Centre for Economic Development,
Transport and the Environment

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Adaptation to Climate Change in the Baltic Sea and Arctic Regions

Governance and policy tools across countries

KATI BERNINGER | MARIA TIUSANEN | ORAS TYNKKYNEN

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Southwest Finland Centre for Economic Development, Transportation and the Environment

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Summary

Objective and methods

The objective of this study was to collect and synthesise information about climate adaptation policy and governance in the Baltic Sea and Arctic regions. The countries and territories included are Sweden, Denmark, Faroe Islands, Greenland, Norway, Iceland, Germany, Poland, Estonia, Latvia, Lithuania, Russia, Belarus, Canada, and the USA.

The results of the study will be used to develop adaptation policy and processes in Finland. Hopefully it can also inform and inspire other countries.

The report is based on a literature study on the situation of adaptation planning and coordination in the target countries and regions. Document review was complemented with interviews of national experts.

Synthesis of the results

Broadly speaking, western, bigger and Nordic countries as well as those that started early have more advanced adaptation policies and governance. The USA is somewhat of an outlier mainly because of its highly irregular federal leadership on climate action.

On a more detailed level, the studied countries and regions show both significant similarities and notable differences in approaches. Five have both a national adaptation strategy and plan, two have only a strategy, and two have only a plan. Faroe Islands, Greenland, Iceland, Belarus and the USA do not have such a document yet. Some countries have preferred to integrate both mitigation and adaptation in the same strategy.

On sectoral adaptation work, the approach differs from mandatory sectoral action plans in Sweden to no separate sectoral adaptation documents at all in Germany, Lithuania and Poland. In most other countries, a few key sectors have prepared adaptation strategies or action plans.

Finland, Germany and Sweden have regular reporting and reviewing cycles and Lithuania has a regular reporting cycle. Other countries seem to have more ad hoc reporting and reviewing cycles or the system is just being developed.

Only Finland and Norway have laws that include adaptation governance at the national level. Germany does not have a dedicated law at a federal level, but nine federal states have established legislation on adaptation.

The ministry in charge of adaptation is in most countries the ministry of the environment, which indicates that adaptation is still seen as an environmental issue. In Finland, the ministry in charge is the Ministry of Agriculture and Forestry, whereas in Denmark it is the Ministry of Climate and Energy.

The most common approach in regional and local adaptation work is that subnational adaptation strategies are voluntary, but they are supported by projects (e.g. Germany, Poland, Norway). However, regional adaptation plans are obligatory in Sweden and local adaptation action plans in Denmark. Both countries provide support for the subnational level.

Countries use national adaptation strategies and action plans to set priorities for policy and action. The processes for setting the priorities vary, but may involve inter-ministerial committees, expert working groups, stakeholder dialogues and public consultations. Sources include vulnerability and risk assessments, existing scientific literature and specifically commissioned studies.

Priorities are defined in various ways, but often cover different sectors (e.g. health) and cross-cutting measures (e.g. information). Some priorities focus more on concrete measures and tools. Several countries underline the need to mainstream adaptation and integrate it into existing processes and governance levels, rather than dealing with it as a stand-alone issue.

Most countries have governmental working groups in place to coordinate the work across sectors. In some countries these working groups include representatives of different stakeholders. Also, subnational working groups exist in some countries – for example in Denmark, there is a coordination network for municipalities.

Stakeholder engagement varies from non-existing in Russia and Belarus to systematic involvement process in for example Germany. Methods

include hearings, workshops and seminars and involvement in official working groups. Knowledge sharing is an important part of stakeholder engagement. Denmark, Germany Norway, Poland and Sweden have a dedicated portal for information sharing on adaptation. Finland has a climate change portal including both mitigation and adaptation issues.

Several sources of EU funding are available for financing adaptation research, planning or measures, mainly for EU countries. They include structural funds, LIFE programmes and EU research programmes. Norway funds adaptation in, for example, Estonia and Latvia. National funding for improving the knowledge base includes research and innovation funding. Moreover, for example, Sweden, Denmark, Norway, Germany and Canada provide funding for various adaptation activities, including at the local level.

International co-operation forms an integral part of development co-operation in countries like Germany and Nordic countries. The countries around the Baltic Sea (Estonia, Finland, Denmark, Germany, Latvia, Lithuania, Poland and Sweden) are collaborating around the implementation of the Baltic Sea Region strategy and action plan for adaptation. Also neighboring countries (Belarus, Iceland, Norway and Russia) are involved. Finland, Norway, Russia and Sweden take part in the Barents co-operation. Canada, Finland, Denmark, Iceland, Norway, Russia, Sweden and the USA are also members of the Arctic Council. Local co-operation across borders is often established around flood risk or water management planning. For example, Poland co-operates with Germany for flood protection on the Odra River and Denmark with Germany and the Netherlands on adaptation of the Wadden Sea.

The biggest challenges in adaptation policy across countries cluster around three issues: the need to improve awareness and political priority of adaptation; challenges in coordination across sectors and levels; as well as lack of funding or human resources dedicated for adaptation. In addition, the need for more knowledge, capacity and tools or technologies is also mentioned.

Recommendations

Based on the best practices from other countries and gaps identified, we propose the following preliminary recommendations to Finland:

1. Foundational work
- Introduce a systematic and iterative process
- Set clear goals and indicators
- Present sectoral strategies
- Focus more on the Arctic

2. Local adaptation action
- Require municipalities to prepare plans
- Allocate funding to local and regional work
- Establish a nation-wide municipal co-operation body

3. Information and visibility
- Set up a master's program on adaptation
- Establish a competition for adaptation actions

4. Dialogue and co-ordination
- Set up a Climate Adaptation Leaders Forum
- Establish a co-operation body for health and social adaptation

5. International co-operation
- Take initiative to create joint Nordic adaptation policy

Tiivistelmä

Tavoitteet ja menetelmät

Selvityksen tavoitteena oli kerätä yksiin kansiin tietoa ilmastonmuutokseen sopeutumispolitiikasta ja -hallinnosta sekä Itämeren alueen maissa että arktisilla alueilla. Selvitys kattaa seuraavat maat ja alueet: Ruotsi, Tanska, Färsaaret, Grönlanti, Norja, Islanti, Saksa, Puola, Viro, Liettua, Venäjä, Valko-Venäjä, Kanada ja Yhdysvallat.

Tutkimuksen tuloksia käytetään Suomen sopeutumispolitiikan ja -prosessien kehittämiseen. Toivottavasti selvitykseen kerätty tieto hyödyttää ja inspiroi myös muita maita.

Selvitys perustuu kirjallisuuskatsaukseen sopeutumisen suunnittelun ja koordinaation tilanteesta kohdemaissa ja -alueilla. Kirjallisuudesta löytyneitä tietoja täydennettiin haastattelemalla kansallisia asiantuntijoita.

Tulosten yhteenveto

Yleisesti ottaen sopeutumispolitiikka ja -hallinto on edistyneintä länsimaissa, isoissa maissa ja Pohjoismaissa sekä niissä maissa, jotka ovat käynnistäneet sopeutumistoimet aikaisin. Yhdysvallat on tässä poikkeus johtuen lähinnä liittovaltiotason ilmastotoimien epäsäännöllisestä johtamisesta.

Eri maiden ja alueiden lähestymistavoissa havaittiin sekä merkittäviä samankaltaisuuksia että huomattavia eroavaisuuksia. Viidellä maalla ja alueella on sekä kansallinen sopeutumisstrategia että -suunnitelma, kahdella vain strategia ja kahdella vain suunnitelma. Färsaarilla, Grönlannilla, Islannilla, Valko-Venäjällä ja Yhdysvalloilla ei vielä ole sopeutumissuunnitelmaa tai -strategiaa. Joidenkin maiden ilmastostrategiat sisältävät sekä ilmastonmuutoksen hillinnän että siihen sopeutumisen.

Sektorikohtaisessa sopeutumistyössä lähestymistavat vaihtelevat Ruotsin pakollisista sektorikohtaisista toimintasuunnitelmista Saksan, Liettuan ja Puolan tilanteeseen, jossa sektorikohtaisia toimintasuunnitelmia ei ole lainkaan. Suurimmassa osassa muita maita on muutamia keskeisiä aloja, jotka ovat valmistelleet sopeutumisstrategioita tai -suunnitelmia.

Ainoastaan Suomessa ja Norjassa on voimassa laki, jossa määritellään sopeutumisen hallinnointia kansallisella tasolla. Vaikka Saksassa ei ole vastaavaa liittovaltiotason lainsäädäntöä, yhdeksällä osavaltiolla on kuitenkin sopeutumiseen liittyvää lainsäädäntöä.

Useimmissa maissa sopeutumisesta vastaava ministeriö on ympäristöministeriö, mikä viittaa siihen, että sopeutumista pidetään yhä ympäristöasiana. Suomessa sopeutumisesta vastaa maa- ja metsätalousministeriö, Tanskassa ilmasto- ja energiaministeriö.

Alueellisen ja paikallisen tason sopeutumisstrategiat ovat useimmissa maissa vapaaehtoisia, mutta niitä tuetaan projektien avulla (esim. Saksa, Puola ja Norja). Kuitenkin Ruotsissa alueelliset ja Tanskassa paikalliset sopeutumissuunnitelmat ovat pakollisia. Molemmat maat tarjoavat tukea niiden laatimiseen.

Maat määrittelevät kansallisissa sopeutumisstrategioissaan ja toimintasuunnitelmissaan sopeutumispolitiikan ja toimenpiteiden tavoitteet ja prioriteetit. Suunnittelun prosessit vaihtelevat, mutta ne voivat sisältää ministeriöiden välisiä komiteoita, asiantuntijatyöryhmiä, sidosryhmädialogeja ja julkisia kuulemisia. Työn tietolähteitä ovat haavoittuvuus- ja riskiarvioinnit, olemassa oleva tieteellinen kirjallisuus ja erityisistä toimeksiannosta tehdyt tutkimukset.

Prioriteetteja määritellään monin eri tavoin, mutta ne sisältävät usein eri osa-alueita (esim. terveys) ja poikkileikkaavia toimia (esim. tutkimus ja tiedonvälitys). Jotkut prioriteetit taas keskittyvät konkreettisiin toimenpiteisiin ja työkaluihin. Useat maat korostavat sopeutumisen valtavirtaistamisen tarvetta ja sen sisällyttämistä olemassa oleviin prosesseihin ja hallintotasoihin sen sijaan, että sopeutumista käsiteltäisiin erillisenä asiana.

Useimmilla mailla on hallinnollisia työryhmiä sopeutumistyön koordinoimiseksi eri sektoreiden välillä. Joissain maissa näissä työryhmissä on jäseninä eri sidosryhmien edustajia. Lisäksi joissain maissa on alueellisia työryhmiä – esimerkiksi Tanskassa on olemassa koordinaatioverkosto kuntia varten.

Sidosryhmien osallistaminen vaihtelee eri maissa olemattomasta (Venäjä, Valko-Venäjä) systemaattiseen osallistamisprosessiin (esim. Saksa). Osallistamistapoja ovat esimerkiksi kuulemiset, työpajat, seminaarit ja kutsuminen virallisiin työryhmiin. Tiedon jakaminen on tärkeä osa sidosryhmien osallistamista. Tanskassa, Saksassa, Norjassa, Puolassa ja Ruotsissa on erillinen portaali sopeutumista koskevan tiedon jakamiselle. Suomessa on ilmastonmuutosportaali, joka sisältää sekä hillitsemis- että sopeutumisasiat.

Sopeutumistutkimukselle, sopeutumisen suunnittelulle tai sopeutumistoimille on olemassa useita EU-rahoituslähteitä, jotka ovat saatavilla enimmäkseen EU:n jäsenvaltioille. Tällaisia ovat rakennerahastot, LIFE-ohjelma ja EU:n tutkimusohjelmat. Norja rahoittaa sopeutumista esimerkiksi Virossa ja Latviassa. Tietopohjan vahvistamiseksi on myös kansallista tutkimus- ja innovaatiorahoitusta. Lisäksi esimerkiksi Ruotsi, Tanska, Norja, Saksa ja Kanada tarjoavat rahoitusta monille sopeutumistoimille, paikallistaso mukaan lukien.

Kansainvälinen yhteistyö muodostaa olennaisen osan kehittämisyhteistyöstä Saksan ja pohjoismaiden kaltaisissa maissa. Itämeren ympärillä olevat maat toimivat yhteistyössä Itämeren alueen sopeutumisstrategian ja -toimintasuunnitelman toimeenpanossa. Suomi, Norja, Venäjä ja Ruotsi osallistuvat Barentsin alueen yhteistyöhön. Kanada, Suomi, Norja, Venäjä, Ruotsi, Tanska, Islanti ja Yhdysvallat ovat myös Arktisen neuvoston jäseniä. Rajoja ylittävä paikallinen yhteistyö rakentuu yleensä tulvariskin tai vesivarojen hoidon suunnittelun ympärille. Esimerkiksi Puola tekee yhteistyötä Saksan kanssa tulvien torjumiseksi Oderjoella, ja Tanska ja Saksa toimivat yhteistyössä Vattimeren sopeutumisasioissa.

Eri maiden sopeutumispolitiikan suurimmat haasteet voidaan tiivistää kolmeen seikkaan: tarve parantaa tietoisuutta sopeutumisesta sekä sen poliittista priorisointia, haasteet alueiden ja tasojen välisessä koordinoinnissa sekä sopeutumiselle osoitettujen rahoituksen ja inhimillisten resurssien puute. Lisäksi monissa maissa sopeutumistyö tarvitsisi lisää tietoa, kapasiteettia, työkaluja ja teknologiaa.

Suositukset

Muiden maiden parhaisiin käytäntöihin ja tunnistettuihin kehittämiskohteisiin perustuen esitämme seuraavat suositukset Suomelle:

1. Sopeutumistyön perusta
- Systemaattisen ja iteratiivisen prosessin käyttöönotto
- Selkeiden tavoitteiden ja mittareiden asettaminen
- Sektorikohtaisten strategioiden käyttöönotto
- Keskittyminen enemmän arktisiin alueisiin

2. Paikallistason sopeutumistoiminta
- Kuntien velvoittaminen suunnittelutyöhön
- Paikallisen ja alueellisen työn rahoitus
- Valtakunnallisen kuntien yhteistyöelimen perustaminen

3. Informaatio ja näkyvyys
- Sopeutumiseen keskittyvän maisteriohjelman perustaminen
- Sopeutumistoimiin keskittyvän kilpailun perustaminen

4. Dialogi ja koordinointi
- Ilmastonmuutokseen sopeutumisen johtajien foorumin perustaminen
- Yhteistyöelimen perustaminen sosiaali- ja terveysalan sopeutumistyöhön

5. Kansainvälinen yhteistyö
- Aloitteen tekeminen yhteisen pohjoismaisen sopeutumispolitiikan luomiseksi

1. Introduction

1.1. The study

This study is a result of cooperation between two projects funded by the Finnish Ministry of Foreign Affairs. The project "Climate resilience with Baltic Sea co-operation – Flood and Drought Risk Management" ordered the main part of the project concentrating on the Baltic Sea Region countries. The Centre for Economic Development, Transport and the Environment of Southwest Finland coordinates the project, other partners being Finnish Environment Institute, Natural Resources Institute Finland and Centre for Economic Development, Transport and the Environment of Pirkanmaa. The project "Arctic cooperation as tool for climate change mitigation and food security ACAF" run by the Natural Resources Institute Finland ordered an extension for the study to include a few more Arctic countries.

The objective of the work is to compile information about climate change adaptation policy and governance in the Baltic Sea and Arctic regions. The countries and territories included are Sweden, Denmark, Faroe Islands, Greenland, Norway, Iceland, Germany, Poland, Estonia, Latvia, Lithuania,

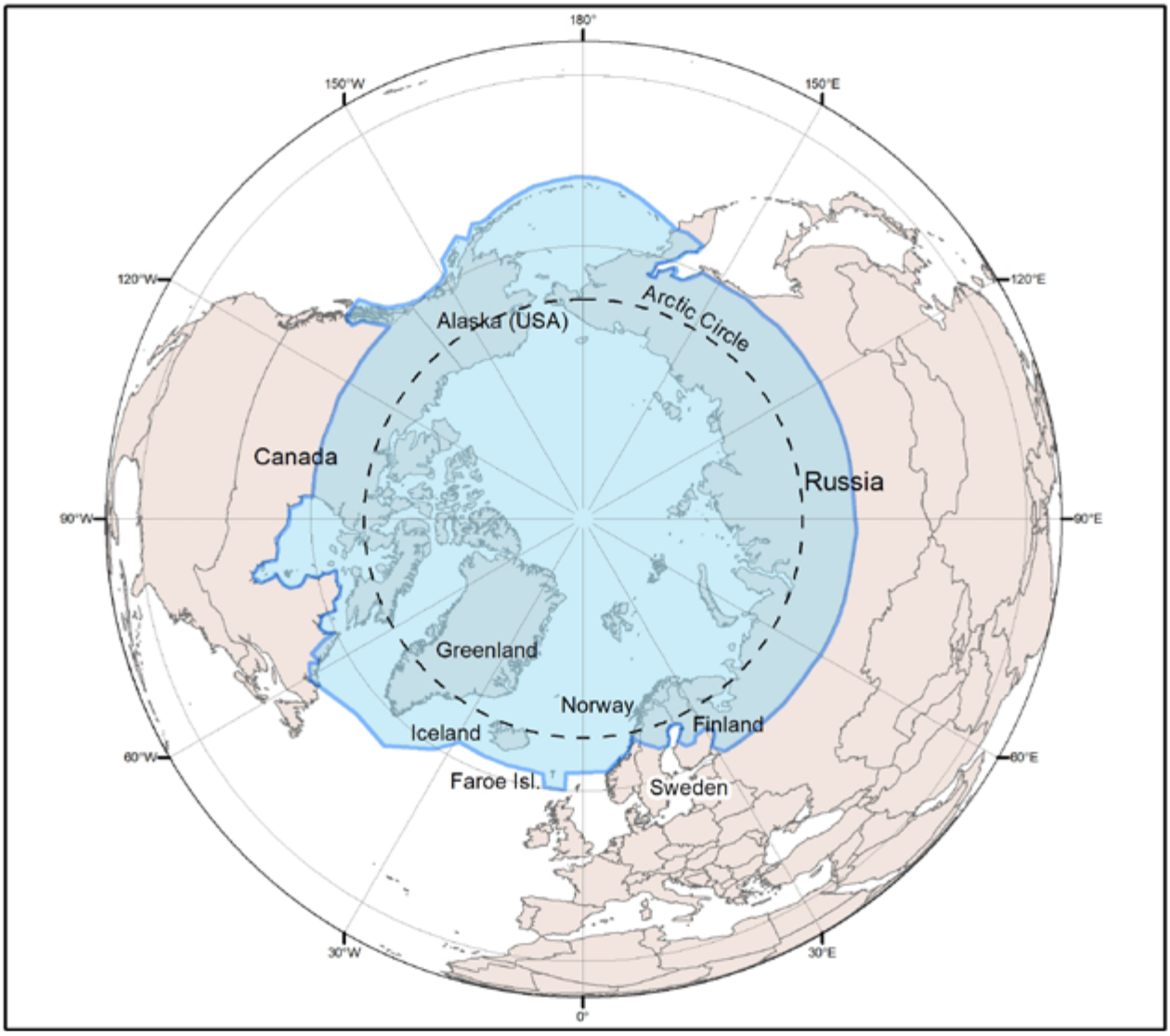

Figure 1.1.1. Map of the Arctic region countries and territories included in the study.

Figure 1.1.2. Map of the Baltic Sea Region countries included in the study.

Russia, Belarus, Canada and the USA. The study area is illustrated in figures 1.1.1. and 1.1.2. The study will be used to further develop adaptation policy and processes in Finland. For that purpose, the Finnish system is also briefly described. It also serves as a source of information and inspiration for other countries.

This study focuses on adaptation work at a national level. Subnational level is included if there are measures or processes guiding regional or local adaptation planning or networks supporting the work. In Canada and the USA, special attention is paid to the Arctic provinces, territories or states. This study describes processes, policies and networks, and does not include sectoral adaptation measures, which have been dealt with in other reports produced within the Baltic Sea project.

Kati Berninger, Oras Tynkkynen and Maria Tiusanen from Tyrsky Consulting Ltd. carried out the study. Pekka Parkkila and Juha-Pekka Triipponen from the Centre for Economic Development, Transport and the Environment of Southwest Finland as well as Ilona Mettiäinen and Seija Tuulentie from the Natural Resources Institute Finland guided the work.

1.2. Adaptation governance

Climate change adaptation aims at reducing the vulnerability of our natural and social systems to the current and future impacts of climate change. Adaptation policy and governance is becoming increasingly important at both national and sub-national agenda beside climate change mitigation. (Russell et al. 2020)

Adaptation requires processes to help coordinate different levels of government and across sectors. The role of national governments is primarily to raise awareness, provide frameworks and guidance for adaptation work as well as to co-finance adaptation efforts. The sub-national governments like regional and local authorities are the ones that

in many cases carry out detailed planning and implement the adaptation actions. Regions and provinces are mediators between the national and local governments, since they have a broader view than municipalities, but they work directly with the local level. (Bauer & Steurer 2014, Russell et al. 2020) The importance of the regional level, however, varies across countries from very important to almost non-existent.

Suitable and successful adaptation policies are very context-specific. They depend both on the natural conditions and risk structure as well as on legislation and administrative structure of each country. Thus, different countries have varying approaches in how adaptation work is organised and supported. However, despite the differences, it is possible to learn from other countries' best practices and challenges. (BASE 2016)

Another important aspect in adaptation policy is that we cannot predict the specific economic and societal developments during the coming decades. Thus, adaptation management should be flexible, making it essential to revisit and modify plans according to the conditions, changing projections and stakeholder interests. In addition, learning from own experience and others enables us to improve the frameworks and actions. (BASE 2016)

2. Methods

2.1. Literature study

A literature study was carried out in order to find information on the situation of adaptation planning and coordination in the target countries and territories as well as in the Baltic Sea, Arctic and Barents regions in general.

The main source of information for the Baltic Region countries was the Climate-ADAPT data base which contains basic information and links to key documents on each country. Results of the following projects were also used as a source of information:

- CASCADE Community safety action for supporting climate adaptation
- ClimaEast Supporting Climate Change Mitigation and Adaptation in Russia and ENP East countries
- BaltAdapt Baltic Sea Region Climate Change Adaptation Strategy

A literature search was conducted in both Google and Google Scholar using search terms “climate change adaptation” and “governance”, “policy” or “strategy” and the name of the country or territory.

The literature study focused on the following issues:

- national and sectoral adaptation strategies and plans as well as their review and reporting processes
- potential regional and local adaptation strategies and plans and how they are supported
- hierarchy of decision-making and coordinating body
- planning process of adaptation policy
- challenges in adaptation and adaptation policy
- priorities in adaptation and how they are set
- coordination and co-operation
- financing tools
- tools to engage stakeholders
- international cooperation
- good practices

2.2. Interviews

19 interviews were conducted in order to complement the information collected during the literature study and to get a deeper understanding about each country’s adaptation policy and governance. Some experts preferred to answer the interview questions in a written form. For clarity reasons, we call all answers interviews.

The names and contact details of potential experts to be interviewed were compiled using various sources. The primary source for the Baltic Region countries was the Climate-ADAPT database, which includes information on national contact persons (Climate-ADAPT Data Base 2020). Also, Horizontal Action Climate focal points of the EU Strategy for the Baltic Sea region were used. Additional contact persons, especially for the Faroe Islands, Greenland, Iceland, Norway, Russia, Canada and the USA, were found via personal networks of the consultant team and the supervisors and, in some cases, from literature.

The interview questions are presented in ANNEX I. The interviewed experts are listed in ANNEX II.

3. Regional co-operation in adaptation

3.1. The Baltic Sea Region

The Baltadapt project produced a Strategy for adaptation to climate change in the Baltic Sea Region (Baltadapt 2013a) accompanied by a non-binding action plan (Baltadapt 2013b). The Council of the Baltic Sea States (CBSS) high level political meeting in 2014 endorsed the strategy. The strategy aims at complementing national and subnational processes with coordinated action within the Baltic Sea region. The key measures are sharing information and developing networks. The Baltadapt strategy has been integrated into the EU Strategy for the Baltic Sea Region (EUSBSR) within the Horizontal Action on Climate. The dialogue continues via BSR Climate Dialogue Platform, which holds regular meetings. The participants are representatives of national governments and flagship projects. (Climate-ADAPT Data Base 2020)

The Baltadapt Strategy focuses especially on the climate change impact and vulnerability of biodiversity and three key sectors: food supply including agriculture and fisheries, coastal infrastructure and tourism. Adaptation within these areas can gain significantly from macro-regional cooperation. Impacts on them are expected in major parts of the region often crossing boundaries between states or between land and sea. They also have main components that correspond to the objectives of the EUSBSR Action Plan. (Baltadapt 2013a)

The Strategy includes 11 common goals concerning adaptation (Baltadapt 2013a):

1. Raised awareness concerning the need for action on all governance levels.
2. Shared macro-regional knowledge bases
3. Research cooperation in order to identify and address knowledge gaps
4. Facilitated science-policy-business dialogues at and between all governance levels through the provision of web-based as well as “real life” meeting places
5. Cooperation on disaster risk management to cope with increased risks due to climate change
6. Reviewed and mainstreamed policies in light of climate change adaptation concerns
7. Baltic Sea Region co-operation with non-EU member states where it has been defined to be of mutual benefit
8. Cooperation between states on the development of national strategies and action plans
9. Macro-regional co-operation within business sectors
10. Macro-regional co-operation in order to ensure solidarity and funding of adaptation measures
11. The Baltic Sea Region as a model region for macro-regional co-operation on climate change adaptation

The three main chapters of the Baltadapt strategy cover building and sharing adaptation knowledge, mainstreaming adaptation and connecting the Baltic Sea Region for adaptation. In addition, the action plan covers the four main focus areas introduced in the strategy. As the scope of the Baltadapt Strategy is on coastal and marine areas, also the Action Plan focusses on them, but it takes into consideration also the interlinkages with the inland. The last topic is how to finance adaptation, and the action plan outlines different funding options, especially different EU programmes. (Baltadapt 2013b)

3.2. The Arctic Council

Arctic Council, established in 1996, is the leading intergovernmental forum for cooperation, coordination and interaction among e.g. the Arctic states and Arctic Indigenous peoples. The council focuses particularly on issues related to sustainable development and environmental protection in the Arctic. Member states of the council are Canada, Kingdom of Denmark (includes Denmark, Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden and the United States. Organizations representing Arctic Indigenous peoples in the Council are AIA, AAC, GCI, ICC, RAIPON and Saami Council. One of the Council's focus areas is climate, including adaptation actions.

Council's research and monitoring activities are mainly carried out by working groups that cover topics from nature conservation to emergency prevention. In regards to adaptation, one relevant working group is the Arctic Monitoring and Assessment Programme (AMAP) that measures and monitors pollutants and climate change effects on ecosystems and human health in the Arctic. AMAP has, for example, assessed climate impacts in the Arctic and collaborated with other working groups to assess e.g. impacts on Arctic ecosystems.

Adaptation Actions for a Changing Arctic project

In 2011, the project Adaptation Actions for a Changing Arctic (AACA) started aiming at enabling more informed, timely and responsive policy and decision making in a rapidly changing Arctic. The first two parts of the project were finalized in 2013 and the third part (AACA-C), was carried out in 2013–2017. AACA-C covered three pilot regions that were the Barents region, Baffin Bay/Davis Strait Region and Bering/Chukchi/Beaufort Region. It produced comprehensive reports that contain material to help decision makers, civil society, business and academia to adapt to climate change in the Arctic (AMAP 2017a, 2017b and 2018a).

Arctic Resilience Action Framework (ARAF)

The Arctic Resilience Action Framework (ARAF), approved in 2017, aims at advancing a coordinated and regional approach to build resilience and adapt to rapid change (Arctic Council 2017). The ARAF provides guidance and support for the Arctic Council and its stakeholders and sets priorities for action. The Framework focuses on the Arctic states, Indigenous peoples and the ecosystems.

The ARAF's objective is to achieve the following outcome: "A measurable increase in the capacity of Arctic States and Arctic communities to understand and respond to risks and changes in ways that support socio-economic development and healthy, functioning ecosystems and ecosystem services." Implementation of the Framework consists of three elements (collecting and tracking implementing actions, providing tools for measuring progress and planning a resilience forum) and provides nine principles to guide action (e.g. valuing and drawing on Indigenous knowledge, empowering local communities and addressing multiple risks together and looking for co-benefits). (Arctic Council 2017)

The ARAF has four priorities that include each four to six action areas (Arctic Council 2017):

1. Analyzing and understanding risk and resilience in the Arctic
2. Building resilience and adaptation capacity
3. Implementing measures that build resilience through policy, planning and cooperation
4. Encouraging investment to reduce risk and build resilience

After the framework was approved, the implementation project was carried out in 2017–2019 and was led by Finland, Sweden, the USA and the Arctic Council's Sustainable Development Working Group. Additionally, each Arctic Council state and permanent participant had a representative in the ARAF implementation team. (Arctic Council 2019)

Implementation had three major activities. The first activity was to identify actions that are being taken e.g. by the Arctic Council States that build resilience. Thus, case examples were gathered from the whole Arctic region illustrating how resilience had been built in different countries. Secondly, the aim was to develop a catalog of protocols and indicators that can measure progress towards building

resilience. The third activity was to plan an Arctic Resilience Forum. In 2018, the first Arctic Resilience Forum was organized in Rovaniemi, Finland, to share and discuss about best practices and challenges. (Arctic Council 2019)

Additionally, as a result of the Arctic Resilience Assessment project the Arctic Council published the Arctic Resilience Report in 2016. The report provides, for example, an assessment of Arctic change and resilience and overviews tools and strategies that can be used to build resilience.

3.3. Barents Euro-Arctic Council and Barents Regional Council

Finland, Norway, Russia and Sweden take part in the Barents co-operation. The Barents Action Plan of Climate Change, the latest update being from 2017, includes 6 topics of co-operation in climate change adaptation (International Barents Secretariat 2017):

1. Rivers, wetlands and mires restoration measures
2. Nature protection in a changing climate
3. Barents Rescue Cooperation
4. Increased knowledge of policies on climate change mitigation and adaptation for the forest sector
5. Increased circumboreal cooperation to address climate change and forest sector competitiveness
6. Cooperation on reindeer husbandry

In addition, the program includes some research and dissemination activities on adaptation issues. (International Barents Secretariat 2017).

4. Description of adaptation plans and their implementation per country

4.1. Finland

Strategies, plans and legislation

National strategies

Finland's National Climate Change Adaptation Plan 2022 (Ministry of Agriculture and Forestry of Finland 2014)

Adaptation is also included in national climate and energy strategies.

The draft arctic policy strategy includes adaptation as one of the key areas. The whole Finland is defined as arctic. (Government of Finland 2021)

Sectoral strategies

- Action Plan for the Adaptation to Climate Change of the Environmental Administration 2022 (2016)
- Action Plan for the Adaptation to Climate Change of the Ministry of Agriculture and Forestry 2011–2015
- Climate Policy Programme for the Ministry of Transport and Communications' administrative sector for 2009–2020 (2015)

The Defence Force's Energy and Climate Programme, which was updated in 2018, also contains goals and measures relevant to adaptation. (Ministry of Agriculture and Forestry of Finland 2020).

Regional strategies

Most of the 18 regions in mainland Finland have either a climate strategy or plan since early 2010s, but in most of the strategies, focus has been on mitigation. The role of climate adaptation in most regions is increasing. (Sorvali 2012, Järvelä & Turunen 2019, Gregow et al. 2021)

In addition to Regional Councils, which are associations formed by municipalities, Finland has 15 Centres for Economic Development, Transport and the Environment (ELY Centres), which are responsible for the regional implementation and development tasks of the central government, including climate change. For example, the Pirkanmaa ELY Centre is developing a roadmap to adaptation. (Pirkanmaa ELY Centre 2020)

Local strategies

Many municipalities have included adaptation in their climate strategies (Ministry of Agriculture and Forestry of Finland 2020).

Guide from Association of Finnish Municipalities on climate work in municipalities includes a section on adaptation (Kuntaliitto 2020). The web portal ilmasto-opas.fi (climateguide.fi) includes a section on adaptation, and good practices from municipalities sorted by sector.

Legal framework

The Finnish Climate change act includes adaptation and provisions on the planning system. (Finlex 2015)

Process and decision making

Planning, reporting and reviewing

- Report: every four years to the parliament as part of the annual climate report.
- Review: Interim review of the implementation of the National Climate Change Adaptation Plan 2020 (2019, English translation published in 2020; Ministry of Agriculture and Forestry of Finland 2020).

According to the climate change act, the government needs to adopt a national adaptation plan (the Finnish Adaptation Strategy) once every 10 years.

Decision making

The responsibility for adaptation action rests primarily with practitioners. The State has the main responsibility for promoting actions necessary for

securing functions vital to the society and the overall promotion of adaptation in cooperation with municipalities, businesses, citizens and organizations. The national adaptation plan provides the overarching framework, complemented with plans by ministries, regions, sectors and local government. (Ministry of Agriculture and Forestry of Finland 2014) The Ministry of Agriculture and Forestry is responsible for coordinating the implementation of the national adaptation plan and the various ministries within their respective branches.

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

- Political level: Ministerial working group on climate and energy policy
- Expert level: National Monitoring Group of the National Adaptation Plan

International co-operation

International co-operation on adaptation takes place in the form of development cooperation and acting in multilateral fora, including the UNFCCC, Arctic Council, Nordic Council, Barents Euro-Arctic and Baltic Sea region (Ministry of Agriculture and Forestry of Finland 2014).

Tools to engage stakeholders

A series of events were held together with private sector and business actors in 2016 and 2017 to identify adaptation action and then to provide tools for identifying and managing risks in business value chains. In 2018, a communication campaign activated NGOs to communicate jointly about the need for everyday life adaptation. (Climate-ADAPT Data Base 2020). A broad mapping of stakeholder views was conducted as part of the mid-term evaluation of the Climate Change Adaptation Plan. (Ministry of Agriculture and Forestry of Finland 2020)

Biggest challenges

Adaptation challenges

The main adaptation challenges are related to natural resources management like forestry, agriculture and fisheries. The management and protection of water resources will also form a challenge since the water quantity will fluctuate and warmer winters will increase nutrient loading. The effects of climate change will be strongest in the Arctic region. The Saami people will be the most affected since their traditional way of living is based on natural resources and reindeer herding. Climate change is predicted to decrease the quality of reindeer winter pastures. (Ministry of Agriculture and Forestry of Finland 2014)

Adaptation policy challenges

1. Improving awareness of weather and climate risks and adaptation needs.
2. Clarifying roles and responsibilities related to adaptation and ensuring adequate co-ordination.
3. Developing policies and measures to support adaptation and tools to advance implementation. (Ministry of Agriculture and Forestry of Finland 2020)

Key policy priorities

Key priorities

1. Adaptation has been integrated into the planning and activities of both the various sectors and their actors.
2. The actors have access to the necessary climate change assessment and management methods.
3. R&D work, communication and education and training have enhanced the adaptive capacity of society, developed innovative solutions and improved citizens' awareness on climate change adaptation. (Ministry of Agriculture and Forestry of Finland 2014)

Choosing priorities

Government adopts them in the national adaptation strategy. Priority is given to actions which secure

functions vital to the society or reinforce risk management and ones that should be taken independent of how climate changes exactly. (Ministry of Agriculture and Forestry of Finland 2014)

Financial tools

Structural funds have financed projects on climate change adaptation amounting EUR 23.5 million in programming period 2014–2020. (Ministry of Agriculture and Forestry of Finland 2020)

Research funding is available through the Strategic Research funding and research programmes of Academy of Finland, for example special funding for system-level research into climate change mitigation and adaptation. There are, however, few funded projects that actually focus on adaptation. (Strategic Research Council 2021, Academy of Finland 2021). Adaptation studies are financed as a part of the Government's Analysis, Assessment and Research Activities (Tietokäyttöön.fi 2021).

Need for best practice examples

Drawing from the mid-term evaluation of the Finnish Adaptation Plan, the following examples would be especially valuable (Ministry of Agriculture and Forestry of Finland 2020):

- how to give national support for regional and municipal adaptation work
- how to promote co-operation within and across sectors, especially examples of co-operation across sectors at a regional level would be valuable
- how to increase awareness on the adaptation need
- how to produce and provide concrete information and tools for adaptation

4.2. Sweden

Strategies, plans and legislation

National strategies

National Climate Change Adaptation strategy, 2018. The strategy was adopted as a part of the Bill 2017/18:163 "Nationell strategi för klimatanpassning".

There is no national adaptation plan in Sweden. Instead, several national authorities and all county administrative boards are assigned to develop action plans (European commission 2018).

Sectoral strategies

In 2019, Government mandated 32 national authorities to develop adaptation action plans. Implementation of the plans has started but some sectors are still in the process of developing action plans (Swedish portal for Climate Change Adaptation 2020):

- The National Board of Housing, Building and Planning
- The National Electrical Safety Board
- The Swedish Energy Agency
- The Public Health Agency of Sweden
- The Swedish Board of Agriculture
- The Swedish Agency for Marine and Water Management
- The Swedish Mapping, Cadastral and Land Registration Authority
- The Swedish Food Agency
- The Swedish Civil Contingencies Agency
- The Swedish Environmental Protection Agency
- The Swedish National Heritage Board
- The Saami Parliament of Sweden
- The Swedish Forest Agency
- The National Property Board Sweden
- Swedish Geotechnical Institute
- The National Veterinary Institute
- The Geological Survey of Sweden
- The Swedish Meteorological and Hydrological Institute
- The Swedish Transport Administration
- The Swedish Transport Agency

Regional strategies

County administrative boards (CABs) are responsible for adaptation at a regional level. All county administrative boards must have an adaptation plan and these 21 regional action plans, adopted in 2014, cover whole Sweden (Swedish portal for Climate Change Adaptation 2020):

- County Administrative Board of Blekinge
- County Administrative Board of Gotland, Part 1 – Actions
- County Administrative Board of Gotland, Part 2 – Background
- County Administrative Board of Gävleborg
- County Administrative Board of Halland
- County Administrative Board of Jämtland
- County Administrative Board of Jönköping
- County Administrative Board of Kronoberg
- County Administrative Board of Norrbotten
- County Administrative Board of Stockholm
- County Administrative Board of Södermanland
- County Administrative Board of Uppsala, Part 1 – Challenges and possibilities
- County Administrative Board of Uppsala, Part 2 – Actions
- County Administrative Board of Värmland
- County Administrative Board of Västerbotten
- County Administrative Board of Västernorrland
- County Administrative Board of Västmanland
- County Administrative Board of Västra Götaland
- County Administrative Board of Örebro
- County Administrative Board of Östergötland

The Swedish Meteorological and Hydrological Institute (SMHI) supports CABs and sectoral authorities in their adaptation efforts and have developed guides on how to do vulnerability analyses and an action plan. SMHI provides also training, arranges regular meetings and provides basic information about climate for the CABs. (Sjöström 2020)

Local strategies

Local authorities are not obligated to develop action plans, but they need to consider adaptation in their planning processes and make risk and vulnerability analyses (Sjöström 2020). According to SMHI (2020b), 90 % of the municipalities have identified the need to take action, but only a few municipalities have assessed whether the taken measures have made the municipality less vulnerable to climate change.

Legal framework

National adaptation strategy is to a large extent guided by existing legislation. The Government has issued amendments to the Planning and Building Act proposed in the National Adaptation Strategy aiming to increase the preparedness of municipalities for climate change (European Commission 2018). In 2018, an ordinance on authorities' climate adaptation work (Förordning om myndigheters klimatanpassningsarbete) was issued mandating national authorities and CABs to initiate, support and follow up on adaptation.

In 2009, the Swedish Parliament adopted an integrated climate and energy policy, including the initial steps for adapting to a changing climate (Ministry of the Environment and Ministry of Enterprise, Energy and Communications, 2009).

Process and decision making

Planning, reporting and reviewing

National adaptation strategy has a five-year policy cycle including implementation, vulnerability analysis, monitoring and evaluation of the implementation and proposals for revisions. Strategy will be updated in 2023. An expert council on adaptation established by the government will evaluate the adaptation progress. (Climate-ADAPT Data Base 2020, Swedish portal for climate change adaptation 2020)

National and regional authorities must report their work on adaptation yearly to SMHI and the sectoral plans must be updated at least every five years. SMHI has also published analyses on how municipalities and authorities have completed the tasks that are included in the Government decree on Swedish authorities' work on adaptation (SMHI 2020b, SMHI 2020c).

1.2019–2022:
- An updated climate and vulnerability analysis
- Follow-up and evaluation of completed work
- Proposals for a revised strategy are prepared

2.2023:
- Revised version of the National strategy for climate adaptation

Decision making

Responsibilities in Sweden are divided across local, regional and national level. The Ministry of the Environment and Energy has the overall responsibility for coordinating the Government's climate policy, including follow up on adaptation. Also, other ministries play an important role in adaptation work as they are responsible for adaptation within their respective area (European Commission 2018). The National Board on Planning, Building and Housing, for example, has a coordinating role in relation to adaptation within physical planning. (Climate-ADAPT Data Base 2020)

At the regional level, the county administrative boards are responsible for coordinating and implementing the adaptation work and supporting local actors in their efforts (European Commission 2018). The National Knowledge Centre for Climate Change Adaptation, SMHI as a responsible agency, offers assistance for all municipalities as well as for regions, authorities and other stakeholders (Climate-ADAPT Data Base 2020).

A national expert council for adaptation, established by the Swedish government, follows up the work on adaptation as well as aims at providing a holistic picture of the work. Expert council's purpose is also to identify knowledge gaps and participate in evaluation and revision of the national adaptation strategy. (European Commission 2018)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

In total 21 counties and 26 governmental agencies form the National Network for Adaptation that promotes both vertical and horizontal cooperation (Myndighetsnätverket för klimatanpassning 2020). Network aims e.g. at strengthening the adaptive capacity of the society, developing information and data and increasing engagement to spread information (European Commission 2018).

Different sectors and actors are working together with land use planning, risk management, natural disasters and adaptation, in order to reduce risks and enhance preparedness (Climate-ADAPT Data Base 2020).

International co-operation

Adaptation is a strategically important issue in Swedish climate diplomacy and considered in Sweden's bilateral development cooperation. In 2016, around 50 % of the climate-related support was focused on adaptation. Sweden is also a major donor in some multilateral climate funds, including the Green Climate Fund, Least Developed Countries Fund and Adaptation Fund. Additionally, Sweden is involved e.g. in BaltAdapt, Arctic Council and Barents Euro-Arctic Council. (Nationell strategi för klimatanpassning 2017)

Tools to engage stakeholders

Stakeholders are involved in the development of adaptation plans in the local and regional level. Swedish National Knowledge Centre for Climate Change Adaptation, based at the SMHI, assists municipalities, regions, authorities and other stakeholders in their adaptation efforts, provides tools and information to help society cope with a changing climate as well as acts as a resource for everybody interest in Sweden's adaptation. (SMHI 2020a)

The Swedish Climate Change Adaptation Portal (klimatanpassning.se) is run in collaboration between several authorities. The portal aims at collecting and sharing latest information on adaptation.

There are several coordination forums where sector agencies and other stakeholders can share experiences and plan key actions (Climate-ADAPT Data Base 2020). These include:

- Network for shore erosion
- Committee on dimensioned flows in hydroelectric dams in a changing climate
- Delegation for landslides
- National network for drinking water

Biggest challenges

Adaptation challenges

Challenges are related e.g. to decreasing snow cover in winter, changing precipitation patterns, flooding, erosion, shortage of drinking water during dry years, heavy rainfalls, health impacts, heat waves and impacts on infrastructure and agriculture

and cultural heritage (Swedish Ministry of the Environment and Energy 2017).

Adaptation policy challenges

Biggest challenges are related to knowledge and capacity. Even though the awareness about adaptation has increased a lot during the recent years, efforts are still needed to increase knowledge and capacity. Often employees who are taking care of adaptation issues are working also on many other topics (e.g. environmental permits). (Sjöström 2020)

For example, according to SMHI (2020b), in municipalities problems are related to lack of support, insufficient personal and financial resources and inadequate prioritization. Especially lack of resources has been reported as one of the main obstacles for the further development of adaptation work in the municipalities. Additionally, national and regional authorities have reported that challenges are related to lack of knowledge and data, insufficient or unclear legislation and unclear divisions of responsibility. (SMHI 2020c)

The national climate and vulnerability analysis was done in 2007 and partly reviewed in 2015. Since then Sweden has not assessed what the biggest risks are and what should be prioritized or focused on.

Key policy priorities

Key priorities

The National Climate Change Adaptation strategy (2017) identifies seven challenges that are especially important for Sweden:

- Landslides and erosion that threatens communities, infrastructure and businesses
- Floods that threaten communities, infrastructure and businesses
- High temperatures that mean risks to health and well-being for humans and animals
- Lack of water resources for people, farms or industry
- Biological and ecological effects that impact sustainable development
- Impacts on domestic and international food production and trade
- Increased occurrence of pest, diseases and invasive foreign species that impact humans, animals and plants

These challenges are also prioritized by the authorities. Several authorities consider flooding, landslides and erosion especially important (SMHI 2020c).

Additionally, the Government's goal for adaptation is to develop a long-term sustainable and robust society that actively reduces vulnerabilities and seizes opportunities. Adaptation work needs to be conducted cross-sectorally and at all levels in society. The objectives for adaptation set in the Paris Agreement and Agenda 2030 must also be achieved and integrated into strategies and planning. (Nationell strategi för klimatanpassning 2017)

Choosing priorities

Priorities are set in the National Adaptation Strategy. Based on the strategy, also the following aspects must be taken into account in adaptation actions:

- Sustainable development
- Reciprocity
- Scientific basis
- The precautionary principle
- Integration of adaptation measures
- Flexibility
- Management of uncertainty
- Risk management
- Time perspective
- Transparency

Financial tools

Municipalities can apply funding for preventive and concrete measures against landslides, floods and other natural disasters. Funding is partly financed by the Swedish Civil Contingencies Agency (MSB). In addition to MSB, also, for example, Swedish Innovation Agency (Vinnova), the Swedish Foundation for Strategic Environmental Research (Mistra) and a Swedish Research Council for Sustainable Development (Formas) are funding activities supporting climate adaptation. Swedish portal for Climate Change Adaptation provides a list of some possibilities for financing adaptation measures and offers assistance in finding suitable financing opportunities.

Best practices

Swedish portal for Climate Change Adaptation (klimatanpassning.se) shares information from authorities helping to get an overview on how adaptation is arranged in Sweden. Webpage provides also case examples and introduces the Climate Adaptation Game that increases the understanding about the impacts of climate change and how the society can adapt to them.

Swedish National Knowledge Centre for Climate Change Adaptation assists municipalities, regions, authorities and other stakeholders and provides tools and information to cope with a changing climate as well as acts as a resource for everybody interested in Sweden's adaptation.

The National Network for Adaptation consists of 28 national agencies and 21 county administrative boards aiming at increasing societal resilience to climate change. The network has been given a small amount of money every year to arrange a competition. All network members can hand in project proposals that are related to adaptation measures. Projects must engage at least three members of the network, so it encourages to work together with other members. After the project proposals are handed in, members have the right to vote on which project wins the prize. Competition has increased the willingness to be a part of the network. (Sjöström 2020)

It is clearly indicated that the sectoral authorities are responsible for creating action plans and making sure that adaptation is included in their planning.

4.3. Denmark

Strategies, plans and legislation

National strategies

Danish Strategy for Adaptation to a Changing Climate 2008 (The Danish Government 2008)

How to manage cloudburst and rain water. Action Plan for a Climate-proof Denmark. 2012. (Danish Government 2012)

Sectoral strategies

A few national sectors, such as transport, roads and coastal protection, had dedicated adaptation plans as of 2017 (Climate-ADAPT Data Base 2020).

Regional strategies

There are no dedicated regional adaptation strategies, but all five regions have incorporated adaptation into their climate strategies. Central Denmark Region leads the EU-funded project "Coast to Coast Climate Challenge", which has a goal of formulating and implementing a coordinated adaptation strategy for the region between 2017 and 2022. (Climate-ADAPT Data Base 2020) In Denmark, regions have a limited role in the issues related to water and environment. Thus, more responsibility is directed to the municipalities. (Wejs 2020)

Local strategies

The National Adaptation Plan required municipalities to draw up climate change adaptation plans by 2013. All 98 Danish municipalities did so. (Climate-ADAPT Data Base 2020, Danish Government 2012)

Legal framework

In 2018, adaptation was integrated into the National Planning Act. Municipal spatial plans must comply with the Planning Act meaning that adaptation must be integrated in the municipal spatial plans. However, there are some weaknesses in the law, for example, municipalities decide themselves what IPCC scenario they are using for sea level rise or

rain incidents (e.g. 5-year event or 100-year event). (Wejs 2020)

Process and decision making

Planning, reporting and reviewing

There is no systematic evaluation and review framework in place, but there are ad hoc reviews. A review of the National Adaptation Plan took place in 2013 and 2015 in an inter-ministerial process. There is no published report of this review. (European Commission 2018)

In 2016, a cross-ministerial working group carried out an evaluation of the municipal climate adaptation efforts (Climate-ADAPT Data Base 2020). The national adaptation strategy will be updated. The new version is expected to be published in spring 2022. (Wejs 2020)

Municipal spatial plans are updated every 4 year (Wejs 2020).

Decision making

Ministry of Environment is in charge of the adaptation strategy. The central government has a role of establishing the framework for adaptation by, for example, adapting laws and regulations, but also by ensuring coordination and providing information. In Denmark, a lot of responsibility for adaptation is given to municipalities, which were obliged in the National Adaptation Plan to draft municipal adaptation plans. (Danish Government 2012) Much less emphasis is placed on regional actions (Climate-ADAPT Data Base 2020).

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

Koordinationsforum for Klimatilpasning (KoK) was in place during the preparation of the National Adaptation action plan in 2008–2011. The members included all relevant state authorities as well as representatives from the municipalities, regions and the coordinating body for research. During the implementation phase of the action plan, cross-sectoral coordination has been taking place in a more ad-hoc manner with task forces or committees named for specific tasks. (Danish Government 2008, European Commission 2018)

In the field of research, the Coordination Unit for Research in Climate Change Adaptation (Koordineringsenhed for forskning i klimatilpasning – KFT) was set up to coordinate national research activities in the context of adaptation. (Climate-ADAPT Data Base 2020) In 2013 the activities of KFT were transferred to a network of research activities on adaptation. The network meets on a yearly basis and keeps up network activities. The website is no longer active. (European Commission 2018)

A formal municipal adaptation network, chaired by the Local Government Denmark (KL), has been set up to help share knowledge and solutions between municipalities (Climate-ADAPT Data Base 2020).

International co-operation

Denmark collaborates with Germany and the Netherlands through the Trilateral Cooperation on the Protection of the Wadden Sea. They developed a common Climate Change Adaptation Strategy (CCAS) in 2014. (European Commission 2018)

The City of Copenhagen has entered into a co-operation agreement with New York City on transferring the ideas and results from the Climate Resilient Neighbourhood in Østerbro to a district of New York. The city has another cooperation agreement with Beijing on exchange of experience of solutions for the management of everyday rain and torrential downpours. (European Commission 2018)

Tools to engage stakeholders

The Danish web portal on adaptation includes information on climate change and advice on adaptation. One example of a concrete tool was a National Dialogue Forum on adaptation established in 2012 to discuss adaptation policy and actions. The forum had representatives from different sectors of the society, including businesses, universities, NGOs and municipalities. (European Commission 2018)

A mobile team (2017–2019) of subject specialists on adaptation, flooding, and erosion established by the Environmental Protection Agency and Coastal Authority provided advise, guide, support, and help coordinate municipalities in implementing adaptation solutions. The team offered

municipalities training, workshops, seminars, and customized advice. The team encouraged cooperation across municipalities and brought in knowledge on different topics. (Climate-ADAPT Data Base 2020)

Several adaptation networks have joined forces and established the National Network for Climate Adaptation (DNNK) gathering together both public and private organizations. DNNK aims e.g. at promoting holistic approach to adaptation and gathering the latest knowledge, tools and experiences to support adaptation efforts.

In the guidelines for the municipalities, government has stressed the importance of stakeholder engagement. However, the government has not provided any specific tools for that. (Wejs 2020)

Biggest challenges

Adaptation challenges

Adaptation challenges are mainly related to water, for example, increased precipitation and cloud bursts, rising terrain-near groundwater, flooding from water courses, increased storm surges and sea level rise (Wejs 2020) and coastal erosion (Danish Government 2012).

Adaptation policy challenges

Coordination at municipal level and cooperation between municipalities are key challenges (European Commission 2018). Other challenges include compartmentalized policy structures, weak mainstreaming adaptation to sectors beyond water and conflicts between adaptation measures and other local interests (Cascade 2019). Moreover, fragmentation of rules and regulations and challenges in multilevel governance exist (Wejs 2020).

Key policy priorities

Key priorities

The Adaptation Strategy describes three key cross-sectoral measures: a targeted information campaign on adaptation, a research strategy ensuring more focus on adaptation research, and intergovernmental coordination. (Danish Government 2008) One priority is mainstreaming of adaptation, and Denmark has included consideration of adaptation in a wide range of legislation. (Climate-ADAPT Data Base 2020) Denmark has also prioritized different tools (e.g. flood screening tools) and new tools have also been launched recently (Wejs 2020).

Choosing priorities

Priorities are set in the National Adaptation Strategy. (Danish Government 2008)

Financial tools

The Danish adaptation portal provides in one place information on different funding sources. Many of the funding schemes are more general like environmental technology or green investment, but also include adaptation projects. Some examples of specific adaptation schemes:

a) There is a public subsidy available for municipalities to finance integrated water management in flood-prone areas. The budget for this scheme for 2020 is DKK 12.1 million.

b) Realdania is a philanthropic association that supports, among others, projects that contribute to the Danish cities becoming climate-resilient at the same time contributing to a general development of the cities and society. (Klimatilpasning.dk 2020)

In the 2018 state budget, money was specifically set aside to support municipalities and property owners to develop coastal protection in connection with climate adaptation between 2018–2021. (European Commission 2018)

Best practices

Climate change adaptation plans are compulsory for municipalities (Climate-ADAPT Data Base 2020, Danish Government 2012). Adaptation is included in the municipal spatial plans (Wejs 2020).

A mobile team provided adaptation expert services to municipalities, including training, workshops and customised advice. (Climate-ADAPT Data Base 2020)

PLASK is a tool that calculates the socioeconomic benefits of adaptation in case of flooding. It can be used to compare different flooding prevention structures and solutions in different land use situations. (European Commission 2018)

The Danish adaptation portal provides in one place information on different funding sources for adaptation. (Klimatilpasning.dk 2020)

Interactive guides (BusinessWizard, AgriWizard and the Resilient House) help to understand how businesses, farmers and individual house owners can adapt to problems related to extreme weather events (Cascade 2019)

4.4. Faroe Islands

Strategies, plans and legislation

National strategies

There is no adaptation strategy or plan that would cover the whole of the Faroe Islands. The Faroese government's official climate policy was in place for the period 2010–2020. However, adaptation planning was not part of the policy. A proposal for a new policy for the period 2020–2030 was drafted in 2019, but due to change of government it was never adopted. The proposal contained 20 recommendations, of which one mentioned the question of adaptation planning. (Dalsgarð 2021)

In March 2021, the current government issued a new proposal for climate policy. However, adaptation planning is not mentioned in the proposal. (Dalsgarð 2021)

Sectoral strategies

There are no sectoral strategies in place.

Regional strategies

There are no regional strategies in place.

Local strategies

Tórshavn Municipality was an associate partner in the CLIMATE project that aimed at e.g. tackling climate change and developing adaptation plans for local authorities. As a part of the project, a working group was established with an objective to draft a climate policy initiative. Additionally, a first-pass risk assessment was conducted and climate-related risks identified. However, more resources would have been needed to continue the adaptation planning further. (University of the Faroe Islands 2020)

The Faroe Islands have a bottom-up approach meaning that instead of following national guidelines and policies, adaptation work is mainly driven by initiatives on the local and regional level. However, most initiatives have focused on mitigation efforts. (University of the Faroe Islands 2020)

Legal framework

There are no laws in place that specifically cover topics related to adaptation. Parliamentary Act No. 61 from 15 May 2012 about preparedness (Løgtingslóg nr. 61 frá 15. mai 2021 um tilbúgving) regulates preparedness measures in the Faroe Islands but adaptation planning is not directly covered by the act. (Dalsgarð 2021)

Process and decision making

Decision making

Ministry in charge: Ministry of Environment, Industry and Trade.

Administration of environmental issues is divided between the Environmental Agency and the municipalities. For example, greenhouse gas inventories are included in the Environmental Agency's responsibilities.

The Faroe Islands' internal affairs are governed by the Faroese parliament and this self-governing nation has home rule status. Thus, the Faroe Islands have exclusive competence to legislate and govern independently in various areas including, for example, protection of the environment, research and energy. (The Government of the Faroe Islands 2021)

Cooperation, coordination and stakeholder engagement

International co-operation

Faroe Islands is a member of the Arctic Council as part of the Kingdom of Denmark. In 2017–2020, the University of the Faroe Islands participated in the CLIMATE project as a project partner and Tórshavn Municipality as an associate partner. The project aimed at promoting and improving awareness in European peripheral rural communities. The project resulted in the International Best Practice Climate Adaptation Model for the development of an adaptation plan for local authorities. (Danish Ministry of Energy, Utilities and Climate 2017)

Biggest challenges

Adaptation challenges

Marine ecosystems and fishing potential is changing but severity of these changes is difficult to predict. Similarly, warming has impacts on terrestrial vegetation, for example, some alpine species are likely to disappear and invasive species are likely to find new favorable conditions. (Danish Ministry of Energy, Utilities and Climate 2017)

Adaptation policy challenges

Adaptation work in the Faroe Islands is just beginning. There are no adaptation strategies or plans.

Financial tools

There are several tools and laws supporting climate mitigation efforts but there are no financial tools to support adaptation efforts (Dalsgarð 2021).

4.5. Greenland

Strategies, plans and legislation

National strategies

There is no territorial adaptation strategy or action plan in Greenland. (AMAP 2018b)

Sectoral strategies

There are no sectoral adaptation strategies, but a series of assessments have been conducted on how the public sector can promote adaptation in fisheries and hunting industry, shipping and agriculture. For example, in addition to commercial activities, the assessment on fisheries and hunting stresses the nutritional and cultural significance of subsistence fishing and hunting for Inuit communities as well as suggests co-management of fish and game resources. (Danish Ministry of Energy, Utilities and Climate 2017, Government of Greenland 2012)

In 2015 the Self-Government requested sector ministries to include climate change in their annual planning documents. For example, the 2016–2022 finance plan for infrastructure mentioned the importance of infrastructure in adapting to the climate change. (AMAP 2018b)

Process and decision making

Decision making

Greenland is part of the Kingdom of Denmark, but it has sovereignty and administration over several issues, including environmental and climate issues. Greenland is not a member of the European Union. (Danish Ministry of Energy, utilities and Climate 2017, Government of Greenland 2021a) In Greenland, the Ministry for Agriculture, Self-Sufficiency, Energy and Environment coordinates climate adaptation and mitigation. (Government of Greenland 2021a)

Cooperation, coordination and stakeholder engagement

International co-operation

Greenland is a member of the Arctic Council as part of the Kingdom of Denmark (see section 3.2).

Biggest challenges

Adaptation challenges

Climate change is projected to cause thawing of permafrost and melting of ice sheets in Greenland. Runoff due to melting is expected to double or triple in amount. Winter ice thickness and ice cover in fall and spring will decrease. (AMAP 2018a)

Greenland people are vulnerable to climate-related risks due to poverty, health problems and low access to quality housing. Traditional and local knowledge, such as the ability to forecast weather conditions and predict animal migrations, is important, and will be affected by climate change. (AMAP 2018a)

Adaptation policy challenges

The adaptation policy work is just beginning. There is no adaptation strategy or plan.

Best practices

The University of Greenland and the Greenland Climate Research Centre have established a joint Climate and Society program, with research and teaching focused on the intersection of social science, climate science, and public policy. This information is used in adaptation planning. (AMAP 2018b)

4.6. Norway

Strategies, plans and legislation

National strategies

National adaptation strategy: Climate change adaptation in Norway (Norwegian Ministry of Climate and Environment 2013).

White paper forms the basis of policy making on adaptation in Norway (Orderud 2020) and outlines the actions to be taken at different governmental levels and sectors (Norwegian Ministry of Climate and Environment 2018).

Sectoral strategies

All ministries and sectoral agencies are responsible for addressing adaptation within their sector (Climate-ADAPT Data Base 2020), but there are differences in how well sectors have actually addressed these issues (Orderud 2020). Several directorates have either developed sectoral adaptation strategies or climate strategies addressing adaptation, and these include e.g.:

- Norwegian Environment Agency
- Directorate of Fisheries
- The Norwegian Water Resources and Energy Directorate (NVE)

Also, following are examples of the sectoral policy documents addressing adaptation (Norwegian Ministry of Climate and Environment 2018):

- The White paper Nature for life – Norway's national biodiversity plan
- The White paper Risk in a Safe and Secure Society – on public security (summary in English)
- The White paper National transport plan 2018–2029 (summary in English)

Regional strategies

The county authorities should assess in their regional plans, how the county can facilitate adaptation in all areas of society, in line with the purpose of the Planning and Building Act. The county governor follows up the Government's policy on regional and local level, supports municipalities, coordinates and cooperates the civil protection efforts at the regional level. (Climate-ADAPT Data Base 2020)

Local strategies

Local authorities are responsible for adaptation within their own field and have the overall responsibility for community development (Cascade 2019).

Legal framework

Climate Change Act (Lov om klimamål, 2017)

Climate Change Act is mostly focused on mitigation, but the government should update it on how Norway adapts to climate change (Cascade 2019). For example, annual reporting requirements related to adaptation are included in the Climate Change Act (Climate-ADAPT Data Base 2020).

Adaptation is also included in the Planning and Building act (Orderud 2020) and the Central Governance Planning guidelines describe how adaptation should be included in the planning processes (Hagen Kjørholt 2021). Additionally, there are several laws that are also relevant to adaptation work (Norwegian Ministry of Climate and Environment 2018).

Process and decision making

Planning, reporting and reviewing

The Norwegian Climate and Environment Ministry monitors and evaluates adaptation progress but a national system for monitoring, reporting and evaluation has not yet been developed or implemented. Sector agencies may have their own systems for monitoring and evaluating progress. (Climate-ADAPT Data Base 2020)

Decision making

The Norwegian Environment Agency has a coordinating role. The Agency supports the Ministry of Climate and Environment, assists e.g. in the follow-up of the adaptation strategy and ensures that the work is being implemented (Cascade 2019). The Agency's tasks include also to give guidelines to the county governors, increase knowledge base and facilitate cooperation between different sectors, actors and public administration levels (Norwegian Ministry of Climate and Environment 2018).

Several agencies, authorities and ministries have adaptation responsibilities within their own

field, for example (Norwegian Ministry of the Environment 2015):

- The Directorate for Civil Protection and Emergency Planning
- Assesses the risks associated with different types of natural hazards
- Draws up guidelines for making risk assessments in connection with land-use planning
- The Norwegian Water Resources and Energy Directorate
- Maps the risk of landslides, avalanches and flood-prone areas. Directorate is also responsible for dam safety and calculates flooding levels.
- The Directorate for Nature Management
- Monitors and assesses the impacts of climate change on the natural environment
- The Norwegian Mapping Authority
- Provides projections of future sea level
- The Climate and Pollution Agency
- Evaluates current knowledge about climate change, facilitates municipal planning for climate change and administers the legislation relating to water supplies and sewage
- The Norwegian Building Authority and the Norwegian Public Roads Administration
- Assesses the implications of climate change for infrastructure
- The Ministry of Petroleum and Energy:
- Has overall administrative responsibility for managing flood, landslide and avalanche risk

Regional and local authorities are responsible for adaptation within their own field. In the regional plans, the county authorities should assess how the county can facilitate adaptation. County governors are also responsible for supporting and guiding municipalities in their adaptation efforts and coordinating prevention and preparedness on the regional level. On the local level, municipalities have the overall responsibility for community development within their geographical catchment areas. (Cascade 2019)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

The Norwegian Centre for Climate Services (NCCS), established in 2013, provides a basis for adaptation to be implemented in the municipalities and by sectoral authorities (Climate-ADAPT Data Base 2020). NCCS has, for example, issued synthesis reports that are meant as a basis for adaptation in Norway (Norwegian Ministry of Climate and Environment 2018).

Informal working group on adaptation is coordinated by the Environment Agency on behalf of the Ministry of Climate and Environment and consists of 14 national level agencies (Climate Change Act 2017). In 2007, an inter-ministerial working group led by the Ministry of Climate and Environment was appointed to promote coordination in the national adaptation work (Norwegian Ministry of Climate and Environment 2018).

International co-operation

In 2021, Norway released a new strategy on climate change, hunger and vulnerability that shifts development cooperation's emphasis towards adaptation (Government of Norway 2021a). Norway increases its funding for adaptation and food security efforts from 3.2 billion NOK to 4 billion NOK (~400 million €) (Government of Norway 2021b). In 2020, Norway doubled its annual contribution to the Green Climate Fund (GCF) from 400 million NOK to 800 million NOK (~80 million €) (Government of Norway 2020).

Norway's Climate and Forest initiative (NICFI) has pledged up to 3 billion NOK (~300 million €) a year to help to save the tropical forests. The Norwegian Ministry of Climate and the Environment administrates NICFI in cooperation with the Norwegian Agency for Development Cooperation (Norad). (NICFI 2021)

Additionally, Norway has played a key role in the establishment of the Global Framework for Climate Services under the World Meteorological Organization. (Norwegian Ministry of the Environment 2015)

Following examples are also part of the international cooperation (Hagen Kjørholt 2021):

- Interest group on adaptation under the EPA network (Environment Protection Agencies)
- Eionet Forum
- Cooperation through the EEA grants
- Adaptation activities under Council of the Baltic Sea States CBSS (meeting in Riga 2018)
- Sectoral international cooperation related to adaptation, for example, in the field of water management
- Barents Euro-Arctic Cooperation

Tools to engage stakeholders

Klimatilpasning.no is a website targeting mainly municipalities and containing tools, case studies and information on adaptation (Klimatilpasning.no 2020). Website is used for delivering relevant information to regional and municipal authorities and contains practical guidelines for starting adaptation work (Cascade 2019). The Norwegian Environment Agency develops and maintains the website on behalf of the members of the informal working group on adaptation (Hagen Kjørholt 2021).

There are also several forums, centres and networks to engage stakeholders and share and produce information, e.g.:

- 13 Norwegian cities collaborate through the front runner network that was established in 2015 and is coordinated by the Norwegian Environment Agency. The network is a follower for the Cities of the future programme (Framtidens byer, 2008–2014) that aimed at developing adaptation plans for municipalities (Klimattilpasning.no 2020)
- The Natural Hazards Forum is focused on cross-sectoral cooperation related to natural hazards aiming at improving cooperation between national, regional and local actors (Klimattilpasning.no 2020)
- The Norwegian Centre for Climate Services (NCCS) was established in 2013 to provide a basis for adaptation implementation in municipalities and by sectoral actors (Climate-ADAPT Data Base 2020)
- NORADAPT (Norwegian Research Centre on Sustainable Climate Change Adaptation) provides information to Norwegian society how to adapt to the impacts of climate change (Climate-ADAPT Data Base 2020)

In 2016, an information campaign Sjekk huset offered information to private house and cottage owners and recommended measures to prevent damages due to climate change. Campaign included also measures suitable for gardens. (Norwegian Ministry of Climate and Environment 2018)

Biggest challenges

Adaptation challenges

The main challenges are expected to be water-related including for example flooding, landslides, avalanches, stormwater, sea level rise and droughts (Norwegian Ministry of the Environment 2015) as climate projections indicate a trend towards increased precipitation (Climate-ADAPT Data Base 2020). Climate change has also major impacts e.g. on ecosystems, health and agriculture and forestry (Norwegian Ministry of Climate and Environment 2018).

Adaptation policy challenges

National level:

- Cooperation between different sectors
- Not enough funding is targeted to adaptation and more funds are allocated to mitigation.

Regional level:

- Cooperation between different sectors
- Regional level has a responsibility in monitoring and advising and guiding municipalities. Advisory requires competence and expertise.

Local level:

- Challenges in funding
- Especially in smaller municipalities, there is lack of competence, resources and knowledge. Larger municipalities or cities might have enough resources but there are challenges in coordination between different departments. (Orderud 2020)

Key policy priorities

Key priorities

One of the National adaptation strategy's key principles is that everyone is responsible for adaptation (individuals, business, authorities etc.). Adaptation work should be based on the best available knowledge and climate projections should be incorporated into planning processes with a long-time horizon. As climate change will result in a higher risk of damage, balance must be found between safety requirements and development of those parts where topography or ground conditions are already challenging. Adaptation must also be designed to support the capacity of species and ecosystems. (Norwegian Ministry of the Environment 2015) In Norway, strong emphasis is put on the local level and the implementation is to a large extent going to be made in municipalities (Orderud 2020).

Choosing priorities

Priorities are set in the National Adaptation Strategy.

Financial tools

There are several grant schemes supporting adaptation actions. For example, Norwegian Environment Agency administers a grant scheme that supports local and regional actors and projects that strengthen the knowledge base. The Norwegian Water Resources and Energy Directorate supports planning and construction of infrastructure that prevents landslides and flooding and measures that improve water quality in rivers. The Agricultural Directorate administers tow grant schemes which are the grant scheme for environmental measures and the grant scheme for drainage of agricultural land. (Climate-ADAPT Data Base 2020)

Best practices

Networks and regional cooperation are effective tools for strengthening the adaptive capacity and enabling municipalities and other actors to exchange experiences. For example, Cities of the Future programme (Framtidens byer, 2008–2014) was an important driving force for the adaptation work and helped to advance the adaptation planning processes in several municipalities (Climate-ADAPT Data Base 2020).

The Cities of the future is followed by the Front runner network (2015–) that focuses on sharing knowledge and competence between the 11 participating cities (Climate-ADAPT Data Base 2020). Knowledge is also shared through courses on adaptation that are offered to municipalities and counties (Norwegian Ministry of the Environment 2015).

The Western Norway University of Applied Sciences offers a master's programme about climate change management concentrating on adaptation related to land use planning (Climate-ADAPT Data Base 2020).

The County Governor of Vestfold has developed an introductory course on adaptation for municipalities that has been also implemented in several other counties (Norwegian Ministry of Climate and Environment 2018).

In 2021, Norway published a new strategy on climate change, hunger and vulnerability (Klima, sult og sårbarhet – Strategi for klimatilpasning, forebygging av klimarelaterte katastrofer og sultbekjempelse). The new strategy marks an increased focus on adaptation in Norwegian development cooperation.

4.7. Iceland

Strategies, plans and legislation

National strategies

There's no national strategy on adaptation, but a country-wide adaptation plan is under way. Iceland's Climate Change Strategy's (2007) one principal objective is that the government will prepare for adaptation. The Government of Iceland released the second version of the Climate Action Plan in 2020, but it does not mention adaptation.

Sectoral strategies

Landsvirkjun, the national power company of Iceland, has included adaptation into its strategies and investment planning (Sveinsson 2016). This is an exception as other sectors have not developed adaptation strategies or plans.

Local strategies

Reykjavik's climate policy, approved in 2016, includes some adaptation measures (Björnsson et al. 2018).

Legal framework

Act no. 70 on Climate Change covers both mitigation and adaptation. Adaptation action plan is discussed in the Article 5.

Process and decision making

Decision making

The Ministry for the Environment and Natural Resources coordinates the national policymaking in climate issues in close cooperation with a few other ministries. The Icelandic Meteorological Office (IMO) and the Marine Research Institute (MRI) are the most important institutions for the observation of climate change.

Cooperation, coordination and stakeholder engagement

International co-operation

In 2016, approximately 40 % of Iceland's relevant ODA (Official Development Assistance) had mitigation or adaptation as a significant or primary objective. Iceland has supported adaptation projects e.g. in Malawi and Uganda (Ministry for the Environment and Natural Resources of Iceland 2018).

Tools to engage stakeholders

Icelandic Climate Council is an independent body that, for example, provides advice on policy objectives related to climate change. Members are representatives of businesses, academia, municipalities and NGOs.

Office of Climate Services and Adaptation (Skrifstofu loftslagsþjónustu og aðlögunar) was established at the Icelandic Meteorological Office in May 2021 (Icelandic Meteorological Office 2021).

Biggest challenges

Adaptation challenges

Adaptation challenges are related e.g. to sea level rise, water management, melting and retreat of glaziers, floods, changes in glacial river runoff, fluvial erosion, precipitation, infrastructure (e.g. roads), ecosystems, ocean acidification, marine environment, agriculture and natural hazards (Björnsson et al. 2018).

Adaptation policy challenges

In Iceland, by far the main focus has been on mitigation policies and measures. Thus, strategies or plans on adaptation haven't been prepared and a comprehensive framework for dealing with adaptation is needed.

More research on adaptation is needed (Björnsson et al. 2018), for example, to quantify the magnitude of climate impacts. Similarly, enhanced monitoring and modeling is needed (Björnsson et al. 2011).

4.8. Germany

Strategies, plans and legislation

National strategies

German Strategy for Adaptation to Climate Change 2008 (Deutsche Anpassungsstrategie DAS) (Federal Government of Germany 2008)

Adaptation Action Plan III (APAIII 2020) as a part of the second progress report of the German Strategy for Adaptation to Climate Change (Federal Government of Germany 2020)

The German Adaptation Strategy focuses on structuring the process and providing the framework for adaptation work. The Adaptation Action Plan contains actions to be taken by the Federal Government, but it is not a detailed implementation plan of all activities. (The Federal Government of Germany 2008, GIZ 2013)

Sectoral strategies

National adaptation strategy is looking at different sectors and includes also cross-sectoral topics, but separate sectoral adaptation strategies or plans do not exist. All ministries were involved in the process of creating the national strategy. (Hoffmann 2020)

An adaptation program of measures is in preparation for the agriculture, forestry, fisheries and aquaculture. The agricultural minister's conference, which coordinates the sectoral work between federal states and the federal government, approved the agenda for this sectoral adaptation program in 2019. (The Federal Ministry for Food and Agriculture 2019)

Regional strategies

All 16 Bundesländer (federal states) have developed adaptation strategies and have developed measures, some as a part of an integrated climate change strategy or programme. (Cascade 2019)

Examples:

- Bayerische Klima-Anpassungsstrategie (BayKLAS) 2016. (2017)
- Anpassungsstrategie an die Folgen des Klimawandels für das Land und die Städte Bremen und Bremerhaven. 2018
- Strategie zur Anpassung an den Klimawandel in Baden-Württemberg. 2015.
- Kilmaschutzplan Nordrhein-Westfahlen. 2015.
- Thüringer Klima- und Anpassungsprogramm. 2013. (KLiVO 2020)
- Brandenburg: Massmahmenkatalog zum Klimaschutz und zur Anpassung an die Folgen des Klimawandels. 2008. (Federal Government of Germany 2011)

Local strategies

Adaptation planning at a local level is seen as voluntary, and it has depended on local initiative and resources. Some cities have been active, empowered by projects like Stadtklima. (Cascade 2019) Most of large municipalities or cities have created adaptation strategies or plans (Hagelstange et al 2021).

Legal framework

There is no Federal Act that defines the process of adaptation, but the process is described in the Adaptation Strategy (DAS) and the Adaptation Plans (APA). However, nine Federal States have established a legal framework for adaptation either in the form of climate acts or an established element in sectoral legislation. (Federal Government of Germany 2020)

Process and decision making

Planning, reporting and reviewing

The first adaptation strategy progress report was adopted by the German government in December 2015. The report led to a regular reporting cycle: monitoring report is published every 4 years (2019), vulnerability analysis every 5–7 years (2021), evaluation report every four years (2019), and progress reports and action plans every 5 years (2020). (Cascade 2019, Federal Government of Germany 2020)

In the second Adaptation Action Plan (APA II), the approach was changed from short-term project-like action towards longer-term established measures. (Federal Government of Germany 2020) There is a broad set of indicators in place for monitoring the adaptation strategy. They are both climate change impact and adaptation indicators (both process/implementation indicators and outcome indicators). (German Environment Agency 2019, GIZ 2013)

Decision making

The Federal Government sets the framework for adaptation and acts as an enabling and coordinating body. The Federal States (Länder) have the freedom of designing their own processes and priorities. Some states have an adaptation strategy, some have a plan or something else. The municipalities or counties may also draft their own strategies or design actions. Other than governmental actors have the responsibility for their own actions.

The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, BMU) is leading the adaptation policy process at federal level and is in charge of the adaptation strategy. The Competence Centre on Climate Impacts and Adaptation (KomPass) at the Federal Environment Agency supports the preparation of the national strategy with technical and environmental advice. (Federal Government of Germany 2008, GIZ 2013, Federal Government of Germany 2020)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

On the national level, federal ministries form the "Interministerial Working Group on Adaptation to Climate Change" (IMAA) led by BMU. To coordinate with the federal states, the Conference of Environmental Ministers established in June 2009 a standing committee for the adaptation to climate change impacts. (The Climate Adapt Data Base 2020; Federal Government of Germany 2020) The committee meets twice a year providing input from the state level into the national process, to exchange experiences across various states and to coordinate joint activities. (European Commission 2018)

The Vulnerability Network supports the identification of the climate vulnerability of relevant sectors. Network partners include the Federal Office of Civil Protection and Disaster Assistance, the Federal Institute for Geosciences and Natural Resources, the German Meteorological Service, several national research institutes and the KfW bank. (European Commission 2018)

There are various co-operation platforms for municipalities, for sectoral actors and across states. The portal klivoportal.de launched by the Federal Government contains information on different tools and services. (KLiVO 2020)

International co-operation

Climate change mitigation and adaptation is systematically integrated in all relevant bilateral development cooperation programmes. Special priority is given to adaptation in agriculture, water and health sectors. Funding is provided for GEF, Nairobi programme and Strategic Climate Fund of the World Bank, for example. (Federal Government of Germany 2008)

Germany collaborates with Denmark and the Netherlands on adaptation of the Wadden Sea through the Trilateral Cooperation on the Protection of the Wadden Sea. They developed a common Climate Change Adaptation Strategy (CCAS) in 2014. (European Commission 2018)

Germany participates actively in various international river basin committees. The International Commission for the Protection of the Danube River published an adaptation strategy in 2013, and the International Commission for the Protection of the Rhine in 2014. Germany has been a leader in BaltAdapt project, which produced an adaptation strategy for the Baltic Sea Region, and the follow-up by the Council of the Baltic Sea States. (European Commission 2018)

Tools to engage stakeholders

There is a systematic stakeholder involvement process within the adaptation governance framework. The German Environment Agency conducts stakeholder dialogues on different topics and the aim is to sensitize and motivate stakeholders, to support networking on adaptation and to integrate

the results to the work of inter-ministerial working group or into process of developing the adaptation strategy (Hoffmann 2020).

A broad range of events have been organized for different target groups. These include, for example, four National Stakeholder Workshops in 2005–2007 and 2010, a workshop for municipalities to discuss operational issues of adaptation as well as a series of thematic stakeholder dialogues in 2009–2014 (11 sectors/issues) (Rotter et al. 2013). The dialogue series has continued with additional national and thematic dialogues (German Environment Agency 2021).

For example, before the publication of the progress report, stakeholders (e.g. federal states, approx. 200 organizations) were invited to comment on the draft version. Afterwards, there was also a workshop with approximately 50 participants where the written statements were discussed. (Hoffmann 2020) KLiVO – Climate Preparedness-Portal provides information on climate services.

Biggest challenges

Adaptation challenges

The biggest adaptation challenges include increased need of coastal protection due to the rising sea level and increased flood risk in the coastal areas, drought, and responding to the extreme weather events like extreme heat and heavy rains. In addition, climate impacts in other countries will have an effect on German economy. (Federal Government of Germany 2020)

Adaptation policy challenges

Coordination between different sectors is a challenge as e.g. different ministries do not share the same priorities for adaptation or lack resources and staff to implement sectoral approaches. Adaptation is a cross-sectoral issue making its coordination difficult. (Hoffmann 2020)

In cities, resources, governance and institutional constraints have been identified as the most important barriers to adaptation work. (Cascade 2019) Only the larger cities have enough resources to have an employee responsible for adaptation issues. Adaptation as cross-sectoral issue poses challenges for adaptation at the local level because there is a need for coordination between different local authorities (e.g. health, construction, planning). (Hoffmann 2020)

Key policy priorities

Key priorities

In the III National Adaptation Plan, the priority is given to activities within the clusters water, infrastructures, land, health, economy as well as spatial planning and civil protection. In addition, work on cross-sectoral topics, like awareness building and enforcing the knowledge base as well as building networks continues to be a key priority. (Federal Government of Germany 2020)

Choosing priorities

Priorities are set in the III National Adaptation Plan. New strategic level priorities will be set in the continuing strategy work. The next step is developing a vision for a climate-resilient Germany in 2060 with a time horizon until 2100. This will be carried out by IMAA in cooperation with Federal States. (Federal Government of Germany 2020)

Financial tools

There has been funding for research projects on adaptation in various programmes. One research programme has been practical in nature supporting model projects in regions. The Ministry for Education and Research funds several projects on adaptation, for example within the programmes Zukuftstadt (Future City) and Regiklim (Regional Information for Adaptation). (Rotter et al. 2013, Hoffmann 2020)

The Federal Government provides funding for climate protection by local authorities under the National Climate initiative. (European Commission 2018) The Federal Environment Ministry provides funding for adaptation in companies, in municipalities and for education projects.

Best practices

Climate change adaptation portal provides information on diverse climate services in one place. (KLiVO 2020)

There is a 9 months long advisory and support process ("adaptation coach") for municipalities and counties in the state of Rheinland-Pfaltz. (KLiVO 2020)

A good practice data base Die KomPass-Tatenbank of adaptation actions provides information on the diversity of actions that are already happening in order to build a resilient Germany. (KLiVO 2020)

KLIWA portal enables cooperation on the effect of the climate change on water cycle. Actors: Landesanstalt für Umwelt Baden-Württemberg, Bayerisches Landesamt für Umwelt, Landesamt für Umwelt Rheinland Pfalz, Deutscher Wetterdienst. (KLiVO 2020)

There was an extensive stakeholder dialogue process during the preparation on the adaptation plan in the form of series of Thematic Stakeholder Dialogues and National Stakeholder Workshops. (Rotter et al. 2013)

A broad set of indicators are used to monitor the adaptation strategy. The indicator system is being improved within the regular evaluation process of the adaptation plan. (GIZ 2013, Federal Government of Germany 2020)

There is a systematic monitoring, evaluation and updating process of adaptation plan in place. (Federal Government of Germany 2020)

There is an annual competition organized by the Federal Environmental Ministry and the German Institute for Urban Studies (Difu) to award successful communal adaptation projects. (Federal Government of Germany 2020)

The Federal Environment Agency regularly awards particularly innovative measures for adaptation by companies, research institutions and associations with the "Blue Compass" (Blauer Kompass) competition. The aim is to identify outstanding measures, make them visible nationwide and thus demonstrate what adaptation looks like in practice. In the context of DAS, it is an important communication tool for improving personal precautions against climate risks. (Federal Government of Germany 2020)

4.9. Poland

Strategies, plans and legislation

National strategies

The Polish National Strategy for Adaptation to Climate Change by 2020 with the perspective by 2030. (Ministry of the Environment 2013) The strategy was published as an end result of the KLIMADA project which was launched by the Ministry of the Environment (Cascade 2019).

Development strategy in the area of the Environment and Water Management prioritizes adaptation as an important topic in the environmental policy. The strategy was adopted in 2019. (Climate-ADAPT Data Base 2020)

At the moment, Poland does not have a national adaptation action plan. According to Czarnocki (2020) there are now some plans to develop an action plan and if the final decision is made the plan could be published after one or two years.

Sectoral strategies

Separate sectoral adaptation plans do not exist (Czarnocki 2020).

Regional strategies

Regional authorities are free to develop their adaptation policies and the Ministry of Climate and Environment has published guidance concerning the preparation of urban adaptation plans (European Commission 2018). However, specific regional adaptation strategies do not exist but in some cases, adaptation is included e.g. in development plans of voivodeships and regional environment protection plans (Czarnocki 2020). Voivodeships are the highest-level administrative divisions that are corresponding to provinces or states in many other countries. Poland has 16 voivodeships.

Local strategies

In 2017–2019, the Let's feel the Climate project aimed at developing adaptation plans for 44 major cities in Poland. Furthermore, around 15 municipalities that weren't part of the project have also developed local adaption plans (Czarnocki 2020).

Legal framework

A dedicated law on adaptation does not exist, but the regulation is distributed into several acts (e.g. laws concerning water, environment, building, spatial planning and EIA) (Czarnocki 2020).

Process and decision making

Planning, reporting and reviewing

Data collection for the review of the national strategy started in 2017. “National Environmental Policy 2030” document, prepared by the Ministry of Environment, will include further adaptation measures. (European Commission 2018)

Decision making

The Ministry of Climate and Environment is the responsible authority and coordinates adaptation actions as well as prepares adaptation strategies, reports to the EC and UNFCCC, supports climate initiatives and builds capacity among regional and local actors. Competent ministries are responsible for taking account of actions indicated in the national adaptation strategy. In the regional level, voivodeship self-governments should indicate the adaptation action lines in the voivodeship development strategies. A large part of the adaptation actions will be implemented at the local level. (European Commission 2018)

Institute of Meteorology and Water Management (IMGW-PIB), the Institute of Environmental Protection (IOŚ-PIB) and the Institute for Ecology of Industrial Areas (IETU) are providing supportive services and IMGW-PIB gathers climate data (Climate-ADAPT Data Base 2020).

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

Working Group on Adaptation to Climate Change supports multi-level and cross-sectoral cooperation. The group aims e.g. at supporting implementation of the national adaptation strategy, mainstreaming adaptation work at regional level, facilitating knowledge sharing between the levels of governance and supporting monitoring and reporting at regional and local level. (European Commission 2018) In addition, there are also joint projects between ministries and public organizations, various forums, guidelines, conferences, training and networks (Czarnocki 2020).

International co-operation

Cross-border cooperation on climate change is not apparent, but transnational cooperation does exist in the areas where flood protection is needed. Even though the national adaptation strategy mentions that adaptation actions should also take cross-border aspects into account, there are relatively few signs on that. (European Commission 2018)

Poland is involved in the Council of the Baltic Sea States Round Table on climate adaptation in the Baltic Sea Region (Climate-ADAPT Data Base 2020) and HELCOM. However, Poland is not a partner in the Baltadapt project (European Commission 2018).

Tools to engage stakeholders

According to the European Commission (2018), stakeholder involvement in the development of the national adaptation strategy was not significant nor systemic. There are some cases of structured stakeholder engagement, e.g. public consultation of the Warsaw’s adaptation strategy, but the involvement of stakeholders in adaptation policy processes is rather limited. Working group on climate change adaptation can be considered as a tool to engage stakeholders, but it is also limited. (European Commission 2018)

There are some websites providing information for stakeholders about climate change and adaptation. For example, the KLIMADA website provides some data on adaptation, but the information is quite general.

One promising tool to engage stakeholders and increase awareness, has been the CLIMCITIES project (Climate change in adaptation in small and medium size cities). The project has provided training at the local level for authorities and e.g. leaders from NGOs and universities. (IOŚ-PIB 2020) Additionally, in 2016 to 2019, Let’s feel the climate project aimed at developing city adaptation plans for 44 cities with population over 100,000 and to raise

awareness and plan adaptation actions at the local level (Climate-ADAPT Data Base 2020).

Additionally, there are conferences, training, working groups, forums, guidelines and courses to engage stakeholders (Czarnocki 2020).

Biggest challenges

Adaptation challenges

The most vulnerable sectors and areas as defined in the Polish National Strategy for Adaptation to Climate Change (2013):

- Water management
- Agriculture
- Forestry
- Biodiversity and protected areas
- Health
- Energy
- Building
- Industry
- Transport
- Mountain areas
- Coastal zone
- Spatial development
- Urban areas
- Extreme weather events: torrential rains, flooding, landslides, heat waves, droughts, hurricanes and landslides

According to Czarnocki (2020), main challenges at the local level and in the cities include also issues related to extreme weather events in urban areas, high temperatures, cloudbursts, flash floods, lack of green infrastructure, rainwater runoff, flooding and urban heat islands.

Adaptation policy challenges

According to the National adaptation strategy (2013), a broad challenge of the development policy in Poland is to ensure the economic growth with the preservation and efficient use of environmental resources and adaptation to climate change. According to Czarnocki (2020), more specific challenges are e.g related to funding and financing, lack of awareness and low technological advancement in adaptation.

Key policy priorities

Key priorities

According to the national adaptation strategy (2013), “the major objective of the national adaptation strategy is to ensure sustainable development and efficient functioning of the economy and society in the conditions of climate change.”

Urban areas, agriculture, water and coastal areas are considered as priority areas for implementing adaptation (Climate-ADAPT Data Base 2020). At the moment, for example, urban areas, agriculture and awareness raising, are prioritized (Czarnocki 2020).

Identified adaptation measures are divided into four groups which are legislative actions, organizational actions, information actions and research (Ministry of the Environment 2013). The National Adaptation Strategy’s objectives are:

1. Ensuring the energy security and good environmental status
2. Efficient adaptation to climate change in rural areas
3. Development of transport in the conditions of climate change
4. Ensuring the sustainable regional and local development with consideration to climate change
5. Stimulating innovations conducive to adaptation to climate change
6. Development of social behavior conducive to adaptation to climate change

Choosing priorities

Priorities are set in the National Adaptation Strategy and National Environmental Policy (2019).

Financial tools

European Structural and Investment Funds (ESIF) play an important role in funding adaptation actions in Poland. Additionally, European Fund for Regional Development, the Cohesion Fund and the European Social Fund are also some of the main sources of funding. (European Commission 2018) For example, EU has funded sustainable rainwater management with over 250 million €. Norwegian

financial mechanism has also funded projects related to adaptation. (Czarnocki 2020)

The National adaptation strategy (Ministry of the Environment 2013) provides an overview on sources of financing in 2014–2020. However, the overview of the funding opportunities is quite general (European commission 2018):

National level:
- NFOŚiGW (The National Fund for Environmental Protection and Water Management)
- Voivodeship funds for environmental protection and water management
- Green Investment Scheme
  - Income from sale of Assigned Amount Units (AAU), tradable emission permits under the Kyoto Protocol
- State budget

EU as part of NFP 2014–2020:
- national and regional operational programmes
- LIFE instrument
- Instruments for the sustainable development of cities

International:
- World Bank
- International Monetary Fund

Private – national and foreign:
- Business operators, including SMEs
- Associations

Others:
- Commercial banks
- Foundations
- Investment funds, including venture capital and private equity

Additionally, subsidies are granted to individuals and owners of a single-family house for the management of rainwater. The aim is to protect water resources and increase retention at the local level with focus especially on blue and green infrastructure (over 25 million € in 2020). (Czarnocki 2020)

Best practices

Let's Feel the Climate project, coordinated by the Ministry of Environment in 2017–2019. The aim of the project was e.g. to identify and analyze adaptation challenges in each city, raise awareness and plan adaptation actions at the local level. The project supported 44 Polish cities to develop adaptation plans and improve their climate resilience. (Climate-ADAPT Data Base 2020). According to Czarnocki (2020), 44 cities are now going to implement the plans.

Ministries have developed guidelines e.g. concerning on how to develop action plans and to investors on how to include adaptation and mitigation in project development (Czarnocki 2020).

4.10. Estonia

Strategies plans and legislation

National strategies

National adaptation strategy: Climate Change Adaptation Development Plan until 2030 (2017)

National adaptation plan: Climate Change Adaptation Action Plan 2017–2020 (2017)

Sectoral strategies

The national adaptation strategy outlines linkages to 32 other national and EU strategies and directives (Republic of Estonia 2017). Some adaptation measures have been included in sectoral plans and laws (e.g. Forestry Development Plan, Nature Conservation Development Plan, Water and Emergency Acts, Public Health Development Plan and the National Security Concept) (European Commission 2018). Ministry of Agriculture adopted in 2013 the Climate Change Mitigation and Adaptation Action Plan for Agriculture Sector 2012–2020 (Lahtvee 2015).

Regional strategies

There are no regional adaptation strategies in Estonia. This is because the regional governance level is not relevant in the Estonian system. (Arro & Jakobi 2020)

Local strategies

Tallinn has started the process of elaborating an adaptation strategy and action plan (Cascade 2019). Other municipalities with either finalised or upcoming adaptation strategies include Tartu, Jõgeva, Rakvere, Viimsi, Saaremaa and Muhumaa. Estonian towns engaged in the EU-wide Covenant of Mayors initiative Mayors Adapt are or will be covered with local adaptation and mitigation plans. Local adaptation strategies are mainly part of broader Sustainable Energy and Climate Action Plans. (Arro & Jakobi 2020)

The Ministry of the Environment is preparing a finance scheme for municipalities to support compiling their local energy and climate plans. This scheme is financed from the EEA and Norwegian Financial Mechanisms grants. (Arro & Jakobi 2020)

Legal framework

Estonia does not have a dedicated law on adaptation and there is no discussion to introduce one. The preferred approach is to integrate adaptation into broader climate policy, sectoral policies and local planning processes. (Arro & Jakobi 2020)

Process and decision making

Planning, reporting and reviewing

The preparation of the strategy was coordinated by the Estonian Environmental Research Centre and supervised by the Climate Department of the MoE. The development was promoted and followed up by the adaptation steering committee. The committee assisted and coordinated the development of the strategy and its action plan, led the adaptation process and discussed the needs and expectations of developing the strategy. The working group of the strategy with the chair of the MoE discusses the action plan once a year before presenting it to the Government for approval, monitors the action plan, gives recommendations for changing the strategy and solves open issues. (Climate-ADAPT Data Base 2020) The preparation was financially supported by the EEA Norway Financial Instrument (Lahtvee 2015).

The Ministry of the Environment reports annually to the government an overview about the execution of the strategy and the achievement of its objectives (European Commission 2018). The ministry has recently reviewed the implementation of the action plan for the period 2017–2020. This review will inform preparing the new action plan for the period 2021–2025. The review is not yet publicly available. (Arro & Jakobi 2020)

Decision making

Ministry of the Environment (MoE) is responsible for all adaptation-related activities in Estonia, including developing national policies, implementing measures, transposing EU legislation and integrating climate policy objectives and concerns into sectors that are not the MoE's responsibility. Within the

Ministry, the Climate and Radiation Department is responsible. (European Commission 2018)

Responsible authorities also include the Ministries of Rural Affairs, Social Affairs, Economic Affairs and Communications, Interior, Finance and Education and Research. The task of each ministry is to coordinate the activities which belong to their area of responsibility. Among other things, they ensure the necessary application for funding to the state budget planning process and mediate the information related to adaptation when preparing overviews and reports. The MoE coordinates the exchange of adaptation-related information between the ministries. (Climate-ADAPT Data Base 2020)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

The strategy recognizes that the most difficult task is to achieve cooperation between governmental institutions and ministries – without that, the coherent implementation of adaptation is not possible. (Republic of Estonia 2017) A Steering Committee was formed for the development and management of the Plan with representatives of all concerned government authorities, associations and organizations (27 members). The Committee was led by the Estonian Environmental Research Centre, and included representatives of government authorities, associations and organizations, including Ministries of the Environment, Rural Affairs, Social Affairs, Finance, Interior, Economic Affairs and Communications, Education and Science as well as the Government Office. (European Commission 2018) The Committee was recently reintroduced with several new members (Arro & Jakobi 2020).

International co-operation

Estonia has had bilateral co-operation with Norway, a donor. The strategy includes a target for adaptation in Estonian development co-operation. (Republic of Estonia 2017) Revenues from the EU emissions trading scheme are channeled to international climate co-operation to the tune of one million euros a year. (Arro & Jakobi 2020)

MoE participates in the Baltic Sea Region working group on climate adaptation. Furthermore, Estonia takes active part in the implementation of the EU Strategy for the Baltic Sea Region and is a member of the Baltic Sea Region Climate Dialogue Platform. (European Commission 2018)

Tools to engage stakeholders

There was a 3-week period for the public review of the draft strategy with a hearing at the end of the period. The draft strategy was published for public consultation through an online portal, and several information seminars were held. (European Commission 2018) The steering committee includes also local government, research and environmental NGOs. (Climate-ADAPT Data Base 2020)

Biggest challenges

Adaptation challenges

The strategy outlines eight priority areas:

1. the spread of new pathogens and increasing health disorders
2. increasing flooding risk and pressure for building relocation
3. changes in hydrological cycle and vegetation and the spread of alien species
4. unfrozen and waterlogged forest land in the winter and new plant pests
5. transient effects of global trends on the economy
6. immigration from global migration
7. additional requirements on infrastructure and building durability
8. changes in seasonal energy consumption

Most vulnerable to climate change in Estonia are densely populated coastal areas and areas around inland water bodies. (Republic of Estonia 2017)

Adaptation policy challenges

An early analysis (Peleikis 2011) suggested that key challenges for Estonia were

1. a relatively minor importance attached to adaptation so far and a missing strategic approach; and
2. a need for more analysis on Estonia's vulnerability and potential climate risks.

The interviewed experts identified the following challenges (Arro & Jakobi 2020):

1. lack of financing for adaptation
2. limited integration into spatial planning
3. difficulties in the co-ordination and exchange of information between ministries and agencies
4. low level of awareness and political priority

Key policy priorities

Key priorities

Principles:

1. awareness
2. readiness and resilience
3. caution

Sectors:

1. health and rescue capability
2. land use and planning
3. natural environment
4. bioeconomy
5. economy
6. society, awareness, and cooperation
7. infrastructure and buildings
8. energy and security of supply

(Republic of Estonia 2017)

Choosing priorities

The adaptation options and measures in the strategy are based on the analysis of existing scientific literature, (national) policies and legislation and information from different databases, as well as expert knowledge gathered in the expert groups for the baseline studies. The selection of priority adaptation options is based on multi-criteria analyses, stakeholder consultations, and the opinion of the inter-ministerial committee. (European Commission 2018) One of the extensive studies forming the foundation for the strategy looked at the climate impacts and adaptation measures (including their costs) in the natural environment and bioeconomy (BioClim 2015).

Financial tools

The cost estimation for the implementation of the strategy for 2017–30 is €43,745,000. The cost of the action plan for 2017–20 is €6,700,000, out of which the state budget expenditure covers €3,310,000 and the support from the environmental programme of the Environmental Investment Centre and foreign sources €3,390,000. Financing of the activities from the state budget is ensured within the cost limits of the implementing agencies. For a more detailed distribution of funding across priority areas, years, ministries and sources, see chapters 6.1–6.3 in Republic of Estonia (2017). In the EU budget period starting from 2021, just transition, recovery and structural funds are also very important to finance adaptation activities (Arro & Jakobi 2020).

Best practices

The strategy includes quantifiable metrics (e.g. mortality rate in summer months, number of residents in flood risk areas). (Republic of Estonia 2017) However, the interviewed experts did not consider them to be particularly useful. The metrics are adopted from sectoral strategies and as such they are not designed for measuring adaptation. (Arro & Jakobi 2020).

4.11. Latvia

Strategies, plans and legislation

National strategies

There is no national adaptation strategy. However, the Latvian National Plan for Adaptation to Climate Change until 2030 (2019) has strategic elements (Pommere-Bramane 2021).

Sectoral strategies

There are currently no sectoral adaptation strategies in Latvia. However, the government is planning to prepare some guidelines at sectoral level. The Adaptation Plan includes adaptation measures based on risk assessments in various sectors. Sectors themselves are also encouraged to use risk and vulnerability assessments. (Pommere-Bramane 2021)

Regional strategies

The first regional adaptation strategy in the Salacgriva region was developed and adopted in 2011. (European Commission 2018)

Local strategies

There are some local adaptation strategies, for example in Valka. However, adaptation is mostly included in broader municipal Sustainable Energy Action Plans. Ministry of Environmental Protection and Regional Development (MEPRD) encourages local governments to develop adaptation in local development plans. (Pommere-Bramane 2021)

Legal framework

There is currently no dedicated law on adaptation. However, MEPRD is working on a national climate law where adaptation will also be included. (Pommere-Bramane 2021)

Process and decision making

Planning, reporting and reviewing

A working group of experts on adaptation was established. MEPRD also established an inter-institutional working group on adaptation, which was given a mandate to make proposals for the development and implementation of the draft Plan and other policy planning documents related to adaptation. (Republic of Latvia 2019)

Ministry of Environmental Protection and Regional Development will submit to the Government a mid-term report on the implementation of the Plan by 31 December 2026 and a final report by 31 December 2031. (Republic of Latvia 2019) The Plan may be reviewed and updated at that point (Pommere-Bramane 2021).

Decision making

Adaptation measures are largely implemented within the existing statutory functions and responsibilities of institutions. MEPRD is the responsible authority for climate policy in Latvia (Republic of Latvia 2019), in particular the Climate Change and Adaptation Policy Division of the Climate Change Department. (European Commission 2018) The Ministry has established an expert group on adaptation and an inter-institutional working group on adaptation. The direction of climate policy is defined in Environmental Policy Guidelines for 2014–2020. (Climate-ADAPT Data Base 2020)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

MEPRD established an intragovernmental working group on adaptation to help in preparing the Plan. The group involved members from Ministries of Health, Finance, Agriculture, Transport, Economics and Welfare, the State Fire and Rescue Service (SFRS), the Cross-sectoral Coordination Centre, and the State Centre for Defence Military Sites and Procurement. (European Commission 2018) However, the group has stopped working after finalising the Plan (Pommere-Bramane 2021).

International co-operation

The Plan refers to relevant international treaties and organisations. (Republic of Latvia 2019) Latvia is a member of the Baltic Sea Region Climate Dialogue Platform. (European Commission 2018)

Tools to engage stakeholders

An adaptation working group was established by MEPRD, with members representing a wide range of public institutions and social partners. (European Commission 2018) Experts from agencies, scientific institutions, ministries, municipalities, business and NGOs participated in workshops and conferences regarding climate change scenarios, risk and vulnerability assessment, indicators and adaptation monitoring system, flood risk warning system and spatial and coastal zone planning. (Climate-ADAPT Data Base 2020) However, the group has stopped working after finalising the Plan (Pommere-Bramane 2021).

Biggest challenges

Adaptation challenges

Strategic areas:

1. health and welfare
2. civil protection and emergency planning
3. buildings and infrastructure, incl. critical infrastructure (energy, transport, water)
4. biodiversity and ecosystem services
5. agriculture, fishery and forestry
6. tourism and landscape planning

Biggest risks:

1. changing seasons and vegetation period
2. fires
3. spread of pests, pathogens and tree diseases, invasive species
4. prevalence of respiratory diseases
5. infectious diseases, heat strokes
6. floods caused by rains, wind surges
7. power failure
8. increased runoff, hydropower fluctuations
9. decrease in frost, drying out
10. eutrophication
11. infrastructure and equipment damage
12. decrease in water runoff in summer
13. (Republic of Latvia 2019)

Adaptation policy challenges

An early analysis (Peleikis 2011) suggested that key challenges for Latvia were

1. lack of knowledge on methods and approaches how to analyse adaptation options and choose possible adaptation measures;
2. structure of the strategy document (design and topics covered); and
3. lack of human and institutional capacity.

The interviewed national expert highlighted in particular the lack of funding and data. Challenges also include lack of awareness and involvement from local government. (Pommere-Bramane 2021)

Key policy priorities

Key priorities

Strategic goals:

- Human life, health and well-being, regardless of gender, age or social background, are protected from the adverse effects of climate change;
- The economy is able to adapt to the negative effects of climate change and seize the opportunities offered by climate change;
- Infrastructure and buildings are climate-resistant and planned in accordance with possible climate risks;
- Latvia's nature and cultural and historical values have been preserved and the negative impact of climate change on them has been reduced;
- Information based on scientific reasoning is provided, including monitoring and forecasting, which promotes the integration of aspects of adaptation into sectoral policies and spatial development planning documents, as well as public information. (Republic of Latvia 2019)

Choosing priorities

Priority sectors and adaptation measures have been identified in the process of developing the Plan based on vulnerability and risk assessments. Adaptation measures were also discussed within inter-institutional coordination and expert working groups using public consultation mechanisms and with the broad involvement of stakeholders. (Pommere-Bramane 2021)

Financial tools

The measures and tasks are planned to be implemented as far as possible within the allocated state budget funds and by attracting EU and other sources of resources and private capital. (Republic of Latvia 2019) Latvia uses a broad range of financing tools: state and municipality funding (funding for adaptation especially in local regions and municipalities is earmarked financing named New Policy Initiatives), EU funding (ERDF, ESF, CF, EAFRD, EMFF, Life, Horizon 2020), the EEA and the Norway Financial mechanism as well as state budget financing through certain funds, e.g. Latvian Environmental Protection Fund (LEPF), Latvian Environmental Investment Fund (LEIF) and Rural Support Service. (Climate-ADAPT Data Base 2020)

Best practices

Latvia has carried out a cost-benefit and cost-effectiveness assessment of adaptation measures for a 50-year period. (European Commission 2018, Bruņeniece, Gudzuks & Degaine 2015) The risk and vulnerability assessments have been done on primary and secondary impacts of climate change, risks and vulnerability, which includes a cost-benefit analysis for adaptation measures, indicators and draft for the monitoring system that will be used in the adaptation policy development process. Assessments included considerations such as (Pommere-Bramane 2021)

- historical climate impacts from 1961 and future scenarios until 2100,
- risk and vulnerability assessment,
- identification of adaptation measures and cost–benefit analysis,
- identification of adaptation indicators, and
- engagement of stakeholders and determination of their responsibilities.

A public online tool for the visualisation of climate scenarios has been developed. (European Commission 2018, Bruņeniece, Gudzuks & Degaine 2015) This climate change and adaptation monitoring system consists of two parts.

The first is based on an analysis of climate change, while the second is based on a sectoral vulnerability assessment (Pommere-Bramane 2021):

1. Climate change monitoring provided by the Latvian Environment, Geology and Meteorology Centre (LEGMC). This includes summarising and analysing selected meteorological parameters and climate indices, their changes in time and trends.
2. The selected climate impact indicators are collected in a climate impact monitoring database. This database is not publicly available due to the ongoing work on data collection.

For wider public the visualisation of the climate scenarios is available online in the climate change analysis tool. The tool allows to explore current and projected future climate scenarios in Latvia in the form of maps and graphs. Maps display 30-year average values of the selected climate indices. (Pommere-Bramane 2021)

There is a climate change and adaptation monitoring system and database, which includes 38 adaptation indicators. (European Commission 2018)

4.12. Lithuania

Strategies, plans and legislation

National strategies

The National Strategy for Climate Change Management Policy covers both mitigation and adaptation. (Seimas of the Republic of Lithuania 2012) An updated strategy is being discussed in the parliament (Liukaitytė-Kukienė 2020).

Inter-institutional Action Plan for the implementation of the goals and objectives for 2013–2020 (2013). New plans for adaptation will be integrated into the National Energy and Climate Plan (NECP) (Liukaitytė-Kukienė 2020).

Sectoral strategies

There are no sectoral adaptation strategies. The preferred approach is to integrate adaptation into existing sectoral strategies (Liukaitytė-Kukienė 2020).

Local strategies

Several municipalities developed adaptation action plans to improve adaptive capacity and infrastructure resilience. (Climate-ADAPT Data Base 2020) These include Klaipeda and Panevėžys. A project is being launched with EEA funding to carry out local vulnerability studies and prepare a pilot plan, followed up with five plans later. (Liukaitytė-Kukienė 2020)

Legal framework

There is no dedicated law on adaptation. The preferred approach is to integrate adaptation into existing legislation. (Liukaitytė-Kukienė 2020)

Process and decision making

Planning, reporting and reviewing

The detailed analysis undertaken in 2015 of the climate sensitivities, vulnerabilities and potential risks for sectors identified adaptation options. (European Commission 2018) The Strategy is developed by the Ministry of the Environment (MoE). State and municipal institutions engaged in the implementation of the Strategy provide MoE with information about the progress in implementing the Strategy and its Action Plan by submitting annual activity reports. (Climate-ADAPT Data Base 2020)

Every two years, the Government prepares a report on the implementation of the Strategy to the Parliament. The outcomes of the monitoring, reporting and evaluation scheme will feed into the further development of the Action Plan and the update of the Strategy. (Climate Adapt Data Base 2020) Ministry of the Environment reports on the implementation of the Action Plan annually. (European Commission 2018)

Decision making

Governmental and municipal institutions responsible for the implementation of the concrete measures are identified in the Action Plan. The horizontal and vertical coordination of the implementation of adaptation policy is ensured through the work of the National Climate Change Committee. The municipalities are responsible for coordinating the regional adaptation work and supporting local actors in their adaptation work. The Strategy refers extensively to EU and national strategies (Seimas of the Republic of Lithuania 2012).

The implementation of the Plan is coordinated by MoE. Ministries of Finance, Energy, Transport and Communications, Economy, Education and Science, Agriculture and the Interior, as well as municipalities, the Research Council of Lithuania, research institutions and universities, companies, organizations and others participate in the implementation within their competence and allocating funds for their measures. The goals and objectives of the Strategy are implemented by cross-sectorial policies, such as the National Progress Programme, the National Sustainable Development Program and sectoral development programmes or short-term planning documents. (Climate-ADAPT Data Base 2020)

MoE is responsible for coordinating the implementation of the Action Plan. However, certain activities of the Plan are assigned to other ministries, such as the Ministries of Agriculture, Transport and Economy. The Committee coordinates the implementation of the Strategy and its Action Plan; coordinates the development of new strategies, action

plans, and legal initiatives; provides recommendations regarding investment priorities; coordinates the preparation of climate reports; and performs other coordination tasks. (European Commission 2018)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

National Climate Change Committee. Representatives of the following ministries are involved in the Committee: Environment (chair), Energy, Finance, Transport and Communications, Education and Science, Foreign Affairs, Economy, Agriculture and the Chancellery of the Government of Lithuania. Most of the relevant sectors are covered by the Committee with the Ministries of Health and Interior and the Fire and Rescue Department exceptions. Usually there are two annual meetings of the Committee. There is also an inter-institutional working group for heatwave prevention. (European Commission 2018)

Lithuania is developing taskforces for different climate-related events. For instance, one taskforce has guidelines on how to manage heat events. (Liukaitytė-Kukienė 2020)

International co-operation

Lithuania has been active within the Baltic Sea Region Climate Change Adaptation Strategy and Action Plan. The transboundary cooperation in flood risk management is organized within the framework of existing intergovernmental agreements between Lithuania, Latvia and Poland to cooperate and exchange information and data in environmental fields. Cooperation is also ensured through the implementation of the four river basin management plans. The Strategy also mentions adaptation in development co-operation (Seimas of the Republic of Lithuania 2012), but the funding goes to mitigation (Liukaitytė-Kukienė 2020).

Tools to engage stakeholders

The National Climate Change Committee is responsible for both climate policy development and its implementation and represents the established coordination mechanism between different governance levels. The Committee consists of experts from government, municipal, science and non-governmental organizations (NGOs) and has an advisory role. (Climate-ADAPT Data Base 2020)

Biggest challenges

Adaptation challenges

Among all Lithuanian regions, the coast is most sensitive to climate change in terms of forecast rise in water level and the risk of flood. (Seimas of the Republic of Lithuania 2012)

Adaptation policy challenges

An early analysis (Peleikis 2011) suggested that key challenges for Lithuania were

1. effective coordination of the process and cooperating with relevant stakeholders;
2. identification of priority sectors;
3. multi-level governance of adaptation policy;
4. establishment of links between adaptation policy and sectoral policies;
5. building of knowledge and awareness (particularly in the general public); and
6. structuring the strategy document.

The interviewed expert highlighted the relatively low priority on adaptation (as opposed to mitigation or other policy areas) as a key challenge. It is also politically difficult to prioritise which sectors to support on adaptation and where to allocate funding. (Liukaitytė-Kukienė 2020)

Key policy priorities

Key priorities

The strategic goal of Lithuanian adaptation policy is to reduce the vulnerability of natural ecosystems and economic sectors by implementing measures that preserve and increase resilience to climate change and maintain beneficial conditions of social life and economic activity (Znutienė 2013). Priority areas include:

1. agriculture, soil
2. forestry, ecosystems, biodiversity, landscape
3. water resources
4. energy, transport, industry
5. public health
6. cross-sectoral (e.g. warning system and disaster risk management)

Main directions:

1. integrated approach at the regional level
2. synergy of mitigation and adaptation measures
3. country-specific adaptation research
4. strong knowledge base about impacts

(Climate-ADAPT Data Base 2020)

Choosing priorities

One factor affecting priorities is the source of funding. For instance, EU and national funding only support measures included in the NECP. (Liukaitytė-Kukienė 2020)

Financial tools

The implementation of the Strategy is funded from the state budget, municipal budgets, EU and international organizations and other sources. For a detailed breakdown, see the Plan (Republic of Lithuania 2013). MoE administers a Special Programme for Climate Change that enables the collection of additional funding for climate change management measures. The funds managed by the Ministry can finance adaptation measures nationally and internationally. The project selection involves the Lithuanian environment investment fund (LEIF). (Cascade 2019)

Best practices

Lithuania has a Climate Atlas on meteorological changes which has helped in planning adaptation measures. However, the Atlas has not been updated recently. (Liukaitytė-Kukienė 2020)

The Plan sets extensive quantitative goals for different sectors and measures, including a target for the share of GDP going to mitigation and adaptation measures and for the share of population aware of adaptation. It also proposes to introduce a system for registering victims of climate change (sick and dead). (Republic of Lithuania 2013) In addition, the Plan is updated annually (Cascade 2019).

Application of climate modelling will become obligatory for newly built large public infrastructure constructions from 1 July 2022. The law on EIAs requires climate impacts on a project to be assessed and an analysis of adaptation options presented. (European Commission 2018) However, this only applies to large and strategic projects, such as Rail Baltic (Liukaitytė-Kukienė 2020).

The Plan proposes to consider including adaptation in training programs for civil servants of state and local government related to sectors affected by climate change. (Republic of Lithuania 2013)

4.13. Russia[1]

In this chapter, we focus on adaptation policy at the federal level as well as the Russian arctic (Figure 1.1.1.). In this report, in sections on Arctic Russia we are focusing on the Chukotka Region and the Russian parts of the Barents Region (Nenets Autonomous Okrug, Republic of Komi, Arkhangelsk Oblast, Murmansk Oblast and Republic of Karelia).

Strategies, plans and legislation

National strategies

National adaptation strategy: Russia does not have a national adaptation strategy.

The national adaptation plan: The National Action Plan for the First Phase of Adaptation to Climate Change for the Period up to 2022. (High North News 2020)

Sectoral strategies

There are no sectoral strategies yet, but the National Action Plan includes plans of developing sectoral strategies for specific sectors like energy, transport and agriculture. (High North News 2020)

Regional strategies

Regions are recommended to develop adaptation strategies, but those are not obligatory (Safonov 2020). According to the National Adaptation Plan, specific operative measures will be developed for the Arctic Region by the third quarter of 2021. The responsible organizations are the Ministry for the Development of the Russian Far East and Arctic and the Ministry of Economic Development together with other ministries. (High North News 2020)

In 2020, a “passport for climate security” was developed by the Ministry of Natural Resources and Ecology for the use of regions. The passport provides a uniform approach and a template for the regions that are developing adaptation plans. Ministry of Economic Development have been producing a document about methodological recommendation for assessment of risks and damage for sectors and regions. The document can be used as a guide when regions are formulating their adaptation plans. (Kokorin 2021)

Local strategies

There are no local strategies yet.

Legal framework

Adaptation planning process is not described in legislation. However, there are some instruments in legislation that can be related to adaptation (e.g. instruments to compensate losses to farmers), but these are not identified as adaptation measures. (Safonov 2020)

Process and decision making

Planning, reporting and reviewing

A 2023–2025 plan of action is expected to replace the latest document by late 2022, according to its tentative schedule. (Moscow Times 2020)

Decision making

The ministry in charge is the Ministry of Economic Development (Moscow Times 2020).

After the collapse of the Soviet Union, several competences and responsibilities were assigned from the federal level to the regional level. Climate and environmental policies are implemented jointly by the federal authorities, authorities of the subjects of the Russian Federation and municipalities. The regional authorities’ governance responsibilities include e.g. elaboration and realization of adaptation measures and incorporation of adaptation measures into regional and municipal strategies and sectoral planning. (AMAP 2017d)

1 Russia is classified as ”not free” and ”consolidated authoritarian regime” by Freedom House, a US-based democracy and human rights think tank. In its Democracy Index 2020, the Economist Intelligence Unit classifies Russia as ”authoritarian”, ranking at 124 out of 167 countries. This can both limit the reliability of information provided by government sources and possibilities to draw on independent experts. Country information presented in this chapter should be interpreted with caution.

Arctic Russia

Regions have affiliations with major domestic bodies that deal with issues related to climate and environment. For example, Chukotka (located in the Far East region) has the Chukotka Committee of Natural Resources that focuses e.g. on environmental and natural resources management. The committee is a territorial organ of the federal environmental ministry and has competencies to perform its functions within the territory and coordination with other executive authorities. (AMAP 2017c)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

There are hardly any cooperation practices or adaptation networks (Safonov 2020).

International co-operation

Russia takes part in the Barents co-operation together with Finland, Norway and Sweden. The Barents Action Plan includes six measures on co-operation in adaptation (International Barents Secretariat 2017). The level of international cooperation is still quite low (Kokorin 2021).

Tools to engage stakeholders

The involvement of stakeholders is limited and not systemic. There are some public advisory councils or committees where e.g. some NGOs are represented (Safonov 2020). During the development of the national action plan, some conversations took place between the NGOs and the government. However, engagement of the stakeholders wasn't systemic. (Kokorin 2021)

Biggest challenges

Adaptation challenges

Forest fires are a major challenge in several regions. Agriculture is sensitive to climate change and due to lack of adaptation measures some regions are facing severe problems as negative impacts on agriculture are rising. (Safonov 2020)

Some parts of the country will suffer from droughts and lack of water (southern part) while some parts will have problems with flooding. Deterioration of infrastructure is also a problem and infrastructure should be renewed to be able to handle climate impacts. (Safonov 2020) Challenges also include the degradation of permafrost in the north (High North News 2020) and heatwaves, cold waves, health issues and peat fires (Safonov 2020). In the Arctic Russia (e.g. in Chukotka), reductions in sea cover and duration are noteworthy (AMAP 2017c).

Adaptation policy challenges

According to Safonov (2020), adaptation is not prioritized in Russia and the importance of adaptation should be better understood. Thus, preventive measures are not taken and Russia is not acting proactively (Safonov 2020 & Kokorin 2021). Generally, the problem is that the strategies and plans are not always implemented (Safonov 2020).

Funding is limited and lack of funding leads also to lack of information and knowledge. Development of better strategies and plans requires good quality research (e.g. about climate projections and health implications), but this is not currently possible as funding is very limited and low. As climate impacts vary between regions, different projections are needed to cover different parts of the country. (Safonov 2020) Also, according to Kokorin (2021) financing is a major problem in Russia, especially in the poorer regions. Additionally, funds are not targeted for preventive measures but rather for emergency situations (Kokorin 2021).

Arctic Russia

For example, in Chukotka, a set of regional government programs concerning e.g. climate risk management were adopted a few years ago. However, there was a lack of fiscal resources to cover multiple programs and services. Challenges related also to the deficit of infrastructure to ensure operational services. (AMAP 2017c)

According to AMAP (2017d), knowledge gaps in the Russian part of the Barents include how to best combine research and assessments of climate change risks and impacts with the interests

of stakeholder groups and how to incorporate research findings into the sustainable development agendas of federation subjects in the Russian North. Additionally, a dedicated interface is needed for information, expertise and knowledge exchange between the regions of the Russian arctic.

Key policy priorities

Key priorities

According to the national adaptation action plan, the first priority is health. Also, forests and forest fires and infrastructure are prioritized. (Kokorin 2021)

Financial tools

Financing is a big question that has not been solved yet. Government has budgeted funds for emergency situations but there is a lack in funding of preventive measures. (Kokorin 2021) There are some tools to compensate crop losses to farmers, but this is not actually a part of adaptation policy (Safonov 2020).

4.14. Belarus[2]

Strategies, plans and legislation

National strategies

The National Strategy for Adaptation to Climate Change and the national plan for adaptation to climate change are under preparation. (Tarasevich 2021)

Sectoral strategies

The Strategy for Adaptation of Forestry in Belarus to Climate Change until 2050 (2019). The National Plan for Adaptation of Forestry in Belarus to Climate Change until 2030 is under preparation. (Tarasevich 2019)

The Strategy for the Adaptation of Agriculture to Climate Change (2019). An action plan for the agricultural sector is being developed. (Tarasevich 2019)

Local strategies

In 2016, within the framework of the Local Climate project, three local adaptation strategies were developed, with the support of the Climate Forum East and ECOPROJECT, funded by the EU and the Australian Agency for Development and Cooperation:
1. Assessment of the vulnerability of Chavusy to climate change. Strategic directions and activities for adaptation to climate change at the local level.
2. Assessment of the vulnerability of the Motal Council to climate change. Strategic directions and activities for adaptation to climate change at the local level.
3. Assessment of the vulnerability of the Sporovsky village council to climate change. Strategic directions and activities for adaptation to climate change at the local level. (Tarasevich 2019)

Plans for climate change mitigation and adaptation at the local (city, district) level have been developed for thirty administrative-territorial units from among the parties to the Covenant of Mayors on climate and energy. (Tarasevich 2019)

2 Belarus is classified as ”not free” and ”consolidated authoritarian regime” by Freedom House, a US-based democracy and human rights think tank. In its Democracy Index 2020, the Economist Intelligence Unit classifies Belarus as ”authoritarian”, ranking at 148 out of 167 countries. This can both limit the reliability of information provided by government sources and possibilities to draw on independent experts. Country information presented in this chapter should be interpreted with caution.

Legal framework

There is no dedicated act on adaptation.

Process and decision making

Decision making

The ministry in charge is the Ministry of Natural Resources. (Tarasevich 2021)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental coordination

In 2015, an Interdepartmental Working Group on Climate Change Problems was created in, which includes specialists from interested government bodies and other organizations. (Tarasevich 2021)

International cooperation

EU and UNDP finance a project assisting the Government in tackling both climate change mitigation and adaptation in Belarus during 2019–2022. The total budget of the project is EUR 1.1 million. (UNDP 2019)

Belarus has adopted international agreements, including the UNFCCC and the Paris Agreement, Convention on Wetlands (Ramsar Convention), and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes. The country takes part actively in their meetings. (Tarasevich 2021)

Belarus has cooperation agreements in the field of environmental protection and rational use of natural resources at the ministerial level with Russia, Poland, Ukraine, Lithuania and Latvia. Five transboundary (with Poland, Latvia, Lithuania, Russia and Ukraine) rivers flow through the territory of Belarus, requiring integrated (joint) management of water resources within the boundaries of their basins. International agreements on transboundary cooperation on the use and protection of water resources have been concluded with Russia, Ukraine and Poland (signed in 2020). (Tarasevich 2021)

Tools to engage stakeholders

The main tools are timely information in an accessible format for all stakeholders (websites, online forums), consultation to collect proposals and conduct surveys and dialogue with stakeholders to obtain a wider range of views and partnerships. Drafts of the national strategy and plan for adaptation to the climate change are sent to the responsible government bodies and other relevant organizations for drawing up and adjusting the sectoral sections and harmonizing them with their own sectoral development plans. The Public Coordination Environmental Council under the Ministry of Natural Resources is in place to ensure coordination across government bodies and public participation in environmental issues. (Tarasevich 2021)

Biggest challenges

Adaptation challenges

Forestry and agriculture have been identified as the most vulnerable sectors in Belarus (OECD 2016).

Adaptation policy challenges

The following challenges have been identified:

- insufficient funding;
- supporting the development of local adaptation plans with up-to-date information and measures suitable for local conditions;
- improving the skills of the participants in the process, without which the implementation of strategies and adaptation measures is extremely difficult;
- development and adoption of specific measures for adaptation, and their implementation in cities, including the search for funding sources; and
- developing, testing and demonstrating scalable solutions, combining top-down and bottom-up approaches.

(Tarasevich 2021)

Key policy priorities

Key priorities

In Belarus, the main priorities in the national policy on adaptation are mitigation of climate change, reducing vulnerability to the negative effects and reaping the benefits of potential positive effects. One of country's priorities is natural solutions – locally appropriate actions that address social issues such as climate change and ensure human well-being and biodiversity protection through the sustainable management and restoration of natural or modified ecosystems. (Tarasevich 2021)

Choosing priorities

Priority directions in adaptation in Belarus were chosen depending on the geographic location of the country, taking into account the varying features of the past, current and future trends in climate change as well as the differences in ecosystems, economic sectors, social areas, sector vulnerability. (Tarasevich 2021)

Financial tools

The main source of funding is the state. It is envisaged to attract additional sources of funding through, for example, international investment, the Global Environment Facility program and EU and bilateral cooperation. Increased public and private funding for adaptation would lead to faster implementation of programs and projects. Foreign direct investment would act as an additional source of investment in the production of goods and services, promote the introduction of new technologies and management methods, and diversify foreign trade. To activate this source of funding, the Government of Belarus needs to improve the basic conditions of the investment climate (legal system, quality of human capital, etc.) and prevent discrimination against foreign investors. (Tarasevich 2021) EU and UNDP finance a project assisting the Government of Belarus in tackling both climate change mitigation and adaptation in Belarus during 2019–2022. (UNDP 2019)

4.15. Canada

In this chapter, we focus on adaptation policy at the federal level as well as the Canadian Arctic region. In this report, the Canadian Arctic region is defined to include Yukon, Northwest Territories and Nunavut as well as Nunavik (Québec) and Nunatsiavut (Labrador). Some information on other provinces is also included.

Strategies, plans and legislation

National strategies

National Strategy: Pan-Canadian Framework on Clean Growth and Climate Change: Canada's Plan to Address Climate Change and Grow the Economy (2016). While not a formal adaptation strategy, adaptation is one of the four pillars in the document, and it includes priorities for action on adaptation identified by federal, provincial and territorial governments. The document has been adopted by all provinces and territories, except Saskatchewan. (Government of Canada 2016)

There is currently no national adaptation plan. In December 2020, the Government of Canada released its strengthened climate plan, A Healthy Environment and a Healthy Economy, which included a commitment to developing Canada's first national adaptation strategy. (Government of Canada 2020)

Arctic Canada

The Arctic region has the National Inuit Climate Change Strategy (2019).

Sectoral strategies

There are some sectoral climate risk assessments and reports, but no sectoral adaptation strategies or plans at the federal level. For example, Transport Canada's report on the transportation sector highlights existing measures in use. (Palko & Lemmen 2017)

At the provincial level, adaptation has been integrated into some sectoral strategies, like Agricultural Soil Health and Conservation Strategy in Ontario and Sustainable Forest Management Strategy in Quebec, but sectoral adaptation strategies or plans are rare. In this study, only one strategy was found:

Ontario Ministry of Natural Resources and Forest published in 2017 their strategy, Naturally Resilient – MNRF's Natural Resource Climate Adaptation Strategy (2017–2021). (Environmental Commissioner of Ontario 2018, Ministère des Forêts, de la Faune et des Parcs Québec 2015, Ontario Ministry of Natural Resources and Forest 2017)

There are seven regional (sub-provincial) agricultural adaptation strategies drafted in British Columbia. Funding has been available for this purpose. (Government of British Columbia 2021)

Strategies or plans in provinces and territories

The status of the latest adaptation strategies and plans in the Arctic territories and provinces is the following (as of March 2021):

- Northwest Territories has an integrated climate change strategy, which includes adaptation: 2030 NWT Climate Change Strategic Framework. They also have an action plan: 2030 NWT Climate Change Strategic Framework 2019–2023 Action Plan.
- Nunavut has a climate change adaptation strategy: Upagiaktavut. Setting the course. Climate Change Impacts and Adaptation in Nunavut, 2011.
- Yukon has an integrated climate change, energy and green economy strategy and plan, which includes adaptation: Our Clean Future: A Yukon Strategy for Climate Change, Energy and Green Economy, 2020. Yukon Strategy for Climate Change, Energy and Green Economy.
- Newfoundland and Labrador have a joint climate change action plan including adaptation: The Way Forward on Climate Change in Newfoundland and Labrador, 2019. The plan includes Nunatsiavut, and the region is aiming at the development and implementation of a Northern Adaptation Strategy that includes Labrador.
- Québec has a Green Economy, Electrification and Climate Change strategy for 2030 published in 2020. It includes adaptation. Quebec has also an implementation plan for the first five years 2021–2026 published in 2020.
- In addition, there is a common Pan-Territorial Adaptation Strategy from 2011 covering Northwest Territories, Nunavut and Yukon.

The status of the latest adaptation strategies and plans in the remaining provinces is the following (as of March 2021):

- Alberta does not have an adaptation plan nor an integrated climate plan that includes adaptation. Alberta has a Climate Leadership Plan from 2015, but it does not include adaptation.
- British Columbia is preparing a new climate preparedness and adaptation strategy, which has been under public hearing. The strategy is to be launched in 2021. The latest strategy was published in 2010. (Government of British Columbia 2020, Abernethy 2021)
- Manitoba's Climate Change and Green Economy Action Plan from 2015 includes adaptation.
- New Brunswick's Climate Change Action Plan from 2017 includes Adaptation.
- Ontario integrated climate change issues in 2018 into a Made-in-Ontario Environment Plan that has a chapter on climate change. The main focus is on mitigation, but some adaptation issues are addressed.
- Prince Edward Island has developed a climate change action plan: Taking Action, A Climate Change Action Plan of Prince Edward Island 2018–2023. It includes adaptation.
- Saskatchewan: Prairie Resilience. A Made-in-Saskatchewan Climate Change Strategy, 2017.

Local strategies

In Canada, local adaptation planning varies greatly across provinces and territories, but many municipalities, especially larger cities have adaptation strategies or plans. Some examples are Vancouver, Edmonton and Montreal.

Most provinces and territories encourage municipalities in voluntary adaptation planning. There are toolkits or guidebooks available on how to undertake adaptation planning and prepare action plans for example, for British Columbia. (West Coast Environmental Law 2012) Many local toolkits and guides have been prepared with project funding. ICLEI Canada has produced a number of resources to support adaptation planning at the community level, including the Guide and Workbook for Municipal Climate Adaptation. (ICLEI Canada 2019)

Nova Scotia is the only Canadian province that has mandated Municipal Climate Change Action Plans, which focus on both climate change

adaptation and mitigation, as part of the in the 2010–2014 Municipal Funding Agreement. Completion of the plan was a prerequisite for a certain federal funding source. Nova Scotia has also published a guide for preparing the plans. (Canada-Nova Scotia Infrastructure Secretariat 2011, Philp & Cohen 2020)

Arctic Canada

In Nunavut, adaptation action plans have been drafted for the following pilot communities: Iqaluit, Arviat, Cambridge Bay, Whale Cove and Kugluktuk. (Government of Nunavut 2011) In addition, the Clyde River and Hall Beach plans have been published. (Nunavut Climate Change Centre 2021a)

Several guides or toolkits that focus on adaptation questions relevant for local communities in the Arctic Canada have been prepared. Examples include:

- In Nunavut, an adaptation planning toolkit for local communities was published in 2011. (Bowron & Davidson 2011)
- The Northwest Territories Association of Communities provides a climate change toolkit, which includes a guide for Northern communities on integrating climate measures into municipal planning and decision-making and community climate profiles providing information on some of the impacts that scientific models predict for each community, and examples of possible adaptation measures. (Northwest Territories Association of Communities 2021)

Legal framework

There is no dedicated federal act on adaptation.

At a provincial level, the British Columbia's Climate Change Accountability Act amended in 2019 requires the province to report annually on adaptation goals and policies and conduct a detailed risk assessment every five years. It also requires public sector organizations to manage their climate risks. (Canadian Institute for Climate Choices 2020)

In Québec, Bill 44 was issued in 2020 to ensure effective governance of the fight against climate change. It concentrates on mitigation, but it also includes some provisions on adaptation. Ministry of the Environment and the Fight Against Climate Change is given the coordination responsibility of climate issues, including adaptation. (National Assembly of Québec 2020)

Process and decision making

Planning, reporting and reviewing

Environment and Climate Change Canada led the development of the Federal Adaptation Policy Framework. (Auditor General of Canada 2018a) Progress on the Pan-Canadian Framework on Clean Growth and Climate Change is reported annually. (National Assembly of Québec 2016)

Arctic Canada

In the Northwest Territories, annual reports are prepared to track the progress of the Climate Change Action Plan 2019–2023. The Action Plan will be evaluated after five years, and a second action plan will be drafted for 2025–2029. (Government of Northwest Territories 2018)

Decision making

Environment and Climate Change Canada leads adaptation policy at the federal level, coordinating action by approximately 15 federal departments and agencies. (Auditor General of Canada 2018a, Bateman & Lax 2021) The federal government enables and complements the actions of provinces and territories, which have the flexibility to design their own policies and programs. The federal government finances programs that support projects at a subregional level. (Abernethy 2021, Government of Canada 2016)

Arctic Canada

In the Northwest Territories, the Department of Environment and Natural Resources is the lead department responsible for climate change, including adaptation. The responsibility for taking climate action is shared by all segments of the Northwest Territories society, including local and Indigenous governments, businesses and residents. The work is based on collaboration and partnerships. The federal government supports and enables this work. (Government of Northwest Territories 2018)

In Nunavut, the Department of Environment's Climate Change Secretariat is responsible for Nunavut's climate change policy and programs. (Auditor General of Canada 2018b)

The Climate Change Secretariat within the Department of Environment coordinates the Government of Yukon's response to climate change; forms climate partnerships with Canada, First Nations, Yukon University and other organizations; coordinates climate activities and participation; and develops climate policies and strategies. (Government of Yukon 2021b, Bateman & Lax 2021)

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

The Canadian Council of Ministers of the Environment (CCME) is the primary intergovernmental (federal, provincial, and territorial) forum for collective action on environmental issues of national and international concern. Climate change, including adaptation, is one of the CCME's priority areas. (CCME 2021, Bateman & Lax 2021)

Federal, provincial, and territorial Ministers of the Environment, Ministers of Innovation, Ministers of Energy, and Ministers of Finance convened to provide advice in the development of the Pan-Canadian Framework on Clean Growth and Climate Change (Government of Canada 2016).

The Government of Canada collaborated with First Nations, Inuit and the Métis Nation to establish three distinctions-based, senior bilateral tables based on the recognition of rights, co-operation and partnership. These joint tables support a collaborative approach to address Indigenous-specific clean growth and climate change priorities. (Government of Canada 2019a)

The Canadian Centre for Climate Services was established in 2018 to provide access to climate data, tools, and information across the country. This centre is working to build a network of climate service providers across Canada, facilitating regional collaboration to provide locally-relevant information. Currently, regional climate organizations are located in British Columbia, the Prairies, and Quebec, with an Atlantic Hub under development. (Government of Canada 2021, Bateman & Lax 2021)

Arctic Canada

The governments of Yukon, the Northwest Territories and Nunavut work together to address adaptation in a Pan-Territorial Adaptation Partnership. The collaboration includes sharing information, practical adaptation measures and organizing meetings. In 2011, the partnership produced a Pan-Territorial Adaptation Strategy. (Governments of Yukon, the Northwest Territories and Nunavut 2021) In Nunavut, an interdepartmental working group on climate impact and adaptation has been set up to coordinate reporting and monitoring of adaptation initiatives. (Government of Nunavut 2011)

International co-operation

Canada was a co-convener and funder of the Global Commission on Adaptation and Canada and Mexico co-led the Nature-Based Solutions (NBS) for Adaptation Action Track, including co-hosting an event at the global Climate Adaptation Summit in January 2021. The Commission (2018–2021) sought to accelerate adaptation by increasing its visibility and by advancing concrete solutions. (Government of Canada 2019a)

Canada provides climate finance for developing countries. Part of this funding is for improving climate resilience. (Government of Canada 2016)

Tools to engage stakeholders

Canada's climate change adaptation platform is an invitation-based collaboration forum. It includes representatives of different levels of government, Indigenous organizations and governments, communities, NGOs, industry as well as professional and research organizations. The platform has a plenary and various thematic working groups. Working groups have initiated projects with concrete outcomes. (Natural Resources Canada 2021)

Let's Talk Climate Action website was used in 2016 to gather ideas and comments from Canadians on how Canada should address climate change as part of the development process for the Pan-Canadian Framework on Clean Growth and Climate Change. Over 13,000 ideas and comments were received. (Government of Canada 2016)

Arctic Canada

The Government of Northwest Territories conducted a series of events to collect input to the Climate Change Framework. The draft framework was open to public feedback. (Government of Northwest Territories 2018)

The Government of Yukon launched an extensive public consultation process of the Yukon strategy for climate change, energy and a green economy, and has published the input received in a separate report. For example, public meetings were organized in 13 communities with 163 participants, some of which were from Northwest Territories. In addition, one-to-one meetings were held with several municipalities, First Nations and transboundary Indigenous groups. (Government of Yukon 2020)

The Nunavut Climate Change Centre is a web-based knowledge resource intended to provide up-to-date information on climate issues. The resource has been developed by the Government of Nunavut's Department of Environment. (Nunavut Climate Change Centre 2021b)

In Yukon, the Youth Panel on Climate Change has been established to advice the government on Yukon's climate actions. The partnership is facilitated by an NGO called BYTE that works on empowering youth. (Government of Yukon 2021a)

Biggest challenges

Adaptation challenges

The Council of Canadian Academies (CCA) released Canada's Top Climate Change Risks in 2019. The CCA convened an expert panel that identified physical infrastructure, coastal and northern communities, human health and wellbeing, ecosystems and fisheries as the top six areas of risk. Other major risk areas identified were agriculture and food, forestry, water, governance capacity and geopolitical dynamics. The report also recognized the severe impacts to Indigenous Peoples' ways of life caused by climate change. (Bateman and Lax 2021)

Indigenous and northern communities are especially impacted through rapid warming in Northern Canada, which, for example, has disrupted access to communities and affects traditional activities like hunting and foraging. (Government of Canada 2016)

Thawing permafrost, rising sea levels and increase of extreme weather events will affect housing and infrastructure in the Arctic regions in Canada. Also, water supply is vulnerable to changing conditions like increasing temperatures and melting glaciers. (Governments of Nunavut, the Northwest Territories and Yukon 2011)

Adaptation policy challenges

While there is a wide range of adaptation actions across Canada, different jurisdictional responsibilities and priorities can affect the ability to make meaningful and transformational change in Canada's resilience to climate impacts. (Bateman & Lax 2021)

Adaptation is multi-level and multi-sector, but responsibilities of different actors are not always clear. There is lack of local expertise on adaptation especially in smaller municipalities. Adaptation work is fragmented to specific individuals and groups, there is no broad awareness of the issue. Adaptation is limited in political discourse. (Bednar et al. 2018)

There is a lack of operational and implementation funding. After project funding ends the activities do not necessarily continue. Concrete and continuous work is needed after conducting risk assessments or building toolkits. (Abernethy 2021)

Arctic Canada

Challenges in the Canadian Arctic identified in the Pan-Territorial Adaptation Strategy are:

- limited financial capacity;
- prioritization of other significant concerns may make responding to climate change a lower priority;
- human resources challenges;
- logistical challenges like lack of roads, limited time windows for sealift, expensive air travel, a harsh climate and underdeveloped telecommunications networks impact government's ability to respond to critical issues and emergencies; and
- limited baseline data and climate change scenario projections at the local level. (Governments of Nunavut, the Northwest Territories and Yukon 2011)

Key policy priorities

Key priorities

Through the Pan-Canadian Framework on Clean Growth and Climate Change, federal, provincial, and territorial governments in Canada identified actions in the following areas:

1. Translating scientific information and Traditional Knowledge into action
2. Building climate resilience through infrastructure
3. Protecting and improving human health and well-being
4. Supporting particularly vulnerable regions
5. Reducing climate-related hazards and disaster-risks (Government of Canada 2016)

Arctic Canada

The Pan-Territorial Adaptation Strategy identifies the following areas of collective action:

1. Sharing best practices for maintaining and protecting infrastructure from the effects of thawing permafrost
2. Protecting people and property from health and safety risks arising from various effects of climate change
3. Strengthening Northern economies by taking advantage of arising opportunities in a changing environment
4. Maintaining food security in a changing environment (Governments of Nunavut, the Northwest Territories and Yukon 2011)

Choosing priorities

The Pan-Canadian Framework on Growth and Climate Change included shared priorities for action identified by federal, provincial and territorial governments, informed by partners and stakeholders. These priorities have guided federal investments on adaptation. (Government of Canada 2016)

Most provinces and territories have or are developing climate change plans that identify priorities within each individual jurisdiction.

Arctic Canada

Priorities are set in the Pan-Territorial Adaptation Strategy and in the strategies of the Arctic territories and provinces.

Financial tools

There are investment programs to support climate-resilient infrastructure projects. The federal government's Disaster Mitigation and Adaptation Fund (DMAF) supports large-scale infrastructure projects to help communities better manage the risks of natural disasters. Projects approved in 2019 include upgrades to Nova Scotia's provincial dyke land system and flooding mitigation projects in Yellowknife, Northwest Territories; Fredericton, New Brunswick; and Windsor, Ontario. (Government of Canada 2019a)

The federal government administers several programs to fund adaptation activities in a variety of areas including human health and well-being, physical infrastructure, transportation, natural resource sectors, Indigenous communities, and northern communities.(Bateman & Lax 2021)

In 2019, Ontario started a $1-million pilot project to help municipalities ensure their infrastructure is resilient to extreme weather. It will give municipalities that qualify for the program up to 15 per cent above the estimated cost of rebuilding damaged public infrastructure to make it more resilient to extreme weather. (Government of Canada 2019a)

Arctic Canada

The federal government's Climate Change Preparedness in the North program supports the territories by funding adaptation projects. Funding is provided for vulnerability and risk assessment of climate impacts, development of hazard maps and adaptation plans, development of adaptation options and implementation of adaptation measures. (Crown Indigenous Relations and Northern Affairs Canada 2020)

Through the Climate Change and Health Adaptation Program, Canada supports First Nations and Inuit communities' efforts to build capacity to adapt to the health impacts of climate change. Funding is provided for community-led adaptation projects. A part of the funding is directed to the Northern

communities through the Climate Change and Health Adaptation Program North of 60°N. (Indigenous Services Canada 2020)

In 2018–2019, the Government of Northwest Territories' Adaptation Initiative funded projects supporting community adaptation to climate change impacts. (Government of Northwest Territories 2018)

Best practices

Under the Canadian Council of Ministers of the Environment, federal, provincial and territorial governments in Canada have collaborated on developing best practices reports related to adaptation, with additional resources scheduled for release in the coming months. (Bateman & Lax 2021)

The Building Regional Adaptation Capacity and Expertise (BRACE) program works in partnership with the provinces and local stakeholders to build resilience to climate change. Several projects have been launched to increase the capacity of professionals, such as planners and engineers, by developing tools and guidance on how to integrate climate considerations into their work and practice. The program also supports the development of training resources and internship programs. (Government of Canada 2019a)

The federal government's Indigenous Community-Based Climate Monitoring Program supports Indigenous-led climate monitoring projects incorporating Indigenous Knowledge and western science, building capacity, and informing local and regional adaptation activities. (Government of Canada 2019a)

In Québec, an Online Open Course and book on health and climate change were launched in 2019, with a goal to raise awareness and mitigate impacts of climate change on the health of populations. The course is intended for health professionals but is open to all residents. (Government of Canada 2019a)

Canada's Climate Change Adaptation Platform brings together both the users and producers of adaptation knowledge and tools. It responds directly to the needs of decision-makers in public and private sectors. (Natural Resources Canada 2019)

Climate Adaptation Leaders Forum brings together executive leaders who have the power to drive institutional change within their organizations. The theme of the forum will change annually. (Natural Resources Canada 2019)

The government of Canada has a web page that highlights various existing tools and guides on adaptation, including several local community adaptation planning guides from different part of Canada. (Government of Canada 2019b)

Arctic Canada

The federal government of Canada has supported the work on National Inuit Climate Change Strategy. The strategy has a strong focus on strengthening the resilience of communities. The government of Canada provides funding for the implementation of the strategy through Inuit-led activities and initiatives related to, for example, knowledge and capacity building, health and well-being as well as climate-resilient infrastructure. (Government of Canada 2019a)

The Government of Nunavut's Climate Change Secretariat (CCS) is in the process of developing a Youth Advisory Committee on climate change to mobilize youth and create action. (Nunavut Climate Change Centre 2021c) In Yukon, the Youth Panel on Climate Change has already been established to advice the government on Yukon's climate actions. The partnership is facilitated by an NGO called BYTE that works on empowering youth. (Government of Yukon 2021)

SmartICE was developed to monitor ice conditions in northern Labrador, integrating traditional knowledge of sea ice with advanced data acquisition and remote monitoring technology. The tools generate near real-time information on sea-ice conditions for community and business users. The system supports better decision-making across various industries from mining, shipping and fisheries, to emergency response and national defense. The system was developed in collaboration between traditional Inuit ice experts, geographers at Memorial University, industry, as well as the Nunatsiavut Government, with support from the Federal and Provincial Governments. (Government of Newfoundland and Labrador 2019, SmartICE 2021)

4.16. The USA

In this chapter, we focus on adaptation policy at the federal level as well as the State of Alaska which is the only Arctic region of the USA. Some information on other states is also included.

Strategies, plans and legislation

National strategies

President Obama's Climate Action Plan, including both adaptation and mitigation, was released in 2013 (Executive Office of the President 2013). However, President Trump's administration eliminated the plan. Now, President Biden has made clear that climate action will be at the top of his administration's agenda (The White House 2021a, 2021b).

Sectoral strategies

In 2013, under President Obama's administration, federal agencies completed the first set of agency-specific adaptation plans (U.S. Department of State 2014), but this order was revoked during the Trump Administration. Now, according to President Biden's Tackling the climate crisis at home and abroad executive order, each federal agency is directed to develop a climate action plan to increase the resilience of its facilities and operations to the impacts of climate change (The White House 2021a).

However, some organizations had crafted sectoral and regional adaptation strategies. For example, the Climate Change Response Network created strategies and approaches e.g., for forests, agriculture and forested watersheds. Resources were designed mainly for the Midwest and Northeast U.S. and the work was led by the Northern Institute of Applied Sciences in collaboration with e.g., the United States Department of Agriculture.

Alaska

According to the Adaptation Clearinghouse's database, Alaska does not have official sectoral adaptation strategies. Alaska's Climate Change Strategy (2010) did address public infrastructure, health and culture, natural systems and other economic activities.

Strategies and plans in the states

The table (4.16.1.) below includes the states that either have developed a state-led adaptation plan, sectoral/agency plans or local/regional plans. More detailed information about e.g. the local and sectoral strategies can be found on the Georgetown Climate Center's and Adaptation Clearinghouse's website. Eight states (Arkansas, Kansas, Missouri, Nebraska, North Dakota, South Dakota, West Virginia and Wyoming) are not included, as according to the Georgetown Climate Center, these states do not currently have any plans regarding adaptation.

Alaska's Climate Change Strategy was rescinded in 2019.

Table 4.16.1. The US states that either have developed a state-led adaptation plan, sectoral/agency plans or local/regional plans.

State	State led adaptation plan	Date finalized (latest version)	Goals	Sector/ agency plans	Local/ regional plans
Alabama	-	-	-	-	yes
Alaska	Alaska's Climate Change Strategy: Addressing Impacts in Alaska	2010	158	yes	yes
Arizona	-	-	-	yes	yes
California	Safeguarding California Plan: 2018 Update The first version of the Climate Adaptation strategy is from 2009	2018	345	yes	yes
Colorado	Colorado Climate Plan 2018 Update – State Level Policies and Strategies to Mitigate and Adapt	2018	72	yes	yes
Connecticut	Connecticut Climate Change Preparedness Plan	2013	76	yes	yes
District of Columbia	Climate Ready DC: The District of Columbia's Plan to Adapt to a Changing Climate	2016		yes	yes
Delaware	Climate Framework for Delaware	2015		yes	yes
Florida	Florida's Energy and Climate Change Action Plan	2008	28	yes	yes
Georgia	-			-	yes
Hawaii	Planning underway			yes	yes
Idaho	-			-	yes
Illinois	-			yes	yes
Indiana	-			yes	-
Iowa	-			yes	yes
Kentucky	-			yes	yes
Louisiana	-			yes	yes
Maine	People and Nature Adapting to a Changing Climate: Charting Maine's Course	2010	118	yes	-
Maryland	Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change – Phase II: Building societal, economic, and ecological resilience	2011	154	yes	yes
Massachusetts	Massachusetts Climate Change Adaptation Report	2011	373	yes	yes
Michigan	Planning underway			yes	yes
Minnesota	Planning underway			yes	-
Mississippi	-			-	yes
Montana	Montana Climate Solutions Plan		0	-	yes
Nevada	-			yes	-
New Hampshire	New Hampshire Climate Action Plan: A Plan for New Hampshire's Energy, Environmental and Economic Development Future	2009	33	yes	yes

State	State led adaptation plan	Date finalized (latest version)	Goals	Sector/ agency plans	Local/ regional plans
New Jersey	Planning underway			yes	yes
New Mexico	-			yes	yes
New York	New York State Climate Action Plan Interim Report	2010	121	yes	yes
North Carolina	North Carolina 2020 Climate Risk Assessment and Resilience Plan	2020	0	yes	yes
Ohio	-			-	yes
Oklahoma	-			-	yes
Oregon	The Oregon Climate Change Adaptation Framework	2010	122	yes	yes
Pennsylvania	Pennsylvania Climate Adaptation Planning Report: Risks and Practical Recommendations	2011	87	yes	yes
Rhode Island	Resilient Rhody: An Actionable Vision for Addressing the Impacts of Climate Change in Rhode Island	2018		yes	yes
South Carolina	-			yes	yes
Tennessee	-			-	yes
Texas	-			yes	yes
Utah	-			-	yes
Vermont	Planning underway			yes	yes
Virginia	Virginia Governor's Commission on Climate Change Final Report: A Climate Change Action Plan	2008	43	yes	yes
Washington	Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy	2012	287	yes	yes
Wisconsin	Planning underway			yes	yes

Source: Georgetown Climate Center

Local strategies

The number of local strategies varies greatly among the states. There are several states that don't have any local strategies but, for example, California has over 40 local strategies whereas Florida has 15, New York 13 and Washington 12 local strategies. Thus, municipalities, cities and communities around the USA have started to prepare for a changing climate. (Georgetown Climate Center 2021) For example, EPA's Climate Change Adaptation Resource Center (ARC-X) supports local communities and provides information, resources and frameworks to help communities to get started.

Alaska

Local strategies in Alaska:

- City of Homer's Climate Action Plan, 2007. Covers both mitigation and adaptation.
- Anchorage, Climate Action Plan, 2019. Covers both mitigation and adaptation.
- Climate Adaptation and Action Plan for the Norton Bay Watershed, Alaska. 2013.
- Oscarville Tribal Climate Adaptation Plan, 2019.
- Nome Tribal Climate Adaptation Plan, 2017.
- Shaktoolik, Alaska: Climate Change Adaptation for an At-Risk Community, Adaptation plan, 2014.
- Tlingit & Haida Adaptation Plan, 2019.
- Metlakatla Indian Community, Climate Change Adaptation Plan. 2017–2027.

In Alaska, adaptation work is mainly carried out at the local level. In addition to municipalities, also, several tribes have created adaptation plans. Money to support these efforts is mainly coming from the federal level directly to the tribes. (Holen 2021)

Several Alaskan tribes have received grants from the Bureau of Indian Affairs (BIA) for developing adaptation plans (Holen 2021). As an example, the Nome Eskimo Community's adaptation plan received funding from BIA and the plan was created in cooperation between the Nome Eskimo Community, the University of Alaska Fairbanks and Alaska Center for Climate Assessment and Policy. (Kettle et al. 2017)

Additionally, for example, Alaska Native Tribal Health Consortium's (ANTHC) Center for Climate & Health helps communities to understand the impacts of climate change and to adapt them in healthy ways as well as provides training, technical assistance and assessments. Also, ANTHC's Center for Environmentally Threatened Communities (CETC) supports rural communities in Alaska that are experiencing infrastructure impacts resulting from flooding, erosion and permafrost thawing.

Legal framework

There is no dedicated act on climate change in the USA. However, executive orders (The White House 2021b, 2021d) issued by President Biden direct his administration to take a whole-of-government approach. Executive orders have much of the same power as a federal law. Additionally, several states have laws concerning climate change.

Alaska

There is no dedicated act on climate change in Alaska.

Process and decision making

Planning, reporting and reviewing

After the Federal Agencies have submitted the initial Climate Action Plans, progress reports are submitted yearly (The White House 2021d).

Decision making

In the USA, climate change policies are developed both at the federal and state levels.

President Biden has established the White House Office of Domestic Climate Policy (Climate Policy Office). The Climate Policy Office coordinates, for example, the policy-making processes, advices the President, ensures that decisions and programs are consistent with the President's stated goals and monitors climate-policy agenda's implementation. (The White House 2021d) President Biden created also a new presidentially appointed position, Special Presidential Envoy for Climate, whose responsibility is to elevate the issue of climate change and underscore the commitment of the administration. (The White House 2021d)

The National Climate Task Force facilitates, for example, the deployment of a government-wide approach and planning and implementation to

increase resilience to the impacts of climate change (The White House 2021d).

The federal government has many times struggled to adopt meaningful climate change legislation, but state and local governments have been quite active in the climate policy sphere. Thus, climate related policy activities have largely taken place via state and local governments. (Bromley-Trujillo & Holman 2020). Although the federal level policies and leadership are needed, the actions taken by states play a vital role by developing and testing effective policies. However, there are also limits in what states can do. For example, they lack the federal government's power of the purse. (Center for American Progress 2020)

States are cooperating through the United States Climate Alliance. The Alliance is a bipartisan coalition of governors consisting of 24 member states that are committed to the goals of the Paris Agreement. States cooperate to enhance action, share expertise across sectoral working groups including also a working group on climate resilience.

Cooperation, coordination and stakeholder engagement

Tools for intra-governmental co-ordination

President Biden nominated a group of climate experts to key roles in his administration. However, it is still unclear how President Biden will coordinate the team (The New York Times 2020) and it is been noted that the group does not have an obvious point person for climate resilience and adaptation (NRDC 2021).

Biden's executive order on tackling climate crisis (The White House 2021a) established the National Climate Task Force. The Task Force includes e.g. cabinet-level leaders from 21 federal agencies. The Task Force had its first meeting in February 2021 (The White House 2021c). When necessary, the Task Force engages e.g. State, local, Tribal and territorial governments (The White House 2021a).

Alaska

Adaptation Advisory Group of the Governor's Sub-Cabinet on Climate Change was established in 2007 by the then Governor Sarah Palin. The Sub-Cabinet had a responsibility for developing adaptation and mitigation options for the state. (AMAP 2017c) In 2017, the Walker administration revoked the order and the Sub-Cabinet was replaced by the Climate Action for Alaska Leadership Team (Georgetown Climate Center 2018).

The Climate Action for Alaska Leadership Team e.g. advised the Governor on adaptation and mitigation and identified climate change priorities, goals and metrics (Georgetown Climate Center 2018). In 2018, the Team also released a series of recommendations for helping Alaska to adapt to climate change (Climate Action for Alaska Leadership Team 2018a, 2018b). However, in 2018, Mike Dunleavy was elected Governor of Alaska and the Climate Action for Alaska Leadership Team was dismissed in 2019 (Arctic Today 2019). All mentions of the Team were removed from the State website but the University of Alaska Fairbanks archived the Team's findings.

Additionally, in 2007, Alaska's Immediate Action Workgroup (IAWG) was established having a task to identify needs of communities that were imminently threatened by impacts associated with climate change (erosion, floods, permafrost degradation etc.). IAWG developed strategies to respond to these impacts and published two reports with recommendations on how communities' needs could be met. However, in 2011, IAWG did not receive authorization to continue. (Norwegian Refugee Council and the Alaska Institute for Justice 2017)

International co-operation

USA officially rejoined the Paris Agreement on the 19th February 2021 (U.S. Department of State 2021). According to the Biden's Executive Order on Tackling the Climate Crisis at Home and Abroad (The White House 2021d), climate crisis will be put at the center of the U.S. foreign policy and the United States will develop a financial plan to help developing countries act on and adapt to the climate crisis.

Tools to engage stakeholders

EPA's Adaptation Resource Center (ARC-X) is an interactive resource helping local governments. Decision-makers can create an information package tailored specifically to the needs of the certain region and area of interest (e.g. air, water, health) and receive information about the risks, relevant

adaptation strategies, case studies, tools and funding opportunities.

Climate Adaptation Science Centers (CASC) is a partnership-driven program where researchers cooperate with natural and cultural resource managers and local communities and help fish, wildlife, waters and lands to adapt. CASC network consists of eight regional and one national CASC. CASCs e.g. fund scientific projects and deliver science to help to adapt.

Adaptation Clearinghouse – An online database and networking site serving policymakers, resource managers, academics and others who are working to help communities to adapt to climate change. The database is mainly focusing on the water, coastal, transportation, infrastructure, public health sectors, adaptation planning, policies, laws and governance. The Clearinghouse includes huge amounts of different adaptation resources and networks providing information on a specific topic.

Resilience21, formed at the end of 2020, is a coalition of more than 50 of the U.S.'s leading practitioners working with cities and communities to build resilience with an emphasis on the natural hazards worsened by climate change. Resilience21 has produced a document that draws up recommended actions for the Biden's administration to build more resilient communities.

BRACE Framework (The Building Resilience Against Climate Effects) is a five-step process for developing plans and strategies to help communities prepare for the health effects of climate change.

The Tribal Climate Change Project is a collaborative project at the University of Oregon that aims at increasing understanding about tribal adaptation and mitigation planning. The Tribal Climate Change Guide and the PNW Tribal Climate Change Network are a part of the project. The Tribal Climate Change Guide provides e.g. information on funding opportunities as well as examples on existing tribal adaptation plans.

The Tribes and Climate Change program coordinated by the Institute for Tribal Environmental Professionals, supports tribes and provides information to gain better understanding of climate change, shares resources and an adaptation planning toolkit to develop adaptation strategies and provides in-person trainings and assistance to build adaptation planning capacity.

Alaska

Alaska Climate Adaptation Science Center (AK CASC) creates Alaska-relevant climate models, inform communities through research and responds to stakeholder needs.

Adapt Alaska website, developed by the Alaska Sea Grant and partners, is a learning and planning tool providing Alaska-specific resources and concrete steps to craft adaptation solutions and plans. Adapt Alaska arranges also workshops for communities and acts as a discussion space e.g., for Alaskan communities, tribes and non-profits.

Alaska Center for Climate Assessment and Policy (ACCAP) conducts research to inform resource management, planning and public policy, and to build Alaskans' capacity to prepare for and adapt to climate change. ACCAP collaborates, for example, with decision-makers, scientists, organizations and industry and assists stakeholders to craft adaptation strategies.

Biggest challenges

Adaptation challenges

As landscapes, ecosystems, communities and economies vary across the United States, climate change affects regions differently. Overall, challenges are related e.g., to more frequent heat waves, extreme precipitation, larger wildfires, water scarcity, coastal flooding, sea level rise, droughts and other extreme weather events. (U.S. Department of State 2014)

Alaska

In Alaska, summer sea ice is receding rapidly, glaciers are shrinking and permafrost is thawing. Climate change causes also damage to infrastructure and major changes to ecosystems. (U.S. Department of State 2014) In the Arctic region, the rate and magnitude of climate change may become a barrier to adaptation. If critical ecological thresholds are exceeded, communities relying, for example, on hunting, fishing and gathering are affected by numerous negative processes including e.g., decline of sea ice and changing ocean temperatures. (AMAP 2017c) It was assessed already in

2003 that 86 % of the Alaska native villages are affected by flooding and erosion (GAO 2003).

Adaptation policy challenges

In the U.S., many challenges are related to the changes in federal administration and their policies regarding climate change. For example, in 2013, president Obama signed the Executive Order 13653 – Preparing the United States for the Impacts of Climate Change which made adaptation a priority for all federal agencies. However, President Trump rescinded the order in 2017. (NRDC 2021) Thus, it is challenging to make long-term climate strategies.

Also, political parties are deeply divided on whether climate change should be a top priority. According to the Pew Research Centre's survey (2020), 78 % of Democrats said that dealing with climate change should be a top priority for the president and Congress whereas only 21 % of Republicans were agreeing on that.

Alaska

Adaptation is not prioritized in the state's policies. Additionally, changes in administration poses also challenges to create long-term planning. For example, Alaska had a climate change strategy that addressed also adaptation but the governor Mike Dunleavy rescinded the strategy in 2019 (Arctic Today 2019).

Due to sea level rise, coastal erosion, permafrost thawing, floods and storms, several communities are facing climate impacts that require immediate adaptation measures and relocation (EPA 2016). The majority of the residents in these villages are Indigenous Alaskans (AMAP 2017c). For example, the village of Newtok is aiming to relocate to Mertavik by 2023 being the first village that have made the decision to relocate. (US Army Corps of Engineers 2006 & Adaptation Clearinghouse)

However, there are challenges to find funding for relocation projects (AMAP 2017c) as federal programs are not designed to address the scale and complexity of community relocation (GAO 2020). There is no clear federal leadership to support climate migration and no federal entity has the authority to coordinate assistance. As an example, it has taken over 30 years to begin to relocate Newtok. (GAO 2020)

Key policy priorities

Key priorities

At the federal level, it is not yet fully possible to assess the priorities of the Biden administration. But even during the Trump administration focus was on coastal resilience and also Biden's administration is focusing on that. Also, more money will be addressed to science. (Holen 2021)

Alaska

In Alaska, adaptation work is mainly carried out at the local level and several communities have developed adaptation plans. Adaptation plans' priorities vary among communities including e.g.:

- Sanitation, water, electrical upgrades and other infrastructure
- Wind and solar integrations
- Supporting research and monitoring
- Increasing awareness
- Development of guidelines
- Culture
- Economy

Financial tools

EPA and other federal government entities offer financial and technical resources to advance local adaptation efforts including e.g., State Revolving Fund, Brownfield Revolving Loan Fund and Cleanup Alternatives, Tribal General Assistance Program and Great Lakes Restoration Initiative. These opportunities are presented at the Climate Change Adaptation Resource Center's website. However, due to the changes in the federal administration, it is probable that all information provided at the EPA website is not yet up to date.

Federal grants are available to support local communities and tribes in adaptation efforts. For example, the Bureau of Indian Affairs' Tribal Climate Resilience Program provides funding opportunities to tribes and tribal organizations. In 2021, grants are available e.g., for adaptation planning, capacity building and planning for relocation. In 2020, in total $14.4 million was awarded to tribes and tribal organizations from which $6 million was awarded to Alaska (BIA 2020).

Tribes can also apply for funding from the EPA's Indian Environmental General Assistance Program (GAP). University of Oregon's Tribal Climate Guide provides information about available grants, programs and plans related to climate change that may be useful for tribes.

There are also several other funding opportunities including, for example, the National Coastal Resilience Fund and the NOAA Climate Adaptation and Mitigation Program.

Best practices

Climate Change Adaptation Resource Center supports communities in adaptation efforts and provides tailored information based on the local authority's location and interests. The website also includes a lot of different resources, for example, about climate impacts, planning, strategies, case studies, tools, training and funding.

U.S. Climate Resilience Toolkit provides a five-step process for communities to identify, assess and confront climate vulnerabilities. The site also provides, for example, data tools and case studies to help communities to put process into action.

Adaptation workbook created by the Northern Institute of Applied Climate Science provides a structured process to consider the potential effects of climate change and design land management and conservation actions. The Workbook consists of five basic steps and when completed it results in a detailed, customized adaptation plan for a property. It is also possible to attend a 7-week free online course and during the course, participants develop their own adaptation project plan or proposal.

The Georgetown Climate Center's Adaptation Clearinghouse database is an online database and networking site serving e.g., policymakers. Additionally, the State Adaptation Progress Tracker tracks the progress states are making in implementing adaptation plans and collects information e.g., on states' local and regional plans.

There are several funding opportunities for tribes for adaptation planning and capacity building. These include, for example, the Bureau of Indian Affairs' Tribal Climate Resilience Program and the EPA's Indian Environmental General Assistance Program.

The Tribal Climate Change Project at the University of Oregon and The Tribes and Climate Change program coordinated by the Institute for Tribal Environmental Professionals, are, for example, increasing understanding about tribal adaptation and mitigation planning, providing information and training, sharing resources and toolkits.

Alaska

In Alaska, communities and tribes are taking the lead on planning for climate change. Thus, the work is not driven by the state. Several communities have developed adaptation plans that are based on the needs and interests of each community. There are also several organizations supporting local level including Adapt Alaska, Alaska Sea Grant and Alaska Native Tribal Health Consortium.

5. Synthesis

5.1. National adaptation work

Five countries studied have both a national adaptation strategy and plan, two have only a national adaptation strategy, and two have only a national adaptation plan (Table 5.1.1.). Faroe Islands, Greenland, Iceland, Belarus and the USA do not have a national or territorial adaptation document. Some countries that started the process early like Germany and Finland, have already updated their strategies or plans. Canada has a strategy that integrates questions related to climate change mitigation and adaptation as well as green economy.

When it comes to sectoral adaptation work, the approach differs from mandatory sectoral action plans in Sweden to no separate sectoral adaptation documents at all in Germany, Lithuania and Poland (Table 5.1.2). In most countries, a few key sectors have prepared adaptation strategies or action plans.

Table 5.1.1. The year of publishing national strategies and action plans in different countries.
S = strategy, ES = existing strategy, P = Plan

Country or territory	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Finland	S	ES	ES	ES	ES	ES	ES	ES	ES	P	ES	ES	ES	ES	ES	ES
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	S	ES	ES
Denmark	-	-	-	S	ES	ES	ES	P	ES	ES	ES	ES	ES	ES	ES	ES
Faroe Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	S	ES	ES	ES	ES	ES	ES	ES
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Germany	-	-	-	S	ES	ES	P I	ES	ES	ES	P II	ES	ES	ES	ES	P III
Poland	-	-	-	-	-	-	-	-	S	ES	ES	ES	ES	ES	ES	ES
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	S & P	ES	ES	ES
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P	ES
Lithuania	-	-	-	-	-	-	-	S	P	ES	ES	ES	ES	ES	ES	ES
Russia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P
Belarus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canada	-	-	-	-	-	-	-	-	-	-	-	S	ES	ES	ES	ES
USA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.1.2. Sectoral strategies in different countries.

Country or territory	General approach	Sectors included
Finland	A few sectors have dedicated adaptation action plans or adaptation as a part of their broader climate programmes.	Environment, agriculture and forestry as well as transport and communications
Sweden	Government has mandated 32 national authorities to develop action plans.	Implementing the plans has started but some sectors are still in the process of developing the action plans. 20 action plans exist at the moment.
Denmark	A few national sectors have adaptation action plans.	Transport, roads and coastal protection
Faroe Islands	No sectoral strategies.	-
Greenland	There are no sectoral adaptation strategies, but sectoral assessments have been conducted on how the public sector can promote adaptation. Ministries are required to include climate change in their annual planning documents.	-
Norway	All ministries and sectoral agencies are responsible for addressing adaptation. Approaches and state of the work differ. Several directorates have either developed sectoral adaptation strategies or climate strategies addressing adaptation.	Environment, fisheries, water resources and energy
Iceland	No sectoral strategies.	The national power company has included adaptation into its strategies and investment planning.
Germany	There are no separate sectoral strategies. The national adaptation strategy is looking at different sectors.	An adaptation program of measures is in preparation for agriculture, forestry, fisheries and aquaculture.
Poland	Separate sectoral strategies do not exist.	-
Estonia	Some adaptation measures included in sectoral development plans and action plans.	A Climate Change Mitigation and Adaptation Action Plan for Agriculture.
Latvia	There are no sectoral adaptation strategies. However, the government is planning to prepare some guidelines at sectoral level.	-
Lithuania	There are no sectoral adaptation strategies. The preferred approach is to integrate adaptation into existing sectoral strategies.	-
Russia	There are no sectoral strategies yet, but the National Action Plan includes plans of developing strategies for specific sectors.	Energy, transport, agriculture to be developed
Belarus	There are two sectoral strategy documents.	Forestry, agriculture
Canada	There are some sectoral climate risk assessments, but no adaptation strategies or plans at the federal level. At the provincial level, some sectoral strategies include adaptation issues, but separate sectoral adaptation strategies are rare. In British Columbia, subprovincial agricultural adaptation strategies have been published.	Natural resources, agriculture
USA	According to President Biden's executive order, federal agencies are directed to develop a climate action plan to increase the resilience of its facilities and operations to climate impacts.	Executive order covers all federal agencies.

Finland, Germany and Sweden have regular reporting and reviewing cycles of either national adaptation strategy or action plan. The reviewing cycle is either 5 or 10 years. (Table 5.1.3). Lithuania has a regular reporting cycle. Other countries studied seem to have more ad hoc reporting and reviewing cycles or the system is just being developed.

Only Finland and Norway have a law that includes the description of climate change adaptation governance at a national level (Table 5.1.3). Germany does not have a dedicated law at a federal level, but nine federal states have established legislation on adaptation.

Ministry in charge of climate change adaptation in most countries studied is the ministry of the environment or similar (Table 5.1.3), which indicates that adaptation is still seen as an environmental issue, not a topic relevant to all sectors. In Finland, the ministry in charge is the Ministry of Agriculture and Forestry, whereas in Denmark it is the Ministry of Climate and Energy.

Table 5.1.3. Process and hierarchy in different countries.

Country or territory	Reporting cycle	Reviewing cycle	Dedicated law	Ministry in charge
Finland	Regular cycle, every four years to the parliament as part of the annual climate report.	Regular cycle, according to the climate change act, the government needs to adopt an adaptation plan every 10 years. Interim review of the current plan was carried out in 2018.	The climate change act includes adaptation	Ministry of Agriculture and Forestry
Sweden	Regular cycle, national and regional authorities must report on their work on adaptation yearly.	Regular cycle, the national adaptation strategy has a five-year evaluation-cycle. The Strategy will be updated in 2023.	No	Ministry of the Environment and Energy
Denmark	-	No regular cycle, the reviews are ad hoc. The adaptation plan was reviewed in 2013 and 2015. The adaptation strategy will be updated in 2021.	No	Ministry of Climate and Energy
Faroe Islands	No	No	Parliamentary Act No. 61 from 2012 regulates preparedness measures	-
Greenland	No	No	No	Department of Research and Environment
Norway	No reporting cycle, the system is under development	No reviewing cycle, the system is under development	The Climate Change Act includes adaptation	Ministry of Climate and Environment
Iceland	-	-	Act no. 70 on Climate Change covers both mitigation and adaptation	-
Germany	Regular cycle, the monitoring report is published every 4 years, progress report every 5 years.	Regular cycle, action plans are revised every 5 years. The adaptation strategy has not been revised.	Not at Federal level. Nine Federal States have a legal framework for adaptation either in climate acts or sectoral legislation.	The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Poland	-	Data collection for the review of the national strategy started in 2017. National Environmental Policy 2030 will include further adaptation measures.	No	Ministry of the Environment

Country or territory	Reporting cycle	Reviewing cycle	Dedicated law	Ministry in charge
Estonia	Regular cycle, the plan is reported annually.	The Ministry of the Environment has reviewed the implementation of the action plan. The review will inform preparing the new action plan for the period 2021–2025.	No	Ministry of the Environment
Latvia	MEPRD will submit a mid-term report on the implementation of the Plan by 2026 and a final report by 2031.	The Plan may be reviewed and updated after the reports.	No, but a future climate law will also cover adaptation	Ministry of Environmental Protection and Regional Development
Lithuania	Regular cycle, every two years the Government prepares a report on the implementation of the Strategy to the Parliament.	The outcomes of the monitoring, reporting and evaluation scheme will feed into further development of the Action Plan and the update of the Strategy.	No	Ministry of the Environment
Russia	-	A 2023–2025 plan of action is expected to replace the latest document by late 2022, according to its tentative schedule.	No	Ministry of Economic Development
Belarus	No	No	No	The Ministry of Natural Resources and Environmental Protection
Canada	Progress of the Pan-Canadian Framework is reported annually.	-	Not at the federal level. The climate legislation in British Columbia and Québec includes adaptation.	Environment and Climate Change Canada
USA	After the Federal Agencies have submitted the initial Climate Action Plans, progress reports are submitted yearly.	No information	No	-

5.2. Regional and local adaptation work

The countries studied have differing approaches towards regional and local adaptation work (Table 5.2.1). The most common approach is that subnational adaptation strategies or plans are voluntary, but they are supported by projects (e.g. Germany, Poland, Norway). However, some countries have obligatory subnational plans.

For example, in Sweden regional adaptation plans are obligatory, and support is provided for the county administrative boards in the form of guides, trainings and regular meetings. Denmark has no specific regional adaptation strategies, but municipalities must adopt adaptation action plans. Denmark provides adaptation expert services for the municipalities.

Table 5.2.1. Summary of the subnational adaptation work in different countries.

Country or territory	Regional strategies	Local strategies	Support for regional/local strategies
Finland	Most of the 18 regions in mainland Finland have either a climate strategy or plan since early 2010s, but in most strategies, focus has been on mitigation. The role of climate adaptation in most regions is increasing.	Many municipalities have included adaptation in their climate strategies	Guide from Association of Finnish Municipalities on climate work in municipalities includes a section on adaptation. The web portal ilmasto-opas.fi (climate guide) includes a section on adaptation and good practices from municipalities sorted by sector.
Sweden	All county administrative boards (CABs) must have an adaptation plan. These 21 regional action plans, adopted in 2014, cover the whole country.	Local authorities are not obligated to develop action plans, but they need to consider adaptation in their planning processes and make risk and vulnerability analyses	The Swedish Meteorological and Hydrological Institute (SMHI) supports CABs in their adaptation efforts and has developed guides on vulnerability analyses and an action plan. SMHI provides also training, arranges regular meetings and provides basic information about climate for the CABs.
Denmark	There are no dedicated regional adaptation strategies, but most regions have incorporated adaptation into their regional climate strategies.	It is obligatory for municipalities to adopt adaptation action plans. All 98 municipalities have done so.	A municipal climate adaptation network, chaired by the Local Government Denmark (KL), shares knowledge and solutions between municipalities. A mobile team provides adaptation expert services to municipalities, including training, workshops and customized advice.
Faroe Islands	No	No	-
Greenland	No	No	No
Norway	The county authorities should assess in regional plans how to facilitate adaptation, in line with the Planning and Building Act. The county governor follows up the Government's policy, supports municipalities and coordinates civil protection on regional level.	Some municipalities have adaptation plans	11 Norwegian cities collaborate through the Front runner network established in 2015 following the Cities of the future programme that aimed at developing adaptation plans for the municipalities. Courses on adaptation are offered to municipalities and counties.
Iceland	No regional strategies	Reykjavik's climate policy includes some adaptation measures.	-
Germany	All 16 federal states have adaptation strategies and measures, some as a part of an integrated climate strategy or programme.	Most large municipalities or cities have created adaptation strategies or plans	The Federal Government provides funding for adaptation by local authorities under the National Climate initiative. Advisory and support is provided by projects or initiatives.

Country or territory	Regional strategies	Local strategies	Support for regional/local strategies
Poland	There are no specific regional adaptation strategies, but in some cases, adaptation is included e.g., in development plans of the regions.	Some municipalities have adaptation plans	Ministry of the Environment has published guidance concerning the preparation of urban adaptation plans. Let's feel the climate -project supported 44 Polish cities to develop adaptation plans and improve their climate resilience.
Estonia	There are no regional adaptation strategies in Estonia.	Several municipalities (including key cities Tallinn and Tartu) have either finalized or are preparing local adaptation strategies. Local strategies are mainly part of broader Sustainable Energy and Climate Action Plans.	The Ministry of the Environment is preparing a finance scheme for municipalities to support compiling their local energy and climate plans.
Latvia	The first regional adaptation strategy in the Salacgriva region was developed and adopted in 2011.	There are some local adaptation strategies, e.g., in Valka. Adaptation is mostly included in broader municipal Sustainable Energy Action Plans.	MoEPRD encourages local governments to develop adaptation in local development plans.
Lithuania	-	Several municipalities have developed adaptation action plans to improve adaptive capacity and infrastructure resilience.	A project is being launched with EEA funding to carry out local vulnerability studies and prepare a pilot plan, followed up with five plans later.
Russia	Regions are recommended to develop adaptation strategies but those are not obligatory. Specific operative measures will be developed for the Arctic Region by the third quarter of 2021.	St. Petersburg drafted a climate strategy. It was not approved, but some parts were incorporated into measures to protect the city from flooding.	-
Belarus	-	The communities of Chavusy, Motal and Sporovksy have local adaptation strategies. Integrated mitigation and adaptation plans have been developed in Covenant of Mayors signatories.	Local adaptation work has been supported by international funding and networks.
Canada	Most provinces and territories have released adaptation strategies. Many of them integrate questions of mitigation, adaptation and green economy.	In Canada, local adaptation planning varies greatly across provinces and territories. Many municipalities, especially larger cities, have adaptation strategies or plans.	Most provinces and territories encourage municipalities in voluntary adaptation planning. There are toolkits or guidebooks available. Many of them have been prepared with project funding.
USA	19 states have a state-led adaptation plan	The number of local strategies varies greatly among the states.	There are several tools, databases, resources, networks, research projects and organizations that support local and regional actors.

5.3. Key priorities

Countries use both national adaptation strategies and action plans to set priorities for policy and action. The processes for setting the priorities vary, but may involve inter-ministerial committees, expert working groups, stakeholder dialogues and public consultations. Sources include vulnerability and risk assessments, existing scientific literature and specifically commissioned studies. Some countries have also analysed the cost-benefit ratio of various adaptation measures. Priorities are also affected by pragmatic considerations such as which measures are eligible for external funding.

Priorities are defined in various ways, but often cover different sectors (e.g. health, agriculture) and cross-cutting measures (e.g. information, co-ordination). Some priorities focus more on concrete measures and tools. Several countries underline the need to mainstream adaptation and integrate it into existing processes and different governance levels, rather than dealing with it as a stand-alone issue on the national level. Some countries have also identified guiding principles, such as flexibility, transparency and the precautionary principle.

Table 5.3.1. Key priorities and how they are set in different countries

Country or territory	Policy priorities	How priorities are chosen
Finland	• Integration of adaptation into the planning and activities of both the various sectors and their actors. • Access for the actors to the necessary climate change assessment and management methods. • R&D, communication and education and training to enhance the adaptive capacity of society, develop innovative solutions and improve citizens' awareness on adaptation.	• Government adopts them in the national adaptation strategy. • Priority is given to actions which secure functions vital to the society or reinforce risk management and ones that should be taken independent of how climate changes exactly.
Sweden	• Landslides and erosion that threatens communities, infrastructure and businesses • Floods that threaten communities, infrastructure and businesses • High temperatures that mean risks to health and well-being for humans and animals • Lack of water resources for people, farms or industry • Biological and ecological effects that impact sustainable development • Impacts on domestic and international food production and trade • Increased occurrence of pest, diseases and invasive foreign species that impact humans, animals and plants	Priorities are set in the National Adaptation Strategy
Denmark	• The Adaptation Strategy describes three key cross-sectoral measures: a targeted information campaign on adaptation, a research strategy ensuring more focus on adaptation research, and intergovernmental coordination. • One priority is mainstreaming of adaptation, Denmark has included consideration of adaptation in a wide range of legislation. • Denmark has prioritized different tools (e.g. flood screening tools) and new tools have also been launched recently	Priorities are set in the National Adaptation Strategy. A coordination forum with members from all relev ant state authorities as well as representatives from the municipalities, regions and the coordinating body for research was an important body in priority setting during the preparation of the National Adaptation action plan in 2008–2011.
Faroe Islands	Priorities have not been set	-
Greenland	Priority has been so far in including climate change in sectoral planning documents	There is no systematic procedure for priority setting yet
Norway	Everyone is responsible for adaptation (individuals, business, authorities etc.). Adaptation work should be based on the best available knowledge and climate projections should be incorporated into planning processes with a long-time horizon. Strong emphasis is put on the local level and the implementation measures are to a large extent going to be implemented in municipalities	Priorities are set in the National Adaptation Strategy

Country or territory	Policy priorities	How priorities are chosen
Iceland	-	-
Germany	In the III National Adaptation Plan, the priority is given to activities within the clusters water, infrastructures, land, health, economy as well as spatial planning and civil protection. In addition, work on cross-sectoral topics, like awareness building and enforcing the knowledge base as well as building networks continues to be a key priority.	Priorities are set in the III National Adaptation Plan. New strategic level priorities will be set in the continuing strategy work. The next step is developing a vision for a climate-resilient Germany in 2060 with a time horizon until 2100.
Poland	Urban areas, agriculture and awareness raising are prioritized at the moment	Priorities are set in the National Adaptation Strategy.
Estonia	Principles: awareness, readiness and resilience, caution Sectors: 1. health and rescue capability 2. land use and planning 3. natural environment 4. bioeconomy 5. economy 6. society, awareness, and cooperation 7. infrastructure and buildings 8. energy and security of supply	The adaptation options and measures in the strategy are based on the analysis of existing scientific literature, policies and legislation and information from different databases, as well as knowledge gathered in the expert groups for the baseline studies. The selection of priority options is based on multi-criteria analyses, stakeholder consultations, and the opinion of the inter-ministerial committee.
Latvia	Strategic goals: 1. Human life, health and well-being, regardless of gender, age or social background, are protected from the adverse effects of climate change; 2. The economy is able to adapt to the negative effects of climate change and seize the opportunities offered by climate change; 3. Infrastructure and buildings are climate-resistant and planned in accordance with possible climate risks; 4. Latvia's nature and cultural and historical values have been preserved and the negative impact of climate change on them has been reduced; 5. Information based on scientific reasoning is provided, including monitoring and forecasting, which promotes the integration of aspects of adaptation into sectoral policies and spatial development planning documents, as well as public information.	-
Lithuania	Main directions: 1. integrated approach at the regional level 2. synergy of mitigation and adaptation measures 3. country-specific adaptation research 4. strong knowledge base about impacts	Priorities have been set in the strategy and action plan. From now on priorities are set in the National Energy and Climate Plan (NECP) NECP.
Russia	Priorities are not yet set	-
Belarus	1. mitigation 2. reducing vulnerability 3. maximizing benefits 4. natural and locally appropriate solutions	Priorities are chosen according to specific local needs.
Canada	1. Translating scientific information and Traditional Knowledge into action 2. Building climate resilience through infrastructure 3. Protecting and improving human health and well-being 4. Supporting particularly vulnerable regions 5. Reducing climate-related hazards and disaster-risks	Priorities are set in the Pan-Canadian Framework on Growth and Climate Change.
USA	At the federal level, it's too early to assess what will be the priorities in adaptation policies of the Biden's administration. However, it is probable that at least coastal resilience will be focused on.	

5.4. Tools and practices for co-operation and stakeholder engagement

Most countries studied have governmental working groups or committees in place to coordinate the work across sectors (Table 5.4.1.). In some countries these working groups include representatives of different stakeholders. Also, sectoral working groups exist in some countries. In Denmark, there is a formal coordination network for municipalities.

Stakeholder engagement varies from non-existing in Russia and Belarus to systematic stakeholder involvement process in for example Germany (Table 5.4.1.). Stakeholder involvement methods include hearings during the preparation of the national adaptation strategy, stakeholder workshops and seminars, and involvement of representatives of different stakeholders in official working groups.

Knowledge sharing is an important part of stakeholder engagement. Denmark, Germany Norway, Poland and Sweden have a dedicated portal for information sharing on adaptation (Table 5.4.1). The content and main target groups vary across countries. Finland has a climate change portal including both mitigation and adaptation issues.

Table 5.4.1. Coordination and co-operation in different countries.

Country or territory	Coordination and co-operation	Stakeholder engagement	Portal
Finland	Political level: ministerial working group on climate and energy policy. Expert level: National Monitoring Group of the National Adaptation Plan.	A series of events were held together with business in 2016 and 2017 to identify adaptation actions and to provide tools for identifying and managing risks in value chains. In 2018, a communication campaign activated NGOs to communicate jointly about the need for everyday life adaptation. A broad mapping of stakeholder views was conducted as part of the mid-term evaluation of the Climate Change Adaptation Plan.	The Finnish Climate change portal ilmastopas.fi includes adaptation issues and examples. The portal is currently under redevelopment.
Sweden	National network for adaptation promotes both vertical and horizontal cooperation and includes 21 counties and 19 Government agencies. Also national networks for thematic cooperation exist. There is wide cooperation on all levels and between sectors and actors working with land use planning, risk management, natural disasters and adaptation, in order to reduce risks and enhance preparedness.	There are several coordination forums where sector agencies and other stakeholders can share experiences and plan key actions. These stakeholders include: • Network for shore erosion • Committee on dimensioned flows in hydroelectric dams in a changing climate • Delegation for landslides • National network for drinking water	The Swedish Climate Change Adaptation Portal (klimatanpassning.se) is run in collaboration between several authorities. It aims at compiling and sharing latest information on adaptation.
Denmark	Koordinationsforum for Klimatilpasning (KoK) was in place during the preparation of the national action plan in 2008–2011 with representatives from state authorities, municipalities, regions and the coordinating body for research. During implementation, cross-sectoral coordination has been more ad hoc with task forces named for specific tasks. There was also a coordinating body for research, but it is no longer active. A municipal adaptation network, chaired by the Local Government Denmark (KL), shares knowledge and solutions between municipalities.	There are several networks involving stakeholders in adaptation. For example, Water in Urban Areas, is an innovation network of knowledge institutions, municipalities, utilities, government agencies and private companies aiming at developing and promoting adaptation technologies and associated planning tools.	The Danish web portal on adaptation includes information on the climate change and advice on adaptation.
Faroe Islands	-	-	-
Greenland	-	-	There is a portal called Climate Greenland http://climategreenland.gl, but it does not work.

Country or territory	Coordination and co-operation	Stakeholder engagement	Portal
Norway	The Norwegian Centre for Climate Services (NCCS) provides a basis for adaptation to be implemented in the municipalities and by sectoral authorities. NORADAPT, Norwegian Research Centre on Sustainable Climate Change Adaptation	The Natural Hazards Forum, cross-sectoral cooperation related to natural hazards, incl. climate change, established in 2016	Klimatilpasning.no is a website targeting mainly municipalities and containing tools, case studies and information on adaptation
Iceland	-	Icelandic Climate Council provides advice on policy objectives related to climate change. Members are representatives of businesses, academia and municipalities NGOs.	There is no portal available
Germany	On the national level, federal ministries form the Interministerial Working Group on Adaptation to Climate Change (IWG Adaptation). To coordinate with the federal states the Conference of Environmental Ministers established in June 2009 a standing committee for adaptation. There are various co-operation platforms for municipalities and sectoral actors and across states.	There has been a systematic stakeholder involvement process including stakeholder workshops, workshops for municipalities and a series of thematic stakeholder dialogues that covered 11 different topics.	KLiVO Climate Preparedness Portal provides information on climate services.
Poland	Working Group on Adaptation to Climate Change supports multi-level and cross-sectoral cooperation. The group aims e.g. at supporting implementation of the national adaptation strategy, mainstreaming adaptation work at regional level, facilitating knowledge sharing between the levels of governance and supporting monitoring and reporting at regional and local level.	Stakeholder involvement in the development of the national adaptation strategy was not systemic. CLIMCITIES project and the Let's feel the Climate project have been promising tools to engage stakeholders in local adaptation planning.	KLIMADA adaptation platform
Estonia	A Steering Committee was formed for the development and management of the national adaptation strategy (NAS). The Committee was led by the Estonian Environmental Research Centre and committee covered representatives of all concerned government authorities, associations and organizations (27 members).	There was a 3-week period for review of the NAS draft with a hearing at the end. The draft was available through an online portal, and several information seminars were held. The committee includes also representatives of local governments, research and environmental NGOs.	There is no portal available
Latvia	An intragovernmental working group on adaptation involved members from different ministries, the State Fire and Rescue Service (SFRS), the Cross-sectoral Coordination Centre, and the State Centre for Defence, Military Sites and Procurement.	An adaptation working group was established by MEPRD, with members representing public institutions and social partners. Experts from agencies, scientific institutions, ministries, municipalities, business and NGOs participated in events in different parts of the planning process.	The visualization of climate scenarios is available online in the climate change analysis tool. The tool allows to explore current and future climate scenarios in the form of maps and graphs.
Lithuania	National Climate Change Committee with representatives of several ministries. Most of the relevant sectors are covered with the Ministries of Health and Interior and the Fire and Rescue Department exceptions. There is also an inter-institutional working group for heatwave prevention.	The National Climate Change Committee consists of experts from government, municipal, science and non-governmental organizations (NGOs) and has an advisory role.	There is no portal available

Country or territory	Coordination and co-operation	Stakeholder engagement	Portal
Russia	There are hardly any cooperation practices or adaptation networks	Involvement of stakeholders is limited and not systematic. There are some public advisory councils or committees where e.g. some NGOs are represented.	There is no portal available
Belarus	Interdepartmental Working Group on Climate Change Problems. The Public Coordination Environmental Council under the Ministry of Natural Resources aims to ensure coordination across government bodies.	The Public Coordination Environmental Council is in charge of public participation on environmental issues.	There is no portal available
Canada	Canadian Council of Ministers of the Environment, Ministers of Innovation, Ministers of Energy, and Ministers of Finance had round table discussions to provide their advice in the preparation process of the Pan-Canadian Framework. In Arctic Canada, the governments of Yukon, the Northwest territories and Nunavut work together to address climate change adaptation in Pan-Territorial Adaptation Partnership.	Canada's adaptation platform is an invitation-based collaboration forum including representatives e.g. from government, Indigenous organizations and NGOs. The platform has various thematic working groups.	Canada's climate change adaptation platform
USA	The Climate Team of Biden National Climate Task Force	There are several projects, websites, databases and networks that aims at supporting and helping stakeholders to adapt to the climate change.	For example, EPA's Adaptation Resource Center provides help to local governments.

5.5. Financial tools

Several sources of EU funding are available for financing adaptation research, planning or practical adaptation measures, mainly for EU countries. They include structural funds, LIFE programmes and EU research programmes. For example, in Finland, projects financed through structural funds have included drafting regional climate strategies including adaptation, and sectoral projects related to, for example, reindeer herding (Sorvali 2012, CLIMINI 2020). In Denmark, the LIFE integrated project Coast to Coast Climate Challenge, is creating a climate resilient Central Denmark Region (Valdemarsen 2018). EU is together with UNDP also financing a project assisting the Government of Belarus in tackling climate mitigation and adaptation. Norway, for its part, funds climate change adaptation in, for example, Estonia and Latvia.

Funding for improving the knowledge base includes research and innovation funding. For example, the Sweden's innovation agency Vinnova and The Swedish Foundation for Strategic Environmental Research Mistra are funding work on adaptation. In Germany, various programmes have included funding for research projects on adaptation. One research project was practical in nature supporting model projects in regions. The Norwegian Environment Agency is funding projects designed to strengthen the knowledge base on which municipalities build their adaptation measures. In Canada, the federal government's Climate Change Preparedness in the North program supports the territories by funding adaptation projects including vulnerability and risk assessments, hazard maps and adaptation plans.

The biggest challenge may be to find finance for implementation of concrete adaptation measures. In general, actors are supposed to finance preventive measures themselves. However, support is available for municipalities both in Sweden and Norway for concrete measures that protect against landslides and floods. In Denmark, the government supports municipalities and property owners to develop coastal protection. There is also a public subsidy in Denmark available for municipalities to finance integrated water management in flood-prone

areas. In Germany, the Federal Government provides funding for adaptation by local authorities under the National Climate Initiative. In Canada, there are investment programs to support climate-resilient infrastructure projects, for example.

In Denmark, Realdania is a philanthropic association that supports, among others, projects that contribute to the Danish cities becoming climate-resilient at the same time contributing to a general development of the cities and society. This and other funding sources for adaptation are found in one place on the Danish adaptation portal.

5.6. International co-operation

International co-operation in the field of adaptation takes various forms. It forms an integral part of the bilateral and multilateral development co-operation in countries like Germany, Norway, Finland and Sweden. For example, in Sweden in 2016, around 50 % of climate-related bilateral development support was focused on adaptation. Sweden is also a major donor in some multilateral climate funds (e.g. Green Climate Fund, the Least Developed Countries Fund, Adaptation Fund). In Germany, mitigation and adaptation are systematically integrated in all relevant bilateral development cooperation programmes. Special priority is given to adaptation in agriculture, water and health sector. Funding is provided for the Global Environment Facility (GEF), Nairobi programme and Strategic Climate Fund of the World Bank, for example. Norway has played a key role in the establishment of the Global Framework for Climate Services under the World Meteorological Organization.

There are multilateral fora on a certain region or climatic area. The countries around the Baltic Sea (Estonia, Finland, Denmark, Germany, Latvia, Lithuania, Poland and Sweden) are collaborating around the implementation of the Baltic Sea Region strategy and action plan for adaptation (see section 3.1). Also neighboring countries (Belarus, Iceland, Norway and Russia) are involved. Finland, Norway, Russia and Sweden take part in the Barents co-operation. The Barents Action Plan of Climate Change includes six measures on co-operation in adaptation. (See section 3.3, International Barents Secretariat 2017) Canada, Finland, Denmark, Iceland, Norway, Russia, Sweden and the USA are also members of the Arctic Council (see section 3.2). The Nordic countries and territories (Finland, Denmark, Iceland, Norway, Sweden, the Faroe Islands and Greenland) have established strong co-operation the main official bodies being the Nordic Council of ministers and the Nordic Council. However, in the field of adaptation, there is no joint Nordic policy or action plan. Co-operation in adaptation is limited to research, and Nordic funding for adaptation projects for the Arctic region. (Nordic Council of Ministers 2017, Goodsite et al.)

All countries in this analysis are parties to both the UN Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. Both treaties include commitments to promote adaptation, such as for wealthier countries to provide climate finance to poorer countries. The Adaptation Committee under the UNFCCC has 16 members, including representatives from Russia, Germany, the USA and Norway. Out of the analyzed countries, Poland and Germany have also recently hosted UN climate conferences (Conferences of Parties, COPs).

Local co-operation across borders is often established around flood risk or water management planning, many times required by the EU planning processes. For example, Poland co-operates with Germany for flood protection on the Odra River. Another example is Denmark collaborating with Germany and the Netherlands on adaptation of the Wadden Sea through the Trilateral Cooperation on the Protection of the Wadden Sea. They also developed a common Climate Change Adaptation Strategy (CCAS) in 2014.

International co-operation may also exist between local governments. For example, the City of Copenhagen transfers the ideas and results from the Climate Resilient Neighborhood in Østerbro to a district of New York.

5.7. Biggest challenges in adaptation policy

The biggest challenges in adaptation policy across countries cluster around three issues: the need to improve awareness and political priority of adaptation; challenges in coordination across sectors and levels; as well as lack of funding or human resources dedicated for adaptation (Table 5.7.1). In addition, the need for more knowledge, capacity and tools or technologies is also mentioned.

Table 5.7.1. Biggest challenges in adaptation policy in the countries studied.

Country or territory	Adaptation policy challenges
Finland	• Improving awareness of weather and climate risks and adaptation needs. • Clarifying roles and responsibilities related to adaptation and ensuring adequate co-ordination. • Developing policies and measures to support adaptation and tools to advance implementation. • There is research funding available for adaptation research as part of various research programmes of the Academy of Finland, but few funded projects actually focus on adaptation.
Sweden	• Even though the awareness about adaptation has increased, efforts are still needed to increase knowledge and capacity. • Often the persons responsible for adaptation work are also working on many other topics • The national climate and vulnerability analysis was carried out in 2007 and partly reviewed in 2015 but since then Sweden has not updated the assessment.
Denmark	• Coordination at municipal level and cooperation between municipalities • Compartmentalized policy structures • Weak mainstreaming adaptation to sectors beyond water • Conflicts between adaptation measures and other local interests. • Fragmentation of rules and regulations and challenges in multilevel governance.
Faroe Islands	Adaptation measures have not been planned nor implemented.
Greenland	The adaptation policy work is just beginning.
Norway	• Cooperation and coordination between different sectors • Funding and resources: not enough funding targeted to adaptation. At the local level and especially in smaller municipalities, there is lack of competence, resources and knowledge. • The regional level has a responsibility in monitoring and advising and guiding municipalities. Advisory requires competence and expertise.
Iceland	Adaptation is not prioritized. In Iceland, the main focus has been on mitigation.
Germany	• Resources, governance and institutional constraints are the most important barriers to adaptation work at the local level. • Coordination across levels (e.g. federal and local) and sectors • Lack of resources in municipalities, only larger cities have resources for an employee responsible for adaptation.
Poland	• Lack of funding for adaptation • Lack of awareness • Low technological advancement in adaptation
Estonia	• Lack of financing for adaptation • Limited integration into spatial planning • Difficulties in the co-ordination and exchange of information between ministries and agencies • Low level of awareness and political priority
Latvia	• Lack of data and awareness • Lack of human and institutional capacity, including knowledge on adaptation options • Lack of funding
Lithuania	Low priority on adaptation. It is politically difficult to prioritise which sectors to support on adaptation. According to an early analysis: 1. effective coordination of the process and cooperating with relevant stakeholders; 2. identification of priority sectors; 3. multi-level governance of adaptation policy; 4. establishment of links between adaptation policy and sectoral policies; 5. building of knowledge and awareness (particularly in the general public); 6. structuring the strategy document.
Russia	• Adaptation is not prioritized. More awareness is needed. Preventive measures are not taken, and Russia is not acting proactively. • Generally, the problem is that the strategies and plans are not always implemented. • Development of better strategies and plans would require good quality research for example on climate projections for different regions, which is not currently possible due to lack of funding.

Country or territory	Adaptation policy challenges
Belarus	• Insufficient funding • Supporting the development of local adaptation plans with up-to-date information and measures suitable for local conditions. • Improving the skills of the participants in the process, without which the implementation of strategies and adaptation measures is extremely difficult. • Development and adoption of specific measures for adaptation, and their implementation in cities, including the search for funding sources. • Developing, testing and demonstrating scalable solutions, combining top-down and bottom-up approaches
Canada	• Adaptation is multi-level and multi-sectoral issue, but responsibilities of different actors are not always clear. • Lack of local expertise on adaptation especially in smaller municipalities • Adaptation work is fragmented to specific individuals and groups and there is no broad awareness of the issue • Adaptation is not present in political discourse
USA	Many challenges are related to the changes in federal climate policies which make it challenging to make long-term plans.

6. Good practices

6.1. Planning process and measuring success

I: German systematic monitoring, evaluation and updating process

In Germany, there is a systematic process to monitor, evaluate and update the adaptation plan. The monitoring report is published every 4 years, vulnerability analysis every 5–7 years, and an evaluation report, as well as progress reports and action plans, every 5 years. This leads to an iterative planning cycle, which enables learning and adjusting the plans according to lessons learned.

II: Adaptation indicators

To support monitoring, there is a broad set of indicators in place for monitoring adaptation in Germany. A part of the indicators illustrate adaptation process and implementation of adaptation measures, and the other part climate change or its impacts. The indicator system has been created as a result of a broad-based expert work. The system is also being improved within the regular evaluation process of the adaptation plan.

Latvia and Estonia have also identified adaptation indicators. However, in Estonia, indicators have not been designed specifically to measure adaptation.

III: Cost-benefit assessment of adaptation measures

Latvia has carried out a cost-benefit and cost-effectiveness assessment of adaptation measures with scientific expertise and methods. The reports cover the most vulnerable sectors and a 50-year period.

IV: Quantitative goals in the adaptation plan

In Lithuania, the National Adaptation Plan sets extensive quantitative goals for different sectors and measures. The Plan also sets a target for the share of GDP going to mitigation and adaptation measures.

V: Compulsory sectoral plans

In Sweden, it is clearly indicated that the sectoral authorities are responsible for creating action plans and making sure that adaptation is included in their planning. However, not all authorities have done so.

In the USA, according to President Biden's executive order, each federal agency is directed to develop a climate action plan to increase the resilience of its facilities and operations to the impacts of climate change.

6.2. Promoting co-operation within and across sectors

I: Cooperation portal for a specific sector

In Germany, the environmental offices of the States Baden-Württemberg, Bayer and Rhineland-Palatinate as well as the German Weather Service have set up the KLIWA cooperation portal. They are investigating historic and predicted changes in the water balance. The aim of this cross-border and interdisciplinary cooperation is to identify possible effects of the climate change on the water balance, including surface runoff, groundwater, water ecology and soil erosion, and to show the consequences. Based on this, common strategies and recommendations for action are developed.

II: Broad national network for adaptation

In Sweden, the National Network for Adaptation consists of 19 national agencies and 21 county administrative boards aiming at increasing societal resilience to climate change. These are all actors that have a set obligation to act on adaptation. The network enables co-operation across sectors and scales. The network has a small budget to arrange an annual competition on adaptation measures. All network members can hand in project proposals. Projects must engage at least three members of the network, so it encourages to work together with other members. After the project proposals are handed in, members have the right to vote on which project wins the prize. Competition has increased the willingness to be a part of the network.

In Canada, the Climate Change Adaptation Platform is an invitation-based collaboration forum. It includes representatives of different levels of government, Indigenous organizations and governments, communities, NGOs, industry as well as professional and research organizations. The platform has a plenary and various thematic working groups. Different working groups have initiated projects with concrete outcomes.

In the USA, the Climate Change Adaptation Centers' (CASCs) network comprises of nine regional and one national center. The network works with several partners including resource managers, tribes, Indigenous communities and NGOs. The CASCs aims e.g. at providing guidance on administration and delivering information.

III: Climate Adaptation Leaders Forum

In Canada, as a part of the activities of the Climate Change Adaptation Platform, Climate Adaptation Leaders Forum was set up. It brings together executive leaders who have the power to drive institutional change within their organizations. The theme of the forum changes annually.

IV: Youth Panel on Climate Change

In the Canadian Territory of Yukon, a Youth Panel on Climate Change has been established to advice the government on Yukon's climate actions. The panel is dealing with both mitigation and adaptation issues. Working with youth brings up new perspectives and ideas. It can help to find innovative solutions.

6.3. Focus on Arctic Regions and Indigenous Peoples

I: Supporting Indigenous adaptation strategies

The federal government of Canada has supported the work on National Inuit Climate Change Strategy. The strategy has a strong focus on strengthening the resilience of communities. The federal government provides funding for the implementation of the strategy through Inuit-led activities and initiatives related to, for example, knowledge and capacity building, health and well-being as well as climate-resilient infrastructure.

In the USA, the Tribal Climate Change project at the University of Oregon focuses to understand the needs of tribes in addressing climate change and explores the role of traditional knowledge e.g., in climate change assessments and plans. The PNW Tribal Climate Change Network aims at fostering communication, for example, about climate policies and programs. The Tribal Climate Change guide shares information, for example, about tribal adaptation plans and resources but also about funding opportunities. The Institute for Tribal Environmental Professionals provides support to tribes as well as tools and resources to develop adaptation strategies.

II: Indigenous-led monitoring

In Canada, the federal government has set up a program that supports Indigenous-led, self-determined climate monitoring projects. The supported projects incorporate both Indigenous Knowledge and western science, build capacity, and inform local and regional adaptation activities. The federal

government has also organized interdepartmental meetings on Indigenous Knowledge. During the meetings, participants shared information on their Indigenous Knowledge initiatives, frameworks and policies.

III: Focus on the Arctic

The Pan-Canadian Framework on Growth and Climate Change has a strong focus on supporting the most vulnerable regions, which are the Arctic regions. It is one of the five topics for action identified for adaptation. There is also special funding for the northern regions.

6.4. Supporting regional and local adaptation work

I: Compulsory plans

In Denmark, adaptation plans are compulsory for municipalities and all municipalities have drafted a plan. On the other hand, in Sweden, all regions (county administrative boards) must have an adaptation plan and the existing 21 regional action plans cover the whole Sweden.

In many cases, like in flood risk management, adaptation requires action on a larger geographic area. Thus, it might be that the ideal planning unit for adaptation is the county or regional level administration coordinating the work with the municipalities. It might also have better planning resources than small municipalities.

Compulsory plans make sure that the work is initiated and carried out, and that the national government has a record of all plans. Compulsory plans, however, do not ensure good quality plans or the implementation of the planned measures. Thus, the compulsory plans should be accompanied with advisory and training services as well as enough personnel to carry out the tasks. Actually, the best practice I and II should be implemented together.

II: Advisory, training and planning support

Both Denmark and the German state of Rhineland-Palatine provide intensive adaptation advice services for subnational governments. In Denmark, it is in the form of a mobile team that goes to municipalities and gives training, workshops and customized advice. Rhineland-Palatine provides a nine-month advisory and support programme for both municipalities and counties. Also in Norway, training on adaptation is offered for municipalities and counties.

Support can also be in the form of guidelines (like in Poland) or guidebooks or online material on how to draft local adaptation plans. Projects can support the local or regional adaptation work provided they build capacity and the actions will continue also after the project. For example, in Poland, the Let's Feel the Climate project (2017–2019) supported 44 Polish cities to develop adaptation plans and improve their climate resilience. The cities are now going to implement the plans.

Networks and regional cooperation are effective tools for strengthening the adaptive capacity and enabling municipalities and other actors to exchange experiences. For example, Cities of the Future programme (Framtidens byer, 2008–2014) in Norway was an important driving force for the adaptation work and helped to advance the adaptation planning processes in several municipalities. The programme is followed by the Front runner network (2015–) that focuses on sharing knowledge and competence between the 13 participating cities.

III: Funding for adaptation

Governments can enable local and regional adaptation measures by providing funding for their implementation. Funding may also help create bottom-up initiatives. The German Federal Government provides funding for climate protection by local authorities under the National Climate initiative.

The Federal Government of Canada has various funding programs that provide funding for local level adaptation projects. Through Climate Change and Health Adaptation Program, Canada supports First Nations and Inuit communities' efforts to adapt to the health impacts of climate change. A part of

the funding is directed to the Northern communities through the Climate Change and Health Adaptation Program North of 60°N. The Climate Change Preparedness in the North program supports the territories by funding vulnerability and risk assessments, hazard maps and adaptation plans, development of adaptation options and implementation of adaptation measures.

6.5. Strengthening the knowledge base and awareness

I: A degree programme on climate change adaptation

Education is an important part of strengthening the knowledge base on adaptation. In this study, we found a few degree programmes dedicated to adaptation:

- The Western Norway University of Applied Sciences offers a master's programme about climate change management concentrating on adaptation related to land use planning.
- The Lund University in Sweden offers a Master of Science programme in Disaster Risk Management and Climate Change Adaptation with a strong focus on risk management.
- The University of Prince Edward Island in Canada offers a Bachelor of Science programme in Applied Climate Change and Adaptation, which includes studies on adaptation.

II: Sharing good practices

An effective way of increasing the knowledge base on climate change adaptation is to learn from what others have done. These good practices can then be adapted to new areas or organization. Telling about good practices also increases the general awareness of adaptation.

The good practices can be shared online on portals or data bases. For example, in Germany, the good practice data base Die KomPass-Tatenbank of adaptation actions provides information on various actions that are already happening in order to build a resilient Germany.

Good practices can also be made public by organizing a competition on adaptation actions. In Germany, there are two competitions for different target groups:

- The Federal Environmental Ministry and the German Institute for Urban Studies (Difu) organize an annual competition to award successful communal adaptation projects.
- The Federal Environment Agency regularly awards particularly innovative measures for adaptation by companies, research institutions, clubs and associations with the "Blue Compass" (Blauer Kompass) competition. The aim is to identify outstanding measures, make them visible nationwide and thus demonstrate what adaptation looks like in practice.

III: Training on a specific topic or sector

Training on adaptation issues for a specific sector is valuable since it focuses on the specific changes and challenges of the sector. It is especially valuable for sectors that do not usually cover adaptation issues in their professional education like the health sector.

For example, in the Canadian province of Quebec, an Online Open Course and book on health and climate change has been made available to everyone. The objective is to raise awareness and reduce impacts of climate change on the health of populations.

6.6. Concrete information and planning tools

I: Guides or planning tools for different target groups

Different sectors or actors need practical information or planning tools in order to figure out what adaptation means for them, and to implement concrete adaptation measures.

There are several concrete guides or tools in place for different target groups:

- Denmark has developed interactive guides for businesses (BusinessWizard), farmers (AgriWi-

zard and individual homeowners (the Resilient House). The guides help to understand how these groups can adapt to problems related to climate change induced extreme weather events. For example, the BusinessWizard contains three scenes: One for outside, one for the interior of a factory and warehouse and one for office spaces. In each scene you can click on different spots each describing a situation that may cause problems when an extreme weather event occurs and how to solve these problems.

- PLASK is a tool developed in Denmark calculating the socioeconomic benefits of adaptation in case of flooding. It can be used to compare different flooding prevention structures and solutions in different land use situations.
- In Poland, there are guidelines to investors on how to include adaptation and mitigation in project development.
- In Canada, there are several guides found on the same website. For example:
- A set of homeowners' handbooks to disaster-resilient homes: Wildfire, Basement flooding, Severe Wind as well as Snow & Ice storms.
- Parking lot development that limits urban heat islands
- Adaptation guidelines: B.C. Sea Dikes and Coastal Flood Hazard Land Use. It provides guidelines for the design of sea dikes to protect low-lying lands exposed to coastal flood hazards.
- Land use planning tools for local adaptation describes planning tools and examples of their use from Canadian communities.
- In Northern Labrador in Canada, SmartICE was developed to monitor ice conditions, integrating traditional knowledge of sea ice with advanced data acquisition and remote monitoring technology. The tools generate near real-time information on sea-ice conditions for community and business users. The system supports better decision-making across various industries from mining, shipping and fisheries, to emergency response and national defense.

II: Portals

Various countries have set up portals to share information on adaptation. The main target group is the general public.

For example, the Swedish portal for Climate Change Adaptation (klimatanpassning.se) shares information from Swedish authorities helping to get an overview on how adaptation is arranged in Sweden. The webpage provides also case examples and introduces the Climate Adaptation Game that increases the understanding about the impacts of climate change and how the society can adapt to them.

Latvia has published an open online visualization tool of climate scenarios. The tool allows to explore current and projected future climate scenarios in Latvia in the form of maps and graphs. Maps display 30-year average values of the selected climate indices.

The Swedish National Knowledge Centre for Climate Change Adaptation assists municipalities, regions, authorities and other stakeholders and provides tools and information to cope with a changing climate as well as acts as a resource for everybody interested in Sweden's adaptation work.

In the USA, there are several portals, databases and centers sharing information and supporting adaptation. For example, EPA's Adaptation Resource Center supports local governments and decision-makers in adaptation efforts and the Georgetown Climate Center's Adaptation Clearinghouse is a database and networking site providing the wealth of data, adaptation resources, tools and information to support adaptation.

In Germany, there is an adaptation portal with information on diverse climate services in one place klivoportal.de.

The Danish adaptation portal Klimatilpasning.dk provides in one place information on different funding sources for adaptation.

7. Recommendations

This report has analysed the adaptation policies and governance of countries and territories in the Baltic Sea and Arctic regions. The cases show a lot of convergence, but also a range of approaches tailored to the particular circumstances and needs of each jurisdiction. There are also many interesting policy innovations and best practices other countries can learn from.

Finland has been one of the early pioneers in adaptation, adopting the first national adaptation strategy already in 2005. The country also has robust governance and good capacity in many respects.

However, adaptation policy and governance need to be constantly reviewed and revised to meet changing needs – not least because of rapidly progressing climate impacts. Many of the lessons from comparable countries in northern regions can inspire improvements also in Finland.

Based on the best practices from other countries and gaps identified, we propose the following recommendations to Finland.

7.1. Foundational work

- **Introduce a systematic and iterative process.** Schedule clearly the periodic monitoring, evaluation and updating of adaptation policy. This leads to an iterative planning cycle, which enables learning and adjusting plans according to lessons learned.
- **Set clear goals and indicators.** Integrate quantitative goals for different sectors and measures in adaptation policy. Follow regularly the progress towards these goals with a set of indicators available in a public dashboard.
- **Present sectoral strategies.** Complement overarching national policy with adaptation strategies for key sectors. Delegate the task to sectoral ministries and their national agencies, in co-operation with key stakeholders.
- **Focus more on the Arctic.** This should happen together with neighbouring Arctic countries and the Saami Parliament. The Saami should also be supported in their adaptation planning and action.

7.2. Local adaptation action

- **Require municipalities to prepare plans.** Municipalities could meet the requirement individually or together, for instance at the level of urban regions. To help in preparing these plans, municipalities should be provided training and expert assistance. (See examples in section 6.4)
- **Allocate funding to local and regional work.** The funding can be both investment and project support for local and regional adaptation measures. Also funding for awareness raising for different target groups would be useful.
- **Establish a nation-wide municipal co-operation body.** The role would be to raise awareness and exchange experiences about local adaptation work. The body could be integrated into existing co-operation models in mitigation (e.g. Hinku and Canemure) or set up separately.

7.3. Information and visibility

- **Set up a master's program on adaptation.** The programme could be a joint undertaking by several universities, including possibly universities in neighbouring countries.
- **Establish a competition for adaptation actions.** The open competition would showcase concrete actions by e.g. local governments, companies, universities and civil society.

7.4. Dialogue and co-ordination

- **Set up a Climate Adaptation Leaders Forum.** The high-level forum should raise the profile of adaptation action and bring together key decision makers from various fields and sectors. (See example in section 6.2)
- **Establish a co-operation body for health and social adaptation.** The health and social sector is still lagging behind others in adaptation planning. A good model is from Canada, where the Canadian Coalition for Global Health Research (CCGHR) established a Working Group on Climate Change and Health (WGCCH).

7.5. International co-operation

- **Take initiative to create joint Nordic adaptation policy.** Nordic co-operation is an important forum for ambitious policy initiatives. However, there is no joint policy or action plan in adaptation. Finland should take initiative to create it.

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Annexes

ANNEX I. Interview questions on climate change adaptation governance and policy in the baltic sea region

To be modified according to the data available from literature study for each country

Date:

Person:

Organisation:

Country:

1. National adaptation documents
- checking the information gathered
- national adaptation strategy, the latest version
- national adaptation plan, the latest version
- sectoral adaptation strategies: are there, which? Can you provide a link to the document/s?
- Is the adaptation planning process defined/described in legislation? If not, where is it defined/described?

2. Regional/local adaptation strategies or plans
- Which regional adaptation strategies/plans exist? Is there a system to support their drafting?
- Are there local adaptation strategies/plans? Is there a system to support their drafting? Any more information on these?

3. Reporting and reviewing process
- Is there a process in place for reporting the implementation of the strategy/plan? Please describe it.
- How is the strategy/plan reviewed?
- Is there an evaluation study? Can you provide a link to the document?

4. What tools and practices are there for intra-governmental co-ordination/co-operation?

5. International co-operation
- What kind of international co-operation there is on adaptation in your country?

6. Engaging stakeholders
- Which tools are used to engage stakeholders?

7. Adaptation challenges
- What are the biggest adaptation challenges in the country?
- What are the biggest challenges in the adaptation policy?

8. Adaptation policy priorities
- What are the main national adaptation policy priorities?
- How are the priorities chosen?

9. Responsibilities and hierarchy within administration

- What is the hierarchy between levels of decision making?
- How are responsibilities divided in the administration?

10. How are the strategies and policies developed?

11. What kind of financial tools are there to support adaptation?

12. Are there any best practices Finland could learn from?

- Please describe the best practices
- More info on the best practices already found (based on our draft report)

13. Additional notes/ Open remarks

- Is there anything else you would like to add?

14. Any other person to be interviewed?

ANNEX II. Persons interviewed

1. Alexey Kokorin, WWF Russia, Russia
2. Ane Hagen Kjørholt, Norwegian Environment Agency, Norway
3. Anja Wejs, Central Denmark Region, Denmark
4. Esther Hoffmann, The Institute for Ecological Economy Research (IÖW), Germany
5. Geir Orderud, Oslo Metropolitan University, Norway
6. George Safonov, Moscow Higher School of Economics, Russia
7. Inese Pommere-Bramane, Ministry of the Environment, Latvia
8. Judita Liukaitytė-Kukienė, Ministry of the Environment, Lithuania
9. Maris Arro, Ministry of the Environment, Estonia
10. Oksana Tarasevich, International Public Association ECOPROEKT, Belarus
11. Piotr Czarnocki, Ministry of the Environment, Poland
12. Reeli Jakobi, Ministry of the Environment, Estonia
13. Åsa Sjöström, National knowledge centre for adaptation to climate change, SMHI, Sweden
14. Päivi Abernethy, University of Waterloo, Canada
15. A person from Ministry for Agriculture, Self-Sufficiency, Energy and Environment, Government of Greenland
16. Ólavur Dalsgarð, the University of the Faroe Islands, the Faroe Islands
17. Davin Holen, Alaska Sea Grant Marine Advisory Program and the Alaska Center for Climate Assessment and Policy, University of Alaska Fairbanks, USA
18. Laniel Bateman, Environment and Climate Change Canada
19. Julie Lax, Environment and Climate Change Canada

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Adaptation to Climate Change in the Baltic Sea and Arctic Regions

Governance and policy tools across countries

Abstract

The objective of this study was to collect and synthesise information about climate adaptation policy and governance in the Baltic Sea and Arctic regions. The report also describes best practices from different countries that Finland could learn from and gives recommendations for Finland.

The countries and territories included are Sweden, Denmark, Faroe Islands, Greenland, Norway, Iceland, Germany, Poland, Estonia, Latvia, Lithuania, Russia, Belarus, Canada, and the USA. The report is based on a literature study on the situation of adaptation planning and coordination in the target countries and regions. Document review was complemented with interviews of national experts.

Broadly speaking, western, bigger and Nordic countries as well as those that started early have more advanced adaptation policies and governance. The studied countries and regions show both similarities and differences in approaches. Five have both a national adaptation strategy and plan, two have only a strategy, and two have only a plan, and five do not have such a document yet. Some countries have integrated both mitigation and adaptation in the same strategy.

On sectoral adaptation work, the approach differs from mandatory sectoral action plans to no separate sectoral adaptation documents at all. The most common approach in regional and local adaptation work is that subnational adaptation strategies are voluntary, but they are supported by projects. However, regional or local adaptation plans are obligatory in some countries.

Countries use national adaptation strategies and action plans to set priorities. The processes for setting the priorities vary, but may involve inter-ministerial committees, expert working groups, stakeholder dialogues and public consultations. Priorities often cover different sectors and cross-cutting measures (e.g. information). Several countries want to integrate adaptation into existing processes and governance levels.

The biggest challenges in adaptation policy cluster around three issues: the need to improve awareness and political priority of adaptation; challenges in coordination across sectors and levels; as well as lack of funding or human resources dedicated for adaptation.

Keywords
climate change, adaptation, governance, policy, Baltic Sea Region, Arctic Region

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Adaptation to Climate Change in the Baltic Sea and Arctic Regions
Governance and policy tools across countries
(**Ilmastonmuutokseen sopeutuminen Itämeren ja Arktisen alueen maissa :** Sopeutumispolitiikka ja -hallinto)

Tiivistelmä

Selvityksen tavoitteena oli kerätä yksiin kansiin tietoa ilmastonmuutokseen sopeutumispolitiikasta ja -hallinnosta sekä Itämeren alueen maissa että arktisilla alueilla. Raportissa kuvaillaan myös eri maiden parhaita käytäntöjä, joista Suomi voi oppia ja annetaan suosituksia Suomelle.

Selvitys kattaa seuraavat maat ja alueet: Ruotsi, Tanska, Färsaaret, Grönlanti, Norja, Islanti, Saksa, Puola, Viro, Liettua, Venäjä, Valko-Venäjä, Kanada ja Yhdysvallat. Selvitys perustuu kirjallisuuskatsaukseen sopeutumisen suunnittelun ja koordinaation tilanteesta kohdemaissa ja -alueilla. Tietoja täydennettiin haastattelemalla kansallisia asiantuntijoita.

Yleisesti ottaen sopeutumispolitiikka ja -hallinto on edistyneintä länsimaissa, isoissa maissa ja Pohjoismaissa sekä niissä maissa, jotka ovat käynnistäneet sopeutumistoimet aikaisin. Eri maiden ja alueiden lähestymistavoissa havaittiin sekä samankaltaisuuksia että eroavaisuuksia. Viidellä maalla ja alueella on sekä kansallinen sopeutumisstrategia että -suunnitelma, kahdella vain strategia ja kahdella vain suunnitelma, viidellä taas ei vielä ole sopeutumissuunnitelmaa tai -strategiaa. Joidenkin maiden ilmastostrategiat sisältävät sekä ilmastonmuutoksen hillinnän että siihen sopeutumisen.

Sektorikohtaisessa sopeutumistyössä lähestymistavat vaihtelevat pakollisista sektorikohtaisista toimintasuunnitelmista tilanteeseen, jossa sektorikohtaisia toimintasuunnitelmia ei ole lainkaan. Alueellisen ja paikallisen tason sopeutumisstrategiat ovat useimmissa maissa vapaaehtoisia, mutta niitä tuetaan projektien avulla. Paikalliset tai alueelliset sopeutumissuunnitelmat ovat kuitenkin pakollisia joissakin maissa.

Maat määrittelevät sopeutumispolitiikan ja toimenpiteiden prioriteetit kansallisissa sopeutumisstrategioissaan ja toimintasuunnitelmissaan. Suunnitteluprosessit ovat erilaisia eri maissa ja ne voivat muodostua ministeriöiden välisistä komiteoista, asiantuntijatyöryhmistä, sidosryhmädialogeista ja julkisista kuulemisista. Prioriteetit vaihtelevat, mutta ne sisältävät usein eri sektoreita ja poikkileikkaavia toimia (esim. tutkimus ja tiedonvälitys). Useat maat haluavat valtavirtaistaa sopeutumista ja sisällyttää sen olemassa oleviin prosesseihin ja hallintotasoihin.

Sopeutumispolitiikan suurimmat haasteet voidaan tiivistää kolmeen seikkaan: tarve parantaa tietoisuutta sopeutumisesta sekä sen poliittista priorisointia, haasteet alueiden ja tasojen välisessä koordinoinnissa sekä sopeutumiselle osoitettujen rahoituksen ja inhimillisten resurssien puute.

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