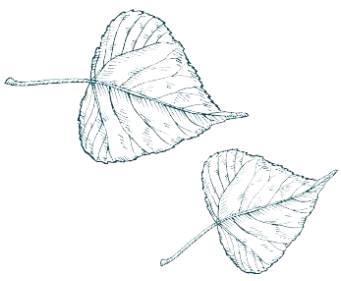
Bundesministerium
für Ernährung
und Landwirtschaft

# Addressing climate change

Measures to adapt agriculture, forestry, fisheries and aquaculture to climate change

bmel.de



# CONTENT

*"Arable land, forests, fish and our animal husbandry – they all have to be able to withstand the challenges climate change presents. This adaptation is a task that will involve several generations. Let's get to work!"*

# Dear Readers,

Anthropogenic climate change is affecting our world. Time lapses show that it is happening ten times faster than natural climate change. As far as we can see from the existing weather recordings, the last 20 years have been the hottest and driest years. At the same time, heavy rainfalls and floods have become more frequent during this period. These weather extremes clearly show that we need to actively support our ecosystems in adapting to climate change in Germany as well. Climate change mitigation and climate change adaptation – both must go hand in hand. Our forests and soils are important climate change mitigators. We need to stabilise them.

Our farmers and foresters as well as our fishers and fish farmers are being hit particularly hard by climate change. Especially for them, it is important to adapt their crop growing and farming systems to altered climatic conditions. Otherwise they will lose their means of livelihood and we will lose out on high quality food and raw materials.

It is important to me to accompany and support them on this journey. In order to do so, we need both short-term action and long-term strategies.

Besides, we also need climate change adaptation measures such as those my Ministry has drawn up in cooperation with federal state experts, researchers and relevant professional associations. We are not only supporting our agriculture, forestry, fisheries and aquaculture with these measures; we are also ensuring food security and preserving our natural resources and our ecosystems for coming generations.

This is a task for us and the generations to come – let's get

to work! With best wishes

Yours,

**Julia Klöckner**
*Federal Minister for Food and Agriculture*

# 1

# Climate change and agenda

*Climate change presents a huge challenge for agriculture, forestry, fisheries and aquaculture. The Federal Government and the federal states work together with other stakeholders to draw up measures to adapt to the effects of climate change.*

Climate change has always existed. Throughout history, the earth has gone through alternating cold and warm periods. Each of the resulting changes in temperature lasted several thousand years.

Anthropogenic climate change, in contrast, is happening significantly faster. From the beginning of industrialisation to 2017, the average temperature globally increased by about 1 degree Celsius according to the Intergovernmental Panel on Climate Change (IPCC). And the Potsdam Institute for Climate Impact Research states that it is continuing to rise by around 0.17 degree Celsius per decade.
The average temperature in Germany has increased by about 1.5 degree Celsius since the first weather recording were made in 1881. The number of very hot days has already doubled compared to the period from the 1960s until the 1980s (see figure page 7). The ten hottest summers have been recorded in the past 20 years. In addition to the temperature rises and increasingly frequent heat waves, nature also has to cope with long dry periods, heavy rain, storms and early frosts.

## Driest years on record

The years 2018 and 2019 were the driest years since weather records began. In 2020, there has once again been exceptionally little rainfall in many parts of Germany. According to the decadal climate prediction of Germany's National Meteorological Service, the next five years will also be too dry.

This is caused by weather patterns known as an Omega Block. The phenomenon is not new but it has become potentially more common. Global air currents are slowing down due to climate change. Thus, weather situations persist for a longer period of time. In this way, high-pressure areas over Central Europe may block the weather patterns in Europe for weeks by forcing the rain-bringing low-pressure areas, which normally move from west to east, around Germany in an omega-shaped wave.

## Dry soils, degraded forests and rising ocean temperatures

Some climate changes can have an positive effect on agriculture. The increasing atmospheric concentrations of CO2, for example, can have a “fertilisation effect” on the crops.
However, this only applies when all other growth conditions are optimal – i.e. enough water and nutrients are available.

Most changes – such as water shortages or heat stress – have negative impacts. The years 2018 and 2019 have shown that extreme weather events reduce the quality and quantity of harvested products. The yield losses are already jeopardising the livelihoods of farmers in some places.

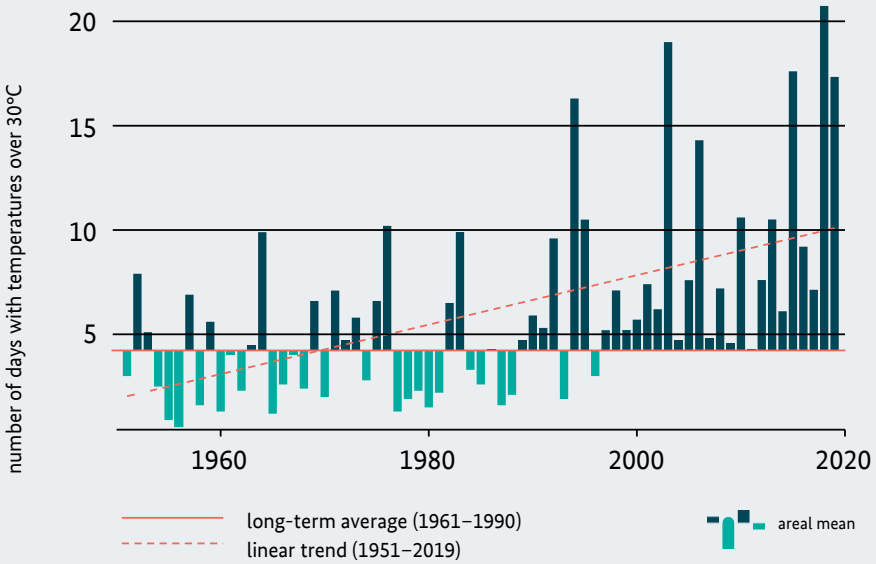
The forestry, fisheries and aquaculture sectors are also affected by climate change. Around 285,000 hectares of forest alone have been severely degraded due to heat, persistent drought and parasite infestations in recent years and need to be reforested. During summer, the water level of rivers drops dramatically in some cases. The ocean temperatures continue to increase.

## Short-term action and long-term strategies

We are faced with the huge challenge of actively supporting our ecosystems in adapting to climate change.  Only climate change adaption measures can ensure that sufficient high quality food, feedstuff and raw materials continue to be produced.

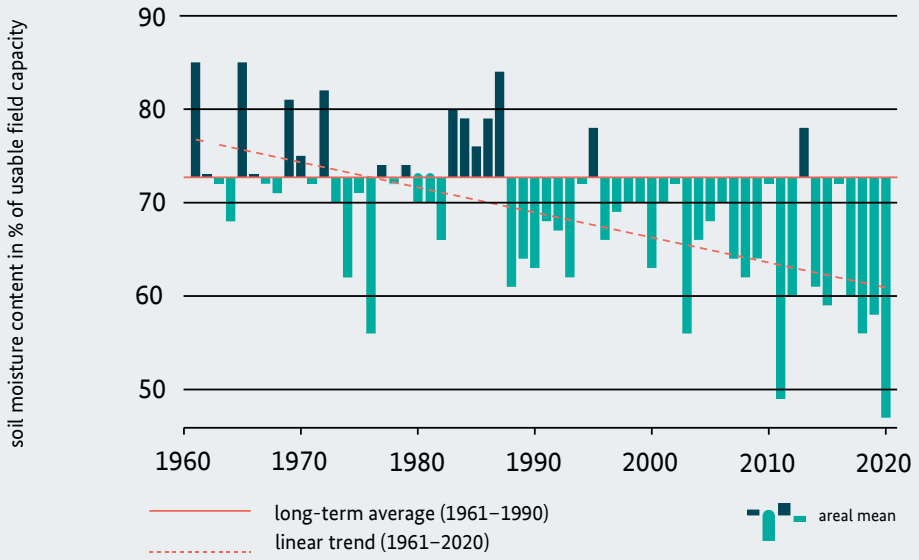
Also, further functions of the agricultural, forest and marine ecosystems, and the services provided for society, must be safeguarded in the long term.

**VERY HOT DAYS IN GERMANY**




*Source: Germany's National Meteorological Service (DWD), 2020*

**SOIL MOISTURE FOR WINTER WHEAT ON LIGHT SOILS IN GERMANY**




*Source: Germany's National Meteorological Service (DWD), 2020*

In order to do so, we particularly need long-term strategies, along with short-term actions taken in response to extreme weather events.

## We cannot mitigate climate change without adapting to it

Conversely, agriculture, forestry, fisheries and aquaculture play an important role for climate change mitigation by providing sustainable management of fields, forests and oceans, because soils, vegetation and oceans are important carbon stores and contribute to slowing down global warming by neutralising greenhouse-gas emissions. Wood products used as a material or for construction provide the possibility to store carbon for a long term. Using wood as energy prevents the release of CO2 from fossil fuels. This is another reason why it is important to ensure the stability of sustainable agriculture, forestry, fishing and aquacultures in the long term by introducing adaptation measures.

To meet the challenges of climate change, the Federal Government adopted the German Strategy for Adaptation to Climate Change in 2008. The Strategy contains adaptation measures for all federal departments in key areas such as health, transport, environment, economy, infrastructure, agriculture and forestry as well as fisheries and aquaculture.

→ Adaptation to Climate Change available at: www.bundesregierung.de/breg-de/service/publikationen

## Consolidated expertise of the Federal Government, the federal states, the scientific community and associations

Coordinated by the Federal Ministry of Food and Agriculture (BMEL), federal state experts, researchers and professional associations continuously work together to identify and formulate the measures necessary for the agricultural sector.

In April 2019, the Conference of Agricultural Ministers adopted the Agenda for Climate-change Adaptation in Agriculture, Forestry, Fisheries and Aquaculture. Based on this agenda, a set of measures was drafted which will be incorporated into the German Strategy for Adaptation to Climate Change. The set of measures includes essential BMEL topics: Crop production, forests, livestock husbandry as well as fisheries and aquaculture.

# Measures with multiple positive effects

The Agenda aims to prepare the agricultural, forestry, fisheries and aquaculture sectors for the expected climate changes in the best possible way and gives recommendations on concrete actions. This is intended to reduce the risks for holdings and companies without harming our environment or endangering food security.

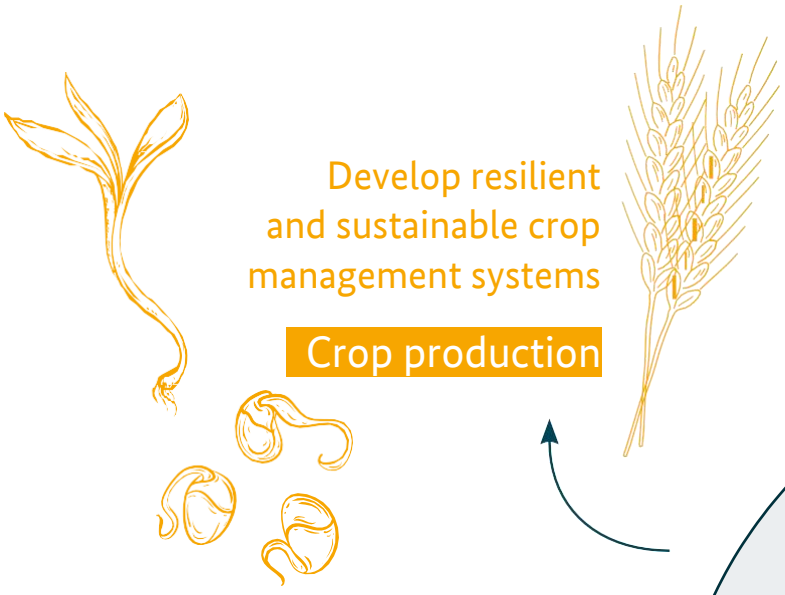
Synergies with other political objectives are expressly requested. This way, climate change adaptation measures can provide benefits in areas like climate, energy transition, animal welfare, soil, water protection and protection of biodiversity. Furthermore, it can be presumed that the measures will have a positive effect on income security and the strengthening of rural areas.

→ Agenda for Climate-change Adaptation in Agriculture, Forestry, Fisheries and Aquaculture available at: www.bmel.de/publikationen

Central strategies in the fields of agriculture, forestry, fisheries and aquaculture were therefore taken into consideration in deducing appropriate climate change adaptation measures. These include:

- → the Arable Farming Strategy (in progress)
- → the Strategy for the Future of Organic Farming
- → the Protein Crop Strategy
- → the Livestock Husbandry Strategy
- → the 2020 Forest Strategy
- → the Sector Strategy for Agrobiodiversity
- → the National Strategy Plan on Aquaculture
- → the National Biodiversity Strategy
- → the German Sustainable Development Strategy

# Overview of fields of action, objectives and measures



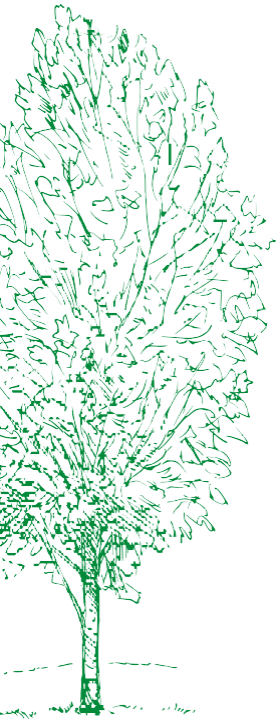
Develop resilient and sustainable crop management systems

**Crop production**

Water management and use

Breeding, selection of species and provenance

Research



**Forests and Forestry**

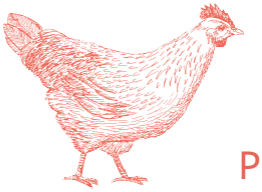
Develop site-specific, robust forests that are able to adapt to climate change

FEDERAL GOVERNMENT

FEDERAL STATES

The Federal Ministry of Food and Agriculture (BMEL) drafted a comprehensive set of measures together with experts from the Federal Government, the federal states, the scientific community and associations. These measures aim to support the sectors of crop production, forestry, livestock husbandry, fisheries and aquaculture in adapting to and mitigating climate change.

They also include overarching measures concerning risk management, research, implementation in practice, breeding, selections of species, provenance, water management, water use, information management, data management, monitoring and dialogue.



Promoting animal protection and animal health

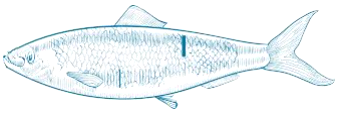
Livestock husbandry

Implementation in practice

Information management, data management and monitoring

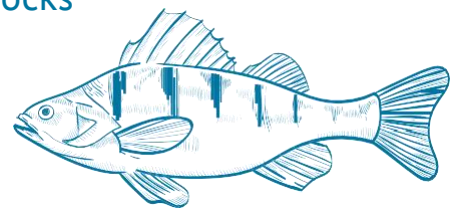
Risk management

Dialogue



Fisheries and aquaculture

Protecting fish stocks



SCIENTIFIC COMMUNITY

PROFESSIONAL ASSOCIATIONS

# 2

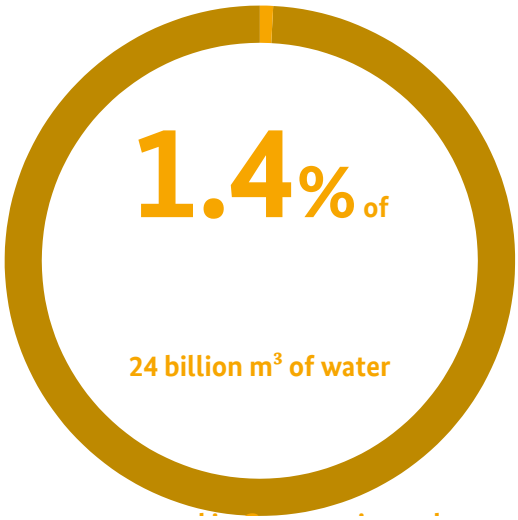
# Crop production

*To make crop management systems able to withstand the change in climate and extreme weather events, they have to be resilient and sustainable.*

Whether it is arable farming, viticulture, hop production, fruit cultivation, vegetable growing or grassland: climate change alters the conditions and processes in crop cultivation. Prolonged vegetative periods, more extreme weather events such as heavy rain, hail, late frosts, prolonged drought and higher temperatures affect the formation, quality and stability of all crop yields.

Besides any possible benefits that may result from climate change, we have to expect mostly negative effects. These include shorter development phases, humus decomposition or a growth in both well-known and lesser-known pests.

Agricultural and also horticultural farms are faced with the difficult task of monitoring all changes at the same time and taking the respective site conditions into consideration when implementing climate change adaptation measures.




## Knowledge transfer between research and practice

Knowledge transfer needs research and teaching. It is important to subject crop management systems to scientific reviews and to create foundations for further developing these systems. How resilient are the systems used so far? What potential is there for adaptation? Which crop species is the most resilient in our new climatic conditions?

In addition to that, we also need feasible and field-tested management practices for the holdings. Academic training offered at technical colleges and universities has to focus more on possible climate changes and climate change adaptation to raise awareness for these challenges among young people.

Furthermore, experts offering advice on cultivation must be rapidly provided with the most recent research findings in order for them to be able to successfully support operators. We therefore have to support relevant research work in a targeted way and to strengthen the knowledge transfer between research, advisory services and practice. We get the best results when researchers can observe their research projects holistically directly in fields, at holdings and also in agricultural areas.

## More efficient irrigation systems as part of the solution

In many German regions, one aspect of climate change that is evident is prolonged droughts. In order to still keep agricultural production going, the agricultural and horticultural sectors will increasingly depend on additional irrigation.

According to the Federal Statistical Office, agricultural irrigation across Germany uses around 1.4 percent of the 24 billion cubic metres of fresh water that Germany gains each year. For comparison: Around 22 percent is used for the public supply of drinking water, about 24 percent for mining and manufacturing industries and around 53 percent for the supply of energy (in 2016).

Water as a resource for irrigation will have to be used as efficiently as possible in the future in order to avoid regional conflicts with the public supply of drinking water and further degradation of forests, which are already affected by aridity due to a lowering of the groundwater table. It is therefore important to support single farm investments in using and managing more efficient, data-based and water-saving irrigation processes. Examples of these include computer-controlled field irrigation sprinklers such as centre-pivot irrigation systems, linear irrigation systems used for arable farming and forage growing, or drip-irrigation for the cultivation of speciality crops. In light of the redistribution of precipitation towards dry summers and damp winters, we will have to put a greater focus on the subject of water storage in the future.

### OVERVIEW OF MEASURES

- → Further develop more efficient and site-optimised irrigation practices
- → Breed and trial a broad range of more heat-tolerant and drought-tolerant crop species and varieties
- → Develop more efficient methods to avoid introduction and spread of dangerous pests
- → Create new outlets for new crops
- → Promote knowledge transfer between research and practice
- → Raise awareness of climate change in training occupations
- → Establish climate-adapted cultivation systems
- → Humus creation
- → Further digitalisation of agriculture
- → Conduct research to adapt production systems and ecosystems to climate change, e. g. through new cultivation systems, irrigation methods, energy-saving opportunities and conversion to renewable energy sources

# 3

# Forests and Forestry

*Aridity, storms and pest infestations have severely damaged German forests. Comprehensive measures are necessary to conserve the forests and their functions.*

Germany is the most densely wooded country in Central Europe. A third of its total area is covered in forests. But since autumn 2017, the forests have suffered extremely from droughts, storms and mass outbreaks of forest pests such as bark beetles. 285,000 hectares are severely damaged – this corresponds to an area slightly bigger than the federal state of Saarland. The amount of timber from damaged areas was more than 175 billion cubic metres. This adversely affects the timber market and poses existential threats to many forestry holdings.

The extent, course and pace of climate change pose a threat to the forests' adaptability. Policy-makers and the forestry sector are faced with the huge challenge of preserving the forests. It is important to stabilise the remaining forests, to reforest degraded areas of woodland and to shape and, if necessary, modify forests to make them able to withstand climate change.

## Support for forests in transition

Vibrant forests fulfil multiple functions. They are of major importance for biodiversity as they are habitats for countless animal and plant species. They offer spaces for recreational purposes, sport or forest experiences, secure jobs and income and provide us with timber, a renewable resource. In addition to that, healthy and productive forests make a key contribution to climate change mitigation because forests and wood-based products, as well as the sustainable use of timber, reduce the burden on the atmosphere. The Scientific Advisory Board on Forest Policy at the BMEL has estimated that this reduction amounted to 127 million tonnes of CO2 in 2014. This corresponds to 14 percent of German greenhouse gas emissions.

The 2050 Forest Strategy, which is currently being drafted by the BMEL, sets out a vision for the future of the forest ecosystem: the aims is to have site-specific and vibrant mixed forests able to adapt to climate change that mainly consist of indigenous tree species, and that these forests are preserved and further developed through sustainable management.

To realise this vision, all stakeholders involved have to pull in the same direction. Besides the Federal Government, the federal states and the municipalities, a major role is also played by the approximately two million private forest owners as they own almost half of all forests.
Targeted advisory services and support help them in implementing suitable adaptation measures for their forests.

## Innovative forest planting concepts

Furthermore, the respective means and concepts are necessary to finance and successfully organise forest conversion. The BMEL has worked to ensure that a total of 1.5 billion Euros of support are made available for coping with forest damage, reforestation and climate-adapted forest conversion in the coming years. In addition to that, the BMEL also provides funds for forest research.

These investments in research and the close cooperation between policy-makes, science and practice are important to further develop existing forest planting concepts in an innovative way and to adapt them to the new challenges. In order to increase the forests' vitality, stability and resilience in times of climate change, the selection of trees and provenance recommendations have to be reassessed for different climate scenarios, taking into account the changed site conditions.
For example, besides indigenous tree species, species from other geographic regions suited to the future climate conditions could also play a role in the future. Supporting instruments such as digital site maps could facilitate "site-specific forest conversion".

### OVERVIEW OF MEASURES

→ Develop innovative forest planting concepts
→ Reforestation, forest conversion and regeneration
→ Expand supporting scientific research on climate-resilient forests
→ Forest-related risk and crisis management, and establishment of a national monitoring system for the protection of forests
→ Conduct research on the genetic quality of indigenous tree species and other tree species and provenances as well as on arboriculture
→ Develop efficient forest protection strategies in the context of integrated pest management
→ Develop more efficient methods of avoiding the introduction and spread of dangerous pests
→ Research on adaptability and adaptedness of forest ecosystems, tree species and provenances with emphasis on forest genetics
→ Increase forest vitality through silvicultural activities such as regeneration and silvicultural treatment

# 4

## Livestock husbandry

*Many farm animals are suffering from the increasing heat; keeping these animals also generates greenhouse gases. It is important that we consider animal welfare, animal health and climate change mitigation holistically and take conflicts of objectives into account.*

The consequences of climate change also show in livestock husbandry and introduce many new challenges into the sector. Prolonged heatwaves cause livestock stress and may significantly affect the animal's wellbeing. Animal wellbeing may also be affected by insufficiently adapted feeding due, amongst other things, to climate-related harvest losses affecting the quantity and nutrient contents of feedstuffs. There are also other problems livestock and livestock keepers have to deal with: increased infection pressure as well as new and recurring animal diseases and zoonoses.

Climate change in some cases also favours the spread of these diseases – this endangers animal health and sometimes also human health. Certain disease-causing agents can easily be transmitted between humans and animals. There is a close connection between the wellbeing of humans, animals and the environment; they must therefore be regarded holistically – in line with the One health approach.

## Avoid conflicts of objectives, further promote breeding

We also need a holistic concept when it comes to adapting livestock husbandry to the expected climate changes, extreme weather conditions and resultant challenges. The focus is on animal health and wellbeing. At the same time, we need to consider conflicts of objectives: it is important for farmers that the measures aimed at animal protection and animal-disease prevention are compatible with market and environmental requirements.

**56 million €** will be spent on building new livestock houses or modifying existing houses between 2020 and 2024.

Consumers, in turn, can contribute to improving animal protection and environmental sustainability through the food they select and can thus support farmers' efforts.

The breeding of healthy, robust, adaptable and disease-resistant farm animals plays a crucial role in adapting livestock husbandry to climate change. It is an important requirement for successful conventional and organic livestock husbandry.

## Especially animal-friendly and climate-friendly livestock housing systems

Future-orientated housing systems are at least just as important in further developing livestock husbandry. These housing systems have to be economically sustainable for the agricultural sector, meet the increasing social demands regarding environmental and animal protection and reduce emissions that are detrimental to the environment and climate. Livestock housing with free ventilation appears at first sight to improve animal welfare. However, given the rising temperatures and long heatwaves, it is more difficult to maintain the optimal housing climate which could then compromise the welfare of the animals.
Furthermore, the emissions generated could be higher, depending on the extent of outdoor climate contact and the livestock housing management.

Extensive research is already being conducted into the design of particularly animal-friendly and low-emission "livestock houses of the future". The BMEL, for example, promotes the establishment of innovation networks and experimental housing in its Federal Programme for Sustainable Livestock Farming and its Livestock Husbandry Strategy. For the "livestock housing of the future" innovation network, a total of 56 million Euros will be spent on building new livestock houses and modifying existing ones in the period from 2020 until 2024.
The aim is to develop socially acceptable and practicable livestock housing concepts and innovative livestock husbandry methods which promote animal welfare, minimise conflicts of objectives and therefore contribute to society accepting livestock husbandry.

This also means addressing the question of how to ensure the wellbeing of farm animals despite increasing heatwaves. Air-conditioned animal housing with digital temperature control could help to remedy this situation. However, it must be taken into consideration that besides the increased energy consumption this could also result in more emissions and costs. In open livestock houses or houses without cooling options, however, other measures are required to improve the housing climate. Ventilation or misting systems could be used, for example.

### OVERVIEW OF MEASURES

- → Grow drought-tolerant, deep-rooting crops such as alfalfa and millet species for feed production
- → Promote alternative feedstuffs to replace silage from grass and maize in case of feed shortages
- → Promote breeding of healthy, robust and stress-resistant farm animal breeds (funding area "Health and robustness of farm animals" of the joint task for the "Improvement of Agricultural Structures and Coastal Protection" (GAK))
- → Conduct research on animal-friendly "livestock housing of the future"
- → Develop holistic husbandry systems
- → Use digital technologies to reduce greenhouse gas emissions etc.

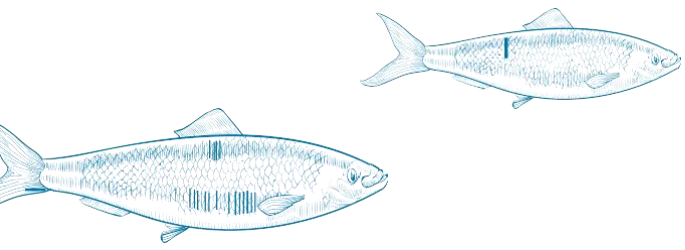
# 5

# Fisheries and aquaculture

*Climate change leads to increasing imbalances in the ecosystems of the oceans and other waters. Aquaculture and fishing industries are faced with manifold challenges.*

Rising temperatures and increasing aridity also affect the fishing industry. During summer, the water level of rivers drops, in some cases dramatically. Ocean temperatures have been rising for years. The temperature of the Baltic Sea, for example, has increased by around 1.9 degrees Celsius during the last 38 years. For the North Sea, the water temperatures have risen by an average of 1.3 degrees Celsius in the last 50 years. These changes not only have severe environmental impacts on flora and fauna underwater; they also affect the jobs and income of those who depend on aquaculture, fishing and the use of marine resources for their livelihoods.

However, the challenges which need to be tackled vary greatly. While marine fisheries and inland fisheries utilise living fish resources, aquaculture as a form of aquatic animal husbandry generally comprises the whole life-cycle of farmed fish. Both systems offer different adaptation potentials and are therefore not affected in the same way by climate change.



## New management practices in aquaculture

The German aquaculture sector mainly consists of family businesses, which produce fish in cold-water, flow-through systems, warm-water ponds, netcages or recirculation systems. In the marine sector, mussel farming is widespread. Most aquaculture areas in Germany are open systems, which are in constant exchange with their environment and are directly affected by climate change. Only a very small proportion of aquaculture consists of closed recirculation systems, which can control husbandry conditions almost completely and are therefore less affected by climate change.

In inland aquaculture, the extremely dry summer of 2018, for example, has shown that open systems are affected by the impacts of climate change particularly severely. Water shortages during the summer even meant that early emergency fish harvestings were required.

Conceivable options for adapting aquaculture installations to climate change therefore include in particular technical innovation and technological adaptations regarding different water usage possibilities or shadowing and ventilation using photovoltaic modules. Such possibilities must be financially supported to push forward further research and practical trials. This concerns, for example, changes in pond management such as the conversion of flow-through systems into semi-recirculation systems or full recirculation systems, which make multiple use of the water and are hence more efficient.

## Adapted fisheries in the North and Baltic Seas

The continuously increasing sea temperatures are also causing changes in the size and distribution of fish stocks in the Baltic and the North Seas. Fish species which have so far not been native to German fishing areas, such as young pilchards, anchovies or various species of octopus, can increasingly be found in the North Sea. However, other species such as mackerel have now migrated polewards. At the same time, researchers assume that the productivity of some fish stocks, such as herring in the Western Baltic Sea or North Sea cod, will decrease as a result of climate change.

The water temperature of the Baltic Sea has increased by **1.9°C** since 1982.

## Catch quotas to prevent overfishing

If the distribution of a fish species changes or the productive capacity of fish stocks decreases due to climate changes, this has to be taken into account when determining the levels of catch quotas and allocating them. Otherwise, there is a danger that fish stocks could be overexploited, which could have severe consequences for the fisheries concerned.

Measures in the aquaculture and fisheries sectors must therefore aim for a common objective: a climate-smart fisheries sector which strikes a balance between protecting and utilising resources, secures fishery-sector services in the fields of tourism, water management and ecosystem management, creates good working and living conditions and facilitates adequate and sustainable livelihoods for people working in these fields.

### OVERVIEW OF MEASURES

- → Research on perennial water use in carp aquaculture
- → Promote technical innovations such as partial recirculation systems (water treatment and recirculation), combine aquaculture and photovoltaics
- → Utilise climate-adapted and robust fish species or breeding lines
- → Develop automated animal-based systems to monitor farming conditions in aquaculture
- → Sustainable management of fisheries which takes into account the changes in fishing opportunities

# 6

# Implementation and outlook

*Climate change affects agriculture, forests, fisheries and aquaculture and requires the implementation of adaptation measures. All parties involved must join forces to make the measures successful.*

The consequences of climate change can be seen in many areas. But agriculture, forestry, fisheries and aquaculture are hit particularly hard by the general temperature rise and increasing heatwaves and periods of drought. The yield losses and forest damage in recent years endanger the livelihoods of farmers, forest owners and fisheries in Germany. And on top of that, they also affect the supply of the population with food and domestically produced timber.

Also, dry soils and damaged forests are restricted in their ability to act as carbon stores and carbon sinks. Climate change adaptation measures are therefore necessary not only for economic and food security reasons but also because they contribute to climate change mitigation.

## Transferring approaches into practice

To tackle these challenges, BMEL started to work on the Agenda for Climate- change Adaptation in Agriculture, Forestry, Fisheries and Aquaculture in 2019 and joined forces with experts from the federal states, the scientific community, associations and the Federal Ministry of the Environment to draw up the Agenda and a programme of measures. Both form part of the German Strategy for Adaptation to Climate Change. The approaches in the Agenda and the programme of measures must now be further developed and in the longer term put into practice. In order to do so, policy makers, the scientific community and practitioners must all pull in the same direction.

Practice-oriented research is a key factor for success: science-based information on climate change and climate change adaptation serves as a basis for developing practical measures. These must be integrated into existing basic training, advanced training and advisory programmes and services. BMEL therefore supports enhancing research activities relating to climate change adaptation at every level and in all fields.

## Pooling knowledge and data

To enable agriculture, forestry, fisheries and aquaculture to adequately meet the ever-growing challenges resulting from a changing environment, information and data management must take place at a higher level. Information, knowledge and data must be pooled to make them easily accessible to the various stakeholders. The BMEL is committed to facilitate and accelerate this knowledge transfer in cooperation with the federal states.

Crisis management also needs to improve. This includes not only strengthening intra-farm risk management, for example via multiple-risk insurances, but also supporting early-warning systems, for instance a system in the forestry sector to warn about risks of forest fire.

## Opportunities based on breeding

Breeding and establishing climate-adapted species and varieties of crops and robust and adaptable livestock breeds is an important part of mitigating climate change.

The aim is to promote specific breeding programmes. The BMEL supports the opening of new markets but also promotes the conservation and utilisation of the genetic diversity of native species.

One factor which is becoming increasingly important for adapting agricultural systems to climate change is improving the efficiency of irrigation and water storage systems, because the low amount of water that is currently used for agricultural irrigation will certainly increase, and not only due to the need to ensure food security.

## Financial support from the Federal Government and the federal states

Climate adaptation measures require a mindset change in many areas and openness to new crop-growing and farming methods. And they also require funds for their development and implementation. The BMEL therefore worked to ensure that the Federal Government and the federal states provided around 800 million Euros for forest support in 2019. A further 700 million Euros for forests, the forestry sector and timber construction were provided from the economic recovery packet in 2020. Private forest owners can use these funds to deal with existing damage and push forward climate-smart forest conversion.

Climate-change adaptation in agriculture, forestry, fisheries and aquaculture represents a task that will take generations and will only be able to be successfully completed if all stakeholders work together. The BMEL is therefore committed to include relevant stakeholders, institutional structures and existing expertise to develop and implement adequate climate change adaptation measures and to further develop already successful measures and promotion schemes. The BMEL is also striving to play a more active role than before on the European and the international stage, because climate change is a global challenge which requires both national and global climate change adaptation measures.

# Further publications

## BMEL Publications

Agenda for Climate-change Adaptation in Agriculture, Forestry, Fisheries and Aquaculture
April 2019

2035 Arable Farming Strategy
Prospects for Productive and Diverse Crop Farming
December 2019

Beans, Peas & Co.
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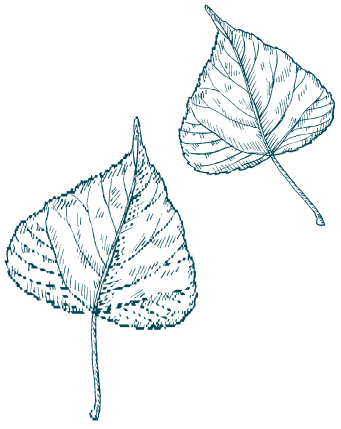

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