

# The Nature Index; a new method to integrate knowledge on biodiversity



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# How is state and trends of biodiversity usually communicated?

- Overview reports:
  - Indicator by indicator is presented, species by species.
  - The overview is presented as text only
  - Also, lack of overview
  - Only crisis are reported in the media and to the public
- Why this fragmented presentation?
  - Lots of biodiversity data (monitoring, research, observation knowledge)
  - Data been gathered with different methods
  - Monitoring often focuses on bad areas, not area representative
  - Data not easily accessible
  - Not any good methods for integrating existing knowledge (data, expert judgement and research results)
- A composite nature index :
  - Is cost-effective if we can use as much of existing knowledge as possible
  - Reflects the overall trends without giving focus to a particular species



# Living Planet Index of Norway 2005

WWF 2005. "Decreasing trends of biodiversity in Norway"



- Based on solely on monitoring data
- Skewed –geographical coverage inadequate
- Government committed to develop an improved biodiversity indicator

# Educational video



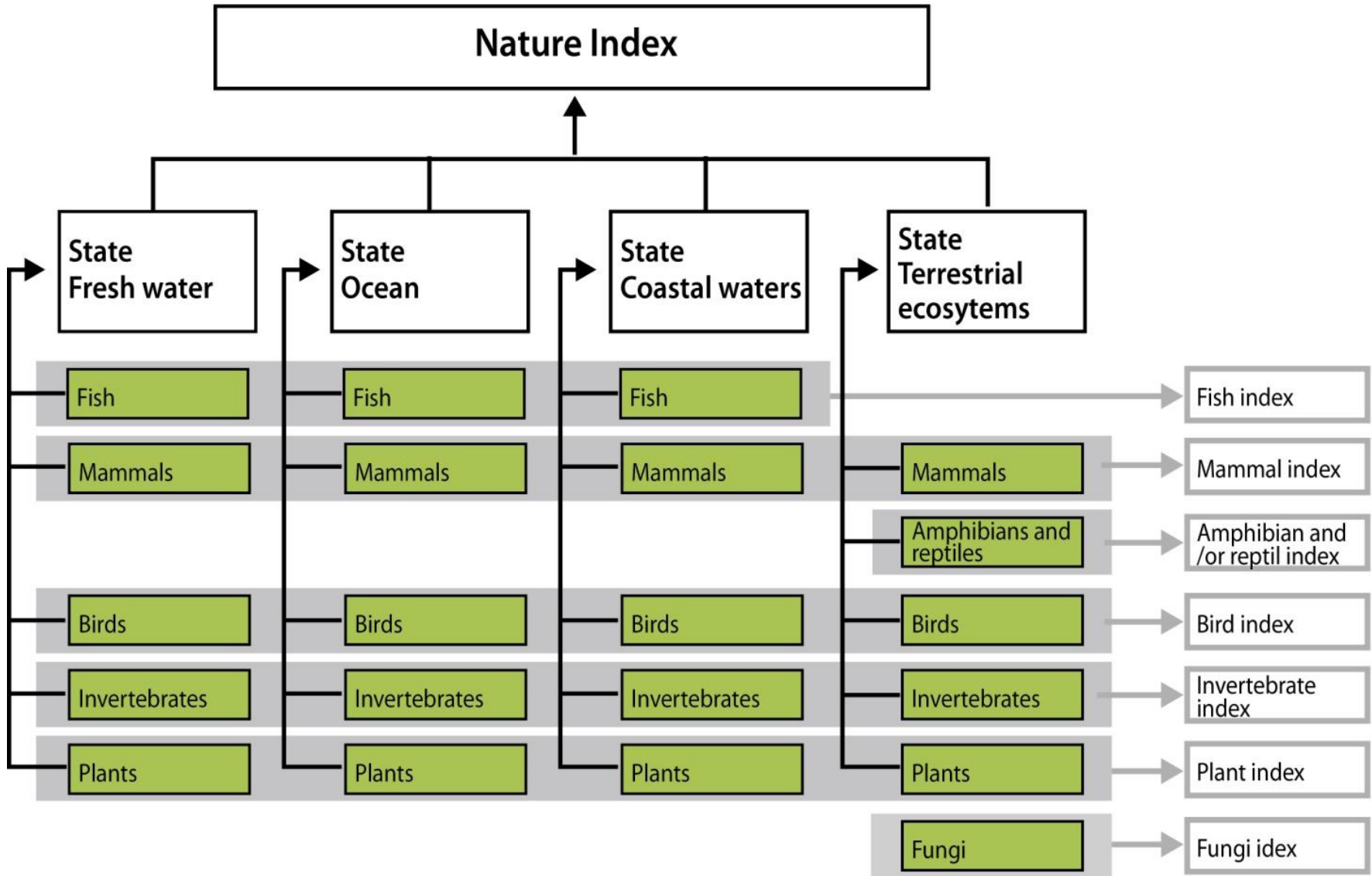
<http://english.dirnat.no/content/500042128/The-Norwegian-Nature-Index>

# Objectives

- Get an overview of state and trends of biodiversity
- Easy to communicate
- Scientifically sound
  - Involve relevant institutions with biodiversity monitoring data.
  - 125 scientists, sector research institutes and environmental research institutes
- Document where knowledgebase needs to increase.

# The methodology

- **Indicators (species or surrogates) are selected according to a set of representation criteria to avoid over-representation of certain groups of species.**



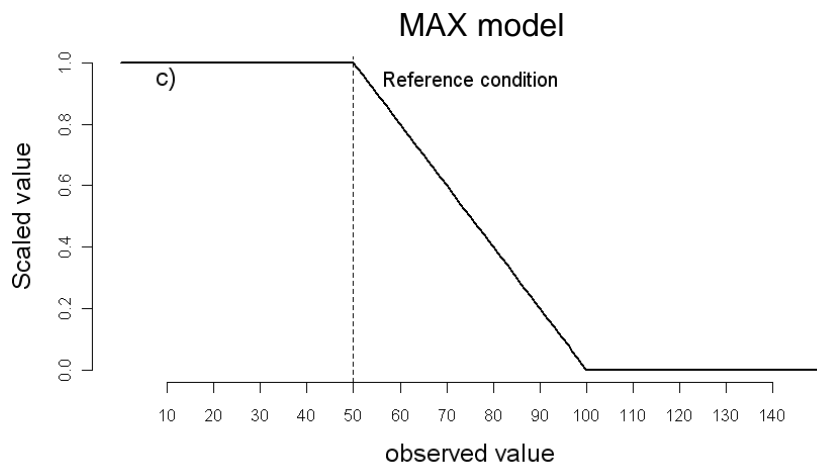
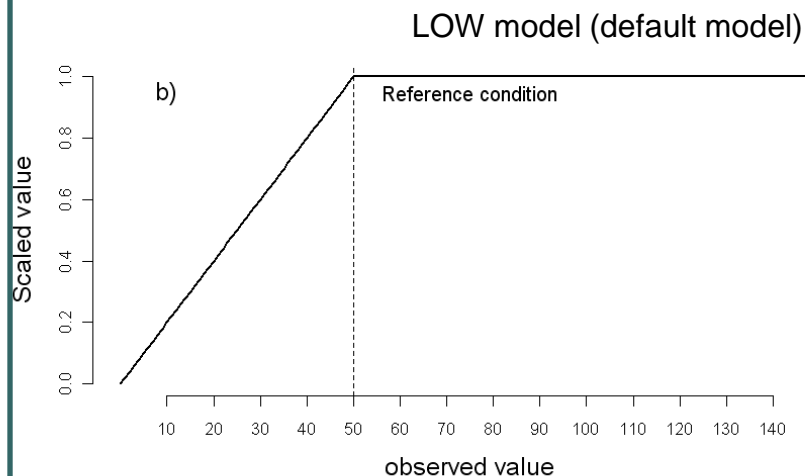
Only natural species, no alien species

# The methodology

- Indicators (species or surrogates) are selected according to a set of representation criteria to avoid over-representation of certain groups of species.
- **Data are scaled with reference value and scaling model**

The indicator value is scaled by its value at the reference state;

- Intact nature
- Nature with low human impact
- Sustainable populations
- Carrying capacity



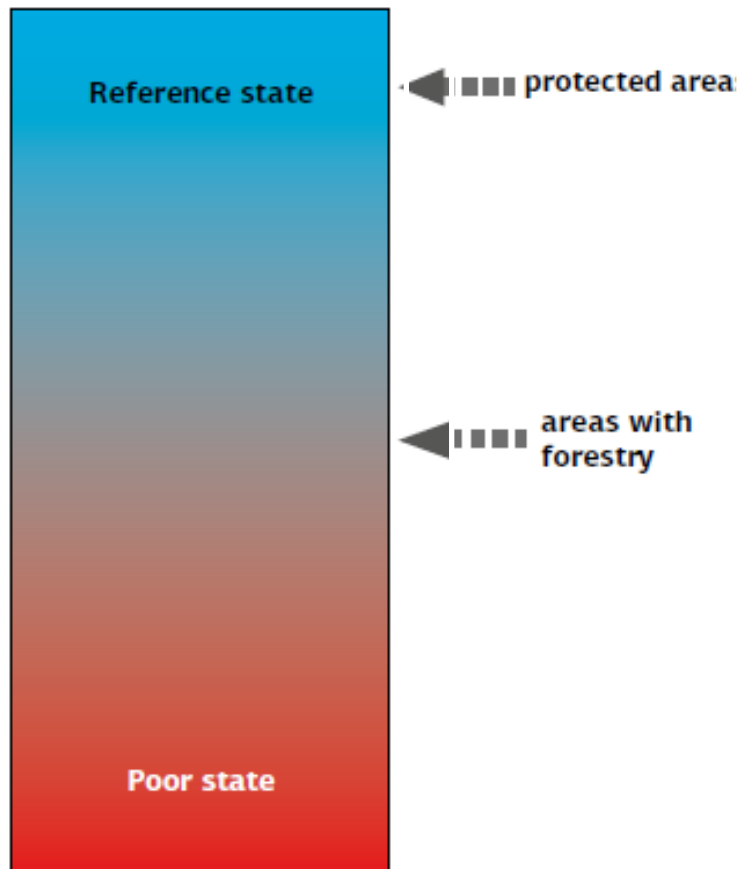
- NI=1; intact ecosystem
- NI=0; degraded ecosystem

Example: Scaled indicator value is 0.7

- Population is 70% compared to levels at intact nature. LOW model.
- Population is harmful and 130% compared to levels at intact nature. MAX model

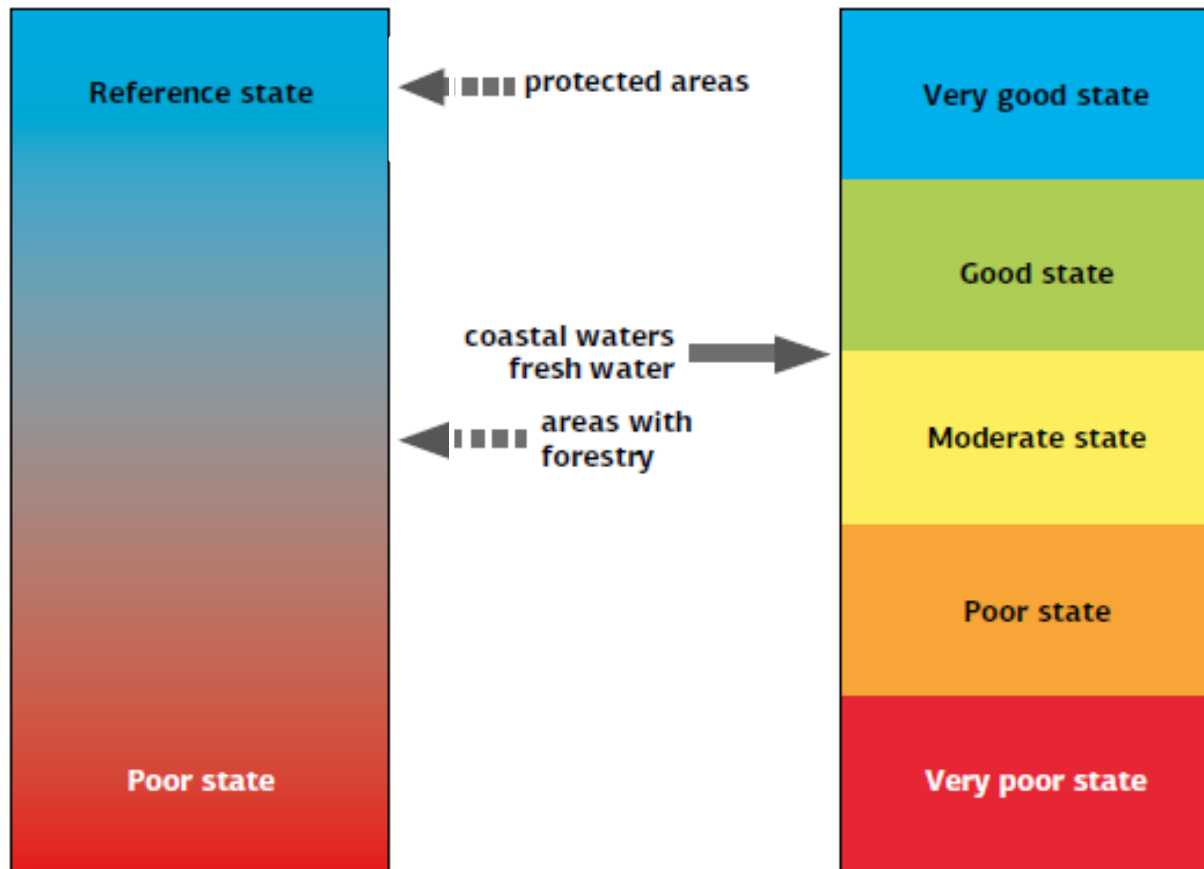
# Management targets versus reference state

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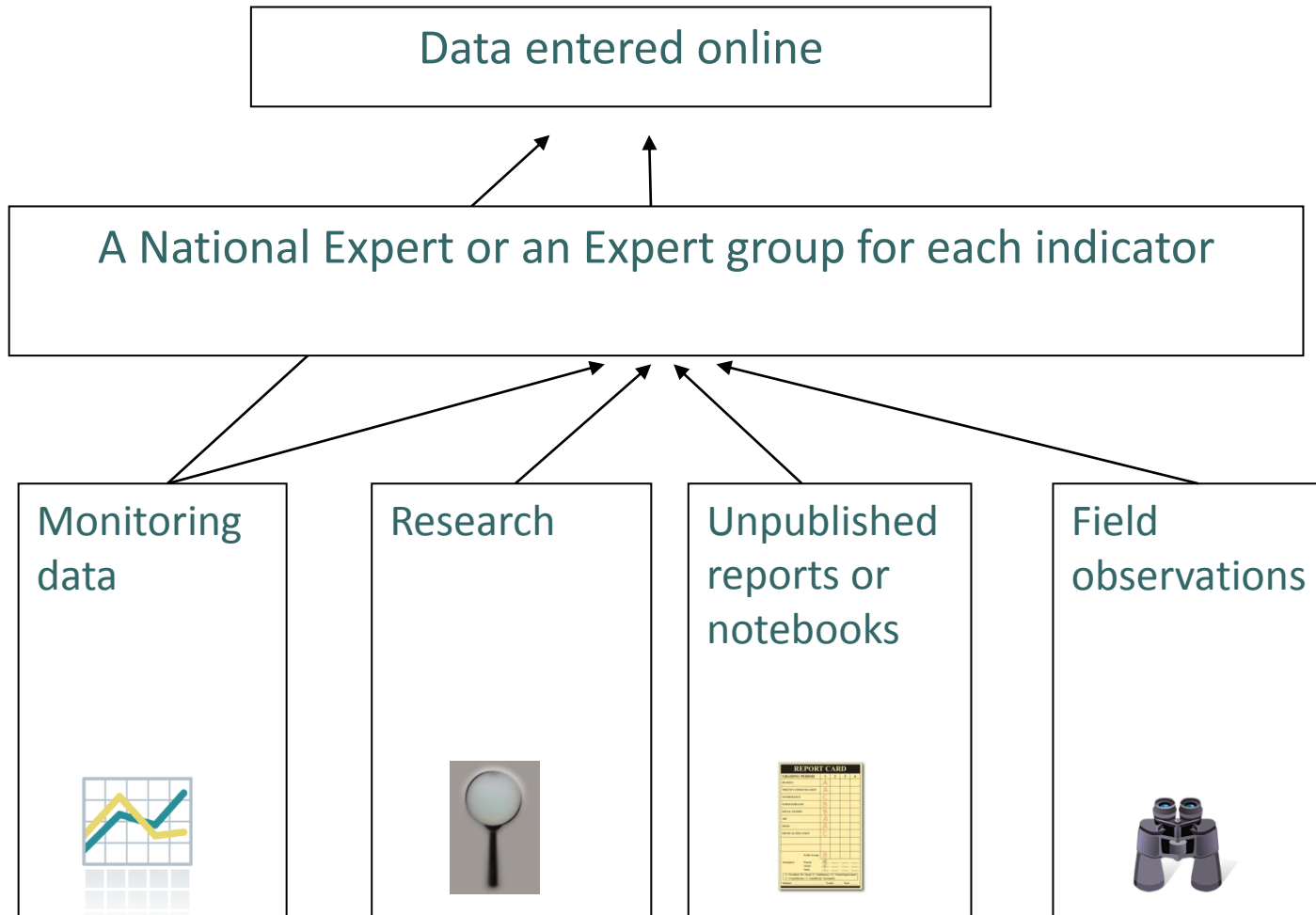
# Management targets versus reference state

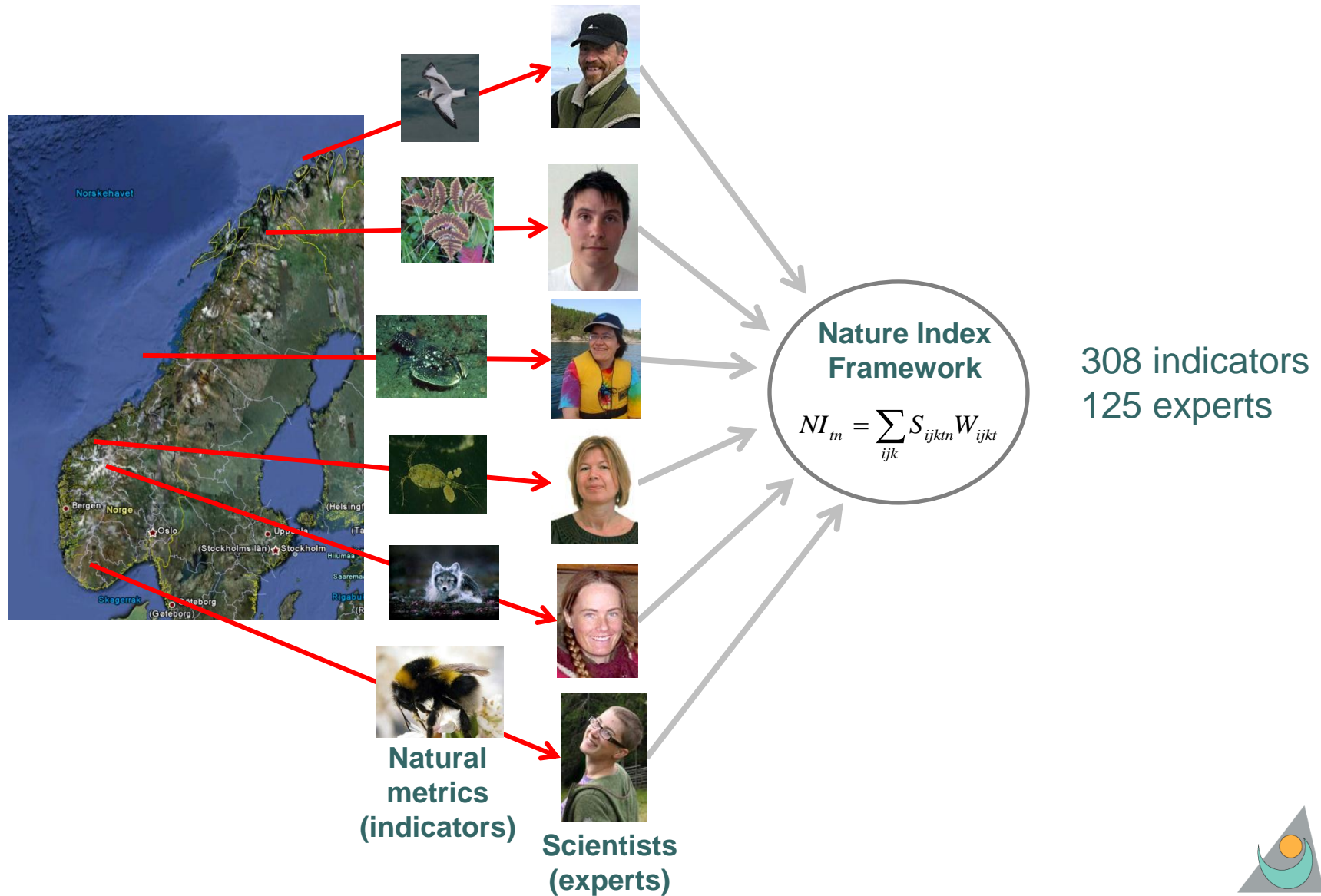
Water Frame Directive



# The methodology

- Indicators (species or surrogates) are selected according to a set of representation criteria to avoid over-representation of certain groups of species.
- Data are scaled with reference value and scaling model
- Both models, monitoring data and expert judgements are used

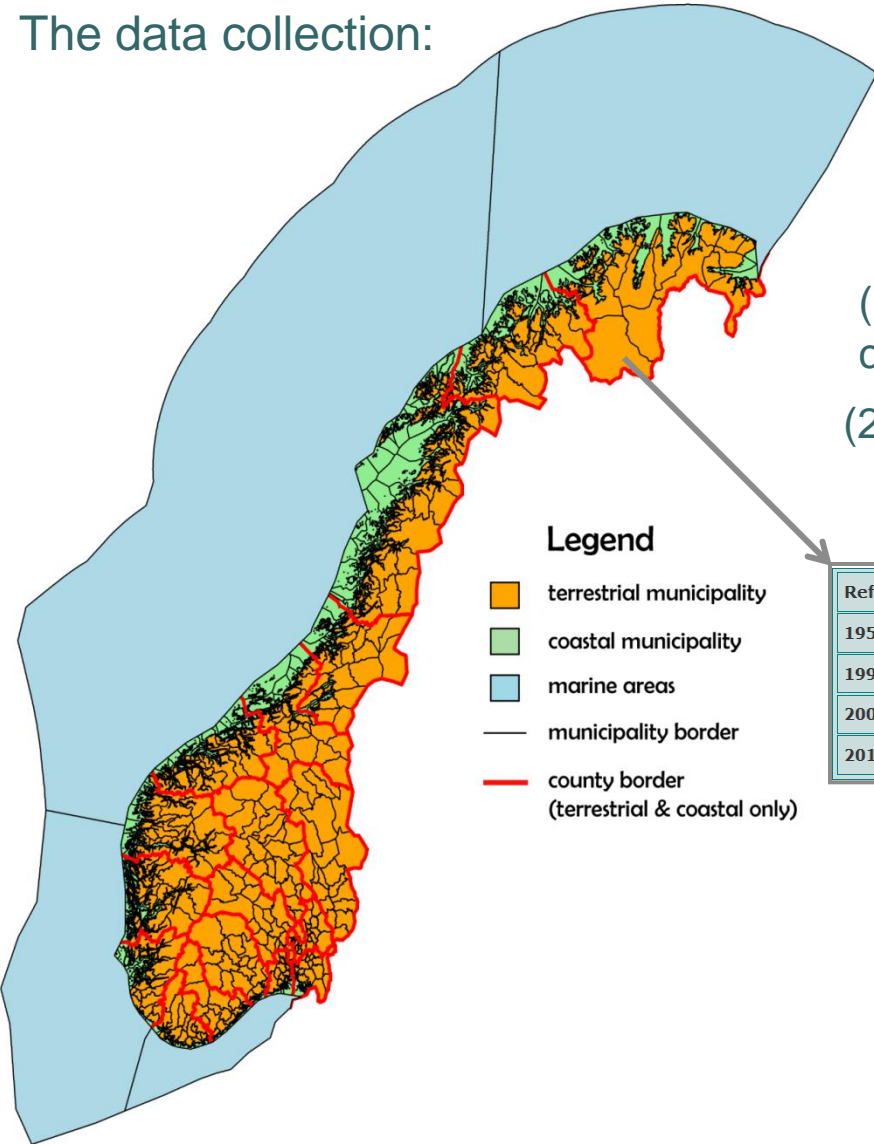




The data collection:

Each expert entered data on their respective indicator(s) after selecting the area the given values are representing

- (1) Selecting a **subset of municipalities** within a county
- (2) **Entering data:**



**Legend**

- terrestrial municipality
- coastal municipality
- marine areas
- municipality border
- county border (terrestrial & coastal only)

Ref	Verdi <input type="text"/>	Nedre verdi (25%) <input type="text"/>	Øvre verdi (75%) <input type="text"/>	Datatype <input type="text" value="Ekspertvurdering"/>
1950	Verdi <input type="text"/>	Nedre verdi (25%) <input type="text"/>	Øvre verdi (75%) <input type="text"/>	Datatype <input type="text" value="Ekspertvurdering"/>
1990	Verdi <input type="text"/>	Nedre verdi (25%) <input type="text"/>	Øvre verdi (75%) <input type="text"/>	Datatype <input type="text" value="Ekspertvurdering"/>
2000	Verdi <input type="text"/>	Nedre verdi (25%) <input type="text"/>	Øvre verdi (75%) <input type="text"/>	Datatype <input type="text" value="Ekspertvurdering"/>
2010	Verdi <input type="text"/>	Nedre verdi (25%) <input type="text"/>	Øvre verdi (75%) <input type="text"/>	Datatype <input type="text" value="Ekspertvurdering"/>

Median value

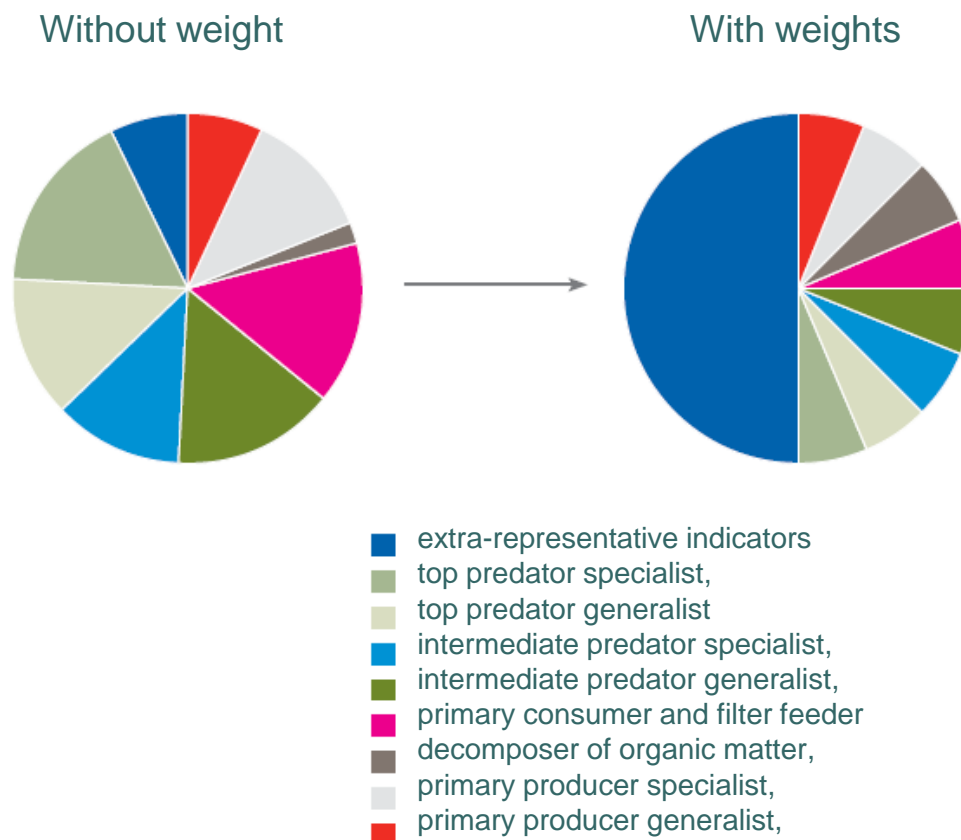
Uncertainty: quartiles

# The methodology

- Indicators (species or surrogates) are selected according to a set of representation criteria to avoid over-representation of certain groups of species.
- Data are scaled with reference value and scaling model
- Both data and expert judgements are used
- **A weighting system is introduced to correct for remaining imbalance in the set of indicators. Key-stone species and other key-elements count 50% of the index.**

# Criteria: Indicators should represent the overall biodiversity

## -Weighting system for each major habitat



Weighting was agreed among the research scientists

## The formula

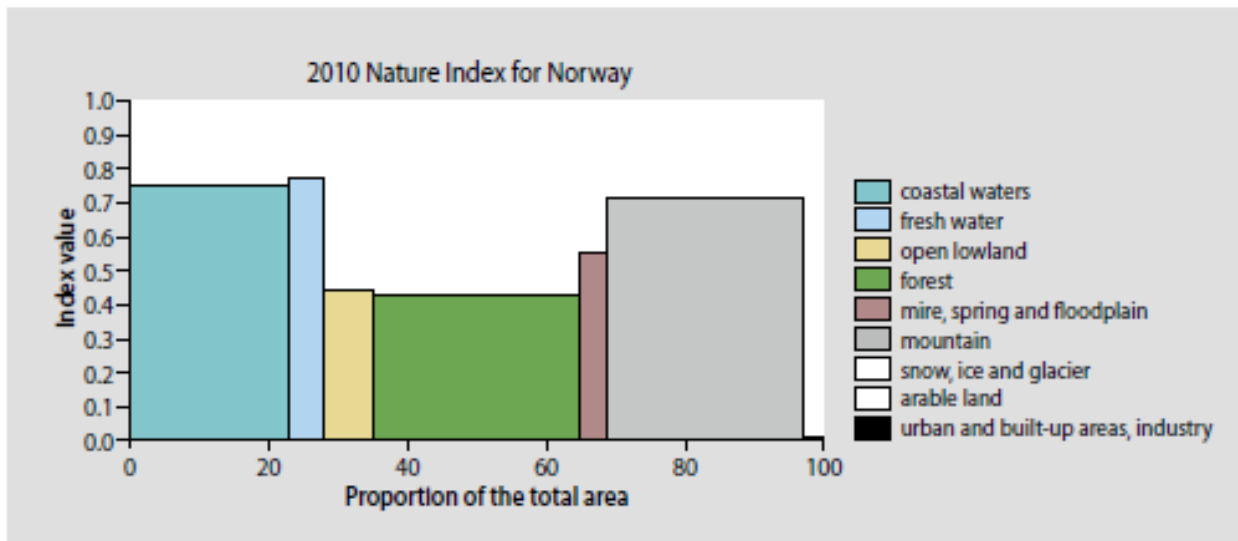
$$NI_t = \sum_{ijk} S_{ijkt} W_{ijkt}$$

S: Scaled indicator value

W: Weight

The NI of an ecosystem is the mean value of all relevant indicators given their weight

# Results



1 nautical mile  
coastal water

The state of major ecosystems in 2010 as calculated by NI (308 indicators and 9 major ecosystems)

Ocean bottom



Ocean pelagic



Coast bottom



Coast pelagic



Freshwater



Open lowland



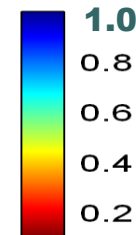
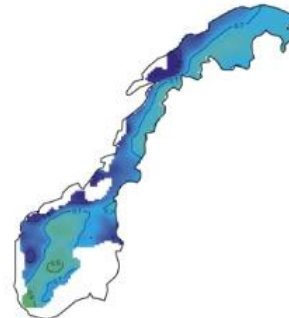
Forest



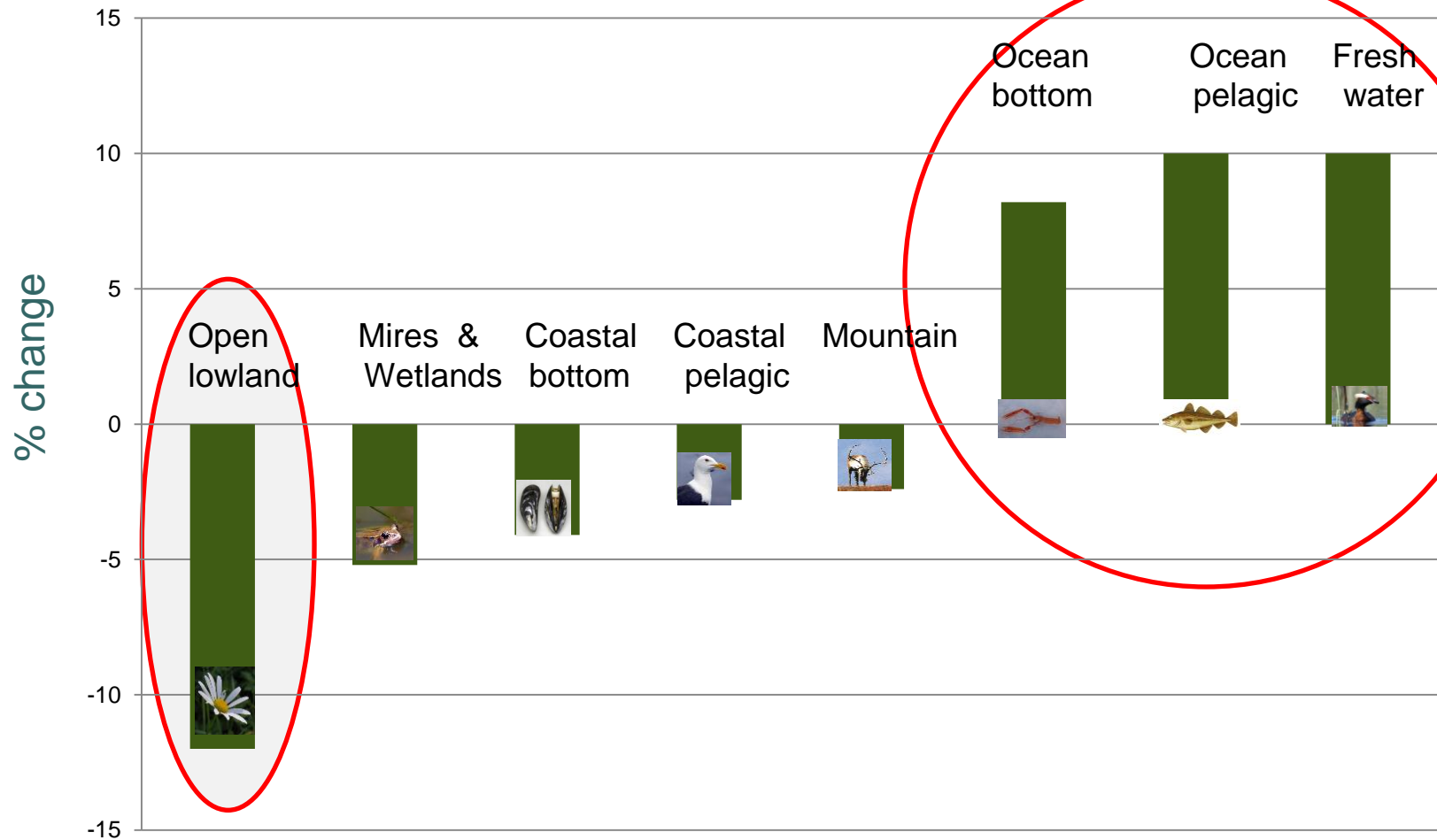
Mires and wetland



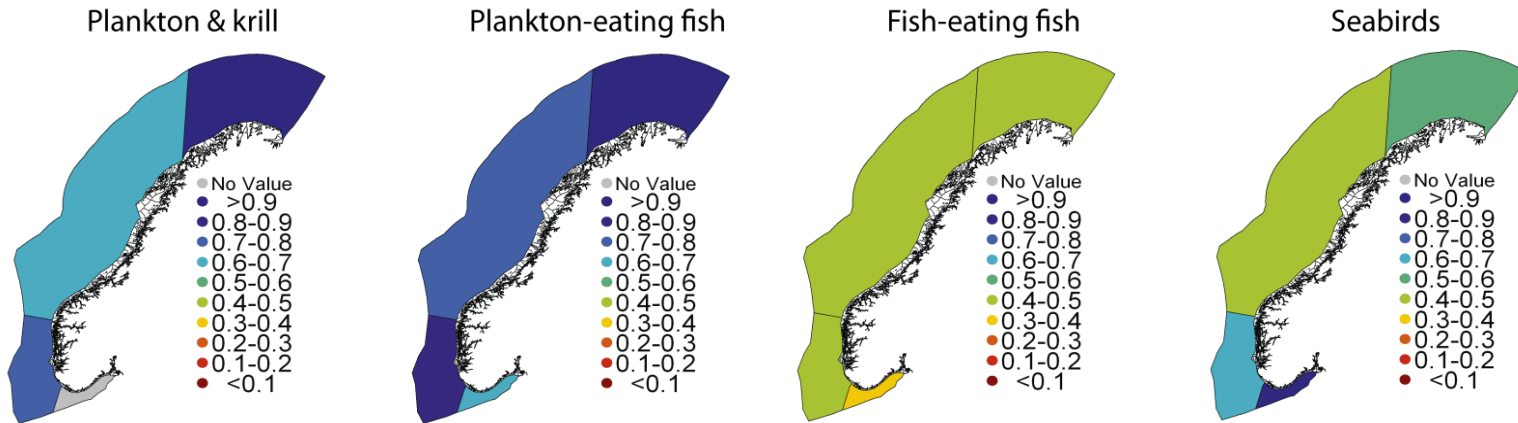
Mountain



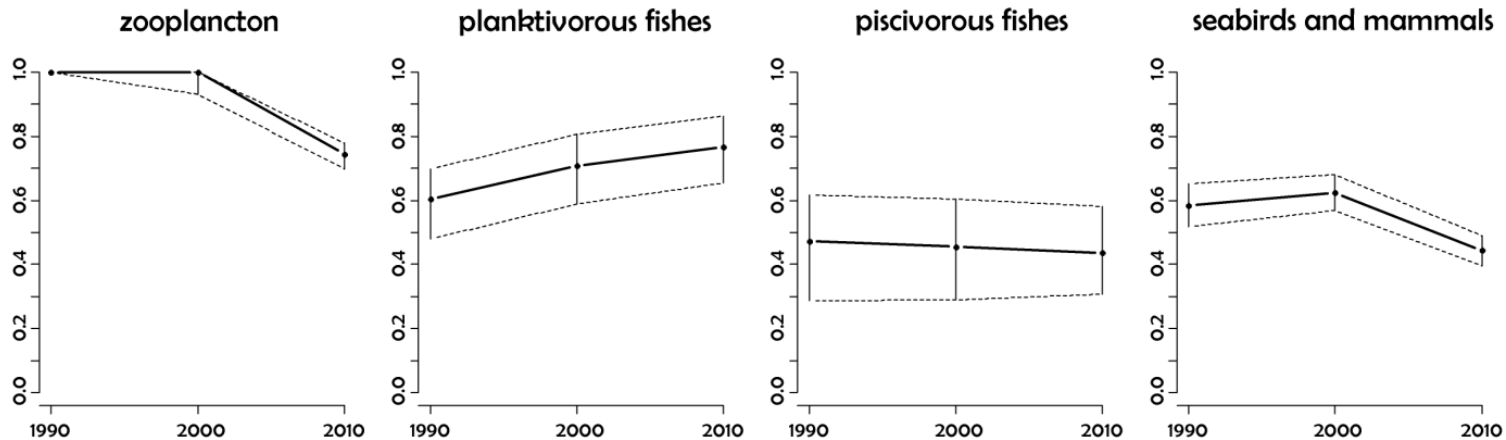
# Percent change of NI 1990-2010, all Norway



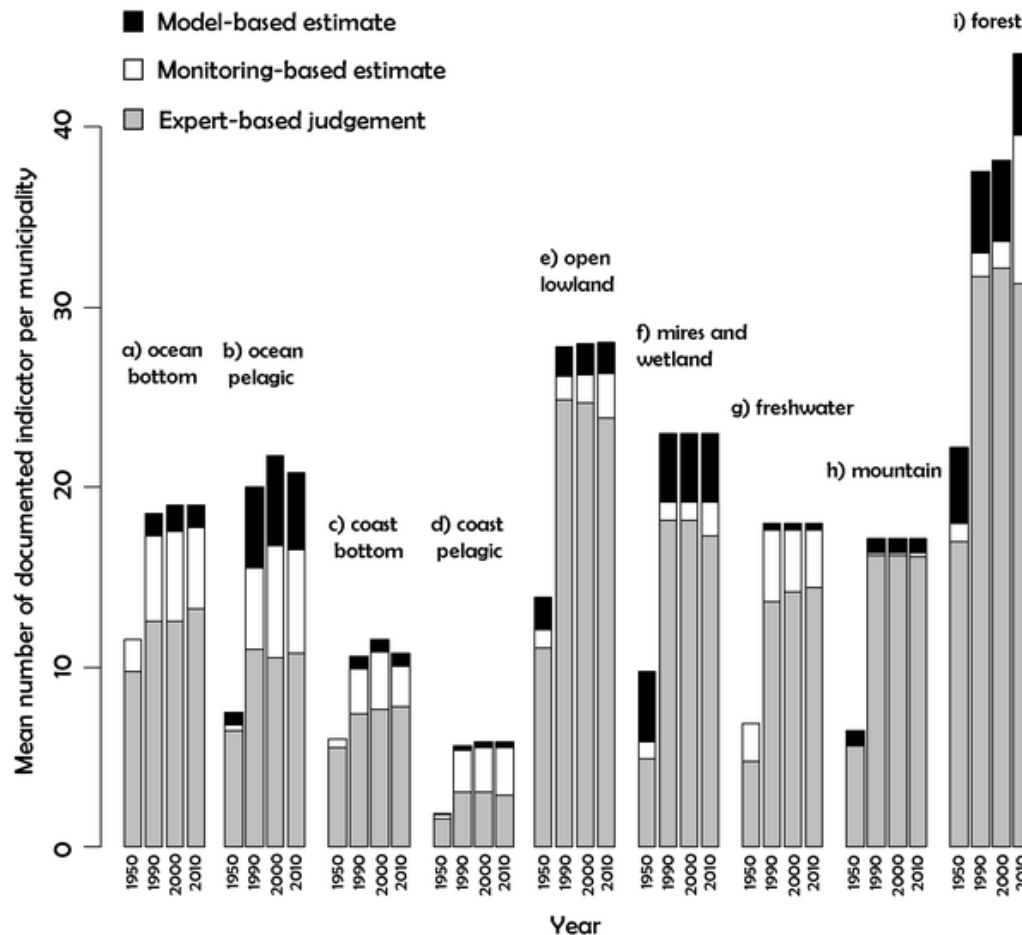
# NI of marine trophic groups 2010



## d) thematic index on trophic groups of pelagic systems



# What kind of data have been used?



# How was the Nature Index perceived by the public and politicians? Launched 2010

- Public debate (forestry, top carnivores)
- Accepted as a new indicator of sustainable development 2 out of 17 indicators (Ministry of Finance)
- Implemented by the Ministry of Environment to measure state of major ecosystems.

# Aichi Targets where the NI methodology could be useful

Aichi target	Indicators possible to calculate using the NI methodology
4	Population trends of utilized species, including species in trade
5	Degradation of natural habitats; population trends of habitat dependent species in each major habitat type
6	Population trends of target species and bycatch aquatic species
7	Population trends of forest and agriculture dependent species in production systems
9	(Impacts of invasive alien species on extinction risk trends)
12	Trends in abundance of selected species
15	Status and trends in species that provide ecosystem services

# Where can the NI be used?

Both within areas with high and low monitoring intensity, all scales

State and trends of biodiversity of

- countries/ regions
  - Select the relevant species
- national parks within a country
  - Possible to obtain data gathered by foreigners on-line
- one national park
- marine areas

# Conclusions

- Get an **overview** of state and trends of biodiversity. Yes.
- Easy to communicate.
  - Maps and graphs, yes
  - Difficult to communicate the difference between reference value and management targets
- Scientifically sound
  - Methodology agreed among involved institutions, incl. sector
  - More of the knowledgebase is used as expert judgements are included. Cost-effective...
  - Published in scientific journal -PLoS one
- Document where knowledgebase needs to increase. ?

# Thanks for the attention!

<http://english.dirnat.no>



**Involved research institutes:**

Norwegian Institute of Water Research,  
Norwegian Forests and Landscape Institute,  
Norwegian Institute for Agricultural and Environmental Research,  
Norwegian Institute of Nature Research.  
Marine Institute

# Cooperation and expertise for a sustainable future