



Earth and Life Sciences

Pole Position - NL 2.0

Strategy for the Netherlands Polar Programme 2016-2020



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**Strategy for the
Netherlands Polar Programme 2016-2020**

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Cover photo

Collecting water samples in Marguerite Bay, Rothera Research Station. *Photo D. den Os*

Table of Contents

Preface	5
1 Contours	7
2 Social relevance and implications	9
3 Two evaluation frameworks	11
4 Research themes within the NPP	13
4.1 Ice, climate and rising sea levels	14
4.2 Polar ecosystems	15
4.3 Sustainable exploitation	15
4.4 Social, legal and economic landscape	16
4.5 Transcending themes	17
5 Two connecting lines	19
5.1 International collaboration and coordination	19
5.2 Collaboration with private parties	20
6 Policy support	21
7 Infrastructure	23
8 Programme execution	25
9 Financing	27
10 Management and organisation structure	29
Annex 1 NPP strategy-forming process 2016-2020	31
Annex 2 List of abbreviations used	33



The Dirck Gerritsz Laboratory in Antarctica. Photo L. Noor, NWO

Preface

In 2010, at the request of Ronald Plasterk, the Minister of Education, Culture and Science at that time, the Master Plan for Pole Position - NL was published, in which the plans were elaborated for the New Netherlands Polar Programme (NNPP) for the period 2010-2014. The 2016-2020 Scientific Strategy Plan in your hands is an updated continuation of the Master Plan and has been realised in collaboration with stakeholders from the scientific community, from financing ministries and from the business community. Under the aegis of Herman Eijsackers, a strategy emerged that globally elaborates the plans for the Netherlands Polar Programme for the years 2016-2020. As one of the building blocks, this Strategy Plan will contribute to the total polar policy of the Dutch government.

This Strategy Plan creates a framework for Dutch research in two important and rapidly changing areas on earth. It presents new lines for future polar research and continues on points that merit continuation. Continuously amassing knowledge about the polar regions and the changes occurring there is necessary in order to deal properly with the changing conditions and to ensure that the Netherlands continues to play a role in international (polar) issues.

The NPP helps generate knowledge about the polar regions – knowledge that provides us insight into how our planet works and how it will react to the imminent changes, and knowledge that contributes to safe, responsible decisions with respect to the conduction of activities in the polar regions.

1 Contours

The Netherlands Polar Programme (NPP) is a financing programme that invests in scientific research into the polar regions. It is supported financially by the Ministries of Foreign Affairs, Education, Culture and Science, Infrastructure and the Environment, Economic Affairs and by the NWO. Knowledge about changes in the polar regions and the consequences of these for the Netherlands remains strategically important: the consequences of climate change (locally and in the Netherlands), rises in sea level due to the melting of ice in the polar regions, ocean acidification, the increasing human burden placed on natural resources present there and the potential opening up of new, shorter, shipping lanes are issues that impact on our living environment and the internationally recognised values of the polar regions. Scientific research generates knowledge into the causes of processes that occur in the polar regions.

This knowledge can also provide solutions. Changes in the polar regions – and, particularly, in the area around the North Pole – also provide opportunities for the Netherlands. Which opportunities and which threats arise in and due to a world of ice that is rapidly changing? Business community forecasts for the coming 10 years indicate an expected general increase in economic activity in various forms. With that, there is talk of rapidly developing business (on the scale of billions of euros) with the growing need for “polar expertise” and influence in the region. In this case, scientific research can be important to the Dutch business community and to the Dutch government that (usually together with other countries) shoulders responsibility concerning the permissibility and concrete substantiation of these developments within the frameworks of applicable international treaties. The topics within the NPP have many overlaps with a number of the economic priority areas. This allows for a good connection with the Dutch government’s economic priority areas policy, particularly with the economic priority areas of Water, Energy and Transport.

The Netherlands has strong historical connections with the polar regions and has its own sense of responsibility for this Global Commons. This is expressed in the 2011-2015 Policy Framework for the Polar Regions, published by the Ministry of Foreign Affairs, which also involves the Ministries of Education, Culture and Science, Infrastructure and the Environment and Economic Affairs. In order to act accordingly, the Netherlands must be able to influence international management regimes for both polar regions. In order to acquire that influence, to maintain it and, especially, to elaborate it properly, the Dutch government must be adequately informed about the state of affairs in the polar regions, the imminent changes, and solutions to possible problems. For this, conducting clearly visible and valued scientific research under the Dutch flag and being able to make results available that are relevant to policy has turned out to be essential. This is even an explicit requirement for acquiring and maintaining consultative status under the Antarctic Treaty.

In addition to the national economic priority areas policy, NWO also strives for similar alignment of Dutch polar research with international polar research agendas of the European Polar Board (EPB), the Scientific Committee on Antarctic Research (SCAR), the Arctic Council (AC) and the International Arctic Science Committee (IASC).

The ambition of this strategy plan is the continuation of a long-term basis of financing for the Netherlands Polar Programme. In 2009, the Terlouw Commission evaluated the NPP and recommended financing on a scale of € 6.5 million per year. That level of financing was not achieved in the time period 2011-2015. Considering the high costs, mainly for the logistical and infrastructural facets within polar research, and the need to be able to make multiple-year financial commitments to our international

partners, NWO is calling for an effective and ambitious growing polar research programme. In order to be able to achieve a proper first alignment with the economic priority areas, NWO considers budget growth to € 10 million per year necessary.

.....
“The Polar Regions may seem remote but the rapid changes now affecting both these areas have resulted in significant consequences (.....). Science is a vital tool in establishing what is driving this rapid change.”
.....

European Polar Board in its challenges for Horizon2020 “Arctic and Antarctic Science for Europe”, June 2014

2 Social relevance and implications

The poles are extremely sensitive to changes in climate: they form the heartbeat of our climactic system. Climate change in the polar regions has huge physical, ecological, social and economic consequences far beyond those regions.

What is now becoming visible in the polar regions in an accelerated manner is generally seen to be a precursor to what the Netherlands is facing in a derivative form. Potential effects include changes in storm tracks, shifts in precipitation patterns, changes in the frequency and intensity of cold polar air flowing to lower latitudes, a rise in sea level, loss of biodiversity and the resulting degradation of fish populations, shifting vegetation boundaries and diminishment of the existing agricultural acreage.

These changes have economic consequences. However, these also create new opportunities for the Netherlands. The continuous retreat of Arctic sea ice gives room for shipping lanes from the Netherlands that may be 40% shorter than the routes now in use. Exploration into raw materials that are present in the North Pole region such as oil, gas and minerals will become technically and economically feasible. This also goes for new and shifting fishing grounds. The tourist sector can expand. As a consequence, the number of maritime operations will increase strongly through the years, along with the pressure to implement more permanent facilities (such as harbours, tourist facilities, etc.) in the polar regions.

All these new activities raise questions about the management of the polar regions, about international regulations and the maintainability of existing treaties and/or the need for new treaties.

Although attention to the Arctic area is increasing, the significant contribution made by the Antarctic ice cap to the global rise in sea level and the key role that Antarctic waters play in the food chain must not be underestimated. Commitment of a substantial portion of the NPP budget to Antarctica remains essential. Naturally, acquiring knowledge also plays an essential role in regulating human activities in Antarctica and in a strong position for the Netherlands in the Antarctic treaty system.

The Dutch government has drawn up the Policy Framework “The Netherlands and the Polar Regions 2011-2015” which elaborates its policy with respect to these areas. The NPP is an inextricable part of this and finances scientific research supporting this policy, along with performing a number of policy supporting tasks such as attending meetings of international organisations occupied with the polar regions (including workgroups of the Arctic Council and SCAR).

.....
 “The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (high confidence).”

IPCC Working Group I, Summary for Policy Makers, 2013



The tip of the iceberg, Antarctica. Photo D. van der Kroef, NWO

3 Two evaluation frameworks

With regard to research, this strategy plan combines “space for science” and “space for policy”. The questions that the ministries wish to see answered for purposes of policy support are not always the same questions that science itself generates: after a policy-driven call for proposals, the most important and urgent policy questions do not always generate the most excellent research proposals. Conversely, the most excellent research proposals do not always address the most important and urgent policy questions.

In order best to take the “specificity” of what the ministries want for purposes of policy support into account and what science itself puts on its (international) agenda, this strategy plan – considering the positive experiences with the 2011-2015 NPP – once again elects to start from a scientific or policy-driven evaluation framework (Clusters I and II). Important in this, as the NNPP evaluation committee recommends¹, is that the link between scientists and policymakers be strengthened. A good dialogue between these two groups is vital, with a proper balance between science and policy-driven questions. For this subdivision into frameworks, it is important to make clear that science-driven research can also be relevant to policy to a great degree. Conversely, policy-driven research can also have significant scientific value.

NPP's financing is subdivided into three Clusters. Curiosity-driven – or science-driven – acquisition of knowledge about the consequences of changes in the polar regions is included in the NPP's Cluster I. Cluster II is structured in order to generate policy-driven and application-oriented knowledge. The intended collaboration with private partners is also included in this. Finally, Cluster III is intended for the financing of all policy-supporting work performed under the heading of the NPP. This cluster is intended primarily for financing work for and contributions to international organisations. Continued support from this cluster is essential, for example, to make a success of the establishment of the EPB secretariat in the Netherlands.

The science-driven framework is geared toward top scientific quality. The themes formulated in this strategy plan determine the proposals that are financed within this cluster. Within this cluster, the emphasis is on curiosity-driven research.

The policy-driven framework is geared toward application and policy relevance. In the policy-driven framework, research must be relevant for policy established by the participating ministries. The challenge here is to fit the research, extensions of the various ministries' working areas, into a collective, future-oriented approach to the policy. An important criterion within this framework of consideration is the suitability of a research proposal within the current Dutch policy for the polar regions. A second important criterion for the assessment of policy-driven research proposals is that the practical implementation in Dutch policy of the research proposals submitted must be clearly described: i.e., what does the scientist intend to do in order to have the results of the proposed research reach the policymakers?

Research proposals are submitted and evaluated within one of the two assessment frameworks. In this manner, financiers have influence on the direction of the NPP's movements. For both frameworks, NWO, the executive party and co-financier of the programme, ensures that all of the research to be financed is of high scientific quality. For both Cluster I and Cluster II, only those proposals whose final evaluations of scientific quality are in the category ‘very good to excellent’ make the grade.

¹ Evaluation (New) Netherlands Polar Programme 2009-2014 – NWO, December 2014

4 Research themes within the NPP

In order to understand and to be able to predict System Earth and the changes that we now observe, continued knowledge gathering about the system is essential. Many of the important processes that regulate System Earth take place in the polar regions or are strongly influenced by the polar regions. Therefore studying these processes is hugely important in order to be able to react appropriately to the changes.

Dutch polar research is conducted from areas of its own strength and uses international collaborative partnerships that have been carefully built up. From the standpoint of the NPP, the research can best be encouraged with a few themes well-tailored to the Dutch field of polar research.

These themes build on the existing NPP themes supported by the cofinancing ministries, on Dutch research that took place in the context of the International Polar Year, and on efforts that the research institutions themselves have made to provide polar research with a solid foundation of expertise within the existing system. In the preparation for this strategy plan, the research field established that the scientific themes from the 2010-2015 Pole Position-NL Master Plan are still extremely relevant. This was confirmed by the NNPP evaluating committee². This conclusion is also supported by the recommendation in “The Future of the Arctic Region” from the Advisory Council on International Affairs³, in which a strong recommendation is made for continuing the financing of scientific North Pole research “for the retention of the position of the Netherlands within the Arctic consultation structures” and to prepare the Netherlands well for any possible rise in sea level in the future.

When formulating the themes, the Grand Challenges as identified by the European Commission were included. Grand Challenges such as Climate action, Resource efficiency, Marine and maritime research and Secure, clean and efficient energy are challenges to which research supported by NPP can contribute. In addition, the topics within the NPP align well with results from SCAR’s recently conducted Horizon Scan. The objectives of the European Polar Board, Europe’s strategic advisory body for scientific policy in the polar regions (EPB), the Arctic Council, the Antarctic Treaty and the International Arctic Science Committee (IASC) were included in the formulation of the research themes in this strategy plan.

In order to achieve focus and mass, the precondition that the NPP’s activities were preferably to be concentrated in the geographic areas of the Antarctic Peninsula in the south and on Spitsbergen and Greenland in the north was formulated in the NPP. This does not exclude research in other areas: it provides a handhold for having the available financial resources yield the highest return possible by means of its concentration into specific rounds of funding. The choice of the Antarctic Peninsula – and, particularly in the area around the Rothera Research Station – is based on the presence of the Dirck Gerritsz Laboratory there. The choice of Spitsbergen, and Ny-Ålesund in particular, is based on the presence of the Dutch polar station there. The choice of Greenland is primarily based on the importance for the Netherlands of research into the melting of the Greenland ice cap.

This geographic focus can be expanded depending on the size of the NPP budget. For example, one could consider the Russian Arctic region as a focus area, considering existing efforts by Dutch scientists there and the Dutch business community’s interest in that part of the North polar region.

² Evaluation (New) Netherlands Polar Programme 2009-2014 – NWO, December 2014

³ “The Future of the Arctic Region” – Advisory Council on International Affairs, September 2014

The four themes for the strategy period 2016-2020 are described below. The description of each theme is determinant for what is categorised within a theme. This concerns global strategy description: the research topics listed serve as examples for the type of research that may fall within a given theme and the summation is not exhaustive.

4.1 Ice, climate and rising sea levels

Observations of the current polar climate, observations of (the consequences of) changes in the dynamics of ice caps and glaciers and the modelling of these, including their impact on global and regional sea levels, are the primary categories for research within this theme. Studies of the (natural) causes and consequences of polar glacial periods and their termination in geological time scales is also part of this theme. The data arising from this is an important source of information for climate models.

Important topics for **science-driven research** within this theme include:

- The surface mass balance of glaciers and ice caps;
- Changes in weather patterns in polar regions;
- Studies of greenhouse gases, atmospheric tracers collectively referred to as “air pollution” and aerosols.

In this theme, **policy-driven research** focuses mainly on issues presenting concrete problems for the Netherlands resulting from climate changes in polar regions such as rising sea levels caused by melting terrestrial ice, or weakening of the warm Gulf Stream due to freshwater fluxes in the northern Atlantic Ocean. Examples of research topics within this theme include:

- What is the impact of the melting Greenland ice cap on Western Europe?
- What are the expectations with respect to increases in extreme weather conditions for the Netherlands from climate change in the polar areas?

Financing
from
Cluster I

Financing
from
Cluster II

The results of Dutch research into the polar climate system are increasingly finding an audience with (inter) national policymakers. See, for example, the Summary for Policymakers in the most recent IPCC report, the AMAP report about Greenland, the recommendation by the Terlouw Commission and the most recent report from the Advisory Council on International Affairs (AIV). In “The Future of the Arctic Region” (September 2014), the AIV concludes:

“The Netherlands is among those countries for which rises in sea level form a real and significant risk. It is important that the Netherlands can rely on well substantiated long-term prognoses and that it remain ahead of the pack in scientific research into rises in sea level and, therefore, in research into the surface mass balance of the Greenland ice cap. The government should make multiple-year resources available for such research. This type of research also expands the base for successful Dutch contributions to policy in international forums such as the Arctic Council.”

These citations also apply to research into the Antarctic ice cap and the role of the Netherlands in the Antarctic Treaty. To remain a leader in international polar climate research, a combination of model studies and observations (remote sensing and in situ) is essential. In addition to international collaboration in an EU context and beyond this, this requires joining forces within the Netherlands of research groups connected with the universities of Utrecht and Delft, SRON, NIOZ and KNMI. Adequate financing of such a research effort is possible through the effective deployment of one or more Core Programme grants. This NPP financing instrument is budgeted at a level of 3-5 M€ for each targeted effort.

4.2 Polar ecosystems

Terrestrial and marine polar ecosystems are subject to rapid climate changes and to increasingly large impacts from human activities. We still know very little about the individual impact of these factors on the functioning of the polar ecosystem in relation to natural variability - to say nothing of the combined impacts. There is a great need for knowledge about the resilience and capacity of these systems, including any tipping points and possible warning signals prior to reaching these tipping points. Scientific underpinning of these issues is essential for the conservation, management and sustainable use of polar ecosystems.

Financing
from
Cluster I

Important topics for **science-driven research** within this theme include:

- The cumulative impact of natural and anthropogenic stress factors on polar ecosystems;
- The effect of changing physical/chemical factors resulting from climate change on the diversity and share of key organisms in the polar food web;
- The consequences of changes in sea ice to polar ecosystems.

Financing
from
Cluster II

In this theme, the focus of **policy-driven research** includes:

- Protecting biodiversity;
- The impact of changes in polar regions on migratory birds;
- Research into the provenance and behaviour of contaminating substances such as persistent organic pollutants (POPs) and heavy metals that end up in the polar region via air and sea flows.

4.3 Sustainable exploitation

Due to the current and predicted decrease in sea ice in polar regions, in combination with the increasing global demand for natural resources, interest in mining activities and fisheries is increasing in the polar regions. New transportation routes and new opportunities for polar tourism are also opening up. The development of clear preconditions for sustainable exploitation and conservation of biodiversity and environmental quality are important in this. This theme concerns not only the impact of human activity and its limitation, but also concerns finding an answer to the question of whether and how safe, sustainable maritime operations can be conducted in the polar regions.

Financing
from
Cluster I

Important subjects for **science-driven research** regarding the exploitation of natural resources, maritime operations and infrastructural development include:

- Acquiring information about the capacity and resilience of ecosystems with respect to emissions and burdens (e.g. research into the effects of underwater noise or turbidity on the environment);
- Research that contributes to better insight into the social, legal, economic and political consequences of mining and new transportation routes.

Financing
from
Cluster II

Policy-driven research within this theme should provide information about the capacity of and environmental effects on the polar regions when using natural resources, conducting maritime operations and using the area for transport. Important topics within this theme include:

- Research that contributes to proper management of fish and marine krill populations;
- Mining in cold regions and the associated environmental problems;
- Research that contributes to knowledge of the local (territorial), social, legal, economic and political frameworks under which companies operate (this topic overlaps with theme 4).

Financing
Public-private
partnership

The Netherlands has a strong maritime and offshore services sector specialised in complex, specific systems and operations. Economic activities in polar regions offer opportunities for Dutch companies and research institutes. These activities must be structured and performed within the preconditions of safety and sustainability. The expected increase in maritime operations in the Arctic (coastal) areas and of tourist activities in both polar regions demands research into methods and technologies for managing the risk and safety of such operations. This can be further subdivided into:

- Risk management for ecosystems and species;
- Risk management, safety and social impact for local communities;
- Risk management and safety for the companies and their employees themselves.

.....
 “Developing the Arctic could be essential to securing
 energy supplies for the future, but it will mean balancing
 economic, environmental and social challenges.”

Shell (www.shell.com/global/future-energy/arctic.html)

4.4 Social, legal and economic landscape

of changes to the polar regions for the existing governance structures, for the exploitation of natural resources and for local communities? Research into these questions can provide insight into the resilience of societies in the Arctic area. The increasing human activities in the polar regions will require further international consultation, governance and regulation. Knowledge of the changes that the various local communities in the Arctic region are undergoing (have undergone) and knowledge of the local political, social and legal situation is also particularly important for Dutch organisations and companies that wish to operate in the Arctic region.

Financing
from
Cluster I

Science-driven research is, among others, related to the following:

- The effectiveness of existing law – e.g., by a study of the way in which existing international treaties are implemented and enforced in practice in national law and enforcement;
- Global economic consequences from thawing in the polar regions;
- The effect of (climate) change on local inhabitants in the Arctic region.

Financing
from
Cluster II

Policy-driven research within this theme focuses, among others, on the following subjects:

- The implementation of protection of biodiversity and wilderness values in the polar regions in treaties and permit systems;
- The improvement of regulation of human activity in Antarctica in order to be able to manage the cumulative effects of these activities on the Antarctic environment and other values (e.g. replacement of the current system of issuing permits for separate activities, which provides no oversight of the final cumulative result);
- What are the existing and possible future values of polar ecosystem services?

.....
 “Answering these many questions [selected in the SCAR Horizon Scan] will require sustained and stable funding (...). Postponed projects and lost field seasons leave gaps.”

SCAR. Polar research: Six priorities for Antarctic science. Nature, vol 512, pp23-25 (2014)

4.5 Transcending the themes

Connections between fields of research occur in various areas. These so-called cross-cutting issues connect the four themes. For example: how will the carbon cycle in the North polar region change due to changes in ice coverage? What will the effects of climate change be on the Gulf Stream in Western Europe? What are the consequences for local communities if a northern passage for shipping comes about? This interdisciplinarity within the Dutch polar research community can be strengthened by formulating research questions that either fall within various themes or that connect the themes.

Two important basic threads run among the themes:

1. Acquiring fundamental knowledge of the polar regions and insight into the various interactions, so that the effects of human activity and climate change can be measured well. This is important for projecting future scenarios and for managing these areas effectively;
2. Monitoring and/or long-term research is important in order to maintain the picture arising from the aforementioned fundamental knowledge with information about the status of a changing system over time. This allows changes that are occurring now to be detected. This information is essential in order to be able to draw up reliable models, which themselves are essential for reliable predictions. Research groups have difficulty with the continued financing of their own longer-term monitoring programmes. The same problem arises at the NPP: it gets financing every 5 years and is therefore unable to finance any monitoring projects that last longer than 5 years. Only by financing individual projects in an overlapping manner can NPP contribute to this, as long as the NWO criterion of a research proposal's originality is still in effect.

The European Polar Board has also designated these two basic threads as being hugely important for the European research agenda Horizon 2020.



Geese research in Ny Ålesund, Spitsbergen. Photo L. Noor, NWO

5 Two connecting lines

In addition to the four themes, two points of commonality run through the Netherlands Polar Programme:

5.1 International collaboration and coordination

Polar research is expensive. This is due to extreme climatological and geographic conditions and the high logistical and infrastructural costs associated with the collection of the required research data. *Without international collaboration, polar research is not possible for the Netherlands.* Polar research in the Netherlands has long-term collaborative partnerships in place with the British Antarctic Survey (BAS) and the German Alfred-Wegener-Institut für Polar- und Meeresforschung (AWI). These collaborative partnerships are established in a Memorandum of Understanding (MoU). The scientific ties with other countries that are important to Dutch polar research will be tightened during this strategy period wherever possible. One can consider Russia in connection with that country's large territorial presence in the North Polar region and the Dutch research efforts already present in Northern Russia. One can also consider whether further collaboration with Belgian scientists might be important for the Netherlands. The Belgian Princess Elizabeth Base may be an interesting terrestrial fieldwork location for Dutch scientists. Opportunities for financing research projects based on collaboration with Belgian scientists also exist in Belgium. Chile, an important access route to Antarctica, is also looking to collaborate with Dutch polar scientists. In 2016, it will be 400 years ago that Willem Schouten rounded Cape Horn. This will be celebrated during the Antarctic Treaty Consultative Meeting (ATCM), the annual meeting of all the member states to the Antarctic Treaty; in 2016 this meeting will take place in Chile. This may lead to a national impulse for Chilean polar research. Dutch scientists from the NPP will be actively involved in this. Norway is also an important partner for Arctic research considering its coordinating role in research on Spitsbergen (Ny-Ålesund) and considering the financial resources that Norway makes available for scientific studies in relation to themes 2 and 3. However, every expansion in the geographic focus of NPP research is linked to expansion of the existing financing.

Extra
financing
required

The Netherlands will have to contribute proportionally to the maintenance/construction/rental of our international partners' Arctic and Antarctic logistical and infrastructural facilities, if we want to be able to maintain our privileged collaboration with them. The Netherlands is and remains an attractive partner for collaboration and Dutch scientists will continue to have access to other countries' polar facilities as long as Dutch scientists produce important research contributions and data sets in return. The Netherlands is a "niche operator" in polar research. Compared to the efforts of such countries as the UK and Germany, our total efforts are relatively limited, but these efforts involve a number of very specific scientific fields, including glaciology and oceanography, with groundbreaking, high-level research in areas where other countries lack expertise. For example, in the NPP there is considerable expertise in the area of (automatic) in-situ monitoring and modelling of the polar climate. Being able to share scientific infrastructure and data with foreign partners provides excellent compensation for the lack of our own polar infrastructure. NPP continues to invest in this area.

European Polar Board

The European Polar Board (EPB) is an advisory body of the European Science Foundation and is part of the European Polar Consortium. NWO is a member of the European Polar Board (EPB) and sends the manager of the NPP as its representative. As of 1 January 2015, the secretariat of the EPB will be established at the NWO in The Hague; this gives NPP a strategic partner close at hand.

International calls for research

Within the NPP, research must be able to align with international research. The field aspires to participate in internationally organised rounds of financing. Financial contributions are necessary for Dutch participation in such calls. The Netherlands has played an important role, for example, in drawing up the PolarNet proposal issued from the EPB in the European Commission's call for proposals – 'Blue growth: unlocking the potential of seas and oceans'. The purpose of this call is to develop an integrated European Research Programme in collaboration with all the relevant stakeholders and international partners. The University of Groningen coordinates the Dutch involvement in this consortium.

Extra
financing
required

SIOS

The Svalbard Integrated Arctic Earth Observing System (SIOS) is one of the proposals accepted from Norway for the European Strategy Forum on Research Infrastructures (ESFRI). The objective is the construction of an Arctic Earth Observing System in and around Spitsbergen that integrates geophysical, chemical and biological processes for all of the research and monitoring platforms. The role of remote sensing will be included in this. Membership costs are estimated to be € 50,000 per year. SIOS wants to become a European crossroads for global monitoring in the 'High Arctic'. The Dutch research station in Ny-Ålesund can make an important contribution to this initiative. A decision about Dutch participation will have to be made sometime between 2016 in 2020.

Extra
financing
required

5.2 Collaboration with private parties

Changes in the polar regions, primarily in the North Pole region, increase the economic importance for the Netherlands because of the new opportunities that these changes create for the Netherlands. The desire to take advantage of natural resources, as well as the northern transport routes that will open up, make this area extremely interesting to the Dutch business community. These activities also make the Netherlands responsible for acting properly in this area.

Private parties may benefit from the research generated by institutions within the frameworks of the NPP. Polar research is a motor for technological development. In the near future, research into specific equipment and technologies and knowledge about safe and environmentally friendly ways of working in low temperatures will be essential. Collecting data in extreme weather conditions and at extremely remote locations makes the design of specific equipment and methods necessary. Interaction between private parties and research institutes can run via the economic priority areas. These organised collaborative partnerships with private parties, clustered into various themes, form an opening to "the business community". The economic priority areas will then play an advisory role in the substantive programming of certain rounds of NPP financing. On the other hand, the NPP requests a financial contribution from the participating private parties. It should be emphasised here that the NPP exists in order to gather knowledge in a scientific manner. The collection and dissemination of existing knowledge is not one of the NPP's activities. The basis is comprised of research assignments of 3-4 year duration, in collaboration with a Dutch knowledge institution. There are various ways to substantiate this public-private partnership, but alignment with Cluster II would appear the most obvious, considering the applied nature that this research will have. In addition, NWO will strive to organise the Calls for Proposals in the areas of knowledge in the economic priority areas that are relevant to polar science. Opportunities for collaboration exist with the economic priority areas of Water, Energy and Transport. NWO will investigate this collaboration further.

Financing
Public-private
partnership

6 Policy support

A third component of the NPP, set up at the recommendation of the Terlouw Commission, concerns expenditures for purposes of proper management of polar regions, international coordination of research and implementation of knowledge, and expanding the international image and visibility of the Netherlands and of Dutch polar research. To achieve this, good national representation in international bodies that are important to polar research (boards, (programme) committees, workgroups, etc.) is important. Cluster III absorbs expenditures for contributions, attending meetings by Dutch representatives, etc. Partly thanks to this effort via Cluster III in 2014, the Netherlands was able to gain the secretariat of the European Polar Board for the period 2015-2019. The important activities and organisations for the polar region are:

- Contract with the University of Groningen's Arctic Centre concerning management of the Dutch Polar Station on Spitsbergen
- Contract with Tilburg University for advisory work concerning membership in the Antarctic Treaty
- Secretariat for the Antarctic Treaty
 - The Antarctic Treaty Consultative Meetings (ATCM & CEP)
- Workgroups/Committee of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Scientific Committee for Antarctic Research (SCAR)
- Council of Managers of National Antarctic Programmes (COMNAP)
- Participation in inspections in the context of the Antarctic Treaty
- European Polar Board
- International Arctic Scientific Council (IASC)
- Workgroups in the Arctic Council (AC)
- European Framework programmes

Extra
financing
required

In the 2010-2014 NNPP, not all of the aforementioned organisations and work activities were funded. Attending the ATCM, the meeting of the CEP and work activities for the Commission on the Conservation of Antarctic Marine Living Resources (CCAMLR), are now mentioned because of the importance of these organisations to the polar regions. NPP research can contribute to the work activities of and the results achieved by these organisations. However, Cluster III funding will have to be expanded in comparison with the period 2010-2014.

Education, Outreach and Communication

The NPP must be supported by an adequate communication strategy and sufficient budget must be appropriated for executing the "3x3" communication strategy developed in the IPY. This strategy links each of the three components of Education, Communication and Outreach to the three important target audiences for polar research: the public, policymakers and scientists. Parts of this communication strategy include the annual NPP symposium, publishing brochures and an annual report, giving lectures or having outsiders provide these, and having videos produced about the NPP's work.

In Cluster III, no (research) requests may be submitted.

Costs transcending the clusters

Outside the three clusters, funding is also required for central activities including the coordination, logistics and support of scientific research. Among other things, this includes contributions to international partners (MoUs), financing Dutch infrastructure, data management and meeting costs for the Netherlands Polar Committee. These activities contribute to all clusters and, therefore, receive contributions from all three clusters.

7 Infrastructure

Access to adequate infrastructure is essential for the visibility and continuity of the NPP.

Antarctic infrastructure

Access to Antarctic infrastructure is coordinated centrally by NWO. For this, NWO takes care of the necessary MoUs and for national representation of the Netherlands in the Council of Managers of National Antarctic Programmes (COMNAP).

Dirck Gerritsz Laboratory – Rothera Research Station, Antarctica

One of the focal points in the Pole Position NL Master Plan (for the period 2011-2015), inspired by Ronald Plasterk, the Minister of Education, Culture and Science at that time, was the construction of a laboratory at the British research station Rothera in Antarctica. This lab was officially opened in January 2013. The entire construction of this laboratory was completed in collaboration with the British Antarctic Survey (BAS). NWO manages the lab with the help of a Scientific Steering Committee, with representatives from both the Dutch and the British side. Effective use of this investment requires a call for proposals once every 2-3 years, (partially) focused on the Dirck Gerritsz Laboratory.

Collaboration with the British Antarctic Survey (BAS)

For the Netherlands, the British are a natural and very reliable partner in a relatively accessible part of the South Pole region, the Antarctic Peninsula. In recent years, the collaboration with BAS has intensified due to the construction of the Dutch Dirck Gerritsz Laboratory. In 2012, the agreements about logistical support in the form of a Memorandum of Understanding with BAS were renewed due to the high mutual value and they were expanded in order to include agreements about managing the Dirck Gerritsz Laboratory. On the basis of expectations and of the agreements made, the Dutch laboratory must remain operational until at least 2020. The technical life cycle even allows for operations extending to approximately 25 years.

Collaboration with the Alfred Wegener Institute (AWI)

This collaboration is mainly about marine biology, but there has also been collaboration with AWI for the last 15 years in the area of unmanned geophysical measurement platforms. The research icebreaker *Polarstern* is deployed frequently for Dutch polar research. Within this collaboration, expensive Dutch measurement equipment that partners do not have available is also deployed. The Netherlands invested previously in aquarium facilities for the AWI's Dallmann Laboratory in Antarctica. AWI has also made research facilities available at the Koldewey Station on Spitsbergen. The long-term (> 30-year), close collaboration with AWI is successful and is highly valued both by the scientists involved and by AWI itself. For this reason, agreements with AWI about logistical support in the form of a Memorandum of Understanding were extended in 2013.

With an eye to the future, the collaboration with AWI will be made more intensive: the Netherlands now has a unique opportunity to participate in the joint construction of a new research station by AWI and the French Polar Institute IPEV in Ny-Ålesund on Spitsbergen.

Arctic infrastructure

Dutch Polar Station – Ny-Ålesund, Spitsbergen

Since 1995, the Netherlands has rented a modest research facility in Ny-Ålesund. This research facility enables Dutch scientists to participate in international research activities and to use other research facilities present at Ny-Ålesund. This fixed, permanent infrastructure contributes to improve continuity, recognisability and integration of the Dutch research. In this context, the situation in Ny-Ålesund is a beautiful example of collaboration in which a small investment in a useful and recognisable Dutch polar station as part of an international research facility results in significant recognisability in international polar research. However, the existing polar station is very outdated and the primitive facilities there no longer meet current needs for the accommodation of scientists. Furthermore, there is a need for special laboratory facilities that are not provided in the current Kings Bay Marine Laboratory. There is now an excellent opportunity for building a new accommodation in Ny-Ålesund in collaboration with AWI and IPEV (AWIPEV). This win-win approach aligns well with the European Polar Board's proposal concerning improved coordination and joint financing of polar infrastructure. NWO is also reviewing possibilities for a mobile addition to the Kings Bay Marine Laboratory, comparable with the mobile laboratories at the Dirck Gerritsz Laboratory. Naturally, this concerns lab facilities not already provided by the Kings Bay Marine Laboratory.

At some point, NPP also wants to provide transnational access to the Dutch facilities.

Financing
from all
Clusters

Extra
financing
required

For the purpose of observational polar research, the Netherlands must have infrastructure that can be used on NPP research projects. With this scientific infrastructure in both the north and south pole regions, scientists from the Netherlands obtain easier access to foreign partners' logistical facilities. During this strategy period, the need for infrastructure/equipment for Dutch polar research is met by the possibility of requesting infrastructure and expensive equipment via a call for proposals.

.....
 “Abrupt changes have been observed in the environment across the Arctic. Such changes risk crossing environmental thresholds, which can have long-term consequences that affect options for future development.”

The Arctic Council in its Arctic Resilience Interim Report 2013

8 Programme execution

The 2014 NPP evaluation showed that the various stakeholders considered NPP's execution in the period from 2009-2014 to be very much professionalised⁴. This provides encouragement for continuing the existing way of working, in which the necessary adjustments will be made to certain components. The various financing instruments consist of:

Open competition

Open rounds of competition will be held for the entire area of polar research, with a call amount of approximately € 2 million, for which interested polar scientists may submit proposals. This concerns a programme for promising, but relatively small-scale, top research (one Ph.D. or postdoc scientist). For the purpose of guiding these proposals, the themes defined in this plan (see Chapter 4) and the policy principles of the Policy Framework (if it involves research funded by Cluster II) take precedence. So researchers are invited to submit theme or policy-driven proposals.

Core programme grants

With this strategy plan, NWO wants to continue the policy of awarding a number of science-driven polar core programme grants on the basis of scientific, internationally recognised top quality. There is a provision to award a number of new core programmes (each a total of € 1-3 million for 5 years). The research proposals must fit within the four indicated themes.

With this plan, NWO also wants to award a number of policy-driven core programme grants (each a total of € 1-3 million for 5 years). The stated conditions also apply to these grants, but here, policy relevance is also co-determinant. Nonetheless, top scientific quality remains a requirement. Core programme grants can be requested and awarded for the four scientific themes and for the policy principles indicated in the Policy Framework for the period 2016-2020.

This funding method is intended to encourage further focus and mass in important, expensive areas of polar research. These core programme grants also make it possible to make solid, reliable agreements with foreign partners and co-investors in a scheduled way and to create good links with the Dutch infrastructure. In addition to top quality, one of the conditions is that the research groups involved are or will be firmly anchored in their knowledge institutions and that they exhibit a substantial, multiple-year financial and personal commitment to polar research linked with the core programme to be awarded.

For the continuation of Dutch polar research, it is important that the institutions for scientific research in the Netherlands that commit to this research (by making funds and personnel available) are, themselves, supported. By investing in these organisations, a powerful home base for polar research in the Netherlands will also be created for the longer term.

⁴ Evaluation (New) Netherlands Polar Programme 2009-2014 – NWO, December 2014

When selecting the core programme grants, primary considerations concerning the applicants are;

1. demonstrated consistency in excellent polar scientific research by means of peer-reviewed publications and international evaluations;
2. demonstrated commitment to scientific polar research through multiple-year investments in infrastructure (technical and administrative support, salaries for scientific personnel, matching of third-party funding, education);
3. research into fundamental questions in an area in which Dutch research is internationally leading, and in which the Netherlands holds an above-average interest;
4. collaboration with other Dutch research groups and/or institutes.

The number of core programme grants is limited; the honouring of proposals is selective and is in no case distributed beforehand across the selected themes and policy principles.

International calls

The possibility of coordinating with international calls will be reviewed each time an opportunity presents itself.

Data management

One of the requirements arising from the Antarctic Treaty is making data available (article III-1c). SCAR, IASC, the EPB and NWO themselves also place great value on data management and data sharing. In the context of international coordination, further study will be done into the role that the Netherlands can play in the area of data management. Good data management can only take place if it is based on a clear national polar data policy that regulates how the Netherlands makes its data available in a sustainable manner. Data management is one of the treaty obligations in the Antarctic Treaty. Polar data management will be further developed as an intrinsic component of the research proposals to be financed.

.....
 “Today we present observational evidence that a large
 sector of the West Antarctic ice sheet has gone into
 irreversible retreat; it has passed the point of no return.”

Professor Eric Rignot, NASA news conference 12 May 2014.

9 Financing

The Netherlands Polar Programme invested € 3.7 million per year in polar research and policy support in the 2011-2015 period. NWO contributes € 0.75 million per year to this. By way of comparison: the UK maintains an expensive logistical infrastructure and invests approximately € 60 million annually in polar research.

NWO has now definitively expanded the incidental research efforts whose impact increased thanks to the International Polar Year⁵, with an emphasis on research projects in areas of study in which the Netherlands scores well internationally. With the core programme grants from the previous strategic plan and the intention to participate in construction plans with international partners in Ny-Ålesund, the Dutch research efforts in the north pole region will further increase. The developments there have direct consequences for the Netherlands and for the many areas mentioned previously.

In order to contribute in a realistic manner to the study of issues concerning global changes, NWO still considers growth in the annual expenditures for the NPP necessary - up to a level of € 10 million per year, divided equally between the north and the south pole regions. Polar research requires facilities such as research vessels, weather stations, satellites, drilling rigs, data and knowledge centres and the Netherlands will have to contribute to this in its collaboration with other countries.

.....
 “If the position of the Netherlands within the Arctic consultative structure is to be retained then adequate financial resources must be made available – also in the future - for scientific Arctic research”.

Advisory Council on International Affairs. Recommendation 90 (September 2014)

⁵ Evaluation (New) Netherlands Polar Programme 2009-2014 – NWO, December 2014

Table 1 shows the estimates of the NPP expenses **annually** for the period 2016-2020:

Table 1 | Estimates of annual NPP expenses 2016-2020 (MEuro /year)

Cluster 1. Science-driven:	3,0
Open competition	
Core programme grant + investments	
International programming and transnational calls	
Cluster 2. Policy-driven + Private:	3,0
A.	
Open competition	
Core programme grant + investments	
International programming and transnational calls	
B.	
Public-private partnership	
Cluster 3. Policy-supporting	1,0
International activities	
Contracts with third parties	
Education, communication and outreach	
Coordination, logistics and international collaboration	3,0
Total	10,0

Table 2 shows the estimates of the necessary NPP income for the period 2016-2020:

Table 2 | Estimate of NPP income for the period 2016-2020 (MEuro)

	2016	2017	2018	2019	2020
NWO	1,0	1,0	1,0	1,0	1,0
OCW	2,0	2,0	2,0	2,0	2,0
I&M	2,0*	2,0*	2,0*	2,0*	2,0*
EZ	2,0*	2,0*	2,0*	2,0*	2,0*
BZ	1,0	1,0	1,0	1,0	1,0
PPS	2,0	2,0	2,0	2,0	2,0
Totaal	10,0	10,0	10,0	10,0	10,0

*= 1.0 MEuro available for matching PPP collaboration

Private parties and the NPP

By means of a public-private partnership structure, such as already has been used in the economic priority areas, the business community can make a financial contribution. For this, co-funding is required from the users of the research, in addition to NWO's contribution to the research project. This co-funding may consist partly of an in-cash contribution and partly of an in-kind contribution. Examples of in-kind contributions include providing access to facilities, data and research locations, and the use of personnel for specific tasks within a project.

The exact definition of this connection is partly a task for the financing ministries. The size of the budget available for polar research related to economic priority areas depends primarily on the Ministry of Economic Affairs, which has the economic priority areas' policy in its portfolio.

10 Management and organisation structure

Financiers

The Interdepartmental Polar Consultation (Dutch: IPO) is the consultative body for all of the NPP's financiers; its chairman is from the Ministry of Foreign Affairs. Decision-making with respect to the NPP takes place in the IPO. The four ministries involved with this programme are: Education, Culture and Science, Infrastructure and the Environment, Foreign Affairs, and Economic Affairs. The IPO establishes the NPP budget.

The IPO draws up the Policy Framework for the polar regions. This policy framework is the basis for financing Dutch polar policy and, therefore, for the NPP. The following Policy Framework will appear in 2015.

If the public-private partnership is going to play a role within NPP, then the business community will have become a collaborating partner. Input from the private partners is necessary for determining the NPP research for which a PPS structure can be formed.

The Netherlands Polar Committee

The underlying organisation structure for Dutch polar research must be transparent and efficient. The Netherlands Polar Committee (NPC) has been active since 2010. Its chairperson is Ms J.M. de Vries. The NPC has taken over the tasks of KNAW's Dutch SCAR committee and of NWO's Committee for Polar Research. The NPC's primary tasks are:

- writing the calls for proposals necessary for the NPP;
- representing and promoting the interests of Dutch polar research in national and international committees and organisations;
- monitoring the progress of NPP research;
- making recommendations about national and international developments in polar research;
- encouraging, initiating and coordinating national and international scientific activities in the polar regions;
- organising an annual polar symposium;
- functioning as a national point of contact for issues related to the NPP.

Selection committees

The evaluation of research proposals within the science-driven framework must take place in an evaluating committee that is designated with international experts for each call for proposals and that works within the provisions of the NWO's Code of Conduct on Conflicts of Interest. The selection committee makes a recommendation to the board of NWO's Earth and Life Sciences Division (GB-ALW). The decision about the composition of these ad hoc committees must be made by GB-ALW – independently and remotely from the polar research community – which will also shoulder final responsibility of the GB-ALW for the execution of the NPP.

The working method created by the NPP in the period 2010-2014 will be continued for the assessment of research proposals within the policy-driven framework. The value of this working method has been acknowledged by the co-financing ministries and it makes use of two assessment committees:

- one that works as the assessment committee for science-driven proposals, and that must be redesigned with international experts for each call for proposals, and that assesses the scientific quality;
- an assessment committee consisting of researchers selected by the IPO, who have policy expertise in the areas of the ministerial policy fields and who assess the relevance of the proposals for Dutch policy.

The ranking of proposals within this framework is based on two sets of criteria (scientific versus policy) with a 50-50 weighting formula for scientific excellence versus importance for policy. If a decision must be made about awarding policy-driven research proposals, then the members of the IPO issue a proposal for a decision, after which the NWO-ALW's divisional board makes the formal decision.

.....
“The Council therefore supports an enhanced
contribution by the EU to Arctic research, including
monitoring and observation efforts, and to the sharing
and dissemination of information about the Arctic.”
.....

Council conclusions of the Council of the European Union, 12 May 2014

Annex 1 NPP strategy-forming process 2016-2020

This Strategy Plan came about under the aegis of Herman Eijsackers, one of the four policy experts in the Netherlands Polar Programme. NWO opted to have this process be led by an independent chairman. A Strategy Committee meeting, in which the first contours of the new NPP strategy were formed, took place on 16 December 2013. This committee consisted of the following people:

Herman Eijsackers	Emeritus professor at Wageningen University & Research Centre and former chief science officer at the Ministry of Agriculture, Nature and Food Quality (now Economic Affairs) chairman
Albert Aalbers	Senior Researcher MARIN and participant in the economic priority area Water
Rien Aerts	Professor of Systems Ecology at VU University Amsterdam and member of the Netherlands Polar Committee
Kees Bastmeijer	Professor of Conservation and Water Law at Tilburg University
Patrick Brandt / Leni Buisman	Ministry of Foreign Affairs, secretariat of the Interdepartmental Polar Consultation (the NPP financiers)
Bram Bregman	Professor of Climatology and Policy at Radboud University Nijmegen, Ministry of Infrastructure and the Environment and Royal Netherlands Meteorological Institute
Michiel van den Broeke	Professor of Polar Meteorology at Utrecht University and member of the Netherlands Polar Committee
Corina Brussaard	Professor of Marine Viral Ecology at University of Amsterdam, senior researcher at NIOZ Royal Netherlands Institute for Sea Research and member of the Netherlands Polar Committee
Anita Buma	Professor of Eco-physiology of Marine Microalgae at University of Groningen and member of the Netherlands Polar Committee
Jan Andries van Franeker	Senior scientist in Ecology and Zoology at IMARES Wageningen University & Research Centre
Loes Gerringa	Senior scientist in Bio-availability of metals for biota at NIOZ Royal Netherlands Institute for Sea Research and member of the Netherlands Polar Committee
Louwrens Hacquebord	Emeritus professor Arctic and Antarctic Studies at University of Groningen and member of the Netherlands Polar Committee
Peter Hendrickx	Principal engineer Offshore at Royal Boskalis Westminster

Dick van der Kroef	Acting director at NWO Earth and Life Sciences Division and manager of NPP
Harro Meijer	Professor of Atmospheric Chemistry at University of Groningen and member of the Netherlands Polar Committee
Liesbeth Noor	Policy Officer at NWO Earth and Life Sciences Division and coordinator of NPP <i>Secretary</i>
Alex Oude Elferink	Senior researcher in International law, the law of the sea and maritime demarcation at Utrecht University and member of the Netherlands Polar Committee
Sander Steenbrink	Head of R&D at Royal Boskalis Westminster and participant in the economic priority area Water

This committee was then asked to provide input to the substantive chapters concerning the research themes. For this, in early May 2014, they were given the first version of the Strategy Plan. On 26 June 2014, part of the Dutch field of polar research and policy makers (a total of 50 people) were invited for a workshop in parliamentary style in the conference hall 'Jaarbeurs' in Utrecht. Here, they could state their opinions about a second version of the Strategy Plan. Herman Eijsackers chaired this workshop. NWO wanted to use this occasion to clarify whether any important topics were missing. The Netherlands Polar Committee met in July 2014 to discuss the second version and the workshop of 26 June. In August, the third version of the Strategy Plan was once again sent to all members of the strategy committee. All could then provide input about the entire document one more time. In September 2014, the Advisory Council on International Affairs (AIV) released an important recommendation for the Arctic region: "The Future of the Arctic Region: Collaboration or Confrontation?". This emphasises the importance of Arctic research. Naturally, this is hugely important for the NPP and this recommendation was subsequently included in this Strategy Plan. The final Strategy Plan for the NPP is a document published by NWO's Earth and Life Sciences Division and under the responsibility of the NWO-ALW divisional board. This was completed at the end of November 2014 and presented to the NPC, the Strategy Committee and to participants in the seminar organised on 28 November 2014 in response to the AIV recommendation.

Annex 2 List of abbreviations used

AIV	Advisory Council on International Affairs (Adviesraad Internationale Vraagstukken - AIV)
ALW	(NWO Division) Earth and Life Sciences (Aard en Levenswetenschappen)
ATCM	Antarctic Treaty Consultative Meeting
AWI	Alfred Wegener Institut für Polar- und Meeresforschung
BAS	British Antarctic Survey
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
COMNAP	Council of Managers of National Antarctic Programmes
IASC	International Arctic Science Committee
IPO	Interdepartmental Polar Consultation (Interdepartementaal Polair Overleg)
NIOZ	Royal Netherlands Institute for Sea Research (Koninklijk Nederlands Instituut voor Zeeonderzoek)
NPC	Netherlands Polar Committee (Nederlandse Poolcommissie)
NPP	Netherlands Polar Programme (Nederlands Polair Programma)
NWO	Netherlands Organisation for Scientific Research (Nederlandse Organisatie voor Wetenschappelijk Onderzoek)
PPP	Public-private partnership (Publiek-Private Samenwerking)
SCAR	Scientific Committee on Antarctic Research
SRON	Netherlands Institute for Space Research

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