Summary

MONS report North Sea Consultation 2021

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Introduction

A healthy North Sea is in everyone's interest. Current use is already leading the marine ecosystem to cry out for protection and recovery. Changes in use (in terms of form and intensity) must fit within the ecological capacity of the North Sea. The ecological capacity is the precondition for the individual and cumulative use of the North Sea by a range of functions.

The North Sea Agreement (NSA) wants to confront the challenges in response to changing use and find a new equilibrium. The NSA outlines the real need for an integrated and systematic research and monitoring programme that forms the basis for knowledge about how the North Sea functions. The 'Nature Strengthening and Species Protection Monitoring Survey' (MONS) aims to answer the central question of whether and, if so, how the changing use of the North Sea can adapt to its ecological capacity.

The aim of the MONS programme is to give the parties to the North Sea Consultation (NSC) and, in the wider sense, society, an understanding of the changes that may and/or will, in future, arise as a result of the transitions that are already under way (energy, food supply and nature), combined with factors such as climate change, acidification and autonomous changes. All these developments will lead to changes in the ecosystem of the North Sea, protected habitats and populations of various protected species. Changes are inevitable. When the environment changes, the ecosystem changes with it. So there will be trade-offs between human use and the ecosystem, the habitats and the species. It is the job of the research carried out within the framework of the MONS programme to explain and/or to predict the scope of these changes, to assess the gravity of the effects (scientifically) and to communicate the results of this to the NSC parties (and the public at large). In this way it is possible for the NSC to make well-informed decisions.

The first three chapters of this MONS programme consider knowledge gap questions, the main points of which are stated in Annex 2 of the NSA and the accompanying Nature Strengthening and Species Protection Memorandum, and what links there are between all these questions. Also indicated is the framework within which the MONS programme is to be carried out. Other than that, there is a description of the method selected to assess the impact of the MONS programme. The method - i.e. working with three pillars for this programme - is based on the subject matter of NSA Annex 2. Also described is how chapter 4, which explores the various parts of the food web, is shaped: from the abiotic and lower trophic levels to the higher levels.

The substantive results: chapter 4

Chapter 4 contains the sections and sub-sections in which the approach to the knowledge gap questions is shown for each part of the food web. These questions are defined, the knowledge gaps themselves are described and, ultimately, the approach to and type of research that is necessary is outlined. The choice for this approach is the result of application of the selected methodology. Chapter 4 (in scientific terms) forms the substantive core of the MONS programme and covers the key results. This is summarised below. The prioritised projects are shown in Annex 8, while the non-prioritised projects are shown in Annex 9.

The basis of the food web

Primary production - the synthesis of biomass from inorganic nutrients by algae - forms the basis of the marine food web and, as a consequence, underlies the capacity of the North Sea ecosystem. Primary production in coastal areas is determined by the

availability of sunlight and nutrients such as carbon (C), nitrogen (N) and silicon (Si). The hydrodynamic conditions, together with the composition of and dynamics in the phytoplankton have a marked influence on this. In a shallow sea such as the North Sea, the seabed ecosystem also has great influence on nutrient dynamics, the phytoplankton and, as a result, primary production. Thorough knowledge of the capacity of the North Sea thus, in the first instance, demands a good understanding of the basis of the food web, in particular the physical conditions, the nutrient cycles, the role of the seabed ecosystem and primary production.

It is to be expected that the effects of climate change such as global warming, acidification and changing current patterns, in combination with the rapidly changing use of the North Sea (e.g. energy transition, changing nutrient loading, potential increase in mariculture, transition in the fisheries), will directly or indirectly lead to changes in the physical conditions, sediment balance

and the nutrient cycles. This will have significant, but as yet unknown effects on the composition of the phytoplankton and, in consequence, primary production and ecological capacity. Of particular importance in terms of policy is the extent to which this has an impact on the protection of areas and different protected species, the food supply via the fisheries, and mariculture.

In order to bring basic knowledge on how the food web works up to the required level, 4 process studies are proposed, an expanded WOT shellfish survey and, most importantly, an expansion of regular monitoring of primary production within the National Water Systems Monitoring programme (MWTL, Rijkswaterstaat monitoring survey):

1. Geochemical and biological diversity on the bed of the North Sea. The aim of this is to quantify the biogeochemical function and exchange of nutrients with the water column for a wide range of seabed types in the North Sea, the emphasis lying on the contrast between seabed areas with sand or silt characteristics.
2. The biogeochemical response to changes in the North Sea. This study focuses on process and impact studies to quantify the effects of North Sea transitions and climate change on biogeochemical seabed processes and exchange of bottom water.
3. Nutrient and silt dynamics in the water column. This study focuses on transport and transformation of nutrients in the water column and the behaviour of silt in the water column.
4. Primary production process study This study focuses on the use of nutrients by pelagic and benthic primary producers, and how production of that kind is regulated by the composition of algal populations and the sediment/nutrient balance.
5. Expansion of the WOT shellfish survey in relation to nutrient management. Occurrences of shellfish and biomass will be analysed as an indicator of the productivity of the ecosystem and, thus, also for the relative impact of nutrient supply via the rivers.
6. Monitoring of Primary production. To monitor changes in primary production and to understand how changes in the ecosystem influence primary production it is highly important to start with basic monitoring of primary production from year 1 of the MONS programme. Something which is not happening at the moment.

In addition to developments on land (including changes in emissions in the agricultural sector), there are three categories of factor exerting pressure on the North Sea that may have a **direct effect** on the basis of the food web, i.e. offshore wind energy, the development of mariculture (whether or not in combination with wind farms; particularly seaweed and shellfish) and the consequences of climate change, specifically global warming, and the acidification that is caused by the increase of CO2 in the atmosphere.

The research approach for the effects of Offshore Wind Energy on the basis of the food web covers the following studies:

Characterisation of currents at the surface and seabed, turbulence and wave patterns within, near to and far from wind farms, over different seasons and under different tidal and meteorological conditions, and the influence on hydrodynamics, silt dynamics and parameters of water quality.

Characterisation of biomass and types of phyto- and zooplankton upstream, within and downstream of wind farms, over different seasons.

Characterisation of sediment (structure, grain size, composition, TOC, chlorophyl, redox gradients, groundwater fluxes), and biomass and species composition of benthic macrofauna within, near to and far from wind farms with turbines.

Process-based research to be carried out into the effects of wind farms, accompanying mariculture and/or measures to help nature adapt to the functional role of the seabed and benthic organisms (in and on the seabed and on hard substrate) in relation to the capacity of the ecosystem.

The effects of global warming are being studied via the following process studies:

PhD/Post-doctoral Research 1: effects of global warming on the physical system;

PhD/Post-doctoral Research 2: effects on the connectivity and recruitment success of larval stages of marine organisms

PhD/Post-doctoral Research 3: effects on primary production and (phyto-)plankton composition

The following studies are proposed in relation to the effects of acidification:

A PhD/Post-doctoral Research position focusing primarily on issues in which the existing monitoring data are analysed, and field campaigns and process-related studies are carried out to determine the key drivers of pH changes in the North Sea.

The implications of acidification for the functioning of the marine ecosystem can best be tackled with a second PhD/Post-doctoral Research position.

Zooplankton

The zooplankton in the North Sea is mainly made up of small copepods (up to approx. 3 mm), jellyfish and larvae of benthic organisms. The functioning of zooplankton is decisive in relation to the transfer of primary production (phytoplankton) to the higher trophic levels in the water column, in particular to (small) fish. There are also various types of benthic organisms alongside these that eat zooplankton. As a group, zooplankton thus form an important link in the ecosystem of the North Sea.

There is currently no structural monitoring of zooplankton in the Dutch section of the North Sea. However, there is monitoring by means of the so-called Continuous Plankton Recorder (CPR) on board liners. Many methodological objections underlie this method of monitoring. Not all the plankton is effectively sampled, the opening is a mere 1.6 cm2, and CPR is also relatively limited as far as coverage (of time and space) is concerned. Information on the spread, seasonal dynamics, composition and functioning of zooplankton is necessary to understand and quantify its significance to the capacity of the North Sea ecosystem and the effects to which it is subjected. The key questions arising from the North Sea Agreement relate to the capacity of the North Sea ecosystem and the effects that various use functions have on it.

It has been suggested that it is time to start drawing up and implementing a monitoring system for zooplankton, given that there is currently no such system on the North Sea to properly monitor zooplankton.

In addition it is important to start up process studies for zooplankton, too, with a view to obtaining an understanding of the relationships between phytoplankton and zooplankton, and to determine how changes in primary production and the phytoplankton community impact on the production and composition of zooplankton. Effects can be expected as a result of such factors as climate change (global warming) and acidification, and potential changes in nutrient balance, primary production and turbidity due to the creation of structures such as wind turbines. And the increase in filter feeders that goes hand in hand with the creation of wind farms and measures to help nature adapt may have an effect.

Fish

The role of fish in the three transitions that are envisaged in the North Sea Agreement is self-evident. Fish can be found almost everywhere in the North Sea, from the shallow surf to the deepest troughs off the Norwegian coast, and from its quietest reaches to the centre of the Port of Rotterdam. Fish is the most important source of food for sharks and rays, and for many marine mammals. The great majority of sea birds is also dependent on fish for food. Finally, a number of species of fish are themselves the subject of protection: sharks, rays and migratory fish. Of course: without fish, there can be no fisheries. A North Sea ecosystem without fish is simply inconceivable, and the condition of the community of fish is a direct indication of the condition of the North Sea as a whole.

Three knowledge gap questions have been identified surrounding the ecological function that fish perform:

- Where is each species of fish to be found, when and why?
- How do fish behave in their habitat?
- How do fish function in terms of diet, growth and population development?

The overarching aim of all the research surrounding capacity and the functioning of fish is to provide the knowledge that is necessary to achieve a healthy and resilient fish community in the North Sea, in a way that can accommodate nature, the generation of sustainable wind energy and viable food production. A central part of this is formed by a spatially explicit model of the fish communities that will be developed as far as the required level of detail. This will make it possible to estimate what the effects as a whole of the fisheries, wind farms, closing of fishing areas and autonomous trends such as climate change will be on nature (ecosystem function, apex predators etc.) and the fisheries, and how these effects relate to existing and future measures. Apart from developing a model, a number of samples and other surveys that provide input for the fish community model are specified.

All factors exerting pressure that are differentiated within MONS have a clear bearing on fish. The fisheries constitute the most immediate of these, but also offshore wind energy and climate change are particularly relevant. The issues surrounding the fisheries and offshore wind energy have a relationship to each other, as the presence of offshore wind energy practically excludes fishing with towed fishing gear. The widespread roll-out of offshore wind energy thus leads to unheard of changes in the distribution of the fisheries and fish. In that context, the sites where fishing activities are excluded as a consequence of policy decisions are fixed (wind farms and nature areas), although it is not known where the pressure exerted by the fisheries will move to.

The fish community model referred to above also occupies a significant place in terms of the effect that factors exerting pressure will have. Data collection and analysis, plus experiments in the field are proposed, as well as a further expansion of the model to include wind farms and a fleet-dynamics module for predicting the behaviour of the fisheries as a result of possible interventions.

Nature strengthening and species protection measures in relation to fish, such as those specified in the North Sea Agreement, particularly focus on sharks, rays and migratory fish. These groups have long held an important indicator status in nature protection in the Netherlands. Sharks and rays are highly sensitive to excess deaths as, unlike other species of fish, they produce few offspring. Being fish eaters they are, necessarily, sensitive to the abundance of their prey. Migratory fish are particularly sensitive to blockades in their route from fresh to salt water and vice versa, routes that are generally highly regulated in the Netherlands.

In addition, there are concerns about the role of electro-magnetic fields. Sharks, rays and migratory fish use such fields (and changes in them) to detect prey and to orient themselves. Wind turbines and cables in or on the seabed also generate an electro-

magnetic field and it is possible that wind turbines and cables interfere with these functions. Other than these possible effects, the following questions arise:

As far as sharks and rays are concerned:

1. How is the life cycle of sharks and rays in the North Sea structured?
2. How is the population of sharks and rays in the North Sea structured?
3. What is the role of sharks and rays in the ecosystem of the North Sea (trophic ecology)?

As far as migratory fish are concerned:

1. What is the spatial distribution of relevant species groups on a seasonal scale?
2. What is the function of different areas for the various life-cycle stages?
3. What is the relationship between the amount of available habitat and population sizes (what are the sticking points)?

These questions are addressed in a range of studies. A number of telemetry studies focuses on electro-magnetic fields, distribution and habitat use, supported by analysis of diet and stable isotopes for the ecological role, and the development of genetic analyses to ascertain the population size on the basis of similarity.

Benthic organisms and benthic habitats

The central question is how the transitions will change the role, function and capacity of the seabed and benthic organisms in the ecosystem of the North Sea. Another question is what the effectiveness of protective measures (some of which have already been taken) is and how future

measures can be optimised. The first question tends to address the role of the benthos in the food web and the impact on (a)biotic processes; this is dealt with in the section on the basis of the food web. This section is specifically concerned with the benthos community (the effects on it and its recovery).

The most significant factor exerting pressure on benthic organisms is seabed disturbance. It is possible to gain an insight into both the effects of seabed disturbance and the effectiveness of excluding such activity using long-term studies of developments in benthic organisms in (comparable) open and closed areas. Sampling from the benthos in these areas also provides material for questions surrounding/input for: 1) changes in the function of benthic organisms in the food web and (a)biotic processes resulting from exclusion of seabed disturbance, 2) comparison with benthic organisms in wind farms, where the fisheries are also excluded, 3) recovery of the natural environment, including European flat oyster (designated zone Frisian Front: NZA 4.43), 4) other possible species protection plans.

Hard substrate is introduced where wind farms and mariculture zones are created. This will lead to changes in the benthic community. From the point of view of biodiversity, the question is which species will establish themselves on these hard substrates and surrounding soft substrates (this may include both native and non-native species), what determines the succession of the community, whether this succession depends on the presence of more than one wind farm (e.g. by functioning as a stepping stone) and the possible increase in the pool of species. Long-term sampling of the benthos also provides material for questions surrounding/input for: 1) changes in the function of benthic organisms in the food web and (a)biotic processes resulting from creation of wind farms, 2) recovery of the natural environment, particularly mitigating measures, 3) site decisions, 4) discussions (policy-related or otherwise) on what constitute 'desirable' species/developments in relation to possible introduction of substrates ('recovery of the natural environment) and the possible dismantling of the same (decommissioning).

Nature strengthening is an important pillar in the North Sea Agreement. The question is which areas in the North Sea are most promising for recovery of biogenic reefs, and what the current situation is. The NSA explicitly includes a clause stating that the presence and distribution of tubeworm reefs must be studied. It is possible to make suitability maps by

means of modelling that can be used to make specific assessments. With these results, these maps can then be applied iteratively. Supplementary experiments may be able to give greater insight into driving factors for reef formation.

It is also important to take into account climate change when identifying effective measures. Knowledge gap questions in this respect are comparable between groups of species and therefore require an integrated approach (one that goes beyond species group).

Marine and coastal birds

Marine and coastal birds have a high dependence on the North Sea (its coastal and international waters) both for food and as a habitat. So it is important to ask whether the North Sea has the capacity to accommodate this group of species (which are apex predators) and how it is influenced by factors exerting pressure such as offshore wind energy, the fisheries and mariculture, but also climate change. All species of marine and coastal birds in the North Sea system have legally-protected status.

Preconditions for the occurrence of marine birds include food which is both available and has nutrients that can be utilised, along with rest and space. Abiotic conditions such as weather, water movements (both horizontal and vertical), water depth and water quality (both turbidity levels and chemical characteristics) are important preconditions for the occurrence of marine and coastal birds; they determine the presence and utility (bioavailability) of nutrients. Within the group of marine and coastal birds it is possible to distinguish 3 functional groups: 1) 'real' pelagic marine birds (including razorbill, common guillemot, northern gannet, kittiwake), 2) birds that forage in the benthos and coastal zone diving birds (including common scoter, red-throated diver, great crested grebe), and 3) generally 'surface' foraging species in (primarily) coastal waters (gulls and terns). This distinction is used in the research approach.

To estimate the capacity of the North Sea to accommodate marine and coastal birds it is necessary to understand what marine birds need, which areas they favour and what the effects of (and interaction between) the factors exerting pressure on these preconditions are. The approach is to use modelling to map out as far as possible how the energy transition and/or food supply transition have an impact on marine and coastal birds. At the moment there is too little knowledge about what the key areas for birds are, what they eat, what they do when at sea and how their environment affects their fitness. Research that is described in the section on fish is important input for an understanding of the presence and vulnerability of fish-eating marine birds. Understanding of the population dynamics of vulnerable species is also important.

Capacity is determined by the extent to which the preconditions for marine birds are met. Factors exerting pressure, such as wind farms and food have an impact on these preconditions. To be able to determine the impact this has, research must be performed on both the direct effects of factors exerting pressure (e.g. bird strike with wind turbines and loss of habitat due to avoidance of wind farms) on vulnerable populations of birds and on the effects that arise due to physical processes and the food web (food availability).

In order to be able to say anything about population effects and capacity, it is important to have long-term basis data (international database on distribution of marine birds).

Protection of species or measures taken to restore natural habitats could play a role in increasing the capacity of the North Sea to accommodate particular vulnerable species. It may be possible to find out whether there are opportunities for this and, if so, what they are. In the context of species recovery, research into potential Birds Directive areas is necessary. In real terms, that means that it is important to identify before 2025 whether bird data is available, on the basis of which new Birds Directive areas can be designated. Where necessary, supplementary monitoring must be carried out.

Marine mammals

The resident marine mammal species in the North Sea are the common seal, grey seal, porpoise, white-beaked dolphin, common minke whale and common bottlenose dolphin. In addition, there are many other species that are present in lesser numbers: these are known as vagrants. Marine mammals play a prominent role in the North Sea ecosystem. They are at the top of the food web so changes in the lower trophic levels may have an impact on their distribution and population growth. They can be seen as indicators for the marine system. In the MONS process, working groups have drafted a large number of knowledge gap questions in relation to marine mammals. These relate to understanding the effects at ecosystem level, the effects of factors exerting pressure such as offshore wind energy and knowledge in relation to species protection plans.

At ecosystem level, the question is: what determines the spatial distribution and abundance of marine mammals and their prey through the different seasons? And how can these best be monitored? It is proposed to track marine mammals via detection networks (Passive Acoustic Monitoring) and by means of transmitters. Data on prey can be found in fish surveys. Data on the distribution of predators, prey and abiotic parameters can be linked to models on different levels (individual, population, habitat). Another question is which functions the various areas in the North Sea have for marine mammals, and how these mammals are affected by the energy transition and food supply transition.

In relation to the factors exerting pressure, knowledge gap questions often address bycatch, competition for food with the fisheries, the effects of wind farms on the behaviour of marine mammals, the effects of underwater noise due to the creation of wind farms and due to other sources such as seismology, the cumulation of various effects and the effects of climate change. The approach of these questions is made up of aspects including electronic monitoring of bycatch on board, the monitoring of the effect of wind farms on behaviour and distribution of marine mammals, and gaining an understanding of the potential for mitigation and the use of models to study the hazards that climate change brings to populations of marine mammals.

HM: verder heb ik niet mee windparken in windmolenparken veranderd. Wel goed om consequent dezelfde term te gebruiken.

As far as species protection is concerned, it is proposed to draft a number of species protection plans with descriptions of status and distribution, threats and factors exerting pressure, plus recommendations for possible measures to be taken in terms of recovery and protection. These measures can be taken up in the MONS programme or via other frameworks. There was a plan of this sort for the porpoise as early as 2011. Similar plans will have to be drafted for the other species in either a national or international context.

Bats and non-maritime birds

Neither bats nor non-maritime birds make direct use of the North Sea ecosystem. These are species or groups that move over the North Sea or along the coastline. The most significant impact for these groups is the direct effect of the operational wind farms with wind turbines that these species groups may fly into ('bird strike'). As a consequence, the MONS programme solely addresses research in relation to the offshore wind energy factor exerting pressure.

The knowledge gap questions and the answers to these questions are aimed at answering the main question: what are the effects of operational wind farms on non-marine birds and bats, and can these effects have an impact at population level for the species in question? For bats, the species in question (for which research is carried out) are Nathusius's pipistrelle and the common noctule. In terms of non-maritime birds, the species in question still need to be determined. The aim is to come to a manageable number of species to be studied. The research focuses (for both groups) on the timing and circumstances of departure in spring and autumn, greater understanding of behaviour in, above and around wind farms, and estimating the extent of the risk of

strikes. To do this, use is made of various (sometimes costly) monitoring techniques/systems, some existing, some yet to be developed.

Models

The MONS programme will provide a great amount of information on the capacity of the ecosystem, the effects of the transitions on the North Sea and possibilities for nature strengthening and species protection. This information will have to be integrated with a view to making an scenario analysis possible and being able to make informed decisions in respect of policy and management of the North Sea as envisaged in the North Sea Agreement. In that way, the answers to questions such as 'What is the ecological capacity of the North Sea ecosystem?' and 'What are the effects of the various use functions on it?' will have to be found. To that end, two complementary pathways are important: a mechanistic model approach and Cumulative Effects Analysis (CEA).

In relation to mechanistic models, it is proposed to create structural modelling capacity during the term of the MONS programme at the Deltares, NIOZ and WMR research institutes, where necessary supplemented with knowledge and expertise from other research institutes and universities, such as TNO for example, where underwater noise is concerned. This will ensure that the approach is integrated, preventing fragmentation. What is achieved, moreover, is that knowledge gleaned in the MONS programme is retained for the future as it is vested in the three most important research institutes in the Netherlands that are involved in marine research.

As far as the analysis of cumulative effects is concerned, it is suggested to develop the CEA methodology further as part of an iterative process in which both the new insights from the other MONS research and the knowledge gap questions raised by the NSC parties are reviewed continuously, and form the basis for further development.

Innovation in monitoring

A great deal of knowledge and, consequently, more data is needed for the roll-out of the NSA and to be able to implement the MONS programme in the period from 2021-2030. It is unrealistic to expect greater savings in the costs of measuring and monitoring, although the MONS programme may offer smarter and better ways to measure and monitor. For instance, by searching for better and more recent technologies and using more combined monitoring programmes.

To ensure that all MONS knowledge gap questions are supported with the right data, it is necessary to develop a monitoring and information strategy for the MONS programme. This

strategy will make use of the continuation of the MWTL programme and any other existing project (or other) monitoring programmes. In addition to this monitoring, new technologies will also have to be developed to gather data more efficiently or to obtain data that cannot be obtained otherwise as no other technologies are available.

Data management, visualisation and communications

In the MONS programme a lot of data will be collected by a large number of parties. Furthermore, much research will be carried out on the basis of newly collected and existing data, once more by many parties. This data collection and the resulting research will ultimately facilitate effective management of the North Sea. The NSA stipulates that all data and research results arising from the Agreement can be accessed according to the 'public, except where specified' principle.

The entire MONS programme ultimately supports the implementation of the NSA. Is it possible to achieve greater energy production, greater and more varied food production and nature protection with the aim of alleviating social needs, and what are the effects on nature and the ecosystem in that case? And, if not, what other options could or should be chosen? Specific reworking and analyses are required for this that can then be presented in dashboards. When the dashboards are created, it is essential that they

support specific policy questions. Determining the indicators that need to be included on such dashboards is a result of the substantive studies within the MONS programme and is based on the needs of the interested parties in the NSC.

It is proposed to shape the management of data from the MONS programme using the approach of the Informatiehuis Marien (IHM, a partnership between the ministries of Infrastructure and Water Management, Agriculture, Nature and Food Quality, and Defence).

NSA: Every other year, the government publishes the 'State of the North Sea', in which it reports on the effects of monitoring and the results of this monitoring, including the available information on commercial fish stocks.

All research and monitoring results will collectively be made available to interested parties and policy makers. Communication of the results in a clearly organised way ensures that there is an overlap between science and policy that can act as an urgently needed instrument for policy makers. This also includes the production of practical dashboards for interested parties.

Chapter 5 discusses prioritisation within the MONS programme, the 'no regrets' research proposals, the follow-up and possible other research subjects.

Prioritisation

All research and monitoring proposals are included in an Excel spreadsheet, including a short description for each proposal. The criteria under which the proposals are prioritised are described in chapter 5. The result of the application of the criteria on the list of proposals is then shown in the spreadsheet referred to above. Section 5.9 describes the results of these investigations. This prioritisation was drafted by the MONS Core Group, in consensus with the MONS Expert Group. This prioritisation thus contains a selection from the overview of the knowledge gap questions listed in sections 4.1 - 4.10 inclusive. Chapters 4 and 5 form the substantive core of the MONS programme. Phasing will be required given the variation in resources that become available on an annual basis. Phasing may also be required for substantive reasons, given the consecutive nature of specific research. Long-term measurements are often required before a start can be made on analysis and answering knowledge gap questions.

It is further important that MONS projects, where possible, build on research and monitoring that is already financed with existing budgets. An adaptive approach is used for work in the MONS programme. There may come a time when proposals that had previously been 'below the line' take on importance. The MONS programme may also at a later date offer opportunities for part-financing and specific projects may be brought into other programmes, so that more funds become available for research proposals that currently fall below the line.

No regrets

In order to make a dynamic start on implementation of the MONS programme, a list of so-called 'no regrets' research proposals has been made. Chapter 5 addresses this list and the criteria used to draft it. The results of the no regrets projects either form the basis for the implementation of larger-scale research projects, often with a longer horizon from 2022, or generate results which the NSC requires in the short term.

Phased implementation

The first phase of the implementation of the MONS programme is the implementation of the list of 'no regrets' projects.

The second phase is picked up at the implementation stage of the programme. This is projected to happen in the autumn of 2021. At that point a decision could be made on the projects which are to be given priority for implementation for 2022 and beyond. When decisions are made on the projects with priority, the list of priority proposals referred to above can be used. A list of miscellaneous possible subjects has also been drawn up that

can also be used in that case. Other than that there are several no regrets projects that cover the drafting of implementation plans (e.g. for long-term monitoring). The start of the projects for which an implementation plan has been drafted is then obvious. Box 5.2 in chapter 5 shows the seven steps that relate to the interpretation of the first and second phases.

A third phase may be decision-making on projects that haven't been picked up so far, but which then become more important for the answering of knowledge gap questions that are current at that point. An evaluation is planned for 2023 to map out the experience gained in the first few years of implementation.

Possible other research subjects

During the comments round of the MONS programme among the NSC parties and the International Review Committee, new research subjects also came to the fore. These are also shown in chapter 5. Decision-making on them will have to be deferred to the second phase of the MONS programme.