

Oceans and the Coastal Area

2006 - 2015

Action Plan 2007

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Foreword

The “Oceans and the Coastal Area” Programme is a continuation of the following programmes: “Marine resources, environment and conservation”, “Long-term-effects of discharges to the sea from offshore activities (PROOF)”, parts of “Fishery Technology”, the marine part of the “ProFo” pollution programme, in addition to input from the planning note for coastal zone research. The Action Plan for 2006 is the first action plan for the new programme.

The Action Plan is based on the Programme Plan. The Programme Board has prioritised certain areas on the basis of the state of our knowledge and other guidelines.

The Action Plan forms the background for the call for proposals for research funding for 2007, for which the following plan has been drawn up:

- Call for proposals, with a deadline of 6 pm. on June 8, 2006: Researcher projects, overseas fellowships, fellowships for visiting researchers and support for meetings, etc.

Summary

“Oceans and the Coastal Area” is a new, coordinating marine research programme. It is management-oriented, in that it is intended to generate basic knowledge for a future ecosystem-oriented, precautionary management system for marine ecosystems, while being designed to contribute to the increased creation of value from ocean and coastal resources. The primary objective of the Programme is to encourage creative research of high international quality on the marine environment. A broad understanding of our marine environment is of great value in its own right for a knowledge-intensive nation such as Norway, at the same time as it will provide us with the foundations of long-term management of our marine ecosystems and their resources as a basis for wealth creation at national and international level. The Programme will lead to the development of basic competence both via studies of specific conditions in Norwegian waters and by reinforcing a holistic understanding of the structure, functions and species diversity of the ecosystem.

This Action Plan takes the Programme Plan as its point of departure. It is intended to provide signals to the research community regarding current priorities for the Programme for the period of the plan, and will provide the basis on which proposals for research funding are invited for this period.

The Action Plan is revised on an annual basis.

Objectives of the Programme

The principal objective of the Programme is to encourage creative marine environmental research of high international quality. A broad understanding of our marine environment will be of great value to a knowledge-intensive nation such as Norway in its own right, at the same time as it will form a basis for long-term management of marine ecosystems and their resources as a basis for value creation at both national and international level. The Programme will bring about basic competence development through studies related to specific conditions in Norwegian waters and as a means of strengthening the integrated understanding of the structure, function and species diversity of marine ecosystems.

The main aims of the Programme are:

- to reinforce Norway's position as a leading nation in marine ecosystem-related research.
- to be a central contributor to the process of generating more knowledge of the marine environment.
- to provide a research-based foundation for long-term integrated management and a basis for the creation of value based on marine resources.

The sub-goals of the Programme are the following:

- To generate new basic knowledge of the structure, functions, driving forces, sub-processes, species diversity and types of nature found in marine ecosystems.
- To generate new knowledge of human impacts on marine ecosystems via the addition and effects of pollution, and to contribute knowledge capable of acting as a basis for measures to clear up pollution from dumping sites and sediments. It will also be necessary to focus on the effects of introduced species on the flora and fauna of the coastal zone.
- To increase our knowledge of the long-term effects of petroleum industry discharges to the sea.
- To acquire knowledge and tools capable of contributing to integrated ecosystem-based management of the ocean and the coast, and to resolving conflicts between various societal interests and between nations.
- To obtain knowledge that will contribute to the foundations of greater value creation from marine resources.
- To sharpen the focus on methods, models and technology for generating new ecosystem knowledge and to develop a methodology for the adoption of knowledge based on experience.
- To stimulate international research cooperation and exchanges of knowledge.

Budget

The zero-growth Programme budget for 2007 is MNOK 76.5, of which MNOK 20 is for new applications. In its budget proposal for 2007, the Research Council of Norway has budgeted for an increase of MNOK 39, of which MNOK 19 is from the Research Fund.

The following table shows the distribution of available/free funding at zero rates of growth, with an increase in the 2007 budget from the Research Fund and with an increase as described in the Research Council of Norway's budget for 2007.

Sub-programme	2006	Budget 2007 (zero growth)	Budget 2007 (growth with Research Fund finance)	Budget 2007 (at proposed rate of growth)
I: Marine ecosystems	4,700,000	5,050,000	9,705,000	15,305,000
II: Impact on ecosystems	7,000,000	2,050,000	4,045,000	6,445,000
III: PROOF	7,000,000	4,800,000	9,500,000	13,500,000
IV: Management and conflict resolution	3,000,000	2,800,000	5,560,000	8,760,000
V: Basis for value creation	2,300,000	2,150,000	4,145,000	6,545,000
Methods, models and technology	1,200,000	1,400,000	3,395,000	4,995,000
Research cooperation	600,000	750,000	2,650,000	3,450,000
Total	25,800,000	19,000,000	39,000,000	59,000,000

For 2007, the Programme Board proposes advertising funding conditional on a budgetary increase based on funding from the Research Fund, i.e. a total of NOK 39 million.

The Programme Board has set out its priorities within the individual sub-programmes/Cross-disciplinary activities, as described below.

Given the rapidly growing pressure on the utilisation of resources in the Arctic, the Government and the Storting wish to see a greater degree of integrated efforts in the Arctic, one important component which will be research. In following up this desire, the Research Council of Norway launched an Arctic programme in summer 2005. A goal-oriented programme known as "Barents 2020" will enable the Research Council of Norway to contribute to and participate in the development of the Government's vision

of knowledge-based development in the Arctic. The programme will make a contribution to an overall development of knowledge by inviting application for projects of potential direct or indirect importance for Arctic development.

For a more detailed description of the Programme, please refer to the Programme Plan.

I. Sub-programme: Marine ecosystems

NOK 9,705,000 is available for the start of new projects in 2007.

The objective of this sub-programme is to acquire new basic knowledge of the structure, functions, driving forces, sub-processes, species diversity and types of nature found in marine ecosystems.

The research involved in this sub-programme will have a broad profile, and is intended to strengthen marine research in such areas as systematics, taxonomy, ecology, population biology, genetics, physiology, biodiversity, ecological modelling, oceanography and marine chemistry.

From organisms to ecosystems - driving forces and sub-processes

focusing on the structures and functions of, and anthropogenic effects on, ecosystems in our marine regions and on acquiring basic knowledge of the physical, chemical and biological driving forces and sub-processes that influence marine ecosystems. A better understanding and management of the living marine resources in our ecosystem will require more knowledge of how physical, chemical and biological factors affect these ecosystems. For example, it will be necessary to acquire knowledge of how ocean climate provides a framework for the production of phyto- and zooplankton, which in turn are controlling factors in the migration, growth and recruitment of fish stocks. Another example is better knowledge of how marine mammals and fish stocks mutually influence one another. Similarly, there is a need for more knowledge of the benthic components of marine ecosystems as well as of interactions between benthic and pelagic organisms.

Operational ecosystem models

focusing on the development of data-driven model systems for our coastal and ocean regions.

If we are to be able to utilise new knowledge about ecosystems quantitatively in order to predict how resources will develop under the influence of various climatic (bottom-up) or catch scenarios (top-down), it will be necessary to develop data-driven operational model systems for our ocean regions. Similarly, we need to be able to predict the development of the status of threatened, vulnerable or rare species and habitats. Such model systems will have to be designed in such a way as to combine information from the lower reaches of the systems (physical pressure) with data about the systems' top predators (catches made by human beings and/or predation by marine mammals). Modelling the likely incidence of habitats, natural states and natural variations in these models requires the development of habitat and ecosystem models for the coastal region.

Biological diversity

focusing on acquiring knowledge about the extent, condition and development of biological diversity as a basis for ecosystem-based management.

Natural variations in biological diversity should be described and projects should help to develop higher levels of competence in taxonomy. More knowledge is needed to enable us to understand how climatic change and the effects of various kinds of human activity affect biological diversity. It is essential to know how viruses, bacteria and disease bring about changes in biological diversity. It is also important to generate knowledge of how foreign species are spreading and affecting our marine ecosystems.

II. Sub-programme: Effects on ecosystems

NOK 4,045,000 is available for the start of new projects in 2007.

The aim of this sub-programme is to generate new knowledge about anthropogenic impacts on marine ecosystems via the introduction of pollutants, and to contribute knowledge capable of acting as a basis for cleaning up contaminated dumping sites and sediments. It will also be necessary to focus on the effects of introduced species on coastal flora and fauna.

Clean seas and environmental toxins

focusing on the necessity of generating new knowledge about how anthropogenic environmental toxins occur, are dispersed and are accumulated in marine food chains from local and remote sources.

The export of safe seafood from our part of the ocean requires that we should be able to document that our seas are clean. Concepts such as “clean environment” and “clean seas” must be based on monitoring and documentation of sources that are capable of impoverishing and having negative consequences for the fishing industry.

There is a need to be able to document the level, dispersal and accumulation of known environmental toxins (PBBs, dioxins, mercury, PAHs, etc.) and of new toxins such as brominated and fluorinated compounds in marine nutrient chains, as well as for more knowledge about the effects of these toxins and of radioactivity. Better knowledge of known and new environmental toxins is a necessary basis for the management of natural resources.

Environmental toxins often occur in “mixtures” and it is natural that these should exist simultaneously. The effects of such mixtures may be additive and lead to more wide-ranging effects than those of individual substances. This is also true of mutual interactions between factors, such as the effects of environmental toxins and other types of pollutants or impacts (e.g. eutrophication, climate). Research on multiple effects is a

topic that will require serious efforts, and integrated projects, in which sources, transport and effects are put into an integrated perspective, should be given priority.

It is important to have in place a contingency system that will enable us to put measures into effect when health and environmentally hazardous substances become the centre of attention. In this connection, there is also a need for models capable of telling us something about the likelihood that a given new substance has particular effects, on the basis of comparisons with similar known substances. Dispersal models are also important.

The effects of environmental toxins on individuals and individual populations in the Arctic and the Antarctic have been studied. We still require better knowledge of their effects at community and ecosystem level. This will be particularly relevant in connection with the International Polar Year (IPY) in 2007 - 2008.

Introduced species and diseases

focusing on mapping the distribution of introduced species and studies of how these affect the flora and fauna of our coastal zone.

Apart from habitat destruction, the introduction of organisms foreign to local environments is regarded as the most important cause of the sharp reduction in global species diversity. The transfer of species from one area to another is taking place on a particularly large scale due to vessels taking ballast water on board in one port and discharging it in another. A number of major algal blooms, which among other effects have caused serious losses to the aquaculture industry, are believed to be due to introduced algae transported in ballast water. Fouling on ships' hulls and fishing gear is another introduction vector, in addition to the introduction of new aquaculture species and other species that accompany these species. What most of the species that are introduced to new areas have in common is their potential ability to displace naturally occurring species, thus altering the ecosystem. The most important goal is to prevent new species from becoming established, while it is also important to map the distribution of introduced species and to study how these are affecting the flora and fauna of the coastal zone.

Marine eutrophication

focusing on the need for better knowledge about the transport, dispersal and effects of nutrient salts over distances or interfaces (e.g. soil - lakes - sea).

Studies of relevance to marine eutrophication and transport from fresh-water to the sea have become more relevant as a result of the EU Water Directive. There is a great need for research in this field, where fjords and inshore waters are affected by run-off from the land, from rivers and groundwater, from the atmosphere and via ocean currents, and where the effects appear to be multiple and serious (e.g. dead seaweed forests, oxygen depletion, etc.). It is now time to move from purely descriptive studies to goal-oriented research aimed at developing a first-generation eutrophication model for the coastal zone.

Additions of nutrient salts can lead to increased algal growth. The natural species composition is altered and more organic particles are produced in the water. High particle density leads to insedimentation of the benthic flora and fauna and affects visibility (which is of importance, for example, for fish vision).

We are sufficiently aware of neither the cause and effect relationships nor of the effects themselves. There is a great need for better integration of contamination research at system level. Ecological aspects will be core issues in research on many types of pollution, but societal aspects that affect economic and recreational conditions will also be affected.

Environmental toxins from contaminants, dumping sites and sediments, cleaning-up operations and measures

focusing on the dispersal, enrichment and effects of concentrations of environmental toxins in our harbour areas and coastal zones.

Diffuse additions of environmental toxins from contaminated sediments make it necessary to offer advice regarding limiting the dietary consumption of seafood from several Norwegian fjords and harbour areas. In order to provide a solid scientific basis for such dietary advice and other measures, more work in this area of research is needed.

There is a particular need to strengthen our knowledge base where this is relevant and is needed to implement clean-up measures for contaminated dumping sites and sediments. It is essential to acquire a better understanding of the chemical and biological processes that take place in sediments, and of sediment and particle transport in water masses. The ecological relevance of measures and cost/benefit analyses can provide us with environmental-economic guidelines for prioritising measures. There is a need to improve our knowledge of value creation and the social benefits related to pollution and clean-up measures, i.e. the economic effects of environmental toxins and measures to eliminate them.

A national effort has been launched to clean up harbours and land-fill sites, and this involves major investments. This effort demands greater insight into plans for measures, alternative solutions and the environmental and societal consequences of such measures, in order to ensure that the most appropriate measures are put into effect. The ecological foundations of alternative sets of measures should be emphasised.

III. Sub-programme: Long-term effects of emissions to the sea from petroleum-related activities (PROOF)

NOK 9,500,000 is available for the start of new projects in 2007.

The aim of this sub-programme is to raise our level of knowledge of the long-term effects of emissions to the sea from petroleum-related activities. Long-term effects are

defined as effects on more than one generation of organisms, or more than a single natural cycle of a system. Such effects may include chronic effects of substances that persist for long periods of time in organisms or ecosystems, or the long-term effects of substances that have a short persistence in the environment, via their effects on central components of the ecosystem, such as production, reproduction, genetic material, or the structures of populations and communities.

This sub-programme is a direct continuation of the PROOF programme and it will be continued in line with the priorities determined by the Programme Board.

The sub-programme comprises the following five main areas of activity:

- Effects in the water column
- Special research tasks in the Arctic
- Links between research and monitoring activities
- Long-term effects of acute emissions
- Ongoing discharges of drill-cuttings.

The sub-programme wishes to be available for application in all five of the main areas. The following topics are regarded as being particularly interesting:

- A number of studies of cod have been launched and carried out. It would be interesting to consider other species too, particularly of fatty fish.
- Effects of discharges of water-based drill cuttings in the Arctic, both on filter-feeding organisms in the water column and on benthic communities (coral reefs, sponges and scallops)
- There is a trend in the direction of locating oil and gas processing plants onshore; the effects of discharges in the coastal zone from such plans is a relevant topic.
- Long-term effects of acute discharges in particularly valuable and vulnerable areas, possibly based on relevant models of dispersal and types of oil.
- The use of dispersing agents is a relevant measure in cases of acute oil spills. Little is known about the secondary effects of dispersed oil when dispersing agents have been used. There is also a need for better knowledge of the fate of oil droplets when such agents have been employed.
- Effects of acute discharges in deep water. The Deepwater project did some work related to the solubility and fate of oil in deep waters. Many problems remain with regard to biological effects on deepwater organisms.

Besides these topics, it is important to carry out projects on joint interactions at ecosystem level. The joint effects of various activities are a field that has been very little studied. Discharges produced by the offshore sector may be responsible for only a small proportion of the total effects but it would be interesting to look at such discharges in the context of other impacts such as climatic effects and long-range transport of pollution. This would be particularly interesting in the Arctic. Discharges from offshore activities that it would be useful to assess in this connection would be a major acute discharge, for example.

IV. Sub-programme: Management and conflict resolution

NOK 5,560,000 is available for the start of new projects in 2007.

The objective of this sub-programme is to generate knowledge that will be directly relevant for decision-makers, so that decisions can be made on the basis of robust data.

In order to make a contribution to the knowledge base needed for the sustainable development of the resources in our marine and coastal areas, a research effort is needed in all the topics listed in this sub-programme, which have been described in detail in the Programme Plan. Within the individual fields, the programme board particularly invites proposals that concentrate on the following topics:

The effect of harvesting on marine resources and the environment

It is necessary to contribute to the development of cost-effective methods capable of combining data from scientific surveys and information from commercial fishing with new basic biological data in order to build realistic population dynamics analytical tools and models. In order to be able to manage our fish resources on an ecosystem basis we still need to increase our knowledge of species interactions. Such species interactions may be between fish species or between marine mammals and fish. In this connection it would be interesting to start projects that analyse specific species interactions and others that implement the most important relationships in applicable population dynamics models. There is also a need for knowledge of the impact on the ecosystem of kelp harvesting and the impact of fisheries on seabird populations.

Responsible fish capture

In order to achieve ecosystem-based management of fish resources it will be necessary to develop fishing gear that optimises harvesting patterns, reduce undesirable bycatch and avoid damage to the benthic habitat.

Measures of environmental quality

There is a need for a basic knowledge for the development of ecosystem indicators and measures of environmental quality capable of being used in ecosystem-based management in the long run.

Management processes

Resources management in our coastal and marine regions primarily has consequences for people who live by and off these resources. Practical experience has given this segment of the population a great deal of knowledge that is of relevance to resources

management, but such knowledge has not penetrated the management process. The Programme Board wishes to launch projects that will illustrate how such knowledge can be implemented in the management process. It will be of particular interest to start projects of this sort in the area of coastal zone planning. In this connection, it will also be of interest to evaluate how well coastal zone planning at local government level has functioned.

Conflicts of interest

The utilisation of marine resources is often marked by conflicts of interest, for example in the question of allocation of fishing rights in traditional fisheries, where rights have to be shared among nations or among the participants in Norwegian fisheries. Conflicts may also arise in the coastal zone, where area is a scarce resources. There may also be conflicts of interest implicit in the choice of management models that will have different consequences in terms of economic efficiency and allocation of resources.

The Programme Board is interested in projects that analyse such conflicts of interest and that put forward proposals for how such conflicts can be resolved or managed as well as possible.

Framework Water Directive

The EU's Framework Water Directive creates a superstructure that overlies existing regulations and provides guidelines regarding integrated water management. The Directive covers the coast out to a mile from the datum line. There is a need for knowledge of the consequences of the Directive for the aquaculture industry and in other intensively exploited coastal waters.

V. Sub-programme: The basis of value creation

NOK 4,145,000 is available for the start of new projects in 2007.

Sustainable management is a necessary but not sufficient condition for marine value creation. The potential for increased value creation lies in part in more socially rational harvesting of marine resources and partly in making the catch and processing phases of the fishing industry more efficient, as well as generating new products based on marine resources. This sub-programme will include the conditions and perspectives of the Sami people.

A coastal society that creates value

and focuses on understanding how local and regional production systems, coastal cultures, knowledge systems and entrepreneurship create the premises for development and the creation of value.

More research is needed in order to give us greater insight into interactions between natural and culturally based industrial activity and social and economic organisation at local and regional level. We also need studies of the coastal infrastructure, including sustainable transport and logistics systems. Another central aspect is interactions between cultural environments and local and regional identity and organisation, and the creation of value based on these.

Under-exploited species and harvesting species lower in the food chain

focusing on acquiring better knowledge for harvesting species lower in the food chain.

There is a need for knowledge regarding the potential for value creation via such harvesting. Underexploited resources may have significant potential for value creation. Here there is a need for knowledge as well as for determining the extent of such resources, and for the development of suitable catch technologies.

For example, we lack basic knowledge about production and about the ecological consequences of a commercial fishery for zooplankton and micronekton for species higher in the food chain. Commercial harvesting of zooplankton and micronekton in our waters cannot be set in motion before we have surveyed the resource base and established a management regime in accordance with sustainable principles and based on ecological management models for fisheries in which harvesting of this sort could be appropriate. Bio-economic multistock modelling will be an important tool for clarifying whether harvesting will be profitable, on the basis of the resource base, density, availability, catch costs, market conditions, etc., and the extent to which harvesting would be profitable when weighed up against the alternative in a multistock context, i.e. to allow the plankton to become food for species at higher trophic levels. Methods of handling catches and processing such types of raw materials, as well as their use in various types of product, should be developed through joint projects with commercial

interests. Scientific challenges of this sort have interfaces with a number of other research programmes in addition to this one (e.g. The Food Programme, The Aquaculture Programme).

Marine bio-prospecting

focusing on contributing to the search for new bioactive substances with a view to the development of commercial products. The ocean covers some 70 percent of the surface of the Earth, and can point to a range of biodiversity and evolutionary processes that have produced a rich source of chemical compounds that are still underutilised. Marine micro-organisms have developed other types of bioactive molecules than those we find in terrestrial systems. In sponges, plants and invertebrates we also find a range of active molecules that form part of the general defence (immune) mechanisms against infections and disease in such natural systems.

Indication-based prospecting has the aim of identifying chemical compounds that are involved in the ecological interplay between organisms, while screening-based bioprospecting is centred to a greater extent on the systematic testing of large numbers of active compounds.

What these approaches have in common is the search for biologically active compounds that could have therapeutic effects on infectious diseases, cancers or other types of disease in human beings; possibly also uses in foodstuffs, other consumer goods such as cosmetics, or in industry.

The Programme invites applications in this subject area, possibly with the participation of basic research groups and commercial interests.

Socio-economically rational harvesting

focusing on promoting a wider understanding of interactions between human beings and marine resources.

There is still a need for better knowledge of how value creation from fishing our most important fish stocks can be increased. Central elements in this regard include the optimisation of catch efficiency and fish-capture patterns in fishing individual stocks, in which which well-known stochastic aspects of biological parameters and/or relevant species interactions are taken into account. It is also necessary to analyse how the choice of fishing-fleet capacity and the regulatory regime affect the creation of value by the fisheries, and the extent to which the regulations are capable of exploiting knowledge of the market for fish products. As far as fish stocks that are harvested bottom-trawl gear several countries are concerned, the consequences of cooperative and non-cooperative management regimes ought to be analysed, e.g. by means of game theory.

Bio-habitats and habitat restoration

focusing on producing an overview and knowledge of marine habitats.

Knowledge of this sort is a prerequisite for sustainable management of the coastal zone, not least where the prospects of combining nature conservation and resource utilisation, with emphasis on the precautionary principle, are concerned.

There are knowledge challenges related to the development of management models that will contribute to the protection of the subsea landscape, with its diversity of habitats, while permitting the sustainable utilisation of living resources by methods that do not harm the seascape. It will also be necessary to acquire management knowledge that will contribute to ensuring species diversity by conserving habitats or biotopes.

VI. Cross-disciplinary activity: Methods, models and technology

NOK 3,395,000 is available for the start of new projects in 2007.

The objective of this activity is to sharpen our focus on methods, models and technology to enable us to acquire new knowledge of ecosystems and develop methodologies for adopting experience-based knowledge. In order to achieve the aims of the Programme this will be organised in the form of a sub-activity that cuts across the other sub-programmes, so that the results of the sub-programmes can readily be incorporated in integrated tools for observing or modelling the characteristics, long-term consequences and management and value-creation aspects of ecosystems.

Method development will require efforts across a relatively broad spectrum, from the development of practical tools and research facilities, via the evaluation of new statistical tools to more basic new ways of shedding light on relevant thematic problems. It will be necessary to develop theories and to draw on contributions from specialists. In several of the thematic areas, it will be necessary to develop new methods or to adopt tools that we do not yet master or have not yet adopted. This will also be a useful means of further developing the ability of the authorities to monitor the marine environment. New methods of statistical analysis of long time-series should be adopted, for example in order to evaluate the hidden potential of existing data series and statistics. Research groups in possession of long time-series must actively involve statistical and mathematical expertise.

Quantitative population dynamic modelling must be strengthened in order to enable us to better understand and rank the importance of a number of potential mortality factors. The development of improved models of production and general overviews that describe the size, or at any rate, the relative significance, or individual mortality factors and influences in all phases of the life cycle, will be an important goal of the Programme.

Important collections of biological material and data can be found in our universities, museums and research institutes. Further processing and analysis of this material using new methods would be capable of improving our insight. It would take many years to obtain new data-sets, since time series of 20 years or more are desirable if we wish to obtain a good picture of a situation. Only modelling enables us to distinguish between important and minor factors, and to understand how stocks are threatened or have been developing in a seriously negative direction.

Surveying and monitoring biological diversity

with a focus on condition reporting

Condition reporting of national and international biological will make major demands of technology if it is to become capable of covering our extensive marine areas. The

development and adoption of new methodologies and technologies to increase superficial coverage will therefore be necessary.

Fisheries technology

with a focus on the fact that greater investments in fisheries technology are capable of making a significant contribution to the development of responsible fisheries management at the same time as it produces benefits in value creation for the fishing industry. New frame conditions for responsible, sustainable fisheries are essential.

In the future, Norwegian fisheries will need to be able to document that they are respecting the overarching goals for responsible fishing, and we must therefore make yet greater efforts to reduce by and unintended mortality in our fisheries, at the same time as we minimise the negative ecosystem effects of fishing operations. Ethical aspects of harvesting natural raw materials in parallel with a sharper focus on quality and stable supplies of fish raw materials will require the development of new, less harsh fish capture methods and new sales methods for the coastal fleet.

Mathematical and statistical models

with a focus on mathematical/statistical methods

The adoption of new or less well-known mathematical or statistical methods could be of importance for related problems that cut across the individual sub-programmes. The use of modern methods based on geostatistics may be relevant to both marine stock estimates and mapping environmental toxins. The programme will encourage generic methodological projects, such as projects that attempt to reveal basic biological laws of nature that apply to a wide range of species.

VII. Cross-disciplinary activity: Research cooperation

NOK 2,650,000 is available for the start of new projects in 2007.

There is a trend in science in the direction of an ever higher degree of specialisation, in which no individual researcher or national centre of expertise any longer has a complete overview of all the scientific aspects of marine science. The scientific challenges facing us thus demand cooperation between institutes and with the university sector, as well as a large degree of international cooperation. This will also make a contribution to better, more efficient utilisation of competence, equipment and research facilities. There is also a need to develop cross- and multidisciplinary research projects in which specialist groups collaborate. The philosophy of the Programme offers major challenges in the fields of developing efficient methodologies, cooperation and coordination at national and international level. It is also important that the Programme should result in an improvement in recruitment to this field of research and to the development of at least one Centre of Excellence in Research. On this basis of this background, the Programme Board invites proposals for projects that will generate national and/or international research cooperation.

National collaboration

One of the strategic guidelines of the Programme is to encourage a greater degree of scientific cooperation among Norwegian research groups. The definition of scientific problems and questions of project funding can be coordinated between several programmes. Research centres will also be encouraged to consider such cooperation and sharing of responsibility.

Generally speaking, the Programme's projects ought to receive funding from other sources than Oceans and the Coastal Area, and efforts should be made to increase funding and to find other financial partners.

International collaboration

International collaboration is essential if we are going to be able to deal with many of the knowledge challenges faced by marine science. The Programme wishes to build on the good traditions of international collaboration that exist in marine research, and to further develop these via collaboration on projects.

The international aspects are therefore well developed in marine management and research, being incorporated in international agreements and conventions, and in the context of research cooperation and networks for exchanges of knowledge at institutional and individual level. Both the international perspective and an awareness of tendencies and research results in other countries are of decisive importance for the development of knowledge in this field. European cooperation benefits us all, given our

many cultural and historical similarities and shared climatic features. However, knowledge development must also be viewed in relationship to research groups in other countries.

A number of Norwegian marine science research groups are already of international standard, and this is a natural consequence of Norway's position as a marine science nation. One of the Programme's objectives is to further reinforce this position.

Research cooperation with research centres in developing countries

Marine products have gradually become highly international commercial products. While global marine production doubled from 1961 to 1999, international trade in fish products increased more in the same period, not least because these are the principal export products of a number of developing countries. Due to weak institutional infrastructures and management bodies in such countries, these important fisheries are vulnerable to over-exploitation and environmental threats. Norwegian research can contribute to the development of local knowledge and a better understanding of the effects of the activity of the Norwegian fisheries sector in other countries.

Marine products are also the most important source of animal protein, particularly for the poorest parts of the population in many developing countries. Norway has committed itself at the UN to participate in the international fight against poverty. One of the areas in which we are best able to contribute, thanks to our scientific competence, is precisely in the fisheries sector, for example by transfers of knowledge and technology. However, this will require the development of research-based knowledge of natural and social conditions in individual countries and of international regimes and agreements. In this connection, it is important to collaborate with local research groups. The research that is carried out must take into account, and develop, methods and technologies that can be applied under local conditions, such as stock estimations that are relevant to small-scale fisheries, local management regimes and coastal zone planning.

Better knowledge of conditions in the southern hemisphere is also needed from the point of view of Norway's own interests. In the course of the past 20 years the consumption of fish products in developing countries has increased seven times as much as in the industrialised world, a trend which is expected to continue. This represents an important market potential for the Norwegian fishing industry, not only in the shape of new markets for fish products but also for fisheries-oriented technology and knowledge.

The International Polar Year (IPY 2007/2008)

The challenges facing marine research tend to vary in different coastal and ocean regions, and this situation must be reflected both in terms of how topics are prioritised and in the choice of ocean regions in which the research is to be done. In connection with the International Polar Year 2007/2008, it ought to be possible to coordinate a few projects with Norwegian participation in this event. However, these projects would need to be within the existing framework of sub-programmes and cross-disciplinary

activities, and should preferably be of such a nature that they would cover research activities in both the Arctic and the Antarctic.

Strategy for awarding research funding

In order to ensure that research supported by the Programme is of high quality, projects will be funded on a competitive basis. High scientific quality is a prerequisite for all programme activities, and when research funds are being allocated, applications of high scientific quality will be prioritised. Applications will be forwarded to external experts for assessment of scientific quality and will be evaluated in accordance with the criteria announced for each type of application (www.forskningsradet.no) >Funding>Evaluation criteria). The aims of the Programme include multi- and cross-disciplinarity and national and international project cooperation. Where these aspects are likely to raise the scientific quality, relevance and usefulness of projects, they will be also prioritised when funding is being allocated. Large projects that are relevant to several sub-programmes may be jointly financed by these programmes.

International cooperation and internationalisation

One of the cross-disciplinary activities of the Programme is to encourage national and international cooperation.

There are opportunities for interesting international cooperation in ecosystem-based research and management. The Programme will encourage optimal use of international measures via projects and other activities. International cooperation should be regarded in connection with the need for higher levels of competence in areas of national and international interest. Exchanges of both graduate students and research scientists with international research groups will be encouraged.

The Programme supports EuroDEEP and is relevant to three ERA-networks: MarinERA, AMPERA and MariFISH

The EU's Seventh Framework Programme

This Programme is currently at the planning stage, and is planned to start in 2007. A significantly larger budgetary framework than that of the 6th Framework Programme is planned. Norway is actively providing input to the planning process for the 7th Framework Programme. Our Programme will support EU cooperative projects as long as they are capable of competing successfully for research funding from the Programme.

Milestones/timetable

Target groups

The target groups of the Programme are universities, institutes and colleges. Because of their responsibility for managing our marine resources and for contributing to the development of this sector of industry, the authorities are also an important component of the Programme's target groups for the knowledge it generates.

Types of support

The Programme will help to generate the basic knowledge required for the future ecosystem-oriented and precautionary-based management of our marine ecosystems, and will also be designed to contribute to increased value creation based on oceanic and coastal resources. In order to meet these goals, the Programme has several means at its disposal, and this call is open to applications for the following types of support:

- Researcher projects
- Overseas fellowships
- Fellowships for visiting scientists
- Support for meetings and congresses.

Researcher projects are aimed at R & D institutions, and are intended to help to give research groups the competence demanded by industry and the public sector in a longer-term perspective. In some cases, it will be desirable to build up high-quality scientific centres of gravity, for example based on multi-disciplinary, cross-institutional projects. Strategic basic research and strategic efforts aimed at value creation will be the important areas here.

Recruitment via doctoral studentships and post-doc. fellowships will be important tasks of the Programme. This type of support should be applied for in connection with researcher projects. International mobility will be important, and this concept covers both periods of research for Norwegian scientists and research fellows at overseas R & D institutions and stays in Norway for foreign scientists. Research students and research fellows are encouraged to spend a period of time at another institution than their own, quite possibly abroad.

The Programme wishes to support the organisation of conferences, symposia and workshops, particularly those of a multi- and interdisciplinary character. The Programme wishes to organise conferences, at least every second year, at which problems are discussed and/or research results are presented. The Programme will organise annual seminars for all research students that it finances, and will organise a researcher conference in autumn 2006, at which the focus will be on projects that have already reached their final phase.

Result measures (success criteria), milestones and result indicators

We refer to the Plan for the Ocean and the Coastal Area Programme. In the Action Plan for 2008, the Programme Board will present revised result measures, milestones and result indicators.

Information and Communication Plan

The Programme Board is working on a concrete plan for information and communication. This will be published on the Programme's Internet site when it has been drawn up, and will form part of the Action Plan for 2008.

Communication objectives

The sea and the coast are the objects of a wide range of research activities that affect conditions of great interest to society as a whole.

This being the case, the communication plan of the Ocean and the Coastal Area Programme will contribute to:

- raising the level of public interest in, and understanding of, the importance of marine research for the maintenance and sustainable use of the sea and the coast
- conveying information to the general public about Norway's position as a leading nation in marine ecosystem-related research
- the spread of knowledge of the marine environment to a wide range of target groups
- transmitting knowledge of the research basis for long-term integrated management and the basis of value creation derived from marine resources.