

Ecological objectives and Integrated Management Plans for Norwegian Seas

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PAME, CAFF, AMAP, SDWG – Ecosystem Approach Expert Group, Fifth Ecosystem Approach Workshop: Methodology and status of development of ecological (quality) objectives for Arctic Large Marine Ecosystems

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Outline

- Background
- Evaluation of objectives
- Coupling between objectives and measures/action
- Challenges
- Recommendations

Background

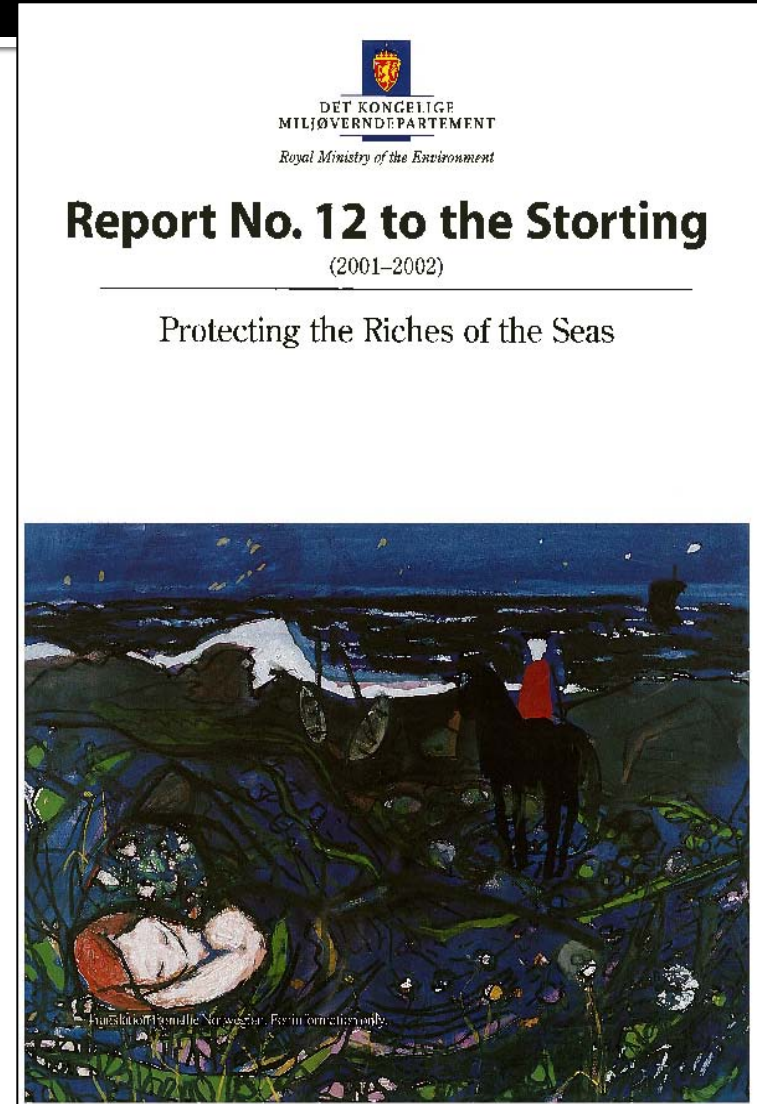


Photo: H. Strøm

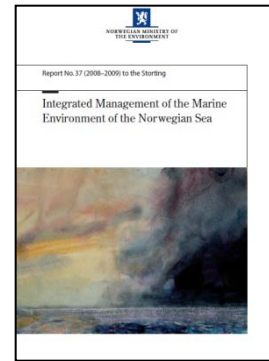
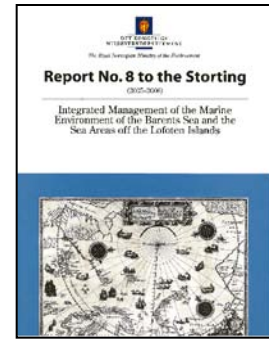
White paper: Protecting the Riches of the Seas

St.meld. nr. 12 (2001-02), "Rent og rikt hav"

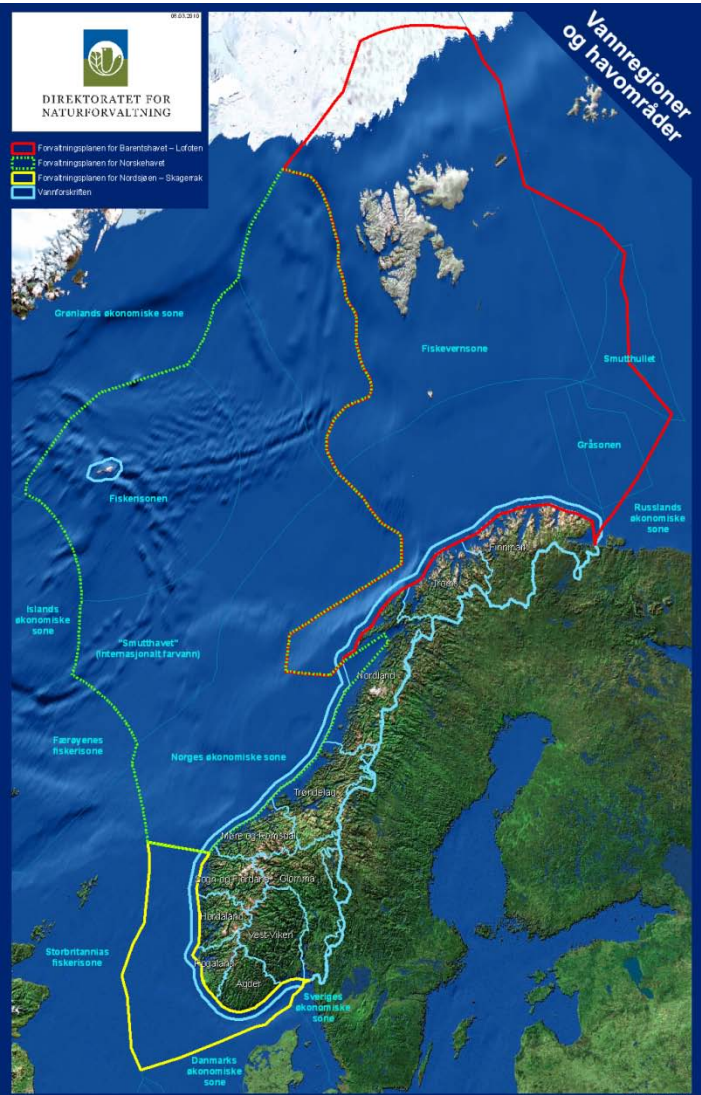
- Overall, integrated and comprehensive policy on the marine environment based on an **ecosystem approach**
- Tools and processes for implementation of ecosystem-based management
 - oceans
 - coastal areas
 - freshwater areas
- Proposals for new policy in areas of major importance for the marine environment
- All Norwegian sea areas covered, but Norwegian part of the Barents Sea as a pilot



Management plans for Norwegian Sea Areas



- Integrated Management plan for the Barents Sea and Lofoten (2006):
Follow up – updated early 2011 and then April 2015
- Integrated Management plan for the Norwegian Sea(2009):
Follow up – updating at the latest in 2015
- Integrated Management plan for the North Sea – Skagerrak (2013)



Need for more comprehensive, ecosystem-based management

The purpose of the **Integrated Management Plan of the Barents Sea-Lofoten area** is to provide a framework for the sustainable use of natural resources and goods derived from the area and at the same time maintain the structure, functioning and productivity of the ecosystems of the area.

Evaluate conflicting interest

Make guidelines for activities



Help achieve consensus about the management

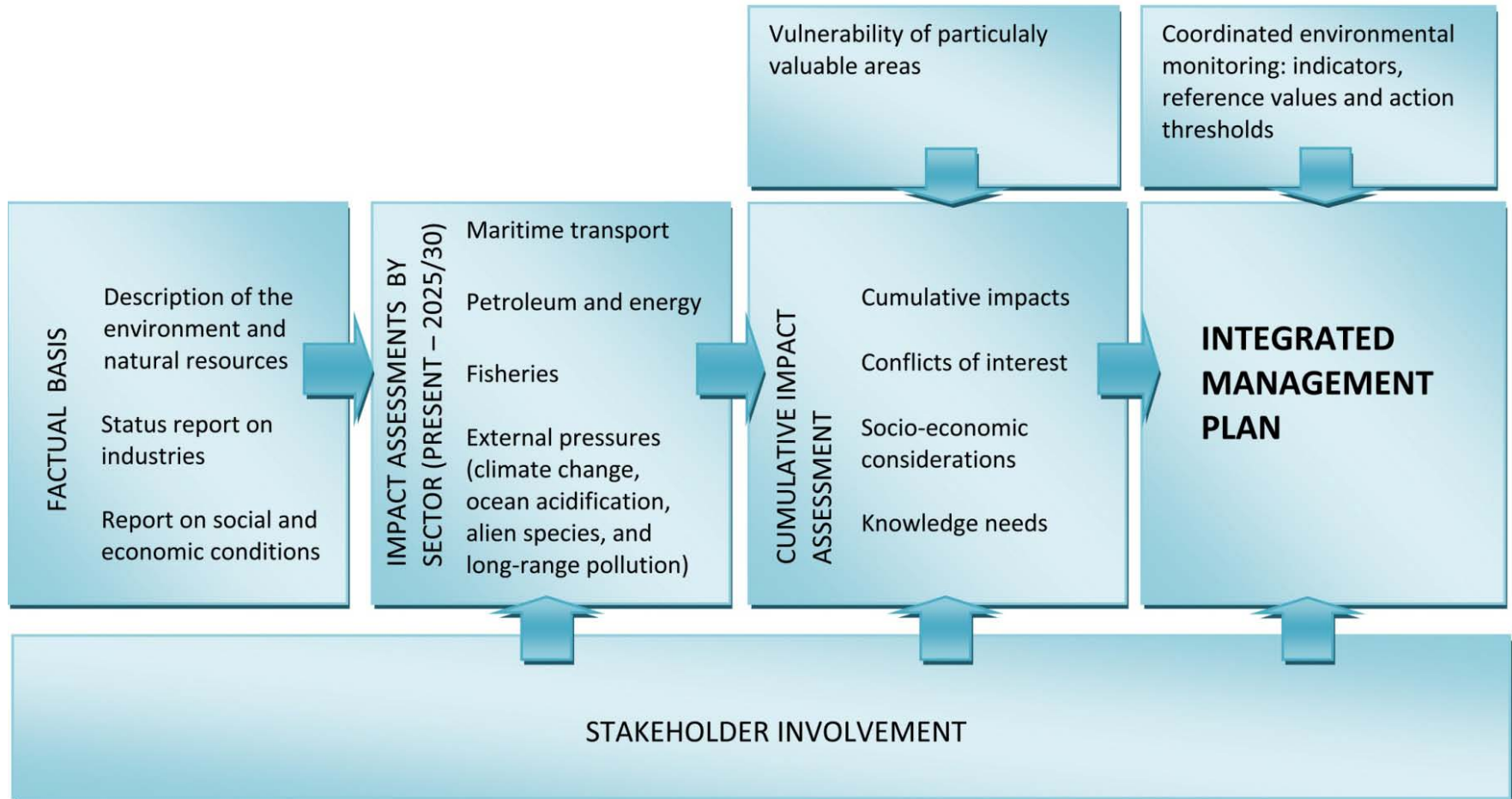
Identify gaps in knowledge

Setting the levels for acceptable influence by human

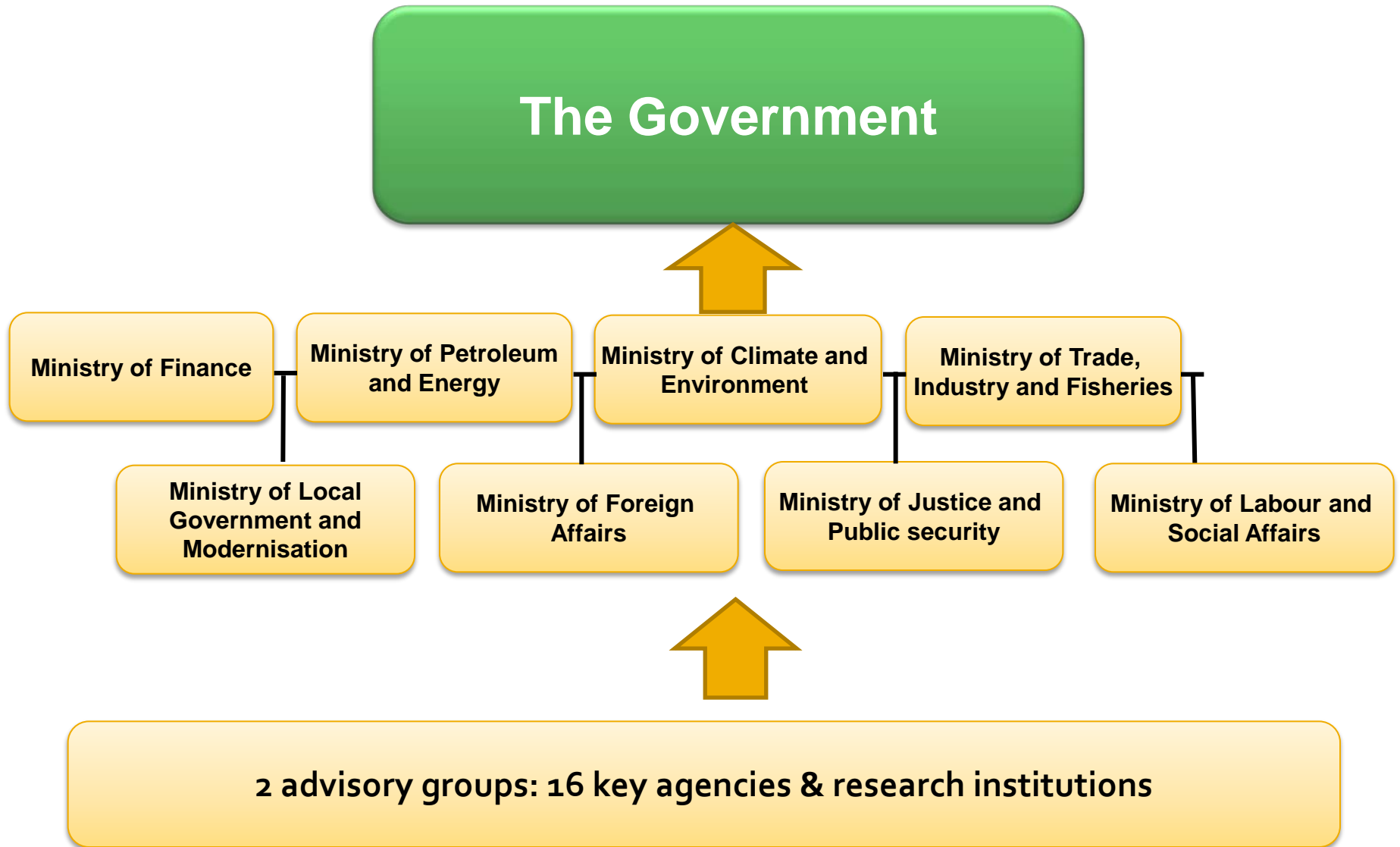
Make guidelines for monitoring

How do we know whether the overall ambition/goal is reached or not?

Cross-sectoral process



Norwegian marine management plans - Organization



A hierarchy of "goals"

- International conventions and agreements
- National Norwegian environmental goals
- Management plans
 - Qualitative descriptions/Ecological objectives/Management goals
 - Quantitative targets used in monitoring etc.
- Other measures



Ensure that Norway fulfill international obligations

- **Usefulness of measures in ecosystem approach to management**
 - Law of the Sea Convention
 - Convention on Biological Diversity
 - Johannesburg-declaration
 - Malawi-protocol
 - UN Agreement on Management of Straddling Fish stocks
 - Stockholm Convention
 - OSPAR Convention
 - EU Marine Strategy Framework Directive
 - SOLAS – Convention for the Safety of Life at Sea
 - MARPOL – Convention for the Prevention of Pollution from Ships
 - STCW – Convention on Standards of Training, Certification and Watch keeping for Seafarers
 - Etc.

At the same time: constraints on the management design, incl. goals

Ecological objectives reflect policy commitments: e.g. species management

- Norway has signed a number of agreements and conventions on species protection and management, e.g.
 - the Convention on Biological Diversity (CBD)
 - the Convention on Trade in Endangered Species of Wild Animals (CITES)
 - the Convention on the Conservation of Migratory Species of Wild Animals (CMS)
 - the Agreement on North Atlantic Marine Mammal Commission (NAMMCO)
 - the Agreement on the Conservation of Polar Bears and their Habitats
 - etc.
- These are legally binding
- The Government has established a set of objectives for species management in the Barents Sea – Lofoten area

Norwegian management plans

- Naturally occurring species will exist in **viable populations** and **genetic diversity** will be maintained.
- Harvested species will be managed within **safe biological limits** so that their spawning stocks have good reproductive capacity.
- Species that are essential to the structure, functioning, productivity and dynamics of ecosystems will be managed in such a way that they are able to maintain their role as **key species** in the ecosystem concerned.
- Populations of **endangered** and **vulnerable species** and **species for which Norway has a special responsibility** will be maintained or restored to viable levels. Unintentional negative pressures on such species as a result of activity in the Barents Sea – Lofoten area will be reduced as much as possible by 2010.
- The introduction of **alien species** through human activity will be avoided.

National goals, Prop. 1 S (2014-2015)

- Environmental goals sorted in accordance to result areas/topics
 - Biodiversity (3)
 - Culture and historical monuments (4)
 - Recreation and tourism (3)
 - Pollution (14)
 - Climate (6)
 - Polar regions (3)
- Not all goals are equally relevant for marine areas



Foto: B. Gulliksen & E. Svensen

National and international processes

- International Council for the Exploration of the Sea (ICES)
- North-East Atlantic Fisheries Commission (NEAFC)
- Arctic Council (LME, MPA, AOR, OGA, AMSA follow-up, RPA, ABA, CBMP, SWIPA, VACCA, AACCA, EA)
- EU
- Nordic Council
- Norwegian-Russian cooperation (environment and fishery)
- UN's International Maritime Organization (IMO)
- Other management plans for sea areas
- National plan for MPAs
- etc



Photo: N. Øien

Objectives with different "functions"

- Strategic/overarching objectives
 - Overriding considerations
- High-level operational objectives/qualitative descriptors
 - Management actions
 - Specific guidelines
 - Environmental status
 - Desired state of the environment

Management of the Barents Sea–Lofoten area will ensure that diversity at ecosystem, habitat, species and genetic levels, and the productivity of ecosystems, are maintained.

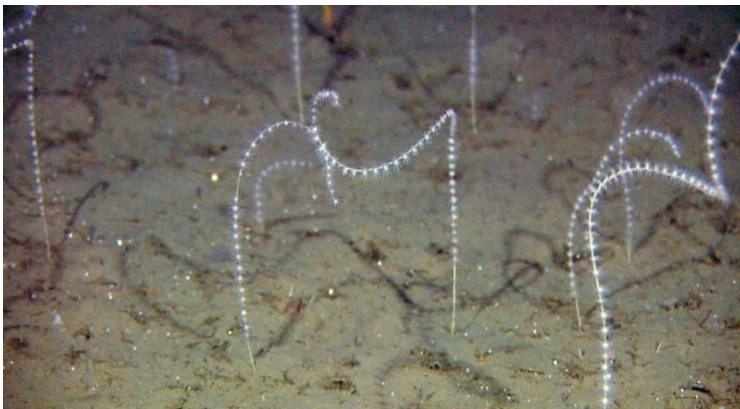
Human activity in the area will not damage the structure, functioning, productivity or dynamics of ecosystems (St. meld. nr. 8 (2005-2006)).

A representative **network of protected marine areas** will be established in Norwegian waters, at the latest by 2012. This will include the southern parts of the Barents Sea–Lofoten area. (St. meld. nr.8 (2005-2006)).

Harvested species will be managed within safe biological limits so that their spawning stocks have **good reproductive capacity**. (St. meld. nr.8 (2005-2006)).

Objectives and targets in Norwegian management plans

- Strategic/overarching objectives
 - High-level operational objectives
 - Qualitative descriptions/targets
 - Quantitative targets/Indicators (for some)



Radicipes sp., candidate species for which Norway has a special responsibility, Bjørnøyraaset (Source: MAREANO/HI).

Key words:

Sustainable use, ecosystem based approach, value creation, employment, coexistence, security

E.g.:

Biodiversity (1 high-level operational objective)

- Valuable areas (3 targets)
- Species management (5 targets)
- Habitat conservation(1 target)

Objectives, the Barents Sea

■ Pollution

- Hazardous and radioactive substances (1)
- Operational discharges (1)
- Litter and environmental damage resulting from waste (1)

■ Safe seafood (1)

■ Risk of damage due to acute pollution (2)

■ Biodiversity

- Valuable areas (3)
- Species management (5)
- Habitat conservation (1)

Objectives, the North Sea

- **Biodiversity and ecosystem**
 - Achieving good environmental status (1)
 - Particularly valuable and vulnerable areas and habitats (1)
 - Management of habitat types and species (4)
 - Sustainable harvesting and use (4)
 - Alien organisms (1)
- **Value creation, commercial activities and society**
 - Fisheries and seafood (3)
 - Petroleum activity (2)
 - Offshore renewable energy (1)
 - Maritime transport (1)
- **Pollution, marine litter and the risk of acute pollution**
 - **Climate change and ocean acidification (2)**
 - **Inputs of nutrients, sediment deposition and organic matter (1)**
 - Pollution (6)
 - Marine litter (1)
 - Risk of acute pollution (2)

Implementing objective evaluation



Clione limacina

Photo: B. Gulliksen

What is used in the evaluation

- Indicators with reference value and action thresholds
 - The management plan's monitoring group
 - Other type of monitoring
- Other
 - Often only descriptive
 - Effects of impacts factors
 - Effects of regulatory measures
 - Etc.



Trawl wire and damaged corals at the world's northernmost coral reef north west of Sørøya. Source: MAREANO/HFB report (2010).

Evaluation of objectives, the Barents Sea

- **Objective**
 - Formulation in the White paper (St.meld. nr. 8(2005-2006))
- **Table**
- **Figure**
- **Discussion, including knowledge gaps and action needs**
 - International references: if equivalent information exist from other sea areas, what is the status compared to those areas.
 - Knowledge gaps
 - What is needed to fill the knowledge gap
 - Assuming adequate resources, how long will it take to fill the knowledge gap
 - Budget

Evaluation of goals - table

What is evaluated?	Is the objective reached?	Justification	If it is not reached, is the trend towards improvement ↑/worsning ↓/status quo →?	How great is the evaluation's uncertainty?		Management forum's assessment
				Degree	Justification	
1	Yes No Uncertain		↑ ↓ →	High Medium Low		
2	Yes No Uncertain			High Medium Low		
Etc.	Yes No Uncertain			High Medium Low		

Coupling of objectives and measures/actions



Photo: C.H. von Quillfeldt

National Norwegian environmental goals, management plan objectives and action items

- Actions for sustainable use and protection of the Norwegian Sea's ecosystems (totally 80 action items), e.g.:
 - Area based management (5 sub-themes)
 - Species management (4)
 - Measures to reduce risks and pollution (2)
 - Strengthening the knowledge base – mapping, research and monitoring (3)
 - Organization and follow-up (5)
- Responsibility: Ministries, Directorates, Institutes etc.



Photo: C.H. von Quillfeldt

Challenges



Evaluation of objectives - challenges

- Formulation of objectives
 - E.g. possible effects of climate/ocean acidification not considered
- Choice of "indicators"
 - Ensure sufficient information and data coverage
 - Few effect indicators
- Data deficiency
 - "Unrealistic": Genetic diversity in order to evaluate changes of genetic diversity
 - Increased data collection – better evaluations in the near future
- Descriptive(textual) evaluation and/or quantitative (measurable) targets
- Connection to ongoing national monitoring
- Connection to international processes/reporting requirements

Ecological quality objectives (quantitative targets)

They indicate the condition we would like the system to be in as compared to the reference level.

The reference level indicates the quality of the environment in a corresponding ecosystem, which has been affected to the least possible extent by outside factors.

	Theme	Consequence "area" (indicator)	Consequence variable (parameter)
Physical and chemical environment	Pollution	Organic pollutants, radionuclides, petroleum hydrocarbons, heavy metals, TBT	Concentrations measured where relevant or methodologically easy (e.g. radionuclides in water, PCB in fat/liver)
	Litter	Non-degradable biological material	Quantity
	Noise and seismics	Low frequency (ship traffic) and high frequency (explosions, seismics, acoustics)	Noise level
Biological environment	Fish	Cod, herring and capelin Bottom fish trawl haul (from scientific surveys)	- Spawning biomass (SSB), demographics, migration/distribution - Diversity index
	Endangered species	All species in categories E and V, incl. "responsibility species", as according to the national Red List	Abundance, demographics, migration/distribution
	Marine mammals	Harp seal, minke whale, ringed seal, sperm whale, harbor porpoise, killer whale	Abundance/population index, demographics, migration/distribution
	Seabirds	Common guillemot, Brünnich's guillemot, common eider	Abundance, demographics, migration/distribution, breeding areas
	Benthic communities	Coral reefs Benthic fauna and flora	- Area, coverage of living corals - Diversity index
	Plankton	Macrozooplankton, fish eggs and larvae	Biomass, geographical distribution
	Seashore	Shore types	Restitution time
	Ice edge	Phyto- and zooplankton	Biomass
Societies	Effects on corporate economies	- Corporate profits - Distribution of profit among stakeholders	- Mill. NOK - % distribution
	Development of trade, business and employment	- Employment (total and distributed by trade) - Professions frequency/choice - Commuting	- Number of man-labour years (national and regional) - Portions in % (regional) - Number (regional)
	Population and settlement patterns	- Demographics (age, sex by regions) - Regional settlement patterns	- Numbers, % of age classes - Structure of cities/towns

Example of possible indicators and parameters

Ecological quality objectives exist for some indicators

Indicator: Spawning stock of Norwegian-Arctic cod

Type: (E) State of the ecosystem

(I) Impact of human pressure

Time series: Based on a time series updated by ICES once a year

Ecological quality objective: The stock must be fished in accordance with harvesting rules approved by ICES

In use? The environmental quality objective is the same as the Joint Norwegian-Russian Fisheries Commission uses in its management of the cod stock

The indicator was proposed by: The Working Group for Fish Stocks and Fisheries, and has been adjusted in response to proposals arising from the Barents Sea Conference on 24-25 May 2005

Other indicators based on Norwegian-Arctic cod:

Fishing mortality

Stomach content

Pollution

- **Pressures**
- **Importance**
 - Ecology
 - Economic etc.
- **Description of the indicator**
 - Scientific background
 - Available data and future needs
 - Threshold value?
 - Effect of management?
- **Description of the objective**
- **Figure**

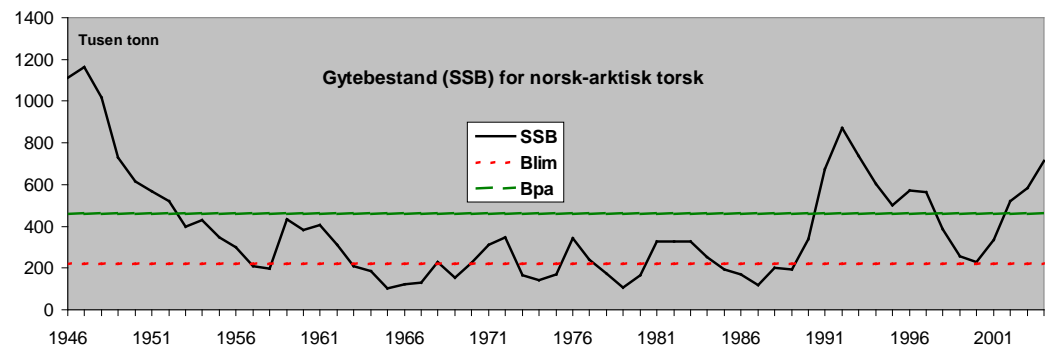
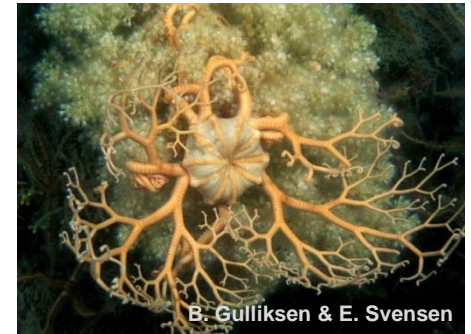
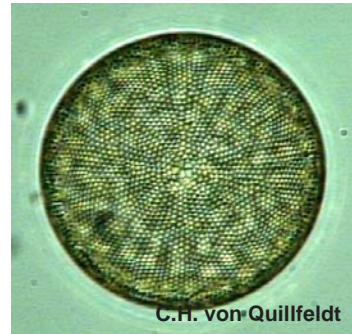


Figure 27 Spawning stock biomass of Norwegian-Arctic cod in 1946 - 2004, with B_{lim} and B_{pa} (see Box 1 for explanation). Based on data from ICES.

What to do when a objective have no/few quantitative targets, but still needs to be evaluated?

- Combine measurable sub-elements (if any) with qualitative evaluation of other items.



Is this good enough for management, or is there a need for more active measures?

Recommendations



Recommendations

- There should be a distinction between strategic/overarching objectives and operational objectives (qualitative and quantitative).
 - Requires a review of the high-level operational objectives of the management plane - formulation of new sub-goals/targets?
- Ecological objectives should be linked to concrete actions and be of such a nature that the effect of measures are captured.
 - Desired environmental state
 - Need for actions (type)
- Evaluation of objectives should be aligned in time with the status assessment of the individual sea areas (now every three years).

Operational objectives

- **Specific** – Objectives should be clearly defined.
- **Measurable** – It should be possible to quantify the objectives.
- **Achievable** – Targets should be achievable in practice.
- **Realistic** – Defined targets should be achievable in the given time frame.
- **Time-bound** – A timeline should establish the deadlines for the fulfillment of defined targets.

Ecosystem approach



Objectives



Action

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