and adaptation measures are not stepped up from the current level. Proactive and preventive adaptation is estimated to reduce losses caused by climate change more efficiently than reactive adaptation. The cumulative benefits created by a proactive and preventive strategy are estimated to generate savings amounting to around EUR 5–8 billion in Finland in 2040–2070 compared with a reactive strategy, depending on the climate scenario. With regard to Finnish national economy and general government finances, mitigation measures and related price changes and technological advances will still remain more visible during the current decade than direct economic impacts caused by climate change.

2.2.4.7 Cross-border impacts of climate change

There are cross-border impacts of climate change that originate from outside the Finnish borders but extend to Finland. The impact chains of such cross-border climate change impacts can be divided into seven categories:

1. International trade (such as flows of commodities on international markets)
2. Finance (the movement or temporary change in value of public and private capital)
3. People (movement of people across borders, such as through migration and tourism)
4. Geopolitical (such as international relations, resource access and strategies)
5. Biophysical (such as water transfer among hydrological systems and movement of species, pests or pathogens)
6. Infrastructure (such as transport and telecommunications networks, energy); and
7. Psychological (impacts brought about by actions of different actors and particularly the media, based on their perceptions and communication of cross-border risks).

Climate change impacts taking place through the described impact chains have direct and indirect impacts on the Finnish society and the economy. The cross-border impacts of climate change may emerge in many different ways and in many sectors.

Finland is a small country with an open economy, with our manufacturing and many sectors critical for our security of supply being quite dependent on long value chains. Sectors identified as particularly vulnerable to cross-border impacts are those industries whose value chains' critical components are located outside of Finland in areas vulnerable to climate change. This increases their vulnerability to cross-border impacts.

Finland's food security is in many respects vulnerable to cross-border climate change impacts. Especially in the absence of adaptation measures, climate change will affect the production conditions of many important raw materials and commodities, such as coffee. Sectors such as pharmaceuticals production focus on China and India, with the latter in particular being located in a region sensitive to climate change. This may be reflected in both price increases and weaker availability.

Cross-border impacts may also be seen as increased rates of population movement. Climate change is linked with several other root causes of migration, such as population growth, poverty, unemployment, lack of prospects, wars and conflicts, and may intensify the push factors that drive migration. From the EU perspective, the greatest impacts of climate change with regard to migration affect the south. The indirect impacts of the phenomenon on Finland may be major through developments such as the weakening of the EU's cohesion. Over the longer term, Finland may turn into an attractive destination for those whose living environment becomes inhabitable due to climate change.

In addition to problems relating to deliveries of raw materials and population movements, manufacturing industries may experience significant indirect impacts due to issues such as price volatility and general economic uncertainty as well as inefficient regulatory solutions.

2.2.4.8 Opportunities and benefits of climate change

Regardless of the major challenges, climate change may also create opportunities for some sectors. Making use of these opportunities will, however, require investments in adaptation measures.

Climate change may benefit sectors such as Finnish agriculture and horticulture as well as forestry in the initial stage thanks to effects such as the longer growing season. At the same time, the impact of climate change on the risk of damage, discussed in section 2.2.4.3 above, should also be taken into account. Increased forest growth may accelerate harvesting cycles and increase timber harvests. Forest growth will increase in northern parts of Finland in particular. Finland may also receive increased inbound tourism.

Climate change may also create some benefits in aspects such as water protection if plant cover in areas bordering on water bodies increases due to longer growing seasons. On the other hand, climate change will increase winter runoff and washout from fields with no snow or plant cover. In such cases the anticipated benefit may not be obtained.

2.2.4.9 Community- and regional-level vulnerability

Population ageing throughout Finland increases population-level vulnerability to climate change. For example, during heatwaves and icy conditions, older people are particularly vulnerable due to their often poorer state of health, with adverse health effects affecting them specifically. Most slipping accidents occur, however, among the working-age population.

Population ageing results in the increased occurrence of long-term health conditions, which in itself causes a burden on the healthcare system and the availability of basic public services, especially social welfare, including home care, services. This makes it difficult to respond to sudden increases in care needs during periods such as heatwaves. At the same time, work disability among young people is increasing, especially for mental health reasons. Societal debate on climate change may create a sense of lacking prospects in young people, adding to their mental health challenges.

Finnish regional structure is undergoing strong divergence, with a few urban regions growing and the rest of the country experiencing population loss. The aim is for regional and community structures to be functional, mobility to be sustainable and easy for all age groups, and services and jobs to be nearby and easy to access.

The contraction of the working-age population will continue in the years ahead. This is a major challenge for the dependency ratio, employment rate and economy of many Finnish regions. The change can be seen particularly in rural areas, where young people's migration to urban areas is also projected to continue. The biggest driver of change in rural areas is population decline and concentration on cities. The rural population is ageing, which may mean that rural depopulation will accelerate in the future. This may also make it more difficult to carry out adaptation measures, as regional- and municipal-level economic resources affect how climate change-related risks materialise and how they can be reduced.

At the population level, opportunities for climate change adaptation vary depending on socioeconomic status, as a stable financial position facilitates preparedness for more extreme phenomena and adaptation to climate change. At worst, climate change may increase societal cleavages, as people have different opportunities to influence their own adaptation measures. For example, fitting one's dwelling with energy- and cost-efficient ventilation and lighting solutions usually depends on income level, and those living in supported service housing have poor opportunities to influence how their dwelling is equipped. Lighting solutions are relevant in association with lower levels of incoming solar radiation

in the winter, which is reflected in lower light levels and may result in seasonal affective disorder (SAD) symptoms and their consequences becoming more common at the population level.

Socioeconomic status is a vulnerability factor also regarding food supply and food security. More extreme water conditions and low profitability of agriculture will affect primary agricultural production and increase food security risks in Finland. Food security and food-related security of supply have emerged as increasingly key issues following both the COVID-19 pandemic and the war of aggression launched by Russia against Ukraine in February 2022. The pandemic and the war have resulted in poorer availability and price increases of production inputs, which is reflected in food prices and availability in Finland, too.

2.2.4.10 Institutional vulnerability

Reducing institutional vulnerability is key to reducing community- and individual-level vulnerabilities. The background material to NAP2030 shows that Finland's adaptation policy involves institutional-level vulnerabilities including the following:

- Coordinated and comprehensive preparation of and decision-making on adaptation action based on continuous monitoring and impact evaluation are still in the process of taking shape.
- Statutory obligations and concrete adaptation targets are absent from many sectors. In the absence of obligations and targets, the authorities are only able to encourage actors to adapt.
- At the societal level, vulnerability to climate change is increased by the shortage of labour experienced in the healthcare and social welfare sector and rescue services as well as the maintenance backlog of infrastructure, such as the road network and water services.
- The shortage of human and budget resources allocated to the implementation of adaptation makes it difficult to develop and implement new adaptation measures in many sectors.
- The development of actual climate change adaptation action has been largely based on individual projects and low resources. This has hampered the planning and implementation of regional and local adaptation action in particular. The lack of permanent staff knowledgeable about climate change adaptation is reflected in short-termism in activities. Climate action launched may wither away as human resources change or projects end, for example.
- Many sectors have targets and actions that are not recognised as climate change adaptation. This causes difficulties in monitoring adaptation activity and measuring performance. The fragmentation of adaptation action hampers learning, which results in inefficiency.

- Responsibilities and chains of actions related to climate change adaptation are in part complex, which is something that municipalities and regional authorities in particular have regarded as a challenge. The need to clarify roles is emphasised with Finland's new wellbeing services counties becoming operational on 1 January 2023.
- The non-specificity of regional and local climate data and shortcomings in access to and utilisation of data make adaptation planning difficult. General climate change data is abundantly available, but local, sector-specific and solution-oriented applied knowledge or expertise is not available in all respects. There are also data shortages related to cross-border impacts, which may result in a sector or area whose vulnerability used to be regarded as low actually turning out to be vulnerable.
- All sectors are short of data on the costs and benefits of adaptation solutions. The identification of benefits may open up new opportunities to implement innovative adaptation solutions.
- The lack of systematic monitoring data on adaptation activities makes it difficult to assess the impacts and effectiveness of adaptation measures. Monitoring data is only being developed at the moment.

2.3 Vision: Wellbeing, safety and security in a changing climate

The vision of Finland's National Climate Change Adaptation Plan is to ensure long-term wellbeing, safety and security in a changing climate.

NAP2030 VISION: Wellbeing, safety and security in a changing climate

The vision aims to make sure that the inevitable climate change will not reduce the wellbeing, safety and security of nature, people or society. The changing climate is part of the rapidly changing world around us, and it is imperative for nature, people and the society to adapt to the change.

In 2022, Finnish society enjoys one of the highest levels of wellbeing, safety and security in the world. However, climate change is already affecting people and the environment in many ways in Finland and around the world, and the impacts are intensifying as climate change advances. Climate change threatens the stability, safety and security of societies in many ways, and the decades ahead will see the impacts become even stronger. It is therefore increasingly necessary to adapt to climate change while at the same time taking even more ambitious steps in mitigation measures.

The preparation of this plan began during the COVID-19 pandemic in 2021, and the plan was completed in late 2022, with the war of aggression launched by Russia against Ukraine still underway. The COVID-19 pandemic and the war in Ukraine highlight the need to safeguard security of supply, as they have shown how other, non-climate factors are linked with consequences relating to climate change. For example, any crop failures in important cereal production areas due to climate conditions lead to more serious cross-border impacts when the pandemic and the war have already affected access to agricultural and industrial production inputs and driven prices up.

Even though the consequences of climate change are not as acute or as large in scale in Finland as in regions more exposed and vulnerable to climate change, they still call for foresight and practical adaptation actions. The best way to mitigate risks emerging in years or even decades from now is to already mitigate them proactively today.

2.4 Aims: Strong will, means, and capacity to adapt

Three aims have been derived from the vision adopted for this plan. The aims specify in more detail the adaptation objective included in the Climate Act with regard to strengthening climate change resilience and the management of climate risks.

Qualitative in nature, the aims crystallise the direction of the adaptation policy as a whole. They are not intended to be directly measurable or time bound. The aims are:

AIM 1: Societal actors have a strong will to adapt to climate change

AIM 2: Societal actors have access to efficient means to assess, prevent and manage the climate change-related risks to nature and society

AIM 3: Societal actors have the capacity to prevent, prepare for and manage the climate change-related risks to nature and society

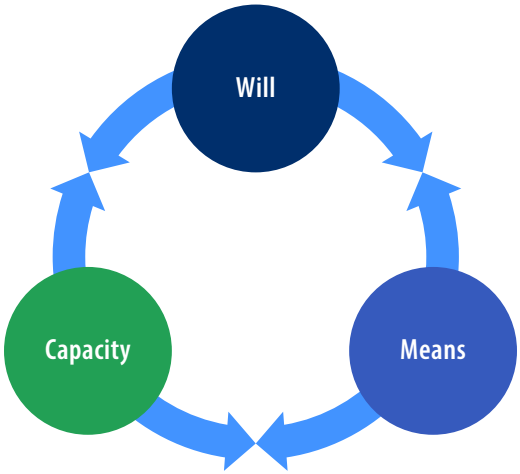
The first aim is to increase the will and commitment related to adaptation action. The consequences of climate change can already be seen in the world today, and the risks will grow in the future. Alongside climate change mitigation, it is therefore essential to adapt to and prepare for the change and related risks already today. It is usually better to prevent consequences beforehand than to fix or compensate for damage afterwards. Adaptation will not, however, happen automatically. It requires an understanding of the need to adapt and of the importance of the adaptation policy and measures as well as broad cooperation, contributions and commitment to implementation by all of society's actors.

The second aim focuses on developing the means of adaptation. Adaptation covers both policies as well as concrete practical means to strengthen the management of risks related to the changing climate. They aim to prevent and reduce climate change impacts, to prepare for and adapt to them and to strengthen society's climate resilience. The means include methods and tools for risk assessment, prevention and management. It is also essential to develop means of monitoring risks and implementation.

The third aim focuses on strengthening adaptive capacity. Adaptive capacity means the capacity to reduce vulnerability and exposure and to carry out short-term preparedness and long-term adaptation actions. The strengthening of adaptive capacity calls for both the will to adapt and the existence of the means of adaptation.

Accordingly, adaptation action is repeated and continuous by nature, and the aims are interlinked. This is illustrated by Figure 5. Making large-scale use of the means, and learning continuously from implementation, will enable stronger adaptive capacity as the climate changes. By learning from experience during implementation, actors are able to further build their capacity to act flexibly in the changing climate. At the same time, we are able to further strengthen our will to adapt and to develop even better means of adaptation.

Figure 5. The three aims of this plan – strengthening will, means and capacities – are interlinked and their progress is mutually dependent.



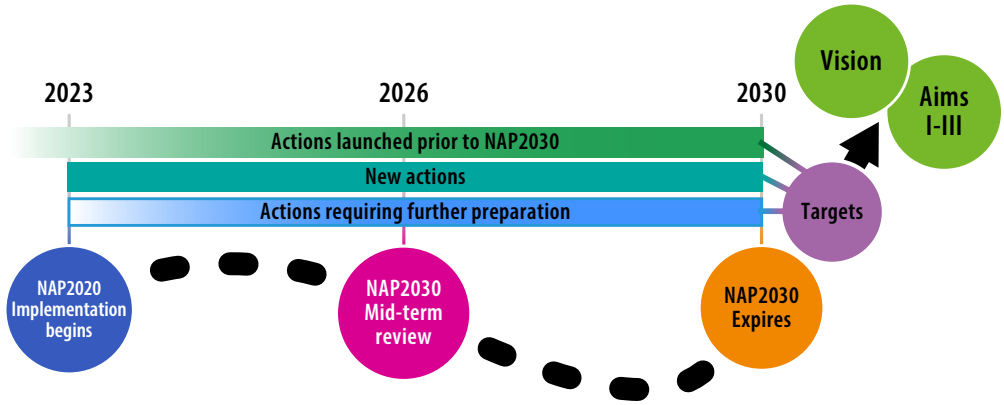
2.5 Targets and actions to take Finland towards the aims

NAP2030 as a whole is illustrated in Figure 6, which shows that the vision and the three aims are intended as long-term guidelines for adaptation action. Steps towards the aims are taken using the 24 targets and the actions outlined to reach them, with the descriptions of these in this section classified under themes. For each target, the aims towards which their implementation provides key

contributions have been identified. In addition, means enabling the monitoring of the targets have been identified. Means of monitoring are specified further in the context of developing the monitoring of the implementation of the plan.

A group of actions is described under each target. It is through the implementation of these that steps are taken towards the target. NAP2030 follows on from the national-level adaptation policy implemented since 2005. Some of the actions included in the plan also follow on from previously launched actions the implementation of which still needs to be continued and strengthened. Moreover, NAP2030 includes several new policy actions not included in the previous plan. The plan also contains a few actions the need for which was identified during the preparation but whose more detailed definition requires further study. The actions have been designed to strengthen adaptation to the changing climate regardless of any specific climate change trend and related uncertainties.

Figure 6. Summary of NAP2030 and its timeline.



For each action, a description is provided of the responsible actor and other key participants to implementation, the implementation timeline and potential funding sources. As regards the responsible actor, the plan specifies the central government authority responsible for implementation, other central government organisations participating in implementation and any other key cooperation partners. The actors participating in and linked with implementation are specified further for each action in conjunction with the more detailed planning and implementation of the action. As regards the timeline, the plan estimates either the implementation timeline or the target timeline for the completion of the action. As regards funding for the actions, efforts have been made to identify the actions that will require additional funding. The starting point is that the central government funding

required for the actions is within the spending limits and full-time equivalent human resources available within the General Government Fiscal Plans and the Budgets. Each ministry is responsible for allocating the resources needed in their administrative branch to the implementation of the plan.

A list of the themes, targets and actions can be found in Appendix 1.

2.5.1 Targets 1 and 2: National-level strategic planning and foresight

From the very beginning, the starting point for Finland's national climate change adaptation action has been to identify, anticipate and adapt to changes as part of the normal planning and activities of the various sectors. Climate change adaptation is not something separate from other activities. Instead, we must prepare for the impacts of the changing climate in all sectors where climate change has direct or indirect impacts on the operating environment or key operating conditions.

The 2019 and 2022 evaluations of the previous National Climate Change Adaptation Plan 2022 emphasise a focus in national climate policy implementation on climate change mitigation, with less attention given to adaptation. In addition, the prominent role of mitigation action is also evidenced by the fact that adaptation to emission reductions is still perceived in many contexts as a change trend prevailing in sectors that is anticipated to shape the operating environment significantly. At the same time, the significance of preparation for and adaptation to the risks caused by climate change is not yet recognised sufficiently.

The large magnitude of the impacts and consequences of climate change calls for the adaptation perspective to be included appropriately in national-level strategic planning and foresight work in all administrative branches. According to the evaluations of the previous plan, this has only been achieved in part. The targets described in this section follow on from and further specify the actions outlined previously to ensure that national-level strategic planning and foresight puts in place sufficiently extensive preparedness for the diverse consequences of climate change. The priorities selected are the foresight work and the operational and financial planning carried out by the entire Government and by relevant ministries.

The Government futures and foresight work builds a common understanding of changes in the operating environment to support policy-making. Drivers for change are assessed regularly and used preparing the Government Report on the

Future every electoral term. The Government Report on the Future is tasked with identifying issues that will be important for policy-making and require particular attention in the future. The report opens up debate for the years ahead. The ministries' futures reviews are also updated during each electoral term, with the latest update completed in autumn 2022.

The purpose of the General Government Fiscal Plan is to support decision-making related to general government finances as well as compliance with the Medium-Term Objective set for the structural budgetary position of general government finances. The plan contains sections related to central government finances, wellbeing services county finances, local government finances, statutory earnings-related pension funds and other social security funds. The Government prepares the General Government Fiscal Plan for the parliamentary term and revises it annually for the following four years by the end of April.

Monitoring the allocation and effectiveness of resources included in the General Government Fiscal Plan and the Budgets to climate change adaptation is challenging, especially when examined as a whole. It is, however, essential to be able to monitor as comprehensively as possible whether resources are allocated and used appropriately for the implementation of the adaptation policy. This is also required by EU regulation, such as the reformed EU legislation on national climate action reporting as part of the implementation of the Governance of the Energy Union Regulation ((EU) 2018/1999)[21].

The performance management of government agencies and other public bodies and organisations of the administrative branches is a key guidance and direction tool for activities in the public sector. Performance management is an agreement-based guidance tool that serves to strike a balance between the resources available and the outcomes that the resources can generate while enhancing service quality and ensuring cost-effective service provision. The key policy instruments of performance management are the Budget and the performance agreements between ministries and government agencies and public bodies.

Based on the resources in the Budget and the initial performance targets, the ministries negotiate with the government agencies and public bodies to establish performance targets for the budget year and the resources required to attain the targets. The outcome of the negotiations, the performance targets for the budgetary year and the resources required to attain the targets are recorded in

21 Governance of the Energy Union Regulation ((EU) 2018/1999)

a performance agreement. The government agencies and public bodies give an annual account of the achievement of the performance targets that were set in their financial statements, and the ministries take a position in the final accounts on the performance of the government agencies and public bodies and on any actions needed. The ministries also report to Parliament on the performance of their entire administrative branch in the Government Annual Report.

Target 1	**Means of monitoring**
Adaptation is integrated into the Government's and ministries' strategic planning and foresight by 2030	Inclusion of actions promoting climate change adaptation in government programmes Climate change adaptation as part of General Government Fiscal Plans Preparedness for climate risks is reflected in ministries' futures reports and foresight work Assessments of effectiveness objectives related to performance management of government agencies and public bodies
The target advances the following aims:	
WILL / **MEANS** / **CAPACITY**	

Action 1.1 Working towards strengthening the role of climate change adaptation as part of government programmes

Description: Identification and inclusion of adaptation-related needs in the Government's joint analysis of the operating environment and in ministry-specific futures reviews. In futures reviews, key development needs are identified for the administrative branches for the years ahead. They are utilised when defining the topics suggested for government programmes.

Responsible actors: **Ministries**

Timeline: Every electoral term

Funding: As part of official duties

Action 1.2 Improving the monitoring of resources related to climate change adaptation included in the General Government Fiscal Plan

Description: Under the EU Strategy on Adaptation to Climate Change, climate resilience should be integrated into national fiscal frameworks. Evaluation of the cost and effectiveness of adaptation measures implemented through public funds requires the possibility to monitor the public funds allocated to adaptation action.

Responsible actors: **Ministry of Finance**, State Treasury, ministries

Timeline: Continuous (mid-term review in 2025)

Funding: As part of official duties

Action 1.3 Integrating climate change adaptation into the strategy and foresight work carried out jointly by the Government and respectively by the ministries

Description: Under the leadership of the Prime Minister's Office, foresight work is carried out in the ministries, including identification of key changes, impacts and uncertainties in the future operating environment. The foresight and strategy processes of the ministries are a key Government tool for operational and financial planning. Cross-cutting strengthening of adaptation requires the strengthening of the adaptation perspective in well-established processes that guide, direct and monitor the ministries' activities.

Responsible actor: **Ministry of Agriculture and Forestry**, Prime Minister's Office, Ministry of the Environment, Ministry of the Interior, Ministry of Finance, Ministry of Defence, other ministries where possible. Government agencies and other public bodies and other actors of the administrative branch also participating in administrative branch-specific strategy and foresight work.

Timeline: Continuous (mid-term review in 2025)

Funding: As part of official duties

Action 1.4 Ensuring the inclusion of climate change adaptation as part of the performance guidance of government agencies, other public bodies and other organisations

Description: In some administrative branches, projects and other measures advancing adaptation have already been included in the performance guidance of key government agencies, public bodies and other organisations. There are, however, clear shortcomings in the continuity and coverage of the guidance and direction. Guidance and direction must be developed further in a consistent and sufficiently coordinated manner, with particular attention to those processes where climate change adaptation is yet to be taken into account. In addition to annual sector-specific guidance and direction, it is key to ensure that climate change adaptation is incorporated into climate action target-setting in periodic updates of strategies of government agencies and other public bodies.

Responsible actor: **All ministries for their respective areas of responsibility**, in cooperation with the agencies and bodies guided and directed by them

Timeline: Continuous (mid-term review in 2025)

Funding: As part of official duties

The rate of progress in adaptation action varies from one administrative branch to another. So far, a separate climate change adaptation plan has been drawn up by the Ministry of the Environment (updated in 2016[22]), the Ministry of Agriculture and Forestry[23] (updated in 2023) and the Ministry of Social Affairs and Health[24] (drawn up in 2021). The administrative branch of the Ministry of Defence has drawn up the Defence Forces' third updated Energy and Climate Programme (targets and actions for 2022–2025), where adaptation is taken into account as preparedness for changes in the operating environment. The defence administration published a climate change adaptation plan[25] in 2023, that seeks to respond to the identified need to examine the significance of climate risks with regard to the operations and sites of the Defence Forces and to plan a systematic operating model for proactive adaptation. The administrative branch of the Ministry of Transport and Communications has not yet integrated adaptation measures comprehensively into strategic guidance and direction documents, but measures under, for example, the Climate and Environmental Strategy for the ICT Sector (2021)[26] support adaptation. In the administrative branch of the Ministry of Economic Affairs and Employment, adaptation has been considered as part of the Ministry's sustainable development policy, which is updated at regular intervals. The Ministry of Finance Strategy on Climate and Nature[27] focuses the Ministry's perspective and role in the preparation of climate and nature policies and related influencing activities.

Administrative branch-specific work involves more detailed identification of climate risks related to the sets of duties falling under the ministries' responsibilities and the measures needed to prepare for and adapt to them. It is essential to ensure that the perspectives related to managing climate risks and strengthening climate resilience are included in the planning, guidance and direction of activities and to make sure the legislation and other instruments for which the ministries are responsible are up to date.

22 Ympäristöhallinnon ilmastonmuutokseen sopeutumisen toimintaohjelma 2022 (*Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022*, in Finnish)

23 Adaptation in the administrative branch of Ministry of Agriculture and Forestry

24 Climate Change in the Healthcare and Social Welfare Sector – Climate Change Adaptation Plan of Ministry of Social Affairs and Health (2021–2031)

25 Puolustushallinnon ilmastonmuutokseen sopeutumisen suunnitelma (*Climate Change Adaptation Plan of the Finnish Defence Administration*, in Finnish)

26 Climate and Environmental Strategy for the ICT Sector

27 Ministry of Finance Strategy on Climate and Nature 2022

In addition to direct risks, administrative branch-specific planning must also take account of cross-border impacts of climate change. By international standards, the Nordic countries have identified these quite well. Cross-border impacts may be significant in the future, but so far their impacts on Finland have been limited. For example, population movements related to climate change impacts have so far not created pressure on the resilience of migration administration in Finland. The Ministry of the Interior's administrative branch seeks to prepare for large-scale influxes of migrants by developing the processes of the Finnish Immigration Service and, more broadly, preparedness planning, the situational picture and foresight. These measures strengthen preparedness for any large-scale influxes of migrants due to a variety of reasons.

Target 2

Sectoral adaptation is done in a structured manner and means for implementation are secured by 2030

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

Ministries have an up-to-date adaptation action plan, or other documents containing plans for adaptation measures, that covers all of the ministry's sectors

Ministries' reporting of adaptation activities

Action 2.1 Ministries draw up or update sectoral adaptation action plans or steer adaptation as part of other guidance documents

Description: In many administrative branches, measures required for adaptation and preparedness are compiled in administrative sector-specific adaptation plans or plans of action (such as the Ministry of Social Affairs and Health plan for 2021–2030, the Ministry of Agriculture and Forestry action plan for 2023–2027, the Ministry of the Environment action plan for 2016–2022, due to be updated in 2023–2024, and the defence administration's climate change adaptation plan prepared under the leadership of the Ministry of Defence in 2022–2023). In some administrative branches, adaptation planning is included in broader policy frameworks (for example, in the Ministry of Economic Affairs and Employment as part of a more extensive update of the sustainable development policy in 2023, in the Ministry of Finance as part of the Strategy on Climate and Nature published in 2022, in the Ministry for Foreign Affairs as part of Finland's Action Plan for Climate Smart Foreign Policy). Alternatively, efforts are otherwise made to ensure comprehensive planning (for example, the Ministry of Transport and Communications will include adaptation measures in the strategic guidance documents of the administrative branch in 2023–2025 as described under action 7.1).

Responsible actors: **Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health, Ministry of Defence, Ministry of the Environment, Ministry of Economic Affairs and Employment, Ministry of Finance, Ministry and Transport and Communications, Ministry for Foreign Affairs,** other ministries, in cooperation with government agencies, public bodies and other organisations in the administrative branches (such as state-owned companies, unincorporated state enterprises and other service providers)

Timeline: 2023–2030

Funding: As part of official duties

Action 2.2 Ministries oversee the implementation and monitoring of sectoral documents guiding adaptation

Description: The action complements action 2.1 and strengthens the implementation of target 24 related to the monitoring and assessment of adaptation.

Responsible actors: **Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health, Ministry of Defence, Ministry of the Environment, Ministry of Economic Affairs and Employment, other ministries,** government agencies, public bodies and other organisations in the administrative branches, other cooperation partners

Timeline: 2023–2030, annual monitoring

Funding: As part of official duties

2.5.2 Target 3: Comprehensive security and general security of supply work

Comprehensive security is the collaboration model of Finnish preparedness, where the functioning of society's vital services is ensured together by the authorities, businesses, the third sector and citizens. The comprehensive security model provides a pre-prepared feasible framework for preparedness for climate change related risks. It also enables the addressing of novel, non-military threats and long-term foresight. Moreover, information exchange and collaboration in accordance with the comprehensive security model between sectors and actors support comprehensive, multisectoral preparedness and adaptation activity.

The general principles and strategic tasks for society's preparedness are laid out in the Security Strategy for Society[28]. The risks underlying the Strategy are updated regularly as part of the national risk assessment[29]. Climate change is one factor in the materialisation of risks. It is therefore necessary for the Strategy to systematically examine the impacts of climate change on the security environment that cut across society by making use of the comprehensive security operating model in a cross-cutting way, especially in conjunction with legislation, the threat landscape and risk assessments, the flexibility of the leadership and management model, the preparedness obligation, and evaluation and measurement.

It is important to further strengthen competence in crisis management. For example, incident management exercises and comprehensive communication need to be developed to make them suitable for responding to crises caused by

28 Security Strategy for Society – Government Resolution

29 National risk assessment – Ministry of the Interior

climate change. National defence courses and the preparedness planning, training and exercise activities of the various actors are important means of increasing society's preparedness capacity and identifying society's vulnerabilities. Regional collaboration and coordination work in the preparedness and security context is described in greater detail in section 2.5.8 Climate risk management at the regional and municipal levels.

The Government Report on Security of Supply[30] outlines the key policies for the development of security of supply by 2030. The report describes the operating environment of security of supply in Finland and in the international context and evaluates the development needs related to security of supply in the rapidly changing operating environment. After Parliament has discussed the report, a reform of the Government Decision on the Objectives of Security of Supply will begin. The National Emergency Supply Agency has also considered the impacts of climate change from the supply of security perspective and found that the matter needs to be reviewed and studied.

Impacts of transboundary significance and scale may turn out to be considerably larger than climate change impacts occurring directly in Finnish conditions. Finland's good level of preparedness and stable society emphasise the significance of cross-border impacts. Cross-border impacts have already been studied and assessed to some extent but still involve many uncertainties. Cross-border impacts may be targeted in particular at many raw materials and production inputs that are critical for security of supply.

30 Government Report on Security of Supply (in Finnish, with an English abstract)

Target 3

The consequences of climate change and and the adaptation needs are identified as part of comprehensive security and integrated into the comprehensive security model and the objectives of security of supply by 2026.

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

The Security Strategy for Society has been updated so that climate risks and adaptation needs have been included in an appropriate manner in all strategic tasks

Climate change has been taken into account in a cross-cutting manner in all foresight, implementation and evaluation of strategic tasks under the Strategy and in related exercises and training

Action 3.1 Climate risks are taken into account in the Security Strategy for Society

Description: Climate change-related risks to strategic tasks under the Security Strategy for Society are assessed in conjunction with the Strategy update and its implementation is monitored.

Responsible actors: The Security Committee is responsible for updating and monitoring the Strategy in broad cooperation with other actors in society. The respective administrative branch is responsible for identifying the climate change risks and assessing their impacts on strategic tasks.

Timeline: From 2023 onwards

Funding: As part of official duties: the Secretariat of the Security Committee is responsible for update-related costs

Action 3.2 Climate change-related risks to security of supply and measures taken to mitigate them are assessed during the process of reforming the Government Decision on the Objectives of Security of Supply

Description: The Government Decision on the Objectives of Security of Supply (1048/2018) defines the general starting points, implementation principles, national objectives and priorities for security of supply work. In September 2022, the Government submitted a report on security of supply to Parliament, proposing a reform of the Government Decision on the Objectives of Security of Supply.

Responsible actor: **The Ministry of Economic Affairs and Employment** coordinates the reform of the Government Decision of the Objectives of Security of Supply, with all ministries and key authorities with regard to security of supply participating.

Timeline: 2023

Funding: As part of official duties

Action 3.3 Cross-border impacts of climate change on security of supply are evaluated

Description: The study examines the cross-border impacts of climate change and the green transition to Finland's security of supply and identifies relevant vulnerabilities from the Finnish perspective and the means to prepare for the impacts. In addition, the study develops foresight and preparedness capacity concerning the impacts of global climate change on security of supply.

Responsible actor: **National Emergency Supply Agency**

Timeline: 2023–2024

Funding: National Emergency Supply Fund

2.5.3 Targets 4 and 5: Food and nutrition security

Food and nutrition security means a situation where everyone has access at all times to sufficient, safe and nutritious food required to lead a healthy and active life. A balanced and healthy diet satisfies the individual's energy need and contains a sufficient and balanced supply of proteins, vitamins, minerals, essential fatty acids and trace elements.

Measures to guarantee food and nutrition security cover primary production, food industry and supply of daily consumer goods as well as distribution. As regards primary production, it must be ensured that the degree of self-sufficiency is high enough from the food and nutrition security perspective must be ensured. Climate change will make it more difficult to guarantee food and nutrition security by making primary production more challenging in Finland and globally and by posing a threat to food supply as shown in the risk review provided in section 2.2.4.3.

To adapt to climate change, Finnish primary food production must undergo development in aspects including diversifying agricultural production, ensuring good arable soil hydrology and health, adopting cultivation methods that improve crop reliability, breeding resistant and tolerant varieties, and managing animal disease risks, food safety risks and plant pest risks. Crop diversification also helps to respond to changing consumption habits and society's aspirations. In addition, it is key to safeguard the availability of cereals, protein crops and other key production factors in case of sudden changes in weather conditions and in the event of global food production disruptions.

Risks to animal welfare at farms and during animal transport posed by high temperatures and extreme weather events must also be taken into account and preparedness for them must be developed. Agricultural resilience can be improved by improving the profitability of agriculture, ensuring continuity and farmers' coping and raising the appreciation of the work.

Section 2.5.3 focuses on the primary production and consumption of food, while the preceding section, 2.5.2, describes actions of a more general nature to promote security of supply. Targets and actions related to food and nutrition security are included in greater detail in the Action Plan for Adaptation to Climate Change of the administrative branch of the Ministry of Agriculture and Forestry and in the Climate Change Adaptation Plan of the Ministry of Social Affairs and Health (2021–2031). The action plan of the administrative branch of the Ministry of Agriculture and Forestry contains measures related to food and nutrition security to safeguard

agriculture, fisheries, reindeer husbandry and game management. Global food and nutrition security will be promoted through international cooperation described in section 2.5.9.

In agriculture, climate change mitigation and adaptation measures are closely interlinked. Measures to support the adaptation of agriculture to climate change are part of Finland's national CAP Strategic Plan for 2023–2027[31] implementing the EU's Common Agricultural Policy. The Climate Plan for the Land Use Sector[32] and the Climate-friendly Food Programme[33] contain measures and targets supporting both adaptation and mitigation until 2035. Finnish National Genetic Resources Programme for Agriculture, Forestry and Fishery from 2018[34] provides guidelines for the protection, conservation and maintenance of genetic resources until 2028.

Actions to safeguard biodiversity promote climate change adaptation, as diverse agricultural environments are more tolerant and resilient to the impacts of climate change. Biodiversity in the agricultural environment will be promoted through measures including the implementation of the National Strategy and Action Plan for Pollinators until 2030[35] and other national programmes. Organic farming supports both the safeguarding of biodiversity and adaptation to climate change. Organic 2.0 – Finland's National Programme for Organic Production[36] aims at increasing organic farming by 2030.

31 CAP-suunnitelma kaudelle 2023-2027 (*CAP Strategic Plan - Ministry of Agriculture and Forestry,* in Finnish)

32 Government Report on the Climate Change Plan for the Land Use Sector (in Finnish, with an English abstract)

33 Ilmastoruokaohjelma (*Climate-Friendly Food Programme*, in Finnish)

34 Finnish National Genetic Resources Programme for Agriculture, Forestry and Fishery (in Finnish, with an English abstract)

35 National Strategy and Action Plan for Pollinators (in Finnish, with an English abstract)

36 Organic 2.0 – Finland's National Programme for Organic Production 2030

Target 4

The operating conditions of agriculture to adapt to climate change are enhanced by 2030.

This means that:

- The targets of the CAP Strategic Plan supporting climate change adaptation and the profitability and continuity of agriculture are reached;
- The objectives of the National Strategy and Action Plan for Pollinators in agricultural environments and the targets of the Organic 2.0 programme are reached;
- The implementation of the Climate-Friendly Food Programme, the Climate Plan for the Land Use Sector and the national programmes supporting biodiversity are underway and the targets are reachable by 2035.

Means of monitoring

The respective monitoring systems of the CAP Strategic Plan, the National Strategy and Action Plan for Pollinators, the Organic 2.0 programme, the Climate-Friendly Food Programme, the Climate Plan for the Land Use Sector and the programmes supporting biodiversity

Emergency stockpiling in the food sector continues

The target advances the following aims:

WILL	MEANS	CAPACITY

Action 4.1 Enhancing the operating conditions of agriculture to adapt to climate change in accordance with national plans and programmes

Description: The profitability and continuity of agriculture is safeguarded in accordance with the CAP Strategic Plan. Arable soil health, carbon sequestration and storage and arable soil hydrology is promoted in accordance with the CAP Strategic Plan, the Climate Plan for the Land Use Sector, the Organic 2.0 programme and other national programmes. Farming is diversified to respond to the changing conditions and society's aspirations in accordance with the CAP Strategic Plan and the Climate-friendly Food Programme, and biodiversity in agricultural environments is promoted in accordance with the CAP Strategic Plan, the National Action Plan and Strategy for Pollinators and other national biodiversity targets. Preparedness for new plant pests is ensured through measures including developing integrated pest management measures. Preparedness for animal diseases, including zoonoses (diseases that can be transmitted from animals to humans) and their prevention and control is also ensured. The genetic diversity of crops is promoted, and the development of plant breeding is continued in accordance with the Action Plan for Adaptation to Climate Change of the administrative branch of the Ministry of Agriculture and Forestry.

Responsible actors: **Ministry of Agriculture and Forestry** and organisations in its administrative branch, research institutes

Timeline: 2022–2035

Funding: The EU's Common Agricultural Policy (CAP) funding, funding under General Government Fiscal Plans and Budgets, as part of official duties

Action 4.2 Continuing the emergency stockpiling of certain production inputs that are important for food security

Description: Stockpiling levels are determined in conjunction with the process to reform the Government Decision on the Objectives of Security of Supply.

Responsible actors: **Ministry of Economic Affairs and Employment** in cooperation with National Emergency Supply Agency and Ministry of Agriculture and Forestry

Timeline: Reform of the Government Decision on the Objectives of Security of Supply in 2023, after that continuous implementation

Funding: National Emergency Supply Fund or the main title of expenditure of the responsible ministry in the Budget

Providing for nutrition security is an important part of adaptation to and, in particular, mitigation of climate change impacts. A plant-forward diet in line with nutrition recommendations reduces the climate impacts and other environmental load of food and promotes health. Consequently, the aim is to ensure the realisation of nutrition recommendations in all age groups. As regards adaptation, it is important to prepare for potential reduced access to certain foods or individual nutrients.

The intention is to promote responsible, sustainable and climate-resilient diets through measures such as the Climate-Friendly Food Programme, and the Domestic Fish Promotion Programme extending until 2035[37] and through public food procurement. The 2020 Government Resolution on the National Public Procurement Strategy sets the national objectives for responsible food procurement. The Guide to Sustainable Food Procurement[38] was updated in 2020 and the Procurement Guide for Responsible Food Services[39] was published in 2021.

37 Kotimaisen kalan edistämisohjelma (*Domestic Fish Concumption Promotion Programme - Ministry of Agriculture and Forestry*, in Finnish)

38 Opas vastuullisiin elintarvikehankintoihin – Suosituksia vaatimuksiksi ja vertailukriteereiksi (*Guide to Sustainable Food Procurement – Recommendations for Requirements and Comparison Criteria*, in Finnish)

39 Procurement Guide for Responsible Food Services

Target 5	Means of monitoring
Climate-resilient food production and consumption maintain food and nutrition security throughout the NAP2030 period.	The objectives of the CAP Strategic Plan related to climate change adaptation are reached The implementation of the Climate-Friendly Food Programme, the Domestic Fish Promotion Programme and the Climate Plan for the Land Use Sector are underway The Nordic and national nutrition recommendations have been updated and are in use Share of organic products in food procurement Percentage of domestic ingredients in food procurement
The target advances the following aims:	
WILL / **MEANS** / CAPACITY	

Action 5.1 Promoting the supply and consumption of climate-resilient food in accordance with national plans and programmes

Description: The production of climate-resilient food is promoted in accordance with the CAP Strategic Plan, the Climate Plan for the Land Use Sector, the Domestic Fish Promotion Programme and the Climate Change Adaptation Plan of the Ministry of Social Affairs and Health 2021–2031. Compliance with the national and Nordic nutrition and food recommendations in all age groups is promoted in accordance with the Climate Change Adaptation Plan of the Ministry of Social Affairs and Health. Responsible public food procurement is promoted in accordance with the government resolution and national criteria. More details on the development of adaptation-related aspects as part of public procurement are provided in section 2.5.11.

Responsible actors: **Ministry of Agriculture and Forestry and Ministry of Social Affairs and Health** as well as organisations in their administrative branches

Timeline: 2022–2035

Funding: The EU's Common Agricultural Policy (CAP) funding, funding under General Government Fiscal Plans and Budgets, as part of official duties

2.5.4 Targets 6–9: Infrastructure and the built environment

This section presents four targets related to infrastructure and the built environment. Target 6 focuses on water services, target 7 on transport and communications infrastructure, target 8 on the built environment and target 9 on energy infrastructure, industry and businesses.

2.5.4.1 Target 6: Water services

Water services cover the withdrawal of water from surface or groundwater sources, the treatment of water and the distribution of water via the network to users, as well as sewerage, that is, the removal and treatment of wastewater. Water services are a vital basic function of society, tasked with safeguarding access to clean water and the appropriate treatment of wastewater. Water services are essential for the functioning of healthcare and food supply. Climate change will have many different impacts on water services. Many of the projected changes may cause problems in the quality or quantity of raw water used to produce household water (water intended for human consumption) or in water distribution. Climate change may, therefore, increase availability risks or health risks related to drinking water and increase problems in the sewerage of wastewater and stormwater.

In Finland, water services are mostly provided professionally and service reliability is high. The public sector plays a key role in safeguarding sustainable water services. The municipalities are currently responsible for organising water services, and the municipalities are the most important owner group for water utilities in Finland. Under the Water Services Act (119/2001), the municipalities must develop water services in their territory and, where necessary, take measures to secure access to water services.

Finnish water utility actors are aware of climate change and regard climate change as a threat to water security at a general level. However, very few actors regard climate change as a threat specifically to the water security of their own utility. Although measures have been taken to prepare for electrical power outages in particular, there is considerable room for improvement in the utilities' preparedness regarding weather and climate risks. The maintenance backlog of the water services infrastructure will also need to be reduced to strengthen adaptation. Securing the incident-free functioning of water services and improving risk management call for operational changes through measures such as coordinated preparedness planning and exercises.

The Water Services Act[40] requires the water utilities to draw up a plan on their preparation for incidents but does not lay down any provisions concerning the contents of the plan. Utilities supplying household water must also draw up a risk assessment and risk management plan. Reform and legislative development needs for the sector have been identified in the Programme for the National Water Services Reform[41].

40 Water Services Act (119/2001)

41 National water services reform - Ministry of Agriculture and Forestry (in Finnish)

Target 6	Means of monitoring
The preparedness of water services for climate change impacts is improved by 2026	Amount and effectiveness of adaptation measures in up-to-date preparedness plans regionally and nationwide
The target advances the following aims:	Up-to-date risk management plans for household water
WILL / MEANS / CAPACITY	

Action 6.1 Ensuring that climate change adaptation is taken into account in the preparedness plans of water services and as part of the national water services reform

Description: When reforming legislation on preparedness, preparedness plans are required to feature climate change impact assessments and an assessment of impacts on the operations of water utilities and the functioning of the water services network. Through supervision, guidance and training, efforts are made to increase the number of plans where climate change is taken into account and the number of adaptation actions per plan. The increase in the maintenance backlog in water services, the structural change in the sector and promotion of cooperation are addressed by updating the Water Services Act and implementing the Programme for the National Water Services Reform.

Responsible actor: **Ministry of Agriculture and Forestry**, Ministry of Social Affairs and Health, Ministry of the Environment, Centres for Economic Development, Transport and the Environment (ELY Centres) in cooperation with municipalities and water utilities

Timeline: 2023–2025

Funding: As part of official duties

Action 6.2 Instructing utilities supplying household water to take account of climate change as part of their risk assessment concerning household water production and the quality and quantity of raw water

Description: The Government Decree on Risk Management and Self-Monitoring in the Household Water Production Chain is implemented. According to the degree, a risk management plan must include a list of hazards and hazardous incidents arising from incidents caused by climate change, and measures for their management must be drawn up.

Responsible actor: **Ministry of Social Affairs and Health**, Ministry of Agriculture and Forestry and organisations in their administrative branches

Timeline: From 2023 onwards

Funding: As part of official duties

2.5.4.2 Target 7: Transport and communications infrastructure

The transport system is a system comprised of all forms of passenger and goods transport, the transport networks used for them, communications connections and information, transport services, vehicles and traffic control systems. Well-functioning communications networks are the foundation of modern society.

Transport and communications networks play an important role for the functioning of activities that are critical for security of supply and of key importance for society, such as emergency operations, national defence, health and social services and postal services. The better the condition of the transport and communications infrastructure, the better its resilience to the impacts of climate change.

Extreme weather events and climate change may cause serious harm or accidents in transport and reduce the infrastructure service level when severe climate conditions affect the durability and condition of transport infrastructure. This may result in the transport network lifecycle being shorter than projected. Identifying the weather and climate risks that transport chains are facing has been started and reduced by means of several measures including improvements of drainage, flood risk management, winter maintenance, design and dimensioning of transport infrastucture, and the reliability of systems and safety devices.

Climate change may increase the risk of disruptions to the communications infrastructure due to incidents such as floods or electrical power outages. Preparedness for these, however, has been maintained in Finland for a long time. It is important to actively monitor their impacts and, where necessary, limit the risks with regulation concerning the reliability of communications networks.

The vulnerabilities of the transport infrastructure are not yet sufficiently known. Identifying the needs for adaptation-related information and compiling information have been identified as essential in the planning and targeting of the adaptation measures. For example, vulnerability is affected by the characteristics of the means of transport and the people operating them, the characteristics of transport infrastructure and other interaction in transport and traffic as well as available weather and road condition data. Risk and vulnerability factors also vary from one region to another.Adaptation actions targeting transport and communications infrastructure will significantly promote the capacity of Finnish industry and businesses to adapt to climate change. It is important for the industrial sector to secure the smooth transport of goods and raw materials also in conditions changing due to climate change. For example, the condition and therefore the accessibility of the forest road and private road network will be under strain in a changing climate. Especially with ground frost periods becoming shorter, the accessability of routes important to agricultural and forestry chains will decline. Private roads are highly important for safeguarding aspects such as timber and energy supply, the local population, agriculture and forestry and other livelihoods.

The adaptation actions will require additional funding. The effectiveness and the benefits of proactive measures for society's robustness and Finland's competitiveness as well as the cost-effective maintenance of assets are many times greater than the costs, which is why these inputs are important and cost effective. The development of the transport system is guided by the National Transport System Plan for 2021–2032[42]. Updated during each electoral term, the plan contains a central government funding programme that provides the financial framework for the development of the transport system. The realisation of the funding programme depends on future budget decisions . Long-term transport system planning together with implementing it through planning and investment programmes and as a basic plan for infrastructure management contribute to the climate resilience of the transport route network.

Target 7	**Means of monitoring**
The vulnerabilities of the transport and communications infrastructure are identified by 2026 and climate resilience is improved by 2030	The identified vulnerabilities of the transport and communications infrastructure are documented and the monitoring of the vulnerabilities is organised. Infrastructure tolerance is at a good level and recovery from incidents meets the requirements set for the infrastructure service level.
The target advances the following aims:	
WILL / **MEANS** / **CAPACITY**	

Action 7.1 Including climate change adaptation measures in the established strategic guidance documents of the administrative branch of the Ministry of Transport and Communications

Description: Climate change adaptation measures are included in key strategic guidance documents, such as the National Transport System Plan (Transport 12) and the Digital Compass. The action will ensure that climate change adaptation is taken into account in all activities.

Responsible actor: **Ministry of Transport and Communications** together with government agencies and other public bodies in its administrative branch

Timeline: By the end of 2025

Funding: As part of official duties

42 National Transport System Plan for 2021–2032

Action 7.2 Developing knowledge-based decision-making and operating models for the transport system and transport and communications networks

Description: Based on transport system-level analyses, knowledge-based decision-making (information, impact assessments, costs) and operating models are developed to identify risks and vulnerabilities as well as measures reducing adverse effects in the transport system and transport and communications networks and to target the measures.

Responsible actors: **Ministry of Transport and Communications** together with government agencies and other public bodies in its administrative branch

Timeline: By the end of 2030

Funding: As part of official duties

Action 7.3 Conducting an assessment of the state of private roads and bridges and, on the basis of it, encouraging road maintenance associations to carry out needed improvements and maintenance work of the private road network

Description: The condition of Finland's private roads and their bridges is assessed, the situation of and need for energy wood terminals is studied and road maintenance associations are encouraged to carry out road improvement and maintenance. The data collected on private road and bridge condition and energy wood terminals is compiled into an digital service. In the near future, the data will be accessible by users including road maintenance operators, road users, funding providers and service providers. Road maintenance associations are encouraged to carry out private road improvement and maintenance and information is produced to support training and advice. To serve as a foundation for the activation of private road maintenance, operating models and tools are developed for road maintenance associations to use.

Responsible actors: **Ministry of Agriculture and Forestry**, Ministry of Transport and Communications, Finnish Forest Centre, Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: 2022–2026

Funding: Funding under General Government Fiscal Plans and Budgets until the end of 2024, further implementation would require additional funding

2.5.4.3 Target 8: The built environment:

Decisions concerning the built environment will have impacts long into the future, as the pace of updating or replacing existing infrastructure is rather slow. The Land Use and Building Act (132/1999) and the decrees issued under it govern both statutory land use planning as well as new and repair construction.

In Finland, the starting point for construction design is a healthy and safe building that is fit for purpose. The new Building Act was approved on 1.3.2023. The new Building Act would improve the effectiveness of regulation in particular to mitigate and adapt to climate change, promote the circular economy and enable

the nationwide digitalisation of decisions and other data related to construction and building. The aim behind the drafting of the new legislation was also to include climate change adaptation more strongly in the decrees on the technical requirements of building and construction supplementing the Act.

Under the Land Use and Building Act, regional land use planning must ensure that national land use objectives are taken into account so that their implementation is promoted. National land use objectives require preparation for extreme weather events and floods and for climate change impacts. New construction must be located outside flood risk areas or flood risk management must be otherwise ensured.

Research plays a key role in preparing for the changing conditions. Key adaptation research and assessment projects in the field of land use and building include projects on climatic design conditions for buildings in the changing climate, guides to land use planning advancing climate adaptation and mitigation targets and stormwater management, and scenarios on sea level rise and adjoined recommendations for the lowest construction levels.

Efforts to take climate change adaptation into account can be improved by increasing property owners' awareness of adaptation measures. A concrete component of this is protecting properties located in flood risk areas against the impacts of floods and ensuring the functionality of building site-specific drainage systems.

More specific measures concerning the built environment are discussed in the action plan of Finland's environmental administration, which will be updated after the adoption of this plan. Climate change adaptation plans of the environmental administration have previously been adopted in 2008, 2011 and 2016. The evaluation of progress made in the current action plan was published in 2020[43].

43 Climate Change Adaptation in the Environmental Administration Sector: Progress in the implementation of the Action Plan in 2016–2019 (in Finnish, with an English abstract)

Target 8

The built environment sector has the capacity to manage climate change-related risks and to adapt to foreseen changes in climate by 2030

This means that:

- Climate change adaptation is incorporated into the normal planning and activities of all of the different actors;
- The availability of the up-to-date information required for preparedness for climate change is ensured.

Means of monitoring

Legislation related to statutory land use planning and building concerning adaptation to climate change, the necessary input data and guide materials

The target advances the following aims:

WILL	MEANS	CAPACITY

Action 8.1 Incorporating provisions on climate change adaptation into legislation governing statutory land use planning and building and assessing how cost optimal building and construction -related guidance and direction is with regard to climate change adaptation

Description: In 2022, the obligation concerning climate change adaptation in land use arises from the national land use objectives under the Land Use and Building Act. Within legislative development, attention is focused in particular on the content requirements of land use plans, impact assessments of the land use plans, and on technical requirements concerning building and construction.

Responsible actors: **Ministry of the Environment**

Timeline: 2023–2026

Funding: Effective implementation would require additional funding

Action 8.2 Ensuring the up-to-dateness and availability of information required in land use planning and building

Description: Key datasets include flood risk areas, sea level rise scenarios and precipitation increase projections (such as design storms) based on studies conducted by the authorities.

Responsible actors: **Ministry of Agriculture and Forestry**, Ministry of the Environment, Finnish Environment Institute, Finnish Meteorological Institute, Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: Continuous

Funding: As part of official duties, funding under General Government Fiscal Plans and Budgets, project funding

Action 8.3 Mapping out regionally significant ecological corridors, required as input data for land use planning

Description: According to the national land use objectives, land use planning must promote the preservation of areas and ecological corridors that are valuable for biodiversity. Ecological corridors play an important role in adaptation to climate change because they enable the migration of species to new habitats as the climate changes. The action promotes the determination of ecological corridors in a way that is uniform throughout the country and strengthens the coordination of ecological corridors and other land use.

Responsible actors: **Ministry of the Environment,** research institutes, in cooperation with other ministries and key actors

Timeline: From 2023 onwards

Funding: Effective implementation would require additional funding

2.5.4.4 Target 9: Energy infrastructure, industry and businesses

Adaptation measures related to electrical power grids have been ensured by an amendment to the Electricity Market Act (386/1995) that was prepared by the Ministry of Economic Affairs and Employment and entered into force in 2013, requiring investments for weather-resilient electrical power grids to be made within a time limit. The measures have been supplemented by an amendment to the Electricity Market Act that entered into force 2021, enabling the investments to be spread over a longer period.

Any concrete weather- and climate-related risk management measures fall within the domain of enterprises in the sector. Power grid companies have implemented measures in accordance with the standards laid down for them in legislation. Weather-resilient power grids contribute towards the capacity of industry, businesses and society as a whole to adapt to the impacts of climate change on electricity distribution. Adaptation measures help to prevent issues such as production disruptions caused by storms. Power grid adaptation measures ensure access to energy and enhance stability in the operating environment of industrial and other business activity and in society.

The requirements for the design of nuclear power plants and their preparedness for external hazards, such as rare weather conditions and floods, are provided in the regulations and nuclear safety guidelines of the Radiation and Nuclear Safety Authority. Provisions on these are laid down in the Nuclear Energy Act (990/1987)[44].

44 Nuclear Energy Act (990/1987)

As regards power and heat production, to strengthen security of supply, stockpiling obligations have been imposed on combustion plants regarding imported fuels. The obligations reduce dependence on foreign actors even though the alternative fuels are also (mainly) sourced from abroad. One of the longer-term objectives of Finland's National Climate and Energy Strategy is to promote measures to strengthen self-sufficiency, particularly when it comes to electricity. The energy transition related to the green transition increases the weather dependence of aspects such as electricity production and, going forward, there will be a need to assess the weather and climate related risks caused by the future development of the energy system more broadly than is currently the case.

In the manufacturing industry and more broadly in businesses, preparedness must be ensured for the direct impacts of climate change, such as floods or drought affecting the actual operations of industry. Adaptation measures concerning the built environment and infrastructure play a key role in the adaptation of Finnish industry to manage risks caused by climate change. Climate change impacts must be taken into account in land use planning, statutory land use planning and planning of industrial construction.

A substantial portion of the measures required by climate change adaptation in industry and business activities fall under the responsibilities of private operators. The public authorities must ensure that the legislative environment and operating framework of industrial and business activities support adaptation to the impacts of climate change and that it is possible for operators to adapt their operations to the risks. The role of businesses in climate change adaptation is emphasised in the context of cross-border impacts on operations. In addition, it is important to safeguard the operating environment of businesses and sectors as the climate changes and to benefit from potential opportunities arising from climate change and adaptation.

Target 9

In the energy and industrial sectors and business activities, awareness of climate change impacts, risk management and the innovation environment will have been strengthened by 2030

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

Adaptation perspectives included in the legislation and other guidance of the energy and industrial sectors

The climate risks related to the energy transition have been mapped out

Inclusion of adaptation measures in sector-specific roadmaps

Availability and utilisation of funding opportunities promoting adaptation

Action 9.1 Defining the needs related to climate risk management in the energy and industrial sectors

Description: Climate risks and the situational picture concerning their management as well as the measures required are assessed. The perspectives to be taken into account are discussed in the central government network for energy and climate policy. A legislative environment that is up to date regarding climate risks and other relevant operational frameworks are secured by means already available to the authorities.

Responsible actor: **Ministry of Economic Affairs and Employment,** central government network for energy and climate policy, in cooperation with other actors

Timeline: 2023–2026

Funding: As part of official duties, project funding and other external funding

Action 9.2 Including assessments of climate risk management opportunities in the updates of sector-specific roadmaps and supplementing the roadmaps with adaptation measures

Description: In accordance with the Programme of Prime Minister Sanna Marin's Government, sector-specific low-carbon roadmaps have been drawn up. In conjunction with updating the current roadmaps or drawing up new ones, in addition to climate change mitigation, assessments are made of the needs and opportunities of businesses as regards both managing the adverse consequences of climate change to businesses and working life and benefitting from opportunities provided by it.

Responsible actor: **Ministries** in cooperation with sectors

Timeline: 2023–2030

Funding: Public and private funding, project funding, as part of official duties

Action 9.3 Assessing the existing funding opportunities for developing and introducing adaptation innovations for businesses

Description: The action involves mapping out the various opportunities and needs related to the development and introduction of adaptation innovations. The potential funding sources include the Finnish Climate Fund, which focuses on combatting climate change, boosting low-carbon industry and promoting digitalisation.

Responsible actor: **Ministry of Economic Affairs and Employment,** Ministry of Agriculture and Forestry, other ministries, in cooperation with Business Finland and other actors

Timeline: 2023–2025

Funding: As part of official duties, assessment work would require additional funding

2.5.5 Targets 10–13: Use and management of renewable natural resources, biodiversity, nature-based solutions and drought risk management

This section presents four targets. Target 10 relates to the use and management of renewable natural resources, target 11 to biodiversity, target 12 to nature-based solutions and target 13 to drought risk management.

2.5.5.1 Target 10: Use and management of renewable natural resources

The sustainable use, management and protection of renewable natural resources will ensure the continuing functioning of Finnish society in the future.

Forest health in Finland has so far remained mainly good. The risk of forest damage will, however, increase as the climate changes. Forest biodiversity and vitality boost our capacity to adapt to climate change impacts.

In case of forest damage, the Forest Damage Prevention Act (1087/2013) obligates forest owners and professional forest operators to take certain measures. For example, fresh pine and spruce timber must be removed from forests and intermediate storage sites within certain time limits. Under the Forest Act (1093/1996), a forest use declaration must be submitted for felling carried out due to forest damage. The Finnish Forest Centre monitors the scope of damage based on these declarations.

One of the aims of the Action Plan for the Adaptation to Climate Change of the Ministry of Agriculture and Forestry is climate risk management to ensure sustainable forestry, and the Action Plan describes the more specific measures to reduce forestry-related risks in 2023–2027. Finland's National Forest Strategy 2035 also takes account of needs related to adaptation in the forest sector.

Water management in agriculture and forestry is analysed in the Water Management Guidelines for Agriculture and Forestry published in 2020[45]. As regards climate change adaptation, an important vulnerability related to water management in agriculture and forestry is the slow pace in which catchment-based coordination and planning is gaining ground. Drainage and irrigation are also measures to which further attention must be paid in the future to safeguard the conditions required for agriculture and forestry. This is why it is important to develop catchment-based methods and tools for the implementation of climate-resilient projects and improved water protection.

45 Water Management Guidelines for Agriculture and Forestry

Target 10:

Climate change adaptation is promoted in the use of renewable resources by 2030

This means that:

- Forest vitality, biodiversity and adaptive capacity are improved;
- New forms of broad-scale cooperation, such as catchment-based planning, enables the sustainable use of renewable natural resources.

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

– Deadwood trend in commercial forests (Natural Resources Institute Finland)
– Quality of Nature Management Project (Finnish Forest Centre)
– Occurrence of different types of damage and pathogens and damage caused by them to forest stands in the National Forest Inventory (Natural Resources Institute Finland)
– Volume of logging due to insect damage (Finnish Forest Centre)
– Forest growth (Natural Resources Institute Finland)
– Occurrence of forest fires (Ministry of the Interior, Emergency Services Academy Finland)
– Number of projects and pilots related to catchment–based planning

Action 10.1 Implementing research and development measures promoting adaptation in the forest-sector, as part of the implementation of the National Forest Strategy

Description: Needs related to forest-sector adaptation are taken into account in Finland's National Forest Strategy 2035. Attention is paid to climate change adaptation in research and development related to forest management methods. High-quality research will improve the knowledge base on the impacts of climate change and, for example, forest management recommendations are brought up to date on the basis of new research. Geospatial datasets are developed. Availability and usability of information is ensured, and awareness and competence of forest owners and forest-sector professionals related to minimising forest damage risks and preparedness for forest fire prevention and control is increased through advisory services and training. Structural features that are important for biodiversity, such as mixed forest stands, forests with mixed age structures and deadwood, are increased, taking account of damage risks. As part of implementing the National Forest Strategy, a new programme is prepared, to establish forest tree seed orchards to ensure the availability of bred forest cultivation material suitable for a variety of climate conditions.

Responsible actors: **Ministry of Agriculture and Forestry**, Ministry of the Environment, Ministry of the Interior, Finnish Forest Centre, research institutes

Timeline: 2023–2027

Funding: Funding under General Government Fiscal Plans and Budgets, effective implementation would require additional funding

Action 10.2 Supporting climate change adaptation of forestry industry with the reformed incentive scheme

Description: The reformed Forestry Incentive Scheme will support climate change adaptation of forestry sector. Aid provided under the new incentive scheme can promote forest health and growth ability as well as biodiversity. In addition, aid for the construction and improvement of the forestry road network will enable timber transport and fire prevention and control in a changing climate, too. It is proposed that the new Forestry Incentive Scheme will include aid for the management of seedling stands and young forests, remedial fertilisation, peatland forest management plans, peatland forest water protection measures and embankment road construction, forestry road network, forest nature management and controlled burning, and environmental support for temporary protection. The aim is to achieve a significant increase in controlled burning to create habitats for species dependent on forest fires. Environmental aid is targeted especially at sites important for biodiversity with a large quantity of deadwood. In addition, harvesting of small-diameter wood could be supported in conjunction with forest management. The update of the incentive scheme enables diverse felling methods suitable for each site.

Responsible actor: **Ministry of Agriculture and Forestry**, Finnish Forest Centre

Timeline: 2023–2027

Funding: Funding under General Government Fiscal Plans and Budgets, effective implementation would require additional funding

Action 10.3 Developing and implementing an operating model for catchment-based planning that includes the coordination of the water management needs of agriculture,forestry and built areas

Description: Catchment-based planning that supports adaptation is promoted by means including pilot projects in cooperation with landowners. Land use changes and water management measures in a catchment area, such as soil drainage, ditch drainage and channel clearing, together with climate change affect the quality and quantity of waters. Measures to drain arable land and forest soil have in many places reduced the water retention capacity of catchment areas already in current water conditions. This may result in lower reaches of catchments suffering from flooding problems and poorer water quality, while upper reaches may suffer from low water levels and changes in small water bodies. Measures taken in catchment areas may also affect stormwater management in the built environment, which is addressed under action 12.1. Planning that covers the entire catchment area can ensure functioning in the various parts of the area. This can also ensure that the various targets, such as productional needs of actors, flood protection, water protection, climate resilience, nature values and habitats are taken into account along with restoration and coordination. To support catchment area planning, development of datasets and methods is also needed, particularly to promote joint planning of agriculture and forestry. The entire catchment area as a whole is taken into account in new actions and in the use of old ones, in modification and in restoration.

Responsible actors: **Ministry of Agriculture and Forestry,** Ministry of the Environment, Centres for Economic Development, Transport and the Environment (ELY Centres), Finnish Forest Centre

Timeline: 2023–2030

Funding: As part of official duties, project funding

2.5.5.2 Target 11: Biodiversity

Impacts of climate change are already visible in Finnish nature. New southern species, especially insect species, are spreading into Finland, with many of them capable of rapidly expanding their range as conditions become favourable for them. On the other hand, species adapted to more northern conditions decline and shift away from the southern parts of their current range. The capacity of species to move elsewhere as the climate is warming depends on their characteristics, such as mobility, and on the quantity and geographic density of habitats that are suitable for them. Impacts on habitat types are mainly qualitative and are slower when flora and other species change and, for example, when humidity conditions change and variability increases.

The significance of the protected area network for the maintenance of biodiversity and many ecosystem services has become increasingly pronounced as the climate changes. Protected areas, where the quality of habitats is high, have been shown to mitigate the adverse effects of climate change on species. Protected areas also play an important role in climate change mitigation through processes including carbon sequestration. The impacts of climate change on nature may, however, be so great that adaptive and proactive development and management of the protected area network may be required.

The threat posed by climate change to the preservation of biodiversity must be taken into account not only in the development and management of the protected area network but also elsewhere in the use of land and natural resources. For the target to be reached, it is important to promote biodiversity outside protected areas, too, by employing nature management in commercial forests, for example (actions 10.1 and 10.2). The restoration and management of degraded habitats and measures to improve habitat connectivity facilitate the capacity of nature to adapt to climate change. Biodiversity improves the resistance as well as resilience of nature, which is important to recognise and take into account when extreme conditions and various causes of damage become more common. The broader application of nature-based solutions may maintain biodiversity and create new habitats of high quality.

The characteristics of species affect their vulnerability to climate change. Negative impacts are emphasised in species adapted to the cool conditions of the north, such as fell and mire habitats. Their dispersal capacity is limited, and their habitats are those affected the soonest by climate change. Alien species are projected to benefit clearly from climate change, which is why it will become increasingly important to combat invasive alien species in a systematic and efficient manner when more and more species are able to become established and more abundant in Finland.

Target 11

Adaptation to climate change and halting biodiversity loss are tackled together by 2030

This means that:

- The knowledge base on the impacts of climate change on species and habitat types are strengthened and utilised in decision-making and planning of activities;
- Adaptation actions are planned and implemented in a manner which also supports efforts to halt biodiversity loss.

Means of monitoring

Threat status assessments of species and habitat types

Reporting under the Habitats Directive and Birds Directive

Results of long-term monitoring of species

Target indicators of the National Biodiversity Strategy

Usage rate of the results of the Protected Area Network in a Changing Climate – towards Climate-Smart Conservation Planning project

The target advances the following aims:

WILL	MEANS	CAPACITY

Action 11.1 Developing the protected area network and its management on the basis of research data

Description: Taking account of climate change adaptation, a representative protected area network is developed by implementing, in particular, the voluntary Forest Biodiversity Programme for Southern Finland (METSO) fully until 2025 and by planning and implementing a follow-on programme for it for 2026–2030 and by ensuring the resources required by the Helmi Habitats Programme. Systematic conservation planning will also take into account new Natura 2000 network sites and Other Effective Area-Based Conservation Measures (OECM). The results of the Protected Area Network in a Changing Climate – towards Climate-Smart Conservation Planning project are taken into account in particular.

Responsible actors: **Ministry of the Environment**, Finnish Environment Institute, Metsähallitus (the agency governing the use of state-owned land), Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: 2023–2030

Funding: Funding under General Government Fiscal Plans and Budgets, effective implementation would require additional funding

Action 11.2 Restoring and managing degraded habitats to improve nature's adaptive capacity

Description: Biodiversity is strengthened, vital ecosystem services provided by nature are safeguarded, climate change is mitigated and climate change adaptation is promoted by implementing restoration, management and protection measures (such as the Helmi Habitats Programme and the Forest Biodiversity Programme for Southern Finland (METSO)). The targets of the EU Biodiversity Strategy (including the Nature Restoration Law) will also be taken into account in the measures and their scope.

Responsible actors: **Ministry of the Environment**, Ministry of Agriculture and Forestry, Metsähallitus (the agency governing the use of state-owned land), Ministry of Economic Affairs and Employment, Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: 2023–2030

Funding: Funding under General Government Fiscal Plans and Budgets, effective implementation would require additional funding

Action 11.3 Taking account of the impacts of climate change in planning and implementation of protection of species and habitat types

Description: Protection measures are targeted as effectively as possible based on research data, taking account of the different characteristics and sensitivity of species and habitat types to climate change impacts. Based on monitoring data, the range of protection instruments are adapted and the maintenance and restoration to Favourable Conservation Status of EU Habitat and Birds Directive species and habitat types as well as other species and habitat types in need of protection are ensured, taking account of the impacts of climate change. Changes in the timing of bird migration and any changes in the location of their winter and migration stopover sites are taken into account in the development of legislation and the protected area network.

Responsible actor: **Ministry of the Environment**, Ministry of Agriculture and Forestry, Metsähallitus (the agency governing the use of state-owned land), Finnish Environment Institute, Natural Resources Institute Finland

Timeline: 2023–2030

Funding: Funding under General Government Fiscal Plans and Budgets, effective implementation would require additional funding

Action 11.4 Monitoring the impacts of climate change on species and habitat types in a systematic and sustained manner

Description: The status of long-term biodiversity monitoring in Finland is assessed and the coordination, planning and implementation of long-term monitoring is developed. Suitable biodiversity indicators are included in the Official Statistics of Finland, and the operating conditions and service capability of the Finnish Ecosystem Observatory (FEO) and the Finnish Biodiversity Information Facility (FinBIF) are ensured. Finland will participate fully in the implementation of the Programme for the Conservation of Arctic Flora and Fauna (CAFF).

Responsible actor: **Ministry of the Environment**, Ministry of Agriculture and Forestry, Finnish Environment Institute, Natural Resources Institute Finland, universities, Finnish Nature Panel

Timeline: 2023–2030

Funding: Long-term implementation would require the allocation of additional appropriations

Action 11.5 Improving the policy coherence of adaptation measures concerning biodiversity within different administrative branches

Description: The linkages of biodiversity and climate change adaptation are examined as part of the work to develop an overall legislative framework safeguarding biodiversity.

Responsible actors: **All administrative braches of the Government**, regional government

Timeline: 2023–2030

Funding: As part of official duties

2.5.5.3 Target 12: Nature-based solutions

One of the measures of the 'More systemic adaptation' objective of the EU Adaptation Strategy is promoting nature-based solutions. Nature-based solutions are solutions to societal problems that are supported or inspired by nature. Nature-based solutions are well suited for preventing climate change impacts, including flood and drought risks, heatwaves, torrential rains, alien species and forest fires, and their consequences. They can also significantly boost the supply of clean, fresh water. Investments in nature-based solutions promote many objectives at the same time. In addition to disaster risk management and adaptation, they can promote climate change mitigation, biodiversity and human health.

Nature-based solutions have been discussed a great deal in recent years in adaptation planning, but their broad-scale use is yet to be established. Finland is well placed to increase the utilisation of nature-based solutions in contexts such as land use planning, stormwater management, development of urban regions, and water management in agriculture and forestry. For example, extreme water

conditions increasing due to climate change pose a challenge to soil functionality and, consequently, water management in agriculture and forestry, but existing or correctly implemented wetlands and sites that are in their natural state help to regulate the water cycle. Correspondingly, in densely built urban environments, nature-based solutions can promote stormwater management and many other objectives.

Target 12

Nature-based solutions are established and have increased society's preparedness for climate risks, improved water protection and increased biodiversity by 2030

This means that:

- The number and surface area of floodable parks and forests that retain water and nutrients is increased in flood risk areas from the 2022 level aiding water protection and management and improving biodiversity;
- Urban nature-based solutions are commonly used in rain, flood risk and heatwave management and water protection;
- Nature-based solutions have increased biodiversity in and around the implementation areas;
- Researched data on multifunctional impacts and benefits of nature-based solutions has increased;
- Research on the benefits and impacts of nature-based solutions has been supported;
- Nature-based solutions are examined as primary options as regards measures, and their societal appreciation is increased.

The target advances the following aim:

WILL	MEANS	CAPACITY

Means of monitoring

Number and surface area of floodable parks and forests supporting water protection and management and biodiversity in flood risk areas

Water management indicators in agriculture and forestry could include the monitoring of the implementation of the work programme for water management in agriculture and forestry, and aid statistics (CAP, Forestry Incentive Scheme).

Nature-based solutions implemented in significant flood risk areas and their upstream catchment areas

Indicators for the introduction of multifunctional nature-based solutions in water management in agriculture and forestry:

– Environmentally sound basic drainage projects: Number (projects/year or projects/period) and Total costs (EUR/year)
– Wetlands: Number of new multifunctional wetlands (number/year) and Wetlands covered by environmental contracts (ha)
– Loading to water bodies from agriculture and forestry (nitrogen, phosphorus, carbon)

Action 12.1 Developing nature-based solutions and the updating of relevant legislation and guidance material, and promoting stormwater management

Description: Promoting national-level guidance and incentives as well as contributions for more efficient utilisation of nature-based solutions is increased. Design options, functioning and maintenance of various nature-based methods is explored. The up-to-dateness of guidance and practices for stormwater management and green structures is ensured, and the necessary guidance is included in land use legislation.

Responsible actors: **Ministry of the Environment**, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Centres for Economic Development, Transport and the Environment (ELY Centres), Finnish Transport Infrastructure Agency, in cooperation with Association of Finnish Local and Regional Authorities. The municipalities are responsible for stormwater management and play a key role in the implementation of other nature-based solutions, too.

Timeline: 2023–2026

Funding: As part of official duties, project funding

Action 12.2 Mainstreaming nature-based solutions for water management in agriculture and forestry

Description: Nature-based solutions are mainstreamed in water management of agriculture and forestry through means such as national aid policy, research and communication. Nature-based hydraulic engineering seeks to preserve or restore the natural features or landscape values, while taking account of the area's usage needs and their changes as well as costs and benefits. In water and marine protection the aim is to reduce loading originating from the catchment area. For example, slowing the flow of water in watercourses and wetlands may improve the water balance of arable land during dry spells and, consequently, promote climate change adaptation.

Responsible actor: **Ministry of Agriculture and Forestry,** Ministry of the Environment, Centres for Economic Development, Transport and the Environment (ELY Centres), Finnish Forest Centre

Timeline: 2023–2030

Funding: EU Common Agricultural Policy (CAP) funding, the reformed Forestry Incentive Scheme, as part of official duties, project funding

2.5.5.4 Target 13: Drought risk management

Flood risk management is implemented in six-year cycles together with water management planning according to water framework directive. A nationwide flood risk assessment takes place once in every six years. In addition to this, the impacts of climate change and the adaptation measures are taken into account when the management plans drawn up for the highest-risk areas and, where necessary, the efficiency of adaptation measures is increased. The process is statutory and already functions well and has resulted in national progress in flood preparedness. Therefore, this plan does not contain any specific targets or actions for flood risk adaptation.

Drought risk management has not been developed consistently in Finland, but the need for it is growing as the climate is changing. As is the case with flood risk management, measures related to the seasonal fluctuation of water resources increasing and becoming more pronounced will also play a key role in drought risk management. Nationally, the challenge is exacerbated as the changes caused by climate change are not uniform catchment areas and ground water basins. The need for regional adaptation and preparedness for rapidly emerging situations will grow. Going forward, the aim is for drought risk management to involve a process similar to that employed in flood risk management, but cost effectively and without it being statutory.

Target 13	**Means of monitoring**
Drought risk management has developed by 2030	A permanent process is developed for drought risk management Early warning and monitoring systems are in use Regional drought risk management plans are drawn up for risk areas Indicators for process performance are created to ensure successful deployment
The target advances the following aims:	
WILL / **MEANS** / **CAPACITY**	

Action 13.1 Creating a national drought risk management process that also includes regional aspects of risk management

Description: Drought risks are managed proactively, in a needs-driven and cost-effective manner and in areas where drought is regarded as a problem. Drought risk management is based on three elements: early warning and indicator systems, risk and vulnerability assessments, and risk management plans. Awareness of droughts and their impacts is increased nationally, and national actions to reduce direct and indirect drought risks are promoted. Examples of actions concerning indirect risks include preventing insect damage and forest fires caused by drought by means of increasing awareness. Drought risk management should take account of the area's water resources and their use, including the catchment-based perspective, all of the sectors suffering from drought, and nature. Drought risk management must be examined in cycles and linked with other processes supporting the theme.

Responsible actors: **Ministry of Agriculture and Forestry**, Centres for Economic Development, Transport and the Environment (ELY Centres), Flood Centre, Finnish Environment Institute, Ministry of the Interior, in cooperation with municipalities and other actors

Timeline: The process is developed in 2023–2027, followed by implementation

Funding: As part of official duties, effective implementation would require additional funding

2.5.6 Target 14: Health protection and promotion

From climate change adaptation standpoint, it is essential to maintain functional basic public services in the changing climate. This means that basic health protection infrastructure and services supporting it play a key role in safeguarding society's climate resilience. These include energy supply, power and data transmission and, in particular, water services, which are addressed under the 'Infrastructure and the built environment' theme.

Structured and systematic adaptation in health protection and health promotion requires a sufficient knowledge base and a well-functioning and robust society.

Finland's high health protection and housing standards have increased our climate resilience significantly compared with less developed countries. This means that the direct and indirect impacts of climate change on health are lower in Finland than on average in the world.

Nevertheless, the impacts of phenomena such as prolonged heatwaves lasting for a few weeks can be seen in visits to medical practices in Finland. In this context, excess mortality in the 65+ age group can be noticed (200–400 excess death per year). Even though such heatwaves do not occur in Finland every year, heatwaves are Finland's deadliest weather event. In the light of European data on the 2000s, older persons living alone in areas affected by the urban heat island effect have been a specific risk group.

The safeguarding of health protection – the most important pillar for the preservation of climate resilience and, consequently, climate change adaptation – takes place in 62 collaborative areas for environmental healthcare. Environmental health protection implements, in particular, legislation of the Ministry of Social Affairs of Health, Ministry of Agriculture and Forestry and Ministry of the Environment that, for example, safeguards the safety and security of water services and food supply as well as housing health. The Housing Health Decree (545/2015) lays down provisions on, for example, indoor temperature conditions that are affected by climate change. As regards the assessments of adverse effects of heat, the action limits defined by the current Housing Health Decree need to be reviewed, as the current limits for momentary indoor temperatures are +32 °C and for older persons +30 °C.

Operational from 1 January 2023, the wellbeing services counties are responsible for promoting the health and wellbeing of the entire population (not just service users and people in these authorities' units and in home care) in their activities in their area. Likewise, the municipalities are responsible for promoting health

and wellbeing in their activities. In addition, the wellbeing services counties and municipalities are required to cooperate with each other and support each other with their expertise. Cooperation must also take place with other actors. Examples of these include other public actors, the third sector and the private sector. Accordingly, in the climate change context, responsibility for promoting health and wellbeing means that the municipalities and wellbeing services countries have to agree with other actors and implement actions that support, for example, the preparedness of the most vulnerable population (aged 65 and above) for heatwaves, especially in areas that are exposed to the urban heat island effect.

To be prepared by the Finnish Institute for Health and Welfare (THL) in cooperation with the wellbeing services counties and municipalities, the national action plan for preparedness for heatwaves will form the basis for the wellbeing services counties and municipalities deploying cost-effective actions for heatwave preparedness under the guidance of the Ministry of Social Affairs and Health and the National Supervisory Authority for Welfare and Health. Well-functioning healthcare and the Finnish Institute for Health and Welfare, provided with adequate resourcing, will create the framework for the monitoring of infectious diseases, which is important in the climate change context.

The energy crisis emerging in Europe and Finland in autumn 2022 requires special actions to prevent energy poverty and to alleviate the effects of any electrical power outages. Power outages may have adverse effects particularly on people living in rural areas and, for example, older people and people with disabilities.

Other measures related to health protection and promotion are included in the Climate Change Adaptation Plan of the Ministry of Social Affairs and Health published in 2021. The Action Plan contains designated sections on non-communicable diseases (incl. mental health), communicable diseases, nutrition and health, occupational health and wellbeing, social impacts (such as services for older people and people with disabilities), health impacts of climate change mitigation actions, and other effects, such as increased amount of pollen, impacts of UV radiation, slipping accidents, and storm-related accidents.

Target 14	Means of monitoring
Negative health impacts of heat are recognised and adaptation and monitoring have progressed on various levels by 2030	A national action plan for the prevention of health hazards of heat is prepared and incorporated into the health promotion strategies and action plans of the wellbeing services counties and the municipalities and into regional and urban planning. A monitoring mechanism is set up and heat-related mortality can be measured and monitored.
The target advances the following aim:	
WILL / MEANS / **CAPACITY**	

Action 14.1 Drawing up a national action plan for the prevention of negative health impacts from heat

Description: A national action plan to prevent negative health impacts from heat that takes the various sectors extensively into account is drawn up.

Responsible actors: **Ministry of Social Affairs and Health, Finnish Institute for Health and Welfare, Finnish Institute of Occupational Health,** Ministry of the Environment, other key ministries, in cooperation with various actors, including civil society organisations.

Timeline: By the end of 2025; as regards preparedness for heatwaves, creating the national action plan is a priority.

Funding: As part of official duties, effective implementation would require additional funding for the Finnish Institute for Health and Welfare to coordinate the implementation of the national action plan for preparedness for heatwaves.

Action 14.2 Launching heatwave preparedness and adaptation measures on the basis of the national action plan

Description: To be specified further once the action plan in accordance with action 14.1 is completed. Activities under the action plan will take place in the wellbeing services counties in healthcare and social welfare units and in home care, and in municipalities.

Responsible actor: **Wellbeing services counties**, municipalities

Timeline: 2026–2030

Funding: As part of official duties, effective implementation would require additional funding

Action 14.3 Setting up a monitoring mechanism for heat-related mortality, to monitor heat-related deaths on a weekly basis during the summer period

Description: To be specified further once the action plan in accordance with action 14.1 is completed.

Responsible actor: **Ministry of Social Affairs and Health**, National Institute for Health and Welfare

Timeline: Mechanism to be set up by the end of 2026, after which the mechanism will act as a monitoring tool/indicator for health hazards

Funding: As part of official duties, effective implementation would require additional funding for the Finnish Institute for Health and Welfare

Action 14.4 Updating the action levels for temperature conditions of the Housing Health Decree

Description: The Decree of the Ministry of Social Affairs and Health on Health-related Conditions for Housing and Other Residential Buildings and Qualification Requirements for Third-party Experts (545/2015) contains the action limits for indoor air temperature in housing and residential facilities applied in the assessment of health hazards. The action involves assessing the health linkages of the action limits and updating them on the basis of the data collected.

Responsible actor: **Ministry of Social Affairs and Health**

Timeline: 2026

Funding: As part of official duties

2.5.7 Target 15: Cultural heritage and the cultural environment

Cultural heritage is created as a result of human activity and in interaction with the environment. It tells us about changes in our values, beliefs, knowledge, skills and traditions. Cultural heritage may be tangible, intangible or digital. It may also relate to the cultural or natural environment. Examples of tangible cultural heritage include artefacts and buildings. Intangible cultural heritage includes various practices, descriptions, knowledge and skills, such as proverbs, ways of observing special days, crafts, and singing and playing traditions. Digital cultural heritage covers both manifestations of tangible and intangible cultural heritage converted into digital form and expressions and practices of native digital cultural heritage. The cultural environment is linked with the physical environment and can be regarded as including the built cultural environment, ancient relics, other archaeological sites of various ages, cultural landscapes, and semi-natural grasslands and wooded pastures.

Climate risks to cultural heritage and the cultural environment have not been taken sufficiently into account in Finnish climate change adaptation policy, and the current actions will not be enough to safeguard the preservation of our cultural heritage and environment as climate change progresses. Climate change has also affected the environment, livelihoods and culture of the Sámi.

The impacts of climate change on cultural environments are examined in the 2008 report of the Ministry of the Environment titled Climate Change and the Cultural Environment – Recognised Impacts and Challenges in Finland[46]. A project to provide a current review of the topic was launched in autumn 2022. The report produced by the project will discuss climate change mitigation and adaptation in relation to the cultural environment, provide concrete examples of impacts on the cultural environment and propose recommended measures. So far, there is not enough information available on the impacts of climate change on cultural heritage and cultural environments. The impacts of climate change on intangible cultural heritage in particular are poorly known, which makes it challenging to formulate effective adaptation measures.

Cultural heritage is also part of society's collective memory, with the continuity it provides supporting people's wellbeing by providing continuity amidst change. Experiences of continuity and communality may support the attitude change that is required for climate change adaptation and help to deal with the changes required by adaptation. Cultural heritage also provides concrete solutions that can be taken into use and applied in climate change adaptation. These include traditional technologies, working methods and materials, existing knowledge and sustainable lifestyles related to intangible cultural heritage. In climate change adaptation, the preservation and protection of cultural heritage and the cultural environment require new measures, but it is also essential to take them into account in order to develop the solutions required for adaptation actions. Cultural heritage actors can contribute towards finding solutions to climate change adaptation and biodiversity loss.

Legislation and international agreements form a basis for the protection of the cultural heritage and environment that has been collectively defined as valuable and guide their use. Legislative reform projects related to cultural heritage and the cultural environment underway in autumn 2022 include the reform of the Antiquities Act (295/1963) and of the Land Use and Building Act (132/1999).

46 Climate Change and the Cultural Environment: Recognized Impacts and Challenges in Finland

Target 15

The protection of cultural heritage and the cultural environment against the impacts of climate change has improved, these are better taken into account in climate change adaptation policy and the utilisation of knowledge carried by cultural heritage and the cultural environments in climate change adaptation has progressed by 2030

This means that:

- Various education and training opportunities related to the protection of cultural heritage and the cultural environment in climate change adaptation are increased;
- The amount of funding allocated to cultural heritage management is increased;
- The impacts of climate change on cultural heritage and the cultural environment are monitored systematically;
- Cultural heritage actors are represented in bodies preparing climate change adaptation measures;
- Knowledge from the cultural heritage and cultural environment sector is used in the formulation of climate change adaptation measures and in the monitoring of their implementation.

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

Cultural heritage and environment education and training

Amount of funding allocated to cultural heritage management

Monitoring of cultural heritage and the cultural environment

Compositions of bodies preparing climate change adaptation measures

Knowledge from cultural heritage and environment sector included in documents used in the formulation and monitoring of climate change adaptation measures

Action 15.1 Developing competence and ensuring sufficient resources for the management of cultural heritage and the cultural environment

Description: The protection of cultural heritage and the cultural environment against climate change impacts requires new inter-administrative competence and competence-sharing related to aspects such as risk management. Safeguarding the preservation of cultural heritage and the cultural environment enables the development of new adaptation methods that make use of cultural heritage and are based on solutions found in the cultural environment. Competence development and the development of new adaptation measures require sufficient resources for the management of cultural heritage and the cultural environment.

Responsible actors: **Central government, main responsibility for cultural heritage assigned to Ministry of Education and Culture / Finnish Heritage Agency and for the cultural environment to Ministry of the Environment.** Implementation in cooperation with Ministry of Agriculture and Forestry, Centres for Economic Development, Transport and the Environment (ELY Centres), Metsähallitus (the Finnish Forest and Park Service) Natural Heritage Services, Senate Properties and other actors

Timeline: Implemented and well-established by 2030.

Funding: Effective implementation would require additional funding. Forms of funding must be developed in different sectors and allocated for the management of cultural heritage and the cultural environment and for the development of innovative adaptation measures based on cultural heritage.

Action 15.2 Developing assessments of the impacts of climate change on cultural heritage and the cultural environment

Description: Assessment mechanisms are developed to assess the impacts of climate change on cultural heritage and the cultural environment, including impacts on the Sámi cultural heritage and cultural environment. The assessments are taken into account in the planning and monitoring of policy measures.

Responsible actor: **Ministry of Education and Culture, Ministry of the Environment**, Ministry of Agriculture and Forestry, Ministry of Economic Affairs and Employment, Finnish Heritage Agency, Metsähallitus Natural Heritage Services and Senate Properties, Centres for Economic Development, Transport and the Environment (ELY Centres), in cooperation with Sámi Climate Council and Sámi Museum Siida as well as other actors.

Timeline: Implemented and well-established by 2030.

Funding: Effective implementation would require additional funding. Requires new competence in aspects including impact assessment and planning of policy measures

Action 15.3 Strengthening the cultural heritage sector's participation in the preparation and implementation of adaptation measures

Description: Cooperation partners are invited to participate more broadly in the planning of measures related to climate change adaptation in sectors such as construction and land use. The cultural heritage sector's participation in the authorities' climate change adaptation related cooperation is developed. Proactive cooperation is increased to coordinate adaptation measures and cultural heritage perspectives.

Responsible actor: **All ministries,** with cultural heritage actors as cooperation partners. The Ministry of Education and Culture and the Ministry of the Environment can provide support in the identification of potential cooperation partners in the cultural heritage and cultural environment sectors.

Timeline: Implemented and well-established by 2030.

Funding: As part of official duties

Action 15.4 Developing the availability, quality, usability and interoperability of cultural heritage and cultural environment data

Description: Due to the risks posed by climate change, cultural heritage and the cultural environment must be better documented digitally, for example by 3D modelling of important cultural heritage sites and by ensuring the recording, monitoring, long-term preservation, interoperability and usability of the data.

Responsible actor: **Ministry of Education and Culture and Ministry of the Environment,** Finnish Heritage Agency in cooperation with cultural heritage sector and other actors

Timeline: Continuous

Funding: Effective implementation would require additional funding in the administrative branch of the Ministry of Education and Culture for the digitisation of cultural heritage material, development of digital services and long-term preservation of digital cultural heritage as well as ensuring its availability and usability. The administrative branch of the Ministry of the Environment will implement measures including interoperability and development of cultural environment data with funding including project funding for the RYHTI project, creating a national information system on the built environment.

2.5.8 Targets 16–18: Climate risk management at the regional and municipal levels

Preparedness for climate change impacts calls for actions at all levels of government and activity. Choices made in the regions and municipalities have a major impact in climate change adaptation and preparedness. Many practical actions to prepare for the diverse consequences of climate change call for commitment and investments in implementation specifically by regional- and municipal-level actors.

An analysis of adaptation action and strategic plans of the regional councils shows that regions are at different stages in their adaptation activities. According to the Regional Development Act (756/2021),[47] climate change mitigation and promotion of adaptation are part of regional development and the duties of regional councils. Adaptation can also be promoted in regional land use planning, which under the Land Use and Building Act (132/1999)[48] belongs to the statutory tasks of the regional councils. So far, climate action by regional councils has focused on climate change mitigation, with only the first steps being taken in adaptation action.

The Centres for Economic Development, Transport and the Environment (ELY Centres) are central government agencies responsible for numerous different expert, official and supervision duties. As regards climate change adaptation, some essential task areas of ELY Centres include land use, functionality of the transport system (incl. transport safety and road and traffic conditions), environmental protection, biodiversity conservation and protection, construction and the built environment, the cultural environment, flood risk management, use and management of water resources, and agriculture and fisheries. In addition, ELY Centres promote adaptation as part of regional development work, advisory, funding and development services for enterprises, promotion of competence and lifelong learning, and agricultural and rural development tasks. As regards climate change adaptation, their key tasks also include defending the public interest in environmental and water issues, generating and disseminating environmental information, and improving environmental awareness. Many tasks of the ELY Centres require addressing adaptation needs in practice, although not all of these activities are necessarily recognised as adaptation.

In regional-level adaptation action, the weather and climate risk perspective has already been integrated into documents including regional risk assessments conducted as assigned by the Ministry of the Interior and in regional preparedness exercises. Prepared at regular intervals, the regional risk assessments cover regionally significant threats and incidents the management of which requires non-normal action and the impacts of which, if materialised, are regionally significant. Data on weather- and climate-related risks is also used when preparing the risk assessments. Prepared in inter-administrative collaboration, the risk assessments are utilised in preparedness and related collaboration.

47 Act on Regional Development and Implementation of the European Union's Regional and Structural Policy (756/2021) (in Finnish)

48 Land Use and Building Act (132/1999)

Rescue departments and Regional State Administrative Agencies coordinate the preparation of the regional risk assessments in broad regional cooperation in accordance with the assignment issued by the Ministry of the Interior. The Procedures Manual for Regional Risk Assessments[49] was published in May 2022. It is the statutory duty (under Act 896/2009)[50] of the Regional Administrative Agencies to coordinate regional preparedness and related collaboration. The Regional State Administrative Agencies organise regular preparedness exercises in their area, with the region's authorities and other actors taking part. The exercises promote the actors' preparedness for various kinds of accident and incident. The Agencies are also responsible for organising wildfire lookout activities.

At the regional level, there are also collaboration and coordination forums for preparedness and safety and security that differ slightly from each other and that are either appointed by Regional State Administrative Agencies or organised in accordance with the division the country into regions or into rescue services regions. Based partly on voluntary activity, these structures operate in accordance with the collaboration model for comprehensive security through broad-scale cooperation between the different regional safety and security actors. This means they are existing collaboration structures for the promotion of climate risk preparedness, too.

In municipalities, adaptation-related strategic planning and target-setting has mainly taken place in the largest cities. Particularly among the smaller municipalities, engagement in adaptation has so far been low. According to a survey by the Association of Finnish Local and Regional Authorities,[51] municipalities have identified quite a broad range of climate change-related risks, such as storms, heavy rains and sudden snow loads, prolonged heatwaves and drought periods, lowering of groundwater table, and increases in slippery conditions during winter. The municipalities' adaptation measures have, however, focused mainly on a few of the municipalities' fields of activity. Practical-level measures have been taken in the technical sector in particular, where rainwater and stormwater management and the reliability of water services have been increased.

49 Procedures Manual for Regional Risk Assessments (In Finnish, with an English abstract)

50 Act on Regional State Administrative Agencies (896/2009), (in Finnish)

51 Kuntien ja maakuntien ilmastotyön tilanne 2021 (*Status of Local and Regional Authorities' Climate Action,* in Finnish)

Climate risks also come up in statutory land use planning and construction. In these duties, action has been promoted through municipalities' own activities but also through the implementation of various types of sectoral legislation. For example, the municipalities are responsible under the Land Use and Building Act for stormwater management in areas covered by the local detailed plan and may also take charge of stormwater management in other areas. The requirements concerning building sites outside the local detailed plan state that, when considering the appropriateness of a site, care must be taken to ensure there is no danger from flood, earth or rock fall, or landslide.

Weather and climate change preparedness in municipalities is currently included in some guides[52] as well as various preparedness plans, such as environmental health preparedness plans of municipalities and administrative branches. It is important to ensure that these will remain up to date and are developed in the future, too.

Climate change adaptation requires attention extending beyond the technical sector in the duties and services of municipalities. Two of the sets of duties important from the climate change adaptation perspective – healthcare and social welfare and rescue services – are transferred to the wellbeing services counties from the beginning of 2023. The role and responsibilities of the wellbeing services countries will need to be examined more closely as part of the work to develop regional adaptation in the next few years.

Going forward, forming an overall regional and local picture will require well-functioning cooperation between the levels of government and actors. Cooperation will benefit the identification of risks and vulnerabilities related to climate change, the determination and prioritisation of the adaptation measures required, and the identification of opportunities.

52 Kuinka kunnat kohtaavat ilmastonmuutoksen (*How Municipalities Can Prepare for Climate Change*, in Finnish) and Exceptional Situations Related to Environmental Health. A Handbook for Environmental Health Care Staff and Cooperation Partners (In Finnish, with an English abstract)

Target 16	Means of monitoring
Regional and municipal actors have access to guidelines for managing climate risks as well as the competence to make use of them in planning on various sectors by 2030	Completion and utilisation of planning guidelines (such as number of downloads, feedback on use) Updates to guides and guidelines
The target advances the following aims:	
WILL / MEANS / CAPACITY	

Action 16.1 Preparing guidelines to support planning of regional adaptation

Description: The guidelines compile information from sources including existing guidelines and processes concerning planning needs for adaptation, tools available and potential funding sources. When preparing the guidelines, synergies with the preparation of the guide to the municipalities' Climate Plans under the Climate Act are utilised.

Responsible actors: **Ministry of Agriculture and Forestry**, Ministry of the Environment, Ministry and Transport and Communications, Ministry of Economic Affairs and Employment, Ministry of the Interior, Ministry of Social Affairs and Health, Ministry of Finance, Centres for Economic Development, Transport and the Environment (ELY Centres) and Regional State Administrative Agencies in cooperation with Association of Finnish Local and Regional Authorities, regional councils and other actors such as research institutes

Timeline: 2023–2024

Funding: As part of official duties, project funding

Action 16.2 Ensuring that sectoral guides and guidelines are up to date from the adaptation perspective

Description: The various sectors have a varying number of guides and guidelines for government agencies, public bodies and other organisations prepared at the national level concerning activities and planning. It must be ensured that the processes to update this guidance examine the needs related to adaptation. Where necessary, the guidance should respond to needs related to anticipated impacts and preparedness for risks. Information on the guidelines and guides are compiled, as appropriate, on sites such as the Climateguide.fi service (action 20.2) and awareness and use of the guides are strengthened through means including communication and competence development (action 17.2).

Responsible actors: **Ministries, government agencies and other public bodies** in accordance with their areas of responsibility

Timeline: By 2030, continuous

Funding: As part of official duties

Action 16.3 Including the latest knowledge on climate risks in regional, municipal and sectoral adaptation and preparedness

Description: Up-to-date information on the impacts of climate change is utilised in adaptation work and its development (e.g. risk assessments, plans and exercises).

Responsible actor: Each ministry in its administrative branch, National Emergency Supply Agency, Regional State Administrative Agencies, in cooperation with Association of Finnish Local and Regional Authorities, regional councils and municipalities

Timeline: Continuous

Funding: As part of official duties

The Climate Act (423/2022) lays down an obligation to the central government authorities concerning the Climate Plans, including NAP2030, drawn up under the Act. An obligation concerning the municipalities' Climate Plans is also being drafted for the Climate Act. The participation of the municipalities, regional councils and other regional actors in adaptation action is necessary for Finland to successfully prepare for the impacts of the changing climate. The targets and actions for the strengthening of climate risk management at the regional and municipal levels shown in the table below have been prepared from the perspective of central government authorities, seeking to strengthen the regional and municipal actors' preparedness for climate change adaptation on a broad scale.

Target 17

The guidance of adaptation for regional and municipal level is consistent and appropriate by 2030

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

Monitoring of the strategy action of regional government

Visibility of adaptation in cooperation between central government and the regions and central government and the municipalities

Action 17.1 Exploring the opportunity to strengthen the obligations laid down by the Climate Act for the municipalities concerning climate change adaptation

Description: In conjunction with the reform concerning amendments to the Climate Act in 2022, it was proposed that the municipalities be obligated to prepare a municipal Climate Plan either on their own or together with other municipalities. The content requirements of the plan do not require the municipalities to assess climate risks or measures required to manage them. Instead, the proposal leaves any adaptation-related measures to the discretion of the municipalities. To strengthen the climate change adaptation of the municipalities, the development of obligations needs to be examined further from the adaptation perspective.

Responsible actor: **Ministry of the Environment, Ministry of Agriculture and Forestry**, Finnish Environment Institute, in cooperation with Association of Finnish Local and Regional Authorities and other key actors

Timeline: 2023–2026

Funding: As part of official duties and project funding

Action 17.2 Strengthening the competence base of actors by including adaptation-related content in sector-specific training and negotiation days

Description: Sector-specific training and negotiation days are organised each year on numerous themes, including water management, natural resources management and the bioeconomy, land use, and environmental impact assessment.

Responsible actor: **All ministries** in accordance with their areas of responsibility

Timeline: 2023–2030

Funding: As part of official duties

Action 17.3 Including sector-specific adaptation targets in guidance and direction of regional state administration and strengthening the coordination of cooperation between ministries

Description: The climate change adaptation perspective is strengthened in the process of preparing the next Strategy for the Regional State Administrative Agencies and the Centres for Economic Development, Transport and the Environment (ELY Centres) in 2023. Coordination of the inclusion of adaptation in sectoral guidance and direction by the responsible actors in contexts such as the activities of the Climate Group of strategy managers and guiding bodies.

Responsible actor: Ministry of Economic Affairs and Employment, Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Finance, Ministry of Transport and Communications, Ministry of Social Affairs and Health, Ministry of the Interior, Ministry of Education and Culture, Finnish Transport Infrastructure Agency, Finnish Food Authority

Timeline: 2023–2030

Funding: As part of official duties

Action 17.4 Strengthening the dialogue on adaptation between central government and the municipalities and between the central government and the regions

Description: Adaptation issues are taken into account where possible in the dialogue between the Government and the regions (e.g. regional development discussions, land use, housing and transport cooperation). Opportunities to address adaptation-related themes in various networks and forums, for example in the implementation of the National Urban Strategy 2020–2030, are examined. Attention to adaptation perspectives is raised in cooperation with the Centres for Economic Development, Transport and the Environment (ELY Centres) and municipalities.

Responsible actor: Ministry of Economic Affairs and Employment, Ministry of the Environment, Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Centres for Economic Development, Transport and the Environment (ELY Centres), in cooperation with Association of Finnish Local and Regional Authorities, regional councils, municipalities and wellbeing services counties

Timeline: Continuous

Funding: As part of official duties

A lack of resources has been identified as a key factor limiting the acceleration of adaptation action at the regional and municipal levels. The range of funding sources is currently quite limited. Developing additional funding sources is necessary over the long term, but awareness of the availability and uses of funding already available needs to be increased.

Target 18	Means of monitoring
Funding opportunities encourage regional and municipal actors to strengthen adaptation, and monitoring of the allocation of funding is made possible by 2030	Use of communication channel Communicating about funding opportunities Monitoring of funding instruments
The target advances the following aims:	
WILL / MEANS / CAPACITY	

Action 18.1 Developing a targeted communication channel for funding opportunities for projects promoting adaptation

Description: Calls for funding enabling adaptation action are compiled on a single website, including national and EU funding. Lessons learned from the listing of climate change mitigation funding sources maintained by Motiva are utilised. The website's ability to serve the various actors is ensured broadly in implementation.

Responsible actors: Ministries in cooperation with other funding providers, including Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: 2023–2027

Funding: As part of official duties, possible need for additional resources to maintain the communication channel and ensure the information is up to date

Action 18.2 Developing the competence of funding advisers related to climate change adaptation

Description: Actors participating in the implementation of funding instruments are identified and opportunities to develop the competence of funding advisers are explored to promote projects supporting climate change adaptation. Synergies with existing funding advisory services, such as Business Finland's advisory service for EU and international funding, is explored.

Responsible actor: Ministry of Economic Affairs and Employment, Ministry of the Environment, Ministry of Agriculture and Forestry in cooperation with other actors

Timeline: From 2023 onwards

Funding: As part of official duties, effective implementation would require additional funding for training delivery

Action 18.3 Exploring opportunities for developing the monitoring of funding

Description: Where possible, the results of the project to improve the administration of discretionary government grants and existing funding monitoring systems are utilised. Potential synergies with follow-up on funding targeted at climate change mitigation are explored.

Responsible actor: Ministry of Economic Affairs and Employment, Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Finance, in cooperation with other actors

Timeline: From 2023 onwards

Funding: As part of official duties

2.5.9 Targets 19–21: International cooperation

This section presents three targets related to international cooperation: Target 19 focuses on international development policy, international climate finance and climate diplomacy, target 20 on means, capacities and capabilities of developing countries to adapt to climate change, and target 21 on other international cooperation.

2.5.9.1 Target 19: International development policy, international climate finance and climate diplomacy

Coupled with environmental degradation and biodiversity loss, climate change causes particularly substantial problems for developing countries and tests their resilience. Climate change and biodiversity loss undermine the foundations of economic activity and have a significant impact on food and nutrition security as well as access to water and energy in many countries. They also increase forced and other migration, poverty and inequality, conflicts and the risk of zoonotic pandemics. The 2015 Paris Agreement on climate change as well as other international environmental agreements, such as the Convention on Biological Diversity, are legally binding on Finland and important in the promotion of sustainable development. Finland supports the climate actions of developing countries through development cooperation funds and as part of foreign and development policy.

Finland's contribution to international climate finance is channelled as part of financing allocated for development cooperation. Financing is continued so as to take Finland's international obligations into account, targeting resources equally to both mitigation of and adaptation to climate change. The Glasgow Climate Pact of the Conference of the Parties (COP26) to the UN Framework Convention on Climate

Change (UNFCC), and the Paris Agreement invited developed countries to increase adaptation finance to developing countries so that the 2019 levels of adaptation finance is doubled by 2025. In line with the Paris Agreement, Finland will act internationally also with a view to the greening of all finance flows.

The Ministry for Foreign Affairs drew up the first Plan for the Implementation of Finland's Public International Climate Finance[53] in 2022. Under the plan, climate finance is planned to increase up to an annual total of around EUR 200 million in 2025. Climate finance is channelled both in the form of grants and in the form of investments and loans. It is anticipated that grant-based climate finance flows are equally split between mitigation and adaptation from 2022 onwards. Efforts are made to also allocate investment- and loan-based support to adaptation, although larger-scale commercial adaptation solutions are still rare. Reaching the targets will require that future Governments, too, are committed to implementing the climate finance plan.

Prepared for the first time and adopted by Parliament in 2021, the Report on Development Policy Across Parliamentary Terms[54] supports the preservation of climate change and natural resources as Finland's development policy priorities across parliamentary terms. It also supports the strengthening of the biodiversity perspective in the implementation of Finland's development cooperation by raising biodiversity alongside climate change and sustainable management and use of natural resources as one of the main goals of development cooperation. Climate resilience and low-emission development are taken into account in the report as cross-cutting objectives of development policy. Environmental protection is introduced in the report as a new cross-cutting objective of development policy. The objectives are sought with an emphasis on safeguarding biodiversity.

A report on development policy results is submitted to Parliament at four-year intervals. Volumes of climate finance are also reported to the EU and, in accordance with the rules binding on the Parties, to the UNFCC and the Paris Agreement.

Covering all the policy areas of the Ministry for Foreign Affairs, Finland's Action Plan for Climate Smart Foreign Policy was adopted for the first time in October 2019 and a process to update it was launched in 2022. The update aims to further clarify the objectives of Finland's climate smart foreign policy and include action to promote

53 Plan for the Implementation of Finland's Public International Climate Finance (in Finnish, with an English abstract)

54 Report on Development Policy Across Parliamentary Terms

climate change mitigation and adaptation even better throughout the Ministry's activities, covering not only development policy but also fields including security and trade policy.

For the targets presented below to be reached, a commitment should be made to the entries of the Report on Development Policy Across Parliamentary Terms and separate policies should be outlined for the human and budget resources for the implementation of the report, the Plan for the Implementation of Finland's Public International Climate Finance and the Action Plan for Climate Smart Foreign Policy.

Target 19	**Means of monitoring**
Adaptation, particularly the capacities of the most vulnerable countries to adapt, is increasingly promoted in international cooperation	Volume of international adaptation finance / Finland's international climate finance reporting Development Policy Results Report Follow-up on Finland's Action Plan for Climate Smart Foreign Policy
The target advances the following aims:	
WILL / MEANS / CAPACITY	

Action 19.1 Directing half of Finland's international climate finance at supporting developing countries in climate change adaptation and increasing the amount of international climate finance

Description: Climate finance to developing countries is one of the obligations under UN climate agreements and part of our global responsibility. Under the Programme of Prime Minister Sanna Marin's Government, Finland increases climate finance channelled to developing countries. Grant-based support is provided for both climate change mitigation and climate change adaptation. Finance in the form of investments and loans is targeted particularly at climate change mitigation, but continuous efforts will also be made in the adaptation context to identify suitable investment opportunities.

Responsible actors: **Ministry for Foreign Affairs**

Timeline: By 2026

Funding: Effective implementation would require separate decisions on increasing climate finance.

Action 19.2 Implementing Finland's development policy with a long-term approach and a commitment to the priorities of the Report on Development Policy Across Parliamentary Terms during future electoral terms Description: Climate change, biodiversity and sustainable management and use of natural resources are preserved as a main goal, and low-emission development, climate resilience and environmental protection with an emphasis on safeguarding biodiversity as the cross-cutting objectives of Finland's development policy. Responsible actor: **Ministry for Foreign Affairs** Timeline: Continuous Funding: Would require a commitment by future Governments to the policies set out in the Report on Development Policy Across Parliamentary Terms and the necessary resources for the mainstreaming of low-emission development, climate resilience and safeguarding of biodiversity into all development cooperation.
Action 19.3 Promoting growth in international adaptation finance globally Description: Finland promotes growth in international adaptation finance globally in accordance with the Glasgow Climate Pact of COP26 in contexts including international climate negotiations, and improvements in the quality and availability of adaptation finance particularly by means of climate diplomacy in accordance with the Action Plan for Climate Smart Foreign Policy. Responsible actor: **Ministry for Foreign Affairs,** Ministry of the Environment Timeline: By 2026 Funding: Effective funding would require the necessary human resources for the implementation of climate diplomacy and international climate policy.

2.5.9.2 Target 20: Means, capacities and capabilities of developing countries to adapt to climate change

Finland's international climate finance, and adaptation action implemented with this finance, is part of Finland's development policy and official development assistance to third countries. In addition to the development policy priorities, Finland's development policy and cooperation are guided by principles including these being results- and human rights-based, and by related guidelines.

Climate and natural resources is one of the five main goal areas of Finland's development policy, with themes supported under the aim being, in particular, food security and water, meteorology and disaster risk prevention, and forests and safeguarding biodiversity. The objective is to reduce poverty, improve food security, promote the sustainable use of natural resources, increase the amount of available water and arable land, improve access to sustainably produced energy, reduce disaster mortality and loss and damage caused by extreme weather events,

and support societal stability and equality and, consequently, prevent uncontrolled migration flows within countries and across state borders. All this will also contribute towards reductions in cross-border impacts on Finland, for example.

The grounds for Finland's international cooperation are laid down in the Paris Agreement on climate change and in the 2030 Agenda for Sustainable Development. In addition to development policy, Finland's international climate action is guided by the first ever Report on Development Policy Across Parliamentary Terms adopted by the Government in 2021, which entrenches the continuity of the role of climate change, including adaptation, at the core of development cooperation across Governments and strengthens biodiversity perspectives in development cooperation.

All in all, Finland's development cooperation aims to strengthen developing countries' own resilience. This means that adaptation action, too, will support their capacity to formulate and implement their own climate and adaptation plans and measures. In addition, future adaptation needs are reduced by financing climate change mitigation and supporting low-emission development in developing countries.

Reporting on development policy results to Parliament takes place at four-year intervals by means of the Development Policy Results Report. Volumes of climate finance are reported annually to the EU and at two- and four-year intervals under the climate agreements. For the targets presented here to be reached, sufficient human as well as other resources will need to be allocated for climate finance.

By means of climate smart foreign policy, the exporting of Finnish solutions supporting climate change adaptation is promoted, with examples of these including Finnish weather observation and early warning systems.

Target 20	**Means of monitoring**
The capacities and capabilities of developing countries to plan and implement adaptation measures and to develop in a climate-resilient way are promoted as part of international cooperation	Development Policy Results Report, Finland's international climate finance reporting Finland's international climate finance reporting Follow-up on Finland's Action Plan for Climate Smart Foreign Policy
The target advances the following aims:	
WILL / MEANS / CAPACITY	

Action 20.1 Flexibly using all development cooperation channels where possible to support the capacities and capabilities of developing countries to draw up and implement national adaptation plans and concrete adaptation measures

Description: Finland supports the capacities and capabilities of developing countries to draw up national adaptation plans and implement concrete adaptation measures through various development cooperation channels from multilateral cooperation with, for example, UN organisations on supporting civil society organisations. In addition to development policy, the work is guided by the Report on Development Policy Across Parliamentary Terms and the various principles and guidelines, such as guidelines on performance-based management and cross-cutting objectives. Effective development cooperation is carried out in line with Finland's development policy particularly in the least developed countries, small island developing states and Africa, and in Finland's areas of strength.

Responsible actors: **Ministry for Foreign Affairs**

Timeline: Continuous

Funding: Effective implementation would require the allocation of the necessary human resources for the administration of development cooperation.

Action 20.2 Working towards decreasing adaptation needs by supporting climate change mitigation through Finland's international climate finance, particularly financial investments, and by promoting ambitious emission reductions globally in line with Finland's Action Plan for Climate Smart Foreign Policy

Description: Adaptation needs are affected essentially by the level of emission reductions achieved and, consequently, success in mitigating climate change and, in particular, its progress. Internationally, Finland will support developing countries in climate change mitigation by, for example, investing in renewable energy.

Responsible actor: **Ministry for Foreign Affairs**

Timeline: Continuous

Funding: Effective implementation would require the allocation of the necessary human resources for both the administration of development cooperation and for climate action in the Ministry for Foreign Affairs.

Action 20.3 Promoting the export of Finnish adaptation solutions through climate smart foreign policy

Description: Examples of solutions include the exports of equipment and knowhow related to meteorological and water expertise.

Responsible actor: **Ministry for Foreign Affairs,** Ministry of Employment and the Economy / Business Finland, Ministry of Agriculture and Forestry in cooperation with key actors

Timeline: Continuous

Funding: Effective implementation would require the allocation of the necessary human resources for climate action in the Ministries.

2.5.9.3 Target 21: Other international cooperation

Finland will take part in strengthening international, European and Nordic cooperation as well as cooperation concerning climate change adaptation in the Baltic Sea, Arctic and Barents Regions. Finland has been involved in generating climate change data and implementing cooperation projects related to adaptation. Finland will also engage actively in negotiations related to the UN Framework Convention on Climate Change and the Paris Agreement.

Adaptation can be promoted broadly in many kinds of international cooperation. For example, many UN organisations, such as the World Meteorological Organization (WMO) and the World Health Organization (WHO), also carry out work relating to adaptation. NATO membership will also provide Finland with opportunities for broader international cooperation relevant to these themes, and will lay a foundation for joint development objectives of the defence sector. NATO has recognised climate change as a multiplier of threats to its own operations. NATO promotes the identification and management of security impacts related to climate change and the adaptation of military operations to climate change as well as climate change mitigation, however without compromising defence capabilities,.

In February 2021, the European Commission adopted its new EU strategy on adaptation to climate change, 'Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change', as part of the European Green Deal. The strategy strengthens preparedness for and adaptation to climate change impacts as part of forging a climate-resilient and carbon-neutral Europe by 2050. Within the framework provided by the Union Civil Protection Mechanism, preparedness for incidents such as extensive wildfires and floods are promoted at the EU level by developing the Union's joint capacities (rescEU). In addition, the Union Civil

Protection Mechanism is used to coordinate material and expert assistance provided by countries to each other in the event of disasters or accidents where a country's own resources are not sufficient.

The increase in and management of migration flows caused by climate change call for stronger common immigration policy of the EU. The situation of people fleeing for environmental reasons underlines the need for strong and crisis-resilient European systems and various channels supplementing the asylum procedure.

Target 21	**Means of monitoring**
Promoting climate change adaptation appropriately as part of international cooperation, strengthening Finland's adaptive capacity and the broadening of the knowledge base	Finland's participation in cooperation projects and bodies
The target advances the following aims:	
WILL / **MEANS** / **CAPACITY**	
Action 21.1 Developing regional and cross-border adaptation cooperation for example in contexts of Nordic, Arctic and Barents Region cooperation Description: Finland participates in the working group for adaptation under the Nordic Council of Ministers and promote adaptation in the Arctic and Barents Regions. Responsible actors: **Ministry of Agriculture and Forestry,** Ministry for Foreign Affairs, Ministry of the Environment Timeline: Continuous Funding: As part of official duties and project funding. Effective implementation would require the allocation of the necessary human resources for international cooperation and climate action in the Ministries and safeguarding access to project funding.	

Action 21.2 Strengthening Finland's contribution as part of the negotiation processes concerning adaptation under the UN Framework Convention on Climate Change and the Paris Agreement and the work of the Intergovernmental Panel on Climate Change

Description: Finland takes part annually in international climate negotiations and their preparation as part of the EU negotiating team. Adaptation issues carry considerable weight in international negotiations, and there is demand for Finland's role and experiences in the negotiations. Adaptation action within the Intergovernmental Panel on Climate Change (IPCC) takes place particularly in Working Group II (Impacts, Adaptation and Vulnerability). In the years ahead, the IPCC will be preparing for the seventh assessment cycle, and it is important to ensure the visibility of themes important for Finland in international action in cooperation with the Finnish scientific community.

Responsible actors: **Ministry for Foreign Affairs, Ministry of the Environment, Ministry of Agriculture and Forestry**

Timeline: Continuous

Funding: As part of official duties, effective implementation would require the allocation of the necessary human resources for international cooperation and climate action in the Ministries.

Action 21.3 Engaging in the implementation of the EU Adaptation Strategy and participating actively in EU-level cooperation to manage risks related to climate change

Description: Finland will participate in the activities of the Working Group on Adaptation of the Climate Change Committee of the EU and actively express Finland's views in conjunction with the implementation of the EU Adaptation Strategy (2021). The cross-cutting and extensive package of measures of the EU Adaptation Strategy also calls for Finland to carry out extensive national coordination for successful influencing and participation related to implementation. Finland will also participate actively through the Union Civil Protection Mechanism in promoting the management of risks related to climate change.

Responsible actors: **Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of the Interior** and other ministries in accordance with their areas of responsibility

Timeline: Continuous

Funding: As part of official duties

2.5.10 Targets 22–24: Knowledge base, communication and monitoring

This section presents three targets. Target 22 focuses on the knowledge base and utilisation of information, target 23 on communication and interaction, and target 24 on the monitoring and evaluation of adaptation.

2.5.10.1 Target 22: Knowledge base and utilisation of information

The need for information on the consequences of climate change and innovative adaptation measures is growing as climate change is accelerating. In addition to strengthening the knowledge base, there is also a need to considerably improve the utilisation of information from the current level.

Quantitative data is not adequately tapped into the assessment of impacts and damage caused by weather events and climate change in Finland. Impact assessments of adaptation measures cannot be conducted successfully without extensive datasets and their utilisation. Climate change impact assessments require research-based assessments examining changes in hazards as well as exposure and vulnerability factors, and the effects of adaptation measures on risks and adaptive capacity. Very few assessments of this kind have so far been conducted in Finland.

For example, in Norway, insurance companies have shared their loss and damage data openly. This data has provided municipalities and central government with a good idea of the locations and scale of damage caused by events such as heavy rain and floods. Data has improved decision-making related to risk management and increased understanding of the societal and economic impacts of weather events. In Finland, too, data could help to improve the efficiency and targeting of risk management and adaptation measures. This has already been the case with, for example, floods: damage compensation data obtained from insurance companies has enabled the validation of flood maps and risk assessments. It is easier to make investment assessments of economically efficient flood risk management measures when the total scope of damage is known. In addition to national climate risk analyses, consistent data analyses would also increase understanding among private actors of the risks facing them and their sector. This applies in particular to the assessment of current but also of future risks.

The Sendai Framework for Disaster Risk Reduction 2015–2030 was adopted by the UN in Sendai, Japan, in 2015. To promote the implementation of the Sendai Framework, the Ministry of the Interior re-activated a large-scale and cross-administrative cooperation network in 2021. The related working group is tasked with promoting the exchange of general information concerning disaster risk management and to ensure the collection of sufficiently extensive and specific information on disaster risk management.

Target 22	**Means of monitoring**
The knowledge base related to weather and climate change risks and adaptation is strengthened in a practical manner, and the availability of research data to end users is ensured by 2027	Weather and climate impact database Operating model in place to collect and make use of research data
The target advances the following aim:	
WILL / **MEANS** / CAPACITY	

Action 22.1 Developing datasets supporting climate change adaptation and promoting their utilisation

Description: Examples include scenarios linking climate change and societal development, a database containing statistics on impacts of weather events, forest resource data, including datasets on fire load, datasets on wind, snow and insect damage risks, and datasets on flood risk areas. The utilisation of datasets is promoted in impact and risk forecasts and monitoring (target 24).

Responsible actors: Research institutes

Timeline: Continuous

Funding: Effective implementation would require additional funding

Action 22.2 Developing an operating model for the compilation of data generated in research projects and developing means to utilise research data

Description: A research review coordinated by the Ministry of Agriculture and Forestry is conducted regularly, compiling continuously evolving research data that can be utilised in Finnish conditions. The development work will require dialogue with research funding providers and operating models to strengthen the utilisation of data in cooperation with those utilising the data.

Responsible actor: **Ministry of Agriculture and Forestry**, Prime Minister's Office, other ministries, research institutes, in cooperation with research funding providers, Finnish Climate Change Panel, universities and other higher education institutions

Timeline: 2024–2027

Funding: Effective implementation would require additional funding

Action 22.3 Developing the collection and dissemination of information related to disaster risks

Description: The Ministry of the Interior coordinates the national cooperation network for disaster risk management, with one of the aims being to collect and disseminate information related to disasters. The current term of the network is until the end of 2023.

Responsible actors: **Ministry of the Interior**, Ministry for Foreign Affairs, Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Education and Culture, Ministry of Finance, Ministry of Social Affairs and Health, Ministry of Economic Affairs and Employment, Ministry of Transport and Communications in cooperation with representatives of other government agencies, public bodies and the third sector in the cooperation network

Timeline: From 2023 onwards, continuous

Funding: As part of official duties

Action 22.4 Developing the assessment of cost efficiency, effectiveness and social justice aspects of adaptation measures

Description: Issues related to the cost efficiency, effectiveness and social justice of adaptation measures were examined during the process to prepare NAP2030, with major methodological challenges discovered in relation to them. Development needs (including methods development and assessment development) and opportunities to solve them must be assessed more specifically on the basis of the results of ongoing projects.

Responsible actor: **Ministry of Agriculture and Forestry,** other ministries and research institutes in cooperation with other key actors

Timeline: From 2024 onwards

Funding: Effective implementation would require additional funding

Action 22.5 Preparing and implementing a research, development and innovation programme for adaptation

Description: The research, development and innovation (RDI) programme can help to strengthen the knowledge base and support the development of adaptation solutions. The programme must be targeted by prioritising identified information needs, emphasising the development of concrete adaptation solutions and innovations to strengthen practical adaptation work.

Responsible actor: **Ministry of Agriculture and Forestry,** other ministries

Timeline: From 2023 onwards

Funding: Would require additional funding for RDI promoting adaptation

Action 22.6 Exploring opportunities to establish a national advisory service focusing on climate change impacts, consequences and adaptation measures

Description: The needs for advisory services concerning climate change impacts and adaptation measures are identified. Based on the needs, cost-effective options for the implementation of the advisory service are explored.

Responsible actor: **Ministry of Agriculture and Forestry**, Ministry and Transport and Communications, research institutes and Centres for Economic Development, Transport and the Environment (ELY Centres)

Timeline: 2024–2025

Funding: As part of official duties, additional funding would be required to establish and maintain the advisory service

2.5.10.2 Target 23: Communication and interaction

Communication and interaction play a key role in increasing awareness of climate change impacts, adaptation needs and adaptation measures. In addition to general climate change awareness, there is increasing demand for more concrete adaptation solutions and for information that is targeted regionally, locally as well as sectorally.

The need for information varies depending on the actor and sector, which means that adaptation information should be targeted at the various target groups. Targeting adaptation-related communication at government and administration, the various stakeholders, citizens as well as decision-makers is equally important and will require increasing efforts in the future. Efforts must be made to ensure the communication is clear, consistent and timely.

The private sector plays a significant role in developing climate change preparedness and adaptation solutions. The identification of opportunities related to new technologies in particular must be developed in cooperation with private-sector actors. In addition, operating models are required to strengthen the adaptation action of private-sector actors in the various sectors. The third sector also covers a wide range of actors. In some administrative branches, civil society organisations (CSOs) are already active in climate change adaptation action, but there are no established operating models concerning adaptation.

Adaptation-related communication has been developed especially by means of the communication plan for adaptation. The plan was created by the inter-administrative monitoring group coordinating the implementation of Finland's National Climate Change Adaptation Plan 2022 that targeted the period 2015–2022.

Since 2020, a newsletter focusing on adaptation has been published in cooperation between several actors and under the leadership of the Ministry of Agriculture and Forestry. The newsletter still requires further development. Communication has, however, often tended to be a one-way process, with there not having been systematic interaction with the various actors in society.

Adaptation-related information is also comprehensively available in various online services. The Climateguide.fi service in particular has served as a key national distribution channel for research-based climate change information for years. Vesi.fi is another online service coordinated by central government and provides researched information on water and current data on water and flood situations. Third-sector websites and various media sources are also important communication channels for climate change and adaptation information.

Target 23

Awareness among society's actors of risks and adaptation measures related to climate change is strengthened through communication

The target advances the following aims:

WILL	MEANS	CAPACITY

Means of monitoring

Up-to-dateness and implementation of the communication and interaction plan

Scope/number and activeness in adaptation communication of those taking part in communication cooperation

Climateguide.fi user statistics and survey results, development of the guide's adaptation-related contents

Statistics and reader feedback on the climate change newsletter

Action 23.1 Preparing a communication and interaction plan to support the implementation of NAP2030 and ensuring its implementation

Description: The communication and interaction plan will take account of aspects such cooperation with the various stakeholders, effectiveness of communication and its monitoring, and ensure that communication is up to date with regard to the implementation of NAP2030. It is important to enhance the reach of new target groups by means of communication and interaction concerning adaptation.

Responsible actors: **Ministry of Agriculture and Forestry,** other ministries in cooperation with key implementation participants

Timeline: Preparation in 2023, updates every two years

Funding: As part of official duties, effective implementation would require additional funding

Action 23.2 Maintaining and developing the Climateguide.fi website as the key communication channel for adaptation information and best adaptation practices

Description: Awareness and accessibility of websites and tools related to adaptation is improved to increase effectiveness. Linkages with other key websites, such as the water-themed vesi.fi, are improved.

Responsible actor: **Ministries and research institutes**

Timeline: Continuous

Funding: Annual maintenance costs EUR 50,000 (with current resources), larger development measures would require additional funding

Action 23.3 Developing the climate change adaptation newsletter as a topical communication tool

Description: Regularly collected reader feedback is utilised in development work, and synergies with services such as Climateguide.fi are explored.

Responsible actor: **Ministry of Agriculture and Forestry,** other ministries in cooperation with key implementation participants

Timeline: Continuous

Funding: As part of official duties, effective implementation would require additional funding

Action 23.4 Developing and establishing interaction with the private sector and the third sector

Description: Dialogue is strengthened and well-functioning means of cooperation is explored together with third-sector actors and the private sector. The incorporation and strengthening of the climate change adaptation perspective is enhanced as part of tried and tested forms of cooperation. This is also developed as part of roadmap development (action 9.2).

Responsible actor: **Ministry of Agriculture and Forestry**, other ministries

Timeline: From 2024 onwards

Funding: As part of official duties

Action 23.5 Making use of monitoring data as part of knowledge-based communication

Description: The effectiveness of communication in increasing awareness is strengthened by making use of monitoring data. The action also contributes towards strengthening target 24 related to adaptation monitoring and evaluation.

Responsible actor: Research institutes, ministries, Centres for Economic Development, Transport and the Environment (ELY Centres), government agencies and other public bodies

Timeline: Continuous

Funding: As part of official duties

2.5.10.3 Target 24: Adaptation monitoring and evaluation

To monitor and evaluate adaptation effectively, it is essential to determine whether the monitoring concerns the implementation of adaptation measures and policy and their impacts, or actual adaptive capacity. The monitoring of climate change impacts and risks can also be seen as part of adaptation monitoring but, if there is no link to adaptation policy and its implementation, such monitoring alone will not provide answers as regards the effectiveness of adaptation policy.

The systematic monitoring of adaptation action is still evolving. So far, the monitoring and evaluation of adaptation action have focused on monitoring progress made in policy measures. Assessing the development of actual adaptive capacity and its possible shortcomings requires scenarios examining the progress of climate change. This work has so far only been carried out as part of research projects and is yet to be turned into a systematic approach. There are no comprehensive definitions of monitoring objectives and indicators, either, apart from a few sector-specific examples.

The challenge is that it is difficult to verify the effectiveness of measures. Effectiveness can only be observed over the long term, and it is challenging to distinguish the effect of an individual measure from the broader whole. The effects and effectiveness of adaptation measures can be examined on a limited scale in the light of historical data and statistics, as the significance of adaptation will increase in the future and will be contingent on how climate change progresses. In addition, other societal trajectories, including cross-border impacts, will determine the significance and effectiveness of measures.

Adaptation measures are reported annually to Parliament in conjunction with the Annual Climate Report submitted under the Climate Act. Policy measures promoting adaptation must also be reported to the EU at two-year intervals and to the UNFCCC every four years. The monitoring of adaptation measures at the regional and local levels is developing but currently still inconsistent. There is also no uniform information resource available in Finland that those planning adaptation measures could make use of to develop their activities and to replicate tried and tested measures.

Target 24	Means of monitoring
Adaptation monitoring is systematic and supports the development of activities	Monitoring data is regularly updated and openly accessible
The target advances the following aims:	Monitoring data is used in national and international climate policy reporting and adaptation policy evaluation
WILL / **MEANS** / **CAPACITY**	

Action 24.1 Appointing a national monitoring group to direct the implementation of NAP2030 and ensuring its monitoring

Description: A broad-based monitoring group led by the Ministry of Agriculture and Forestry directs and coordinates the implementation of NAP2030 and its monitoring. In addition to central government, representatives of the regional and municipal levels and, where possible, of businesses and the third sector, are linked with the work.

Responsible actors: **Ministry of Agriculture and Forestry,** other ministries, research institutes and key implementation participants

Timeline: From 2023 onwards

Funding: As part of official duties

Action 24.2 Monitoring and reporting on progress made in the implementation of NAP2030 and the administrative branch-specific adaptation programmes / plans

Description: All ministries report annually on progress made in the implementation of NAP2030 in their respective areas of responsibility to the Ministry of Agriculture and Forestry, which is responsible for reporting the information for the Annual Climate Report submitted to Parliament. In addition, the ministries must ensure the regular monitoring of the administrative branch-specific adaptation programmes/plans as part of the monitoring of target 2. In addition to national reporting, the information is used in other periodic reporting to the EU and the UNFCCC.

Responsible actors: **All ministries in accordance with their areas of responsibility under the leadership of the Ministry of Agriculture and Forestry**, in cooperation with implementation participants

Timeline: Annually from 2023 onwards

Funding: As part of official duties

Action 24.3 Updating the indicator base supporting adaptation monitoring and expanding the utilisation of indicator data in adaptation monitoring

Description: The need to update the adaptation monitoring indicators collected previously and the opportunities to supplement the indicator collection to cover more comprehensively both the monitoring of climate change impacts and risks and the monitoring of adaptation measures are assessed. International cooperation and the results of projects developing adaptation monitoring are utilised in the updating process. Opportunities to include adaptation indicators in the Annual Climate Report submitted to Parliament are examined.

Responsible actor: **Ministry of Agriculture and Forestry**, other ministries, government agencies and other public bodies, and research institutes in cooperation with other actors

Timeline: 2023–2025

Funding: As part of official duties, effective implementation would require additional funding (estimate EUR 250,000)

Action 24.4 Setting up a monitoring system for climate change adaptation and ensuring the conditions for its implementation

Description: The monitoring system consists of components including monitoring of the plan, monitoring of impacts where necessary, and monitoring of funding. Groundwork to establish an impacts database has already been made, but utilising it in risk monitoring would require additional efforts and studies (linked with action 19.1 on the strengthening of the knowledge base). The adaptation monitoring indicators (action 24.3) are linked as part of the monitoring system. The collection of regional monitoring data and linking it to the national-level monitoring system is developed. As part of the system, the realisation of the principles of cost effectiveness and social justice in the implementation of the plan is monitored.

Responsible actor: **Ministry of Agriculture and Forestry**, other ministries and research institutes, Centres for Economic Development, Transport and the Environment (ELY Centres) in cooperation with regional councils and other actors

Timeline: System completed by 2026, implementation from 2027 onwards

Funding: Effective implementation would require additional funding (setting up EUR 1–2 million, annual maintenance EUR 300,000)

Action 24.5 Conducting a mid-term review of progress made in the implementation of NAP2030

Description: In accordance with the Climate Act, the up-to-dateness of the National Climate Change Adaptation Plan and the need for any additional measures are assessed during the next electoral term. The assessment makes use of the results of the annual monitoring, the data generated for EU and international reporting, and new research data, with stakeholder views on progress made in adaptation also collected.

Responsible actor: **Ministry of Agriculture and Forestry** in cooperation with the plan monitoring group and other key actors

Timeline: 2026

Funding: Funding under General Government Fiscal Plans and Budgets

2.5.11 Actions requiring further preparation

Several adaptation-related needs emerged in the material accrued and in the interaction that took place with stakeholders during the preparation of this plan. The schedule and resources allocated for the preparation of the plan did not allow for addressing all of these to an extent enabling any more specific targets and actions to be determined. The rough outlines for actions presented below call for further preparation and more extensive interaction than was possible during the preparation process. For some of the themes, measures can be determined in greater detail once additional evaluations have been completed, for example in conjunction with the mid-term review of the plan.

- **SÁMI CLIMATE CHANGE ADAPTATION PROGRAMME**
  In line with Finland's Strategy for Arctic Policy, the preparation of NAP2030 involved exploring opportunities to formulate a separate programme to support the adaptation of the Sámi to climate change. The need for the programme is evident, as the impacts of climate change can already be seen in the living environments of the Sámi Homeland and the changing conditions affect the livelihoods that are important for the Sámi culture in many ways. Initiating the preparation of the programme requires more detailed planning concerning the responsible actor and the other actors participating in the work as well as resourcing of the work. These issues need to be examined in cooperation with key ministries (Ministry of Justice, Ministry of Education and Culture, Ministry of the Environment, Ministry of Agriculture and Forestry), the Sámi Parliament and other key actors. In addition, the Sámi Climate Council to be established under the Climate Act is a key cooperation partner as regards the knowledge base required for the programme, which is why it is justifiable to proceed with the programme work once the Climate Council is operational (estimated in 2023).
- **COMPETENCE DEVELOPMENT**
  It was not possible to determine the diverse needs related to competence development, education and training in more detail during the preparation process. Competence development is a broad set of themes that calls for an active dialogue between the various actors of society to map out needs and opportunities. In addition to basic education, opportunities for the development of further training (such as national defence courses) and advisory services must be examined.

- **DEVELOPMENT OF OCCUPATIONAL SAFETY AND HEALTH**
  The impacts of climate change on working conditions in different sectors have started to attract attention in recent years. Under the EU Adaptation Strategy, the European Commission intends to continue to ensure the enforcement of existing employment and social legislation and, where relevant, consider proposing new initiatives that increase workers' protection from climate impacts. It is important to follow related research and development of EU regulation and to assess the need for national-level measures more specifically in the next few years.
- **PUBLIC PROCUREMENT**
  The National Public Procurement Strategy (Ministry of Finance and Association of Finnish Local and Regional Authorities 2020) recognises the risks of climate change to food security in particular, but the guide to environmental aspects published by the Public Procurement Advisory Unit[55] has so far only paid attention to energy efficiency. The guide to preparedness in procurement[56] does not identify climate change as a potential particular risk factor. This is why a report on the adaptation-related criteria, opportunities and related challenges/bottlenecks related to public procurement are commissioned at a later date. The Ministry of Agriculture and Forestry and the Ministry of Finance is responsible for the preparation of the report.

55 Ympäristönäkökohdat - Julkisten hankintojen kehittämisyksikkö (*Environmental perspectives - Public procurement development unit*, in Finnish)

56 Varautuminen hankinnoissa (*Preparedness in Procurement*, in Finnish)

3 Assessment of the impacts of NAP2030

This impact assessment aims to provide the preparing officials, decision-makers and stakeholders with information on the impacts of NAP2030 and their significance and any opportunities to alleviate potential adverse effects.

The assessment of impacts related to climate change adaptation is particularly important yet challenging because of the diversity, broad scale, long duration and profound effect of the impacts. The impacts of the policy measures set out in this plan must be examined more specifically in conjunction with the preparation of their implementation.

Adaptation measures involve the risk of maladaptation. This means such implementation of adaptation that causes adverse environmental effects from, for example, the climate change mitigation perspective by resulting in growing carbon dioxide emissions. An example of maladaptation is reducing the impacts of heatwaves by using cooling methods that consume electricity, provided that the electricity is produced using fossil fuels. Similarly, it is important in the context of adaptation measures to seek to identify any other potentially adverse or beneficial cross impacts on aspects such as health and wellbeing and to plan the measures so that harmful impacts can be avoided or minimised.

3.1 Economic impacts, including impacts on general government finances and macroeconomic impacts

Economic impacts mean impacts on the position of households, enterprises, general government finances and the national economy. General government finances also include impacts on local government finances.

The economic impacts of changes taking place in the various sectors of society as well as internationally must be taken into account as comprehensively as possible and, as regards the planning and implementation of decision-making, as proactively as possible in climate change adaptation. The whole formed by economic impacts and their assessment, which includes the examination of both

risks and opportunities and the benefits gained from the measures, must lay the foundation for policies that are carefully considered and sustainable over the long term and for the monitoring of their implementation.

The economic impacts of the measures of this plan must be assessed as comprehensively as possible when concretising and implementing the measures. The purpose of the impact assessment is to ensure that the plan is implemented appropriately, and that the measures will support sustainable development, economic growth, employment, enterprise activity and competitiveness, and citizens' wellbeing as well as possible and for as long as possible.

Needs for additional resources to launch or ensure the implementation of the measure have been identified for the following 40 NAP2030 measures:

- Action 7.3 Conducting an assessment of the state of private roads and bridges and, on the basis of it, encouraging road maintenance associations to carry out needed improvements and maintenance work of the private road network
- Action 8.1 Incorporating provisions on climate change adaptation into legislation governing statutory land use planning and building and assessing how cost optimal building and construction -related guidance and direction is with regard to climate change adaptation
- Action 8.3 Mapping out regionally significant ecological corridors, required as input data for land use planning
- Action 9.1 Defining the needs related to climate risk management in the energy and industrial sectors
- Action 9.2 Including assessments of climate risk management opportunities in the updates of sector-specific roadmaps and supplementing the roadmaps with adaptation measures
- Action 9.3 Assessing the existing funding opportunities for developing and introducing adaptation innovations for businesses
- Action 10.1 Implementing research and development measures promoting adaptation in the forest-sector, as part of the implementation of the National Forest Strategy
- Action 10.2 Supporting climate change adaptation of forestry industry with the reformed incentive scheme
- Action 10.3 Developing and implementing an operating model for catchment-based planning that includes the coordination of the water management needs of agriculture, forestry and built areas
- Action 11.1 Developing the protected area network and its management on the basis of research data

- Action 11.2 Restoring and managing degraded habitats to improve nature's adaptive capacity
- Action 11.4 Monitoring the impacts of climate change on species and habitat types in a systematic and sustained manner
- Action 12.1 Developing nature-based solutions and the updating of relevant legislation and guidance material, and promoting stormwater management
- Action 12.2 Mainstreaming nature-based solutions for water management in agriculture and forestry
- Action 13.1 Creating a national drought risk management process that also includes regional aspects of risk management
- Action 14.1 Drawing up a national action plan for the prevention of negative health impacts from heat
- Action 14.2 Launching heatwave preparedness and adaptation measures on the basis of the national action plan
- Action 14.3 Setting up a monitoring mechanism for heat-related mortality, to monitor heat-related deaths on a weekly basis during the summer period
- Action 15.1 Developing competence and ensuring sufficient resources for the management of cultural heritage and the cultural environment
- Action 15.2 Developing assessments of the impacts of climate change on cultural heritage and the cultural environment
- Action 15.4 Deloping the availability, quality, usability and interoperability of cultural heritage and cultural environment data
- Action 16.1 Preparing guidelines to support planning of regional adaptation
- Action 17.1 Exploring the opportunity to strengthen the obligations laid down by the Climate Act for the municipalities concerning climate change adaptation
- Action 18.1 Developing a targeted communication channel for funding opportunities for projects promoting adaptation
- Action 18.2 Developing the competence of funding advisers related to climate change adaptation
- Action 19.1 Directing half of Finland's international climate finance at supporting developing countries in climate change adaptation and increasing the amount of international climate finance
- Action 19.2 Implementing Finland's development policy with a long-term approach and a commitment to the priorities of the Report on Development Policy Across Parliamentary Terms during future electoral terms

- Action 21.1 Developing regional and cross-border adaptation cooperation for example in contexts of Nordic, Arctic and Barents Region cooperation
- Action 22.1 Developing datasets supporting climate change adaptation and promoting their utilisation
- Action 22.2 Developing an operating model for the compilation of data generated in research projects and developing means to utilise research data
- Action 22.4 Developing the assessment of cost efficiency, effectiveness and social justice aspects of adaptation measures
- Action 22.5 Preparing and implementing a research, development and innovation programme for adaptation
- Action 22.6 Exploring opportunities to establish a national advisory service focusing on climate change impacts, consequences and adaptation measures
- Action 23.1 Preparing a communication and interaction plan to support the implementation of NAP2030 and ensuring its implementation
- Action 23.2 Maintaining and developing the Climateguide.fi website as the key communication channel for adaptation information and best adaptation practices
- Action 23.3 Developing the climate change adaptation newsletter as a topical communication tool
- Action 24.3 Updating the indicator base supporting adaptation monitoring and expanding the utilisation of indicator data in adaptation monitoring
- Action 24.4 Setting up a monitoring system for climate change adaptation and ensuring the conditions for its implementation

3.2 Health and social impacts

Overall, NAP2030 will have positive or neutral indirect and direct impacts regarding the realisation of fundamental and human rights and health protection. For example, the measures promoting food security will maintain the population's nutrition or may strengthen it in a positive way. As regards fundamental rights, key aspects safeguarded in the future by NAP2030 measures include access to clean drinking water and preparedness for various incidents. In addition, the implementation of the plan may indirectly increase citizens' understanding and awareness of risks relating to climate change and adaptation to them. The

implementation of the communication measures may also strengthen rights of access to information by improving access to and transparency of information on adaptation.

Impacts related to health protection can be assessed by examining the implementation of the actions included in the plan. For example, the contents of the strategies of the wellbeing services counties and the measures implemented in the counties to prevent health hazards from heatwaves can be monitored in the impact assessment. The mechanism to be set up to monitor health hazards from heat can also be used to monitor the heat mortality trend and the impacts of any adaptation measures. The measures concerning heat preparedness will have positive impacts particularly on the health status of the older population and other groups vulnerable to hot weather. Heat preparedness can also prevent excess mortality and, consequently, safeguard the right to life.

Preparedness for drought and forest fires will contribute towards positive impacts from the perspectives of the protection of property, freedom to engage in commercial activity, and health protection. The measures will also have strengthening impacts on the realisation of the fundamental right to the environment, including cultural heritage and environmental justice. Actions contained in the plan, particularly the actions under targets 10–12 related to the use of natural resources, biodiversity and nature-based solutions, may have positive health and wellbeing impacts when, for example, nature-based solutions increase the amenity and recreational opportunities provided by the environment.

The plan also includes further measures to strengthen the adaptation action of the Sámi. Depending on the scope of implementation, this will have impacts that will maintain and/or promote the safeguarding of fundamental and human rights as regards safeguarding the rights of the indigenous people in terms of aspects such as language, culture, livelihoods and health.

3.3 Environmental effects

The targets and actions of NAP2030 will, for the most part, not have any significant environmental effects referred to in the Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (200/2005, SEA Act)[57] in Finland

57 Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (200/2005) (in Finnish)

or outside its territory. Nor does the plan set any direct framework for development consent of projects, which is why the environmental effects have been assessed at a general level and no separate environmental impact assessment has been commissioned in conjunction with preparation. The assessment summary was compiled as part of official duties by the expert secretariat appointed to support the preparation process. The assessment of environmental effects has made use of, as appropriate, of the respective environmental assessments available concerning programmes and strategies referred to in the report.

Where necessary, the assessment has stated the impacts of the targets and actions of NAP2030 on the use of natural resources, soil, water and air, climate change mitigation, biodiversity, and community structure, the built environment, landscape, townscape and cultural heritage. Impacts related to human health are described in section 3.1.2.

Half of the themes included in the plan are cross-cutting, administrative themes that will result in hardly any increase in the environmental effects already currently arising from government and administration. Consequently, any adverse environmental effects from their implementation are minor. These include the following themes: national-level strategic planning and foresight, comprehensive security and general security of supply, knowledge base and utilisation of information, communication and interaction, and monitoring and evaluation of adaptation. The direct beneficial effects on the environment will not be significant as regards the targets and impacts included in these themes, either, and are likely not to occur at all. The measures under the theme concerning the management of regional- and municipal-level climate risks will also have hardly any adverse or beneficial environmental effects.

NAP2030 contains several sector-specific measures, the main focus of which at this point is on developing administrative work. Actions under the infrastructure and the built environment, health protection and health promotion, and cultural heritage and the cultural environment themes seek to develop plans, documents, legislation and guidelines as well as knowledge-based decision-making and operating models, to create adaptation roadmaps and to influence adaptation funding. They will have hardly any direct harmful or beneficial environmental effects. The same applies to the action developing drought risk management.

Any potentially adverse environmental effects of these measures may arise at the stage when the implementation of actual concrete measures begins based on the legislation, guidelines, guides and plans. Consequently, the formulation of guidelines, instructions and guides at the regional and municipal level will not

have direct environmental effects, whereas their substance that guides actions may eventually have such impacts. Furthermore, if the municipalities implement adaptation measures in accordance with adaptation plans under the Climate Act, environmental effects may arise. This also applies to the infrastructure and the built environment theme and to health protection and promotion. Transport infrastructure measures related to drainage and flood risk management may have minor (harmful or beneficial) environmental effects on aquatic ecosystems and biodiversity.

This emphasises the need to examine environmental effects also when implementation proceeds to a more concrete level. When implementing measures, it will be important to seek to avoid or at least minimise effects that are harmful to the environment. For example, when planning preparedness exercise activity or adaptation projects to be funded, their adverse environmental effects should be assessed and minimised.

A few themes, such as food and nutrition security, use and management of renewable natural resources, and biodiversity involve environmental effects that have been assessed more specifically during the processes of preparing the plans and programmes underlying the measures. The methods and level of detail of the assessments vary a great deal, and an existing environmental impact assessment under the SEA Act is available for some of these. The estimates of environmental effects for these themes provided below are summaries of the results of the various assessments.

The food and nutrition security targets 4–5 cover a broad set of programmes. According to the environmental report prepared under the SEA Act on Finland's CAP Strategic Plan, the CAP Strategic Plan is a complex whole and its environmental effects cannot be depicted simply or fully. The report specifies the environmental effects of the measures, the climate impacts of current agricultural aid, and the objectives of EU environmental and climate law. The beneficial environmental effects of the measures include reduced erosion, thanks to plant cover on arable land in winter, as well as increased buffer zones. Beneficial environmental effects may also arise from means employed to reduce impacts on water bodies (e.g. by increased precision in fertiliser use) and cut greenhouse gas emissions, particularly through measures targeted at peatlands.

An evaluation of the environmental effectiveness of the CAP Strategic Plan was also conducted by the Ministry of Agriculture and Forestry in 2021. The evaluation focused on loading to water bodies, biodiversity and greenhouse gas emissions. The results show that the effectiveness of the environmental measures of the CAP

Strategic Plan comes from a set of several measures, and an individual measure will have a greater (or beneficial/adverse) impact on some parameters depicting environmental burden than on others. According to the evaluation, the growth in greenhouse gas emissions from agriculture will slow thanks to the measures changed under the CAP Strategic Plan. As regards biodiversity impacts, it was evaluated that the CAP Strategic Plan will increase those areas that will have positive impacts on the living conditions of various groups of organisms. As regards loading to water bodies, the measures of the CAP Strategic Plan were evaluated to reduce the runoff of nitrogen compared with the current situation.[58]

The environmental report prepared under the SEA Act on the Climate Plan for the Land Use Sector[59] evaluated the 27 measures of the plan on the basis of the evaluation criteria created for the evaluation (soil, groundwater, air quality, exploitation of natural resources, biodiversity, landscape, recreational values, human health, living conditions and amenity). As regards soil impacts, the effects of the measures were evaluated as being positive or highly positive. The measures reduce the need for soil preparation and increase soil coverage. Potential adverse soil effects are evaluated to be caused only by increases in long-lived wood products, as the measure will increase the forest felling rate. As regards groundwater, beneficial environmental effects are created by measures that increase the cultivation of grass, which will decrease the use of plant protection products and fertilisers. Any adverse effects in turn are related to potential increases in the use of plant protection products and fertilisers. However, these evaluations involved a lot of uncertainties.

As regards surface water, the effects of the measures defined in the Climate Plan for the Land Use Sector varied and depended on local conditions and the baseline situation. Impacts on air quality were generally very low or could not be evaluated. Some of the measures weakened opportunities to exploit natural resources, as the measures sought to impact reductions in the intensity of agricultural and forestry management methods or to transfer them in part outside of active exploitation. Effects on biodiversity depended on local conditions and the baseline situation, which is why evaluating them is highly challenging. Measures covering the landscape, such as afforestation or the cultivation of reed canary grass (*Phalaroides*

58 CAP-strategiasuunnitelman ympäristöselostus LUONNOS (*Environmental report on the CAP Strategic Plan DRAFT*, in Finnish); Suomen CAP-suunnitelman ympäristövaikuttavuusarvio (*Evaluation of the effectiveness of Finland's CAP Strategic Plan*, in Finnish)

59 Maankäyttösektorin ilmastosuunnitelman ympäristöselostus (*Environmental report on the Climate Plan for the Land Use Sector*, in Finnish)

arundinacea) were evaluated to have adverse landscape effects, whereas continuous-cover forestry was evaluated to have positive landscape effects. The measures of the plan were evaluated to have mainly positive effects on recreational values as well as human health, living conditions and amenity.

As regards crop diversification mentioned in action 4.1, the assessment and effectiveness evaluation of the Climate-Friendly Food Programme[60] brought up aspects including climate-friendly food measures promoting the diversity of agricultural environments following the introduction of more diverse plant production and use of legumes. According to the environmental assessment conducted under the SEA Act on the National Strategy for Pollinators, the strategy is anticipated to have significant and highly positive environmental effects. These include increases in landscape features and microhabitats important for pollinators in agricultural areas, which will promote the biodiversity in agricultural environments described under action 4.1.

In addition to the environmental effects presented in the assessment of the Climate-Friendly Food Programme, the promotion of climate-resilient food production is linked with issues including loading to water bodies. Lower livestock production is directly connected with lower nutrient loading, although it may also reduce opportunities for nutrient recycling. This means that environmentally friendly cultivation methods in plant production will play an important role. According to the effectiveness evaluation conducted on the Domestic Fish Promotion Programme, the consumption of fish may reduce the burden on the climate, and fishing also reduces eutrophication by removing nutrients that have ended up in water bodies.

As regards the use and management of renewable natural resources theme (target 10), environmental effects have been examined particularly as regards action 10.2. The environmental assessment conducted during the preparation of the Forestry Incentive Scheme[61] expresses the significance and positive effect of forests concerning climate change mitigation. Actions improving forest health and wellbeing also have positive effects on biodiversity. Forest nature management measures can support habitat remediation and efforts to reduce the adverse effects of forestry on water bodies. However, the concrete measures under the incentive

60 Ilmastoruoka-ohjelman arviointi ja vaikuttavuus (*Assessment and effectiveness of the Climate-Friendly Food Programme*, in Finnish)

61 The environmental effects of the reformed Forestry Incentive Scheme are discussed in greater detail in Government Proposal 167/2022, section 4.3.2.

scheme involve uncertainties, as the environmental effects of the various types of work vary and the results of the reviews are affected by aspects including the time horizon employed and the spatial scale of implementation. The environmental assessment of the Forestry Incentive Scheme also covered the environmental effects of the construction and improvement of forest roads, which are linked with action 7.3. Measures related to forest road construction are assessed to have both direct and indirect positive and negative climate effects.

As regards the biodiversity theme of NAP2030, the assessment is based on the impact assessments and other assessments, where possible, available concerning the protection programmes mentioned in the description of the actions under target 11.

The indirect effects of the biodiversity-related target and actions of NAP2030 can be regarded as being mostly positive. The target itself will not have any direct environmental effects. Instead, its focus is on ensuring policy coherence. Reaching the target can in turn be concluded to have positive indirect effects on biodiversity, as the integration of activities related to climate change adaptation and halting of biodiversity loss will create synergies for the implementation of both policy sectors.

Action 11.1 "Developing the protected area network and its management on the basis of research data" will primarily be executed by implementing existing protection programmes to develop and increase the protected area network. At year-end 2021, the protected areas established through the Forest Biodiversity Programme for Southern Finland (METSO) cover 84,000 hectares, accounting for almost 90% of the target set for the scheme by 2025. Commissioned by the Ministry of the Environment in 2019, the mid-term review of the METSO programme shows that the scheme has succeeded in improving the quality of the protected area network compared with the overall ecological quality of the areas covered by the programme. The 2022 interim results of the Helmi Habitats Programme also indicate progress having been made in the implementation of several measures under the programme. Therefore, the successful implementation of the relevant NAP2030 action 11.1 can facilitate the promotion of positive indirect effects on biodiversity. Action 11.2 "Restoring and managing degraded habitats to improve nature's adaptive capacity" seeks to strengthen biodiversity by implementing restoration, management and protection measures by means of, for example, protection programmes, and by taking account of the targets of the EU Biodiversity Strategy. The action is therefore likely to have positive effects on biodiversity.

The purpose of action 11.3 "Taking account of the impacts of climate change in the planning and implementation of the protection of species and habitat types and the scope of measures" is to target protection measures by taking account of the characteristics and sensitivity to climate change impacts of species and habitat types. The measure can be assumed to have indirect positive effects on biodiversity, as the implementation of nature conservation can be supported by making use of data on climate change impacts in the planning and targeting of protection measures.

It is difficult to determine the environmental effects of action 11.4 "Monitoring the impacts of climate change on species and habitat types systematically and over the long term" and action 11.5 "Improving the policy coherence of the adaptation measures of the different administrative branches concerning biodiversity". The measures will probably have neutral direct effects on biodiversity and partially positive indirect effects. Both actions contribute towards supporting the planning of actions strengthening biodiversity.

4 Main steps in the preparation of NAP2030

4.1 NAP2030 was prepared by a broad group of contributors

A preparatory group consisting of representatives of nine ministries was responsible for the preparation of NAP2030. The group was led by the Ministry of Agriculture and Forestry, the ministry coordinating climate change adaptation at the Government level. The preparatory group consisted of the Ministry for Foreign Affairs, Ministry of Defence, Ministry of Economic Affairs and Employment, Ministry of Finance, Ministry of Social Affairs and Health, Ministry of the Environment, Ministry of the Interior and the Ministry of Transport and Communications. In addition, the Ministry of Education and Culture participated in the work concerning the set of targets related to cultural heritage and the cultural environment. The broad participation and interaction during preparation sought to ensure coherence with the Government's other recent strategies and plans.

The preparatory group was supported by an expert secretariat coordinated by the Ministry of Agriculture and Forestry, in which experts from the Finnish Meteorological Institute, Natural Resources Institute Finland, Finnish Environment Institute, Finnish Institute for Health and Welfare, Finnish Transport Infrastructure Agency and a Centre for Economic Development, Transport and the Environment (ELY Centre) also took part. The members of the preparatory group and secretariat can be found in Appendix 2. In addition, the broad-based monitoring group of the National Climate Change Adaptation Plan 2022 also participated in the preparation.

The preparation of NAP2030 included consultations with a broad range of stakeholder representatives. Interaction during the preparation included the following:

- Science Sparring process in 2022[62]
- Digital Panel for young people in June 2022[63]
- Finnish Nature Panel meeting in April 2022
- Climate Policy Roundtable in June 2022
- Two barometers
- Meeting with councils for people with disabilities in September 2022[64]
- Meeting with councils for older people in September 2022[65]
- Interaction event for municipal and regional actors in June 2022
- Meeting with the Sámi Parliament in August 2022
- Stakeholder event during the round for comments in September 2022.

4.2 Round for comments

The working group's draft for Finland's National Climate Change Adaptation Plan until 2030 was circulated for comments from 14 September 2022 to 14 October 2022. The invitation to comment was published on the lausuntopalvelu.fi website. At total of 131 parties responded to the invitation to comment, with comments submitted by 127. The breakdown of the 127 parties submitting comments was as follows:

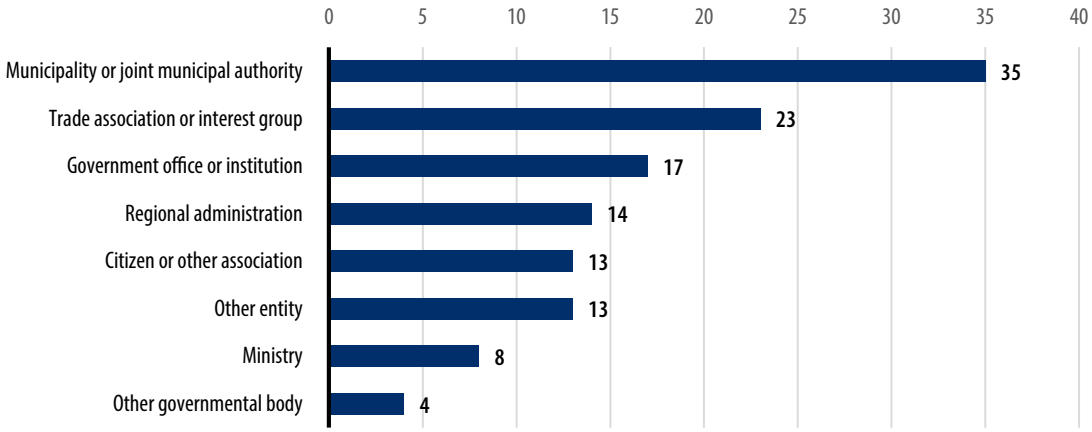
62 Tiedesparraus osana kansallisen ilmastonmuutokseen sopeutumissuunnitelman 2030 valmistelua (*Science Sparring as Background for the NAP2030*, in Finnish)

63 Final statement to the Digital panel: "Digiraati kansallisesta ilmastonmuutokseen sopeutumissuunnitelmasta (KISS2030)" (*Digital Panel on the National Climate Change Adaptation Plan NAP2030*, in Finnish)

64 Vammaisneuvostojen kuulemistilaisuus koskien kansallisesta sopeutumissuunnitelmaluonnoksesta (*Memorandum from Meeting with Councils for People with Disabilities*, in Finnish)

65 Vanhusneuvostojen kuuleminen koskien kansallista sopeutumissuunnitelmaluonnosta (*Memorandum from Meeting with Councils for Older People*, in Finnish)

Figure 7. Breakdown of comments submitted on NAP2030.



The 'Municipality or joint municipal authority' category contains 19 individual municipalities and cities, 15 regional councils and 1 joint municipal authority (Helsinki Region Environmental Services (HSY)). The category 'Other' contains organisations including 3 universities, 3 science panels and 3 enterprises. 'Other central government' (4) contains the Finnish Innovation Fund Sitra, the National Emergency Supply Agency, VTT Technical Research Centre of Finland and Business Finland. All comments (in Finnish) can be found in the Government Project Register[66].

This section provides a brief summary of the comments and of how the comments have affected NAP2030[67]. The comments also drew attention to several issues on the basis of which no changes were made to the plan. A more detailed summary of the comments and the preparing officials' responses to the summary are published as background material to this plan[68].

66 Valtioneuvoston hankeikkuna: Kansallinen ilmastonmuutokseen sopeutumissuunnitelma 2030 (KISS2030) (*NAP2030 at the Government Project Register*, in Finnish)

67 The numbering of the targets and measures in this summary is in line with the final plan, but differs to some extent from the numbering of the draft on which comments were invited.

68 Kansallinen ilmastonmuutokseen sopeutumissuunnitelma 2030 - Lausuntoyhteenveto ja valmistelijoiden vastine (*Finland's National Adaptation Plan 2030 – Summary of Statements and Preparing Officials' Response*, in Finnish)

On the basis of the comments, all of the proposed targets and actions were regarded as mostly necessary. The inclusion of comprehensive security and security of supply and regional- and municipal-level themes in the plan was commended in particular. Based on the comments, the preparing officials further specified almost all actions (their title, specifying texts or responsible actors) and added six entirely new actions: actions 9.2 and 9.3 strengthening the adaptation of businesses and the various sectors, action 14.4 reducing the heat risk, action 21.3 focusing on EU-level influencing and cooperation and action 23.4 developing interaction. In addition, a mid-term review of the plan in accordance with action 24.5 was added.

The comments pointed out broadly, and in the context of several themes, that sufficient resources must be allocated for climate change adaptation. The resourcing of the implementation of NAP2030 will take place within normal general government fiscal planning, which is why resourcing could not be specified in greater detail during preparation. The descriptions of the various funding opportunities given in the plan were specified further on the basis of feedback provided in the comments.

It was pointed out in comments that the plan had an excessive focus on central government. The role of municipalities, enterprises and the third sector as adaptation actors was brought up extensively in comments, with a few comments also mentioning the role of citizens. Based on these, the role of actors other than central government actors as part of the implementation of the actions has been specified further in the plan, action 23.4 seeking to develop and establish interaction with the private sector and the third sector has been added and, in addition to one-way communication, the preparation and implementation of an interaction plan has been added to action 23.1. Furthermore, the adaptation of businesses and the various sectors in particular is strengthened by the addition after the round for comments of action 9.2 seeking to include assessments of climate risk management opportunities in the updates of sector-specific roadmaps and supplementing the roadmaps with adaptation measures and action 9.3 developing funding opportunities for adaptation innovations. These resulted in measures aiming to develop cooperation with the private sector and the third sector no longer being included in measures requiring further preparation as they had been in the draft.

The vision and three aims of the plan received mainly positive feedback. Regardless of individual amendment proposals focusing of wordings, no amendments were made to them, as the majority of those commenting regarded the wordings as good. Based on the feedback provided in the comments, the descriptions of aim 2 related to the means and aim 3 related to capacity were specified further to better

express the difference between the two aims. The comments also stated that it will be difficult to monitor the effectiveness of the aims. No amendments were made on the basis of these, as the vision and the aims have been formulated to serve as general long-term mission statements concretised through the targets and actions of the plan. In connection to the targets, it is specified which aim they seek to strengthen and how progress made with the targets and actions will be monitored. Monitoring and the means used in it will also be developed further in accordance with target 24 as part of the implementation of NAP2030.

It was commended that social justice had been taken into account in the plan. Critical comments were, however, received on social justice not being reflected more specifically in target-setting or actions. These observations are correct. Instead of individual targets or actions, the aim as a general rule is to ensure the realisation of the principles of justice and cost effectiveness in the implementation of the entire plan. Based on feedback received in the comments, the monitoring of the realisation of the principles of cost effectiveness and justice in the implementation of the plan was added to action 24.4 "Setting up a monitoring system for climate change adaptation and ensuring the conditions for its implementation".

The risk and vulnerability assessment (section 2.2) has been expanded on the basis of aspects pointed out in particular by research institutes and the research community. Comments raised the brevity of the sections related to economic and cross-border impacts. Based on the feedback, the assessment of economic risks was expanded in section 2.2.4.6, and a description of the various impact chains of cross-border impacts based on scientific analysis was added to section 2.2.4.7. Many of the aspects raised in the comments concerning section 2.2 have been included in the risk and vulnerability assessment conducted as background material for the plan.

Comments provided critical observations concerning the brevity of the plan's impact assessment. The assessment of economic impacts was regarded as too brief. After the round for comments, a list of actions that would require additional funding was added to the section assessing the economic impacts. There is a need to further specify the economic impacts of implementation as part of the more detailed planning and execution of implementation. Many comments also pointed out that the draft circulated for comments did not contain an assessment of the environmental effects of the plan. Following the round for comments,

the assessment of the impacts of the plan was supplemented in accordance with section 3 of the Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (SEA Act)[69] (section 3.1.3).

It was commended in the comments that efforts had been made already in the preparation phase to determine monitoring indicators for the targets and actions. Critical observations and several proposals for indicators to be added were, however, received concerning the monitoring indicators of the draftThe preparation schedule did not permit any further development of the monitoring indicators or system. In the final plan, the monitoring indicators have been specified to be only preliminary monitoring tools, that will be specified further in conjunction with the development of the monitoring of the implementation of the plan (target 24) from 2023 onwards. The monitoring of implementation was also further strengthened by the addition of a new action, 24.5, concerning the mid-term review of the plan.

The comments drew attention to the relationship of NAP2030 with administrative branch-specific adaptation plans and programmes and the monitoring of their implementation. This resulted in strengthening the execution of NAP2030 by adding reporting on progress made in adaptation within the administrative branches as a means of monitoring for target 2. In addition, particularly as regards themes related to food and nutrition security and health protection and promotion, critical comments were received concerning missing aspects such as reindeer husbandry and fisheries, and the link between climate change and mental health issues. Based on these, more detail has been added to the background texts of some targets concerning the contents of administrative branch-specific adaptation programmes, supplementing the themes covered by NAP2030. These include, in particular, documents guiding adaptation in the administrative branches of the Ministry of Agriculture and Forestry and the Ministry of Social Affairs and Health.

Several comments raised the need for biodiversity actions to strengthen climate change adaptation in areas outside protected areas, too. This resulted in the linkages between the targets concerning biodiversity and the use and management of renewable natural resources being made stronger. The descriptions of actions 10.1 and 10.2 strengthening adaptation in the use and management of renewable natural resources were made more specific in order to express their aim to promote biodiversity by means of nature management of commercial forests.

69 Act on the Assessment of the Effects of Certain Plans and Programmes on the Environment (200/2005) (in Finnish)

In addition, a few comments contained observations concerning immigration related to climate change and concerning ecological corridors (action 8.3). Based on the comments, a description was added to NAP2030 on the work carried out by the administrative branch of the Ministry of the Interior to prepare for immigration independent of the root cause and on EU-level work on the topic. The description of action 8.3 was made more specific so that it better expresses how the mapping out of ecological corridors facilitates the adaptation of species to climate change. Based on the comments, almost all of the background texts were also amended and the targets focusing on strengthening the knowledge base, communication and monitoring were combined into a single thematic section.

Submitters of comments also provided a lot of input that will be drawn on in the more specific planning and implementation of the measures of NAP2030. For example, the roles of the actors will be specified further, and efforts will be made to implement the plan in broad cooperation with stakeholders. Efforts will be made to engage regional- and local-level actors strongly in the planning and implementation of the execution of the measures, and the different characteristics of the regions will be taken into account in implementation.

Appendices

Appendix 1 List of the targets and actions of NAP2030

Theme 1 National-level strategic planning and foresight

Target 1 Adaptation is integrated into the Government's and ministries' strategic planning and foresight by 2030

- Action 1.1 Working towards strengthening the role of climate change adaptation as part of government programmes
- Action 1.2 Improving the monitoring of resources related to climate change adaptation included in the General Government Fiscal Plan
- Action 1.3 Integrating climate change adaptation into the strategy and foresight work carried out jointly by the Government and respectively by the ministries
- Action 1.4 Ensuring the inclusion of climate change adaptation as part of the performance guidance of government agencies, other public bodies and other organisations

Target 2 Sectoral adaptation is done in a structured manner and means for implementation are secured by 2030

- Action 2.1 Ministries draw up or update sectoral adaptation action plans or steer adaptation as part of other guidance documents
- Action 2.2 Ministries oversee the implementation and monitoring of sectoral documents guiding adaptation

Theme 2 Comprehensive security and general security of supply

Target 3 The consequences of climate change and and the adaptation needs are identified as part of comprehensive security and integrated into the comprehensive security model and the objectives of security of supply by 2026

- Action 3.1 Climate risks are taken into account in the Security Strategy for Society
- Action 3.2 Climate change-related risks to security of supply and measures taken to mitigate them are assessed during the process of reforming the Government Decision on the Objectives of Security of Supply
- Action 3.3 Cross-border impacts of climate change on security of supply are evaluated

Theme 3 Food and nutrition security

Target 4 The operating conditions of agriculture to adapt to climate change are enhanced by 2030

- Action 4.1 Enhancing the operating conditions of agriculture to adapt to climate change in accordance with national plans and programmes
- Action 4.2 Continuing the emergency stockpiling of certain production inputs that are important for food security

Target 5 Climate-resilient food production and consumption maintain food and nutrition security throughout the NAP2030 period

- Action 5.1 Promoting the supply and consumption of climate-resilient food in accordance with national plans and programmes

Theme 4 Infrastructure and the built environment

Target 6 The preparedness of water services for climate change impacts is improved by 2026

- Action 6.1 Ensuring that climate change adaptation is taken into account in the preparedness plans of water services and as part of the national water services reform
- Action 6.2 Instructing utilities supplying household water to take account of climate change as part of their risk assessment concerning household water production and the quality and quantity of raw water

Target 7 The vulnerabilities of the transport and communications infrastructure are identified by 2026 and climate resilience is improved by 2030

- Action 7.1 Including climate change adaptation measures in the established strategic guidance documents of the administrative branch of the Ministry of Transport and Communications
- Action 7.2 Developing knowledge-based decision-making and operating models for the transport system and transport and communications networks
- Action 7.3 Conducting an assessment of the state of private roads and bridges and, on the basis of it, encouraging road maintenance associations to carry out needed improvements and maintenance work of the private road network

Target 8 The built environment sector has the capacity to manage climate change-related risks and to adapt to foreseen changes in climate by 2030

- Action 8.1 Incorporating provisions on climate change adaptation into legislation governing statutory land use planning and building and assessing how cost optimal building and construction -related guidance and direction is with regard to climate change adaptation
- Action 8.2 Ensuring the up-to-dateness and availability of information required in land use planning and building
- Action 8.3 Mapping out regionally significant ecological corridors, required as input data for land use planning

Target 9 In the energy and industrial sectors and business activities, awareness of climate change impacts, risk management and the innovation environment will have been strengthened by 2030

- Action 9.1 Defining the needs related to climate risk management in the energy and industrial sectors
- Action 9.2 Including assessments of climate risk management opportunities in the updates of sector-specific roadmaps and supplementing the roadmaps with adaptation measures
- Action 9.3 Assessing the existing funding opportunities for developing and introducing adaptation innovations for businesses

Theme 5 Use and management of renewable natural resources, biodiversity, nature-based solutions and drought risk management

Target 10 Climate change adaptation is promoted in the use of renewable resources by 2030

- Action 10.1 Implementing research and development measures promoting adaptation in the forest-sector, as part of the implementation of the National Forest Strategy
- Action 10.2 Supporting climate change adaptation of forestry industry with the reformed incentive scheme
- Action 10.3 Developing and implementing an operating model for catchment-based planning that includes the coordination of the water management needs of agriculture, forestry and built areas

Target 11 Adaptation to climate change and halting biodiversity loss are tackled together by 2030

- Action 11.1 Developing the protected area network and its management on the basis of research data
- Action 11.2 Restoring and managing degraded habitats to improve nature's adaptive capacity
- Action 11.3 Taking account of the impacts of climate change in planning and implementation of protection of species and habitat types
- Action 11.4 Monitoring the impacts of climate change on species and habitat types in a systematic and sustained manner
- Action 11.5 Improving the policy coherence of adaptation measures concerning biodiversity within different administrative branches

Target 12 Nature-based solutions are established and have increased society's preparedness for climate risks, improved water protection and increased biodiversity by 2030

- Action 12.1 Developing nature-based solutions and the updating of relevant legislation and guidance material, and promoting stormwater management
- Action 12.2 Mainstreaming nature-based solutions for water management in agriculture and forestry

Target 13 Drought risk management has developed by 2030

- Action 13.1 Creating a national drought risk management process that also includes regional aspects of risk management

Theme 6 Health protection and promotion

Target 14 Negative health impacts of heat are recognised and adaptation and monitoring have progressed on various levels by 2030

- Action 14.1 Drawing up a national action plan for the prevention of negative health impacts from heat
- Action 14.2 Launching heatwave preparedness and adaptation measures on the basis of the national action plan
- Action 14.3 Setting up a monitoring mechanism for heat-related mortality, to monitor heat-related deaths on a weekly basis during the summer period
- Action 14.4 Updating the action levels for temperature conditions of the Housing Health Decree

Theme 7 Cultural heritage and the cultural environment

Target 15 The protection of cultural heritage and the cultural environment against the impacts of climate change has improved, these are better taken into account in climate change adaptation policy and the utilisation of knowledge carried by cultural heritage and the cultural environments in climate change adaptation has progressed by 2030

- Action 15.1 Developing competence and ensuring sufficient resources for the management of cultural heritage and the cultural environment
- Action 15.2 Developing assessments of the impacts of climate change on cultural heritage and the cultural environment
- Action 15.3 Strengthening the cultural heritage sector's participation in the preparation and implementation of adaptation measures
- Action 15.4 Deloping the availability, quality, usability and interoperability of cultural heritage and cultural environment data

Theme 8 Climate risk management at the regional and municipal levels

Target 16 Regional and municipal actors have access to guidelines for managing climate risks as well as the competence to make use of them in planning on various sectors by 2030

- Action 16.1 Preparing guidelines to support planning of regional adaptation
- Action 16.2 Ensuring that sectoral guides and guidelines are up to date from the adaptation perspective
- Action 16.3 Including the latest knowledge on climate risks in regional, municipal and sectoral adaptation and preparedness

Target 17 The guidance of adaptation for regional and municipal level is consistent and appropriate by 2030

- Action 17.1 Exploring the opportunity to strengthen the obligations laid down by the Climate Act for the municipalities concerning climate change adaptation
- Action 17.2 Strengthening the competence base of actors by including adaptation-related content in sector-specific training and negotiation days
- Action 17.3 Including sector-specific adaptation targets in guidance and direction of regional state administration and strengthening the coordination of cooperation between ministries
- Action 17.4 Strengthening the dialogue on adaptation between central government and the municipalities and between the central government and the regions

Target 18 Funding opportunities encourage regional and municipal actors to strengthen adaptation, and monitoring of the allocation of funding is made possible by 2030

- Action 18.1 Developing a targeted communication channel for funding opportunities for projects promoting adaptation
- Action 18.2 Developing the competence of funding advisers related to climate change adaptation
- Action 18.3 Exploring opportunities for developing the monitoring of funding

Theme 9 International cooperation

Target 19 Adaptation, particularly the capacities of the most vulnerable countries to adapt, is increasingly promoted in international cooperation

- Action 19.1 Directing half of Finland's international climate finance at supporting developing countries in climate change adaptation and increasing the amount of international climate finance
- Action 19.2 Implementing Finland's development policy with a long-term approach and a commitment to the priorities of the Report on Development Policy Across Parliamentary Terms during future electoral terms
- Action 19.3 Implementing Finland's development policy with a long-term approach and a commitment to the priorities of the Report on Development Policy Across Parliamentary Terms during future electoral terms

Target 20 The capacities and capabilities of developing countries to plan and implement adaptation measures and to develop in a climate-resilient way are promoted as part of international cooperation

- Action 20.1 Flexibly using all development cooperation channels where possible to support the capacities and capabilities of developing countries to draw up and implement national adaptation plans and concrete adaptation measures
- Action 20.2 Working towards decreasing adaptation needs by supporting climate change mitigation through Finland's international climate finance, particularly financial investments, and by promoting ambitious emission reductions globally in line with Finland's Action Plan for Climate Smart Foreign Policy
- Action 20.3 Promoting the export of Finnish adaptation solutions through climate smart foreign policy

Target 21 Promoting climate change adaptation appropriately as part of international cooperation, strengthening Finland's adaptive capacity and the broadening of the knowledge base

- Action 21.1 Developing regional and cross-border adaptation cooperation for example in contexts of Nordic, Arctic and Barents Region cooperation
- Action 21.2 Strengthening Finland's contribution as part of the negotiation processes concerning adaptation under the UN Framework Convention on Climate Change and the Paris Agreement and the work of the Intergovernmental Panel on Climate Change
- Action 21.3 Engaging in the implementation of the EU Adaptation Strategy and participating actively in EU-level cooperation to manage risks related to climate change

Theme 10 Knowledge base, communication and monitoring

Target 22 The knowledge base related to weather and climate change risks and adaptation is strengthened in a practical manner, and the availability of research data to end users is ensured by 2027

- Action 22.1 Developing datasets supporting climate change adaptation and promoting their utilisation
- Action 22.2 Developing an operating model for the compilation of data generated in research projects and developing means to utilise research data
- Action 22.3 Developing the collection and dissemination of information related to disaster risks
- Action 22.4 Developing the assessment of cost efficiency, effectiveness and social justice aspects of adaptation measures
- Action 22.5 Preparing and implementing a research, development and innovation programme for adaptation
- Action 22.6 Exploring opportunities to establish a national advisory service focusing on climate change impacts, consequences and adaptation measures

Target 23 Awareness among society's actors of risks and adaptation measures related to climate change is strengthened through communication

- Action 23.1 Preparing a communication and interaction plan to support the implementation of NAP2030 and ensuring its implementation
- Action 23.2 Maintaining and developing the Climateguide.fi website as the key communication channel for adaptation information and best adaptation practices
- Action 23.3 Developing the climate change adaptation newsletter as a topical communication tool
- Action 23.4 Developing and establishing interaction with the private sector and the third sector
- Action 23.5 Making use of monitoring data as part of knowledge-based communication

Target 24 Adaptation monitoring is systematic and supports the development of activities

- Action 24.1 Appointing a national monitoring group to direct the implementation of NAP2030 and ensuring its monitoring
- Action 24.2 Monitoring and reporting on progress made in the implementation of NAP2030 and the administrative branch-specific adaptation programmes / plans
- Action 24.3 Updating the indicator base supporting adaptation monitoring and expanding the utilisation of indicator data in adaptation monitoring
- Action 24.4 Setting up a monitoring system for climate change adaptation and ensuring the conditions for its implementation
- Action 24.5 Conducting a mid-term review of progress made in the implementation of NAP2030

Appendix 2 Participants to preparation

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In addition, numerous experts from the Ministries designated to the contributor group, the Ministry of Education and Culture as well as central government organisations took part in the preparation work.

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