

Indicators and their application in the Ecosystem Approach.

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The talk

- Introduction to the ecosystem approach
- How to get there
- The role of indicators (reference points, power, etc.)
- A framework
- Things we need to do next.

Sustainable Development and the Ecosystem Approach

The ecosystem approach is embedded in concept of sustainable development. It requires that the needs of future generations are not compromised by the actions of people today.

- The EA has a long-term perspective.
- It requires management of human activities to ensure Sustainable Development and conserve biological diversity.
- Highlights links between economic, social and ecological sustainability.
- And requires balance between them, without compromising ecological sustainability.

The Ecosystem Approach

In the CBD, the ecosystem approach was originally defined as 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way'

But: this is a very 'high level' definition and does not help set operational management objectives,

In the absence of clear objectives, many existing examples of the ecosystem approach are based on the integration of ecosystem concerns into sectoral management activities.

The management process (Policy)

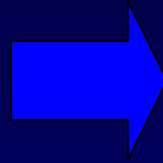
e.g. European Marine Strategy



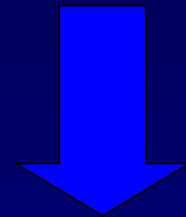
... applied to economic, social and ecological properties.

Seven steps to an Ecosystem Approach (Delivery)

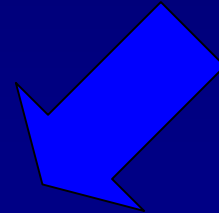
Scope / review
(assess ecosystem state,
policies, human activities),



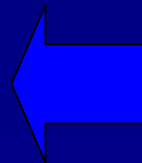
Compare with the Vision, and
Strategic Goals



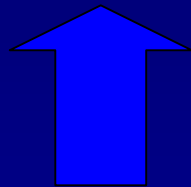
Identify important ecological
properties and threats,



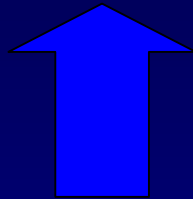
Set ecological objectives
(no gaps or redundancy),



Identify **indicators**
and reference points,



Monitor, assess and develop
adaptive management,



The role of indicators

Indicators are required to implement an effective Ecosystem Approach.

They make (Ecological) Objectives operational, especially when linked to targets and/or limits.

They should to some extent be Sensitive, Responsive and Specific.

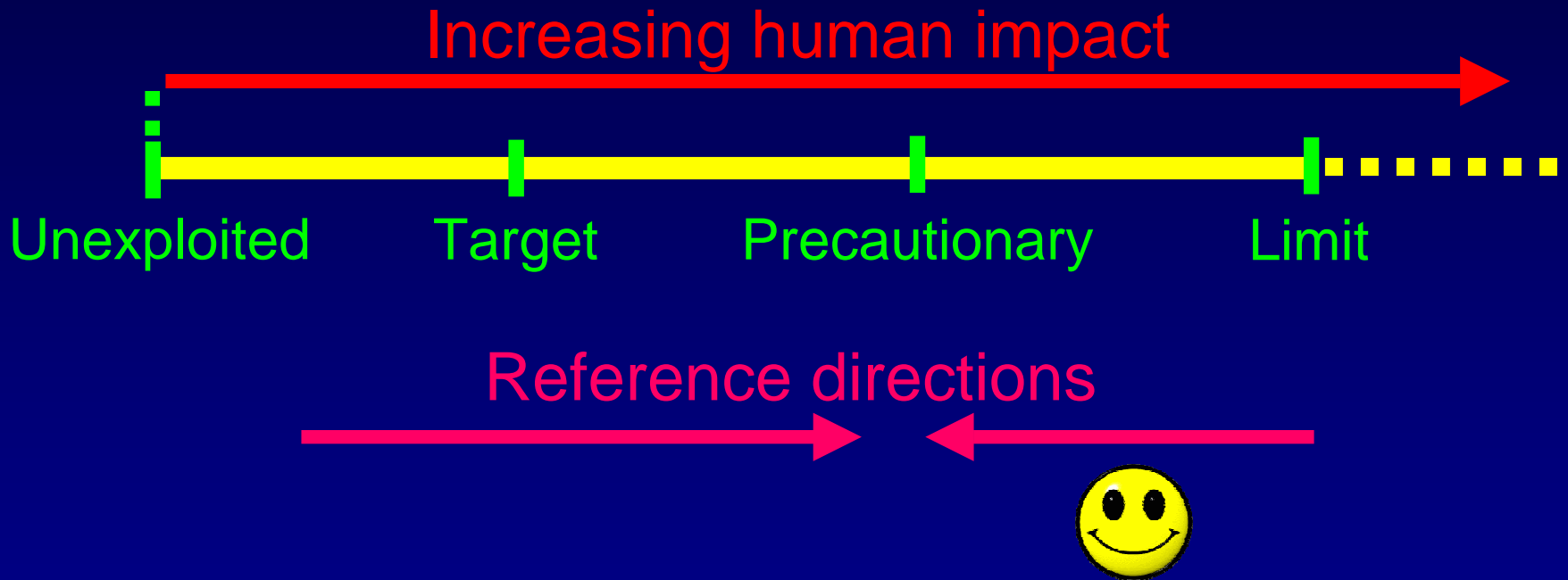
To be useful for management, indicators should be...

1. Relatively easy to understand by non-scientists and other users
2. Sensitive to a manageable human activity
3. Relatively tightly linked in space and time to that activity
4. Easily and accurately measured, with a low error rate
5. Measurable over the area where they may be used
6. Based on existing time-series data to help set objectives

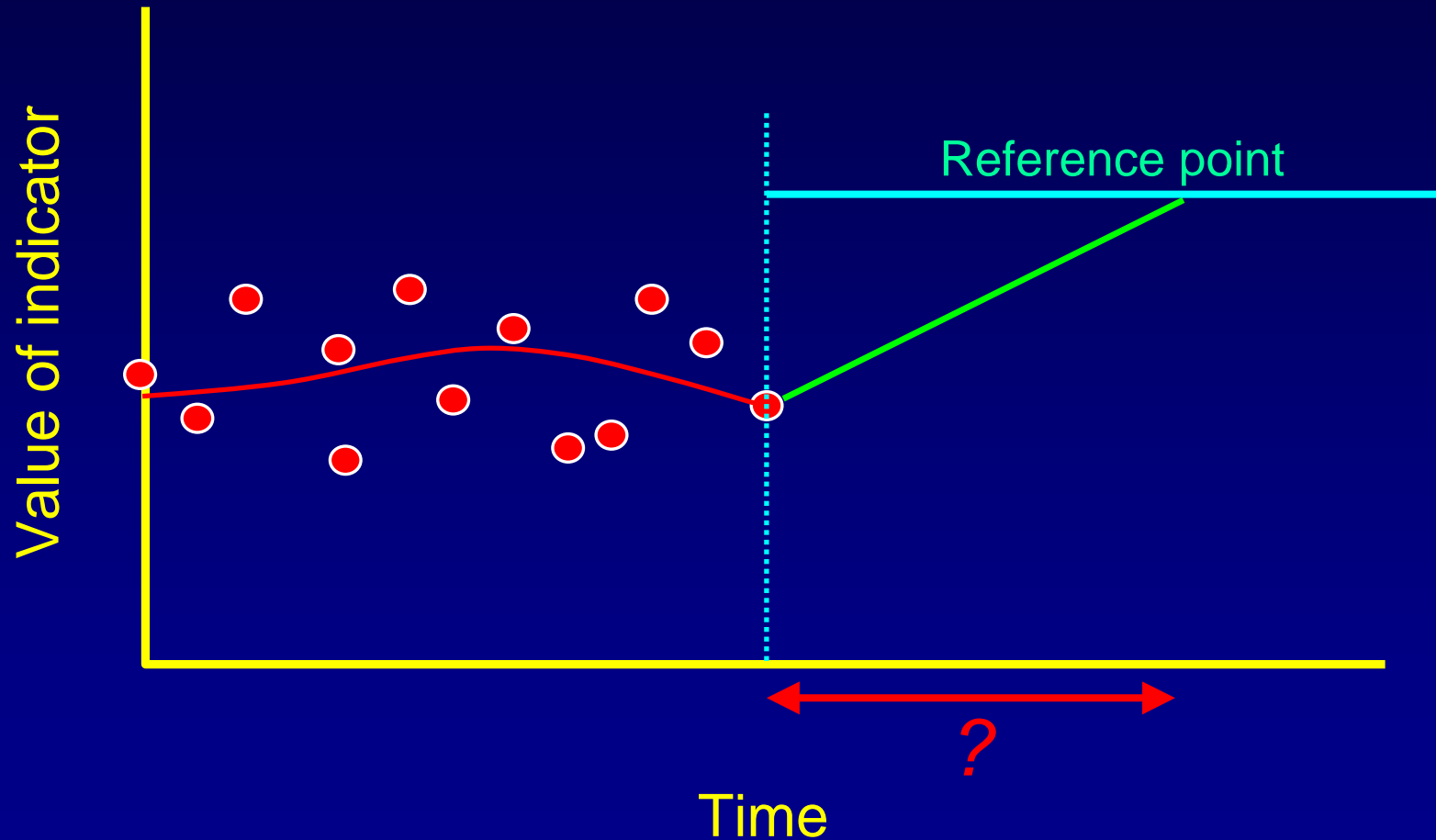
To begin the selection process for indicators we need to know...

1. The management issues to which the indicators are to be applied,
2. The management objectives, strategies and actions which the indicators will support,
3. The states of the ecosystem that are acceptable/ unacceptable to managers/ society,

.. and we also need reference points



How quickly do indicators respond to the success or failure of management



How quickly do indicators respond to the success or failure of management

Years of monitoring required to detect significant and expected trends in indicators of vulnerable species abundance or fish community structure

Indicator	Time
Rare species (single)	9- 39 years
Rare species (comp.)	9 years
Mean weight	16 years

A framework for using ecosystem indicators

- Development of objectives (and their indicators) is not well coordinated between sectors.
- Marine environmental objectives come from various legal drivers operating at different spatial scales.
- This will inevitably lead to overlaps, and gaps.
- Adaptive management systems used by EEA, OSPAR, etc. can help.

Legal / policy drivers

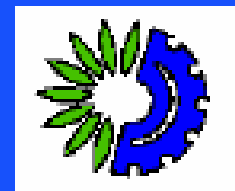
1. OSPAR Ecological Quality Objectives (for 10 'issues'),
2. OSPAR Riverine Inputs and Direct Discharges (RID), and Coordinated Environmental Monitoring Programme (CEMP),
3. EA Water Framework Directive,
4. EU / EEA headline biodiversity indicators,
5. UK government England Biodiversity Strategy,
6. UK Habitat and Birds Directives, SSSI / UK BAP habitats and species.

Scope and scale

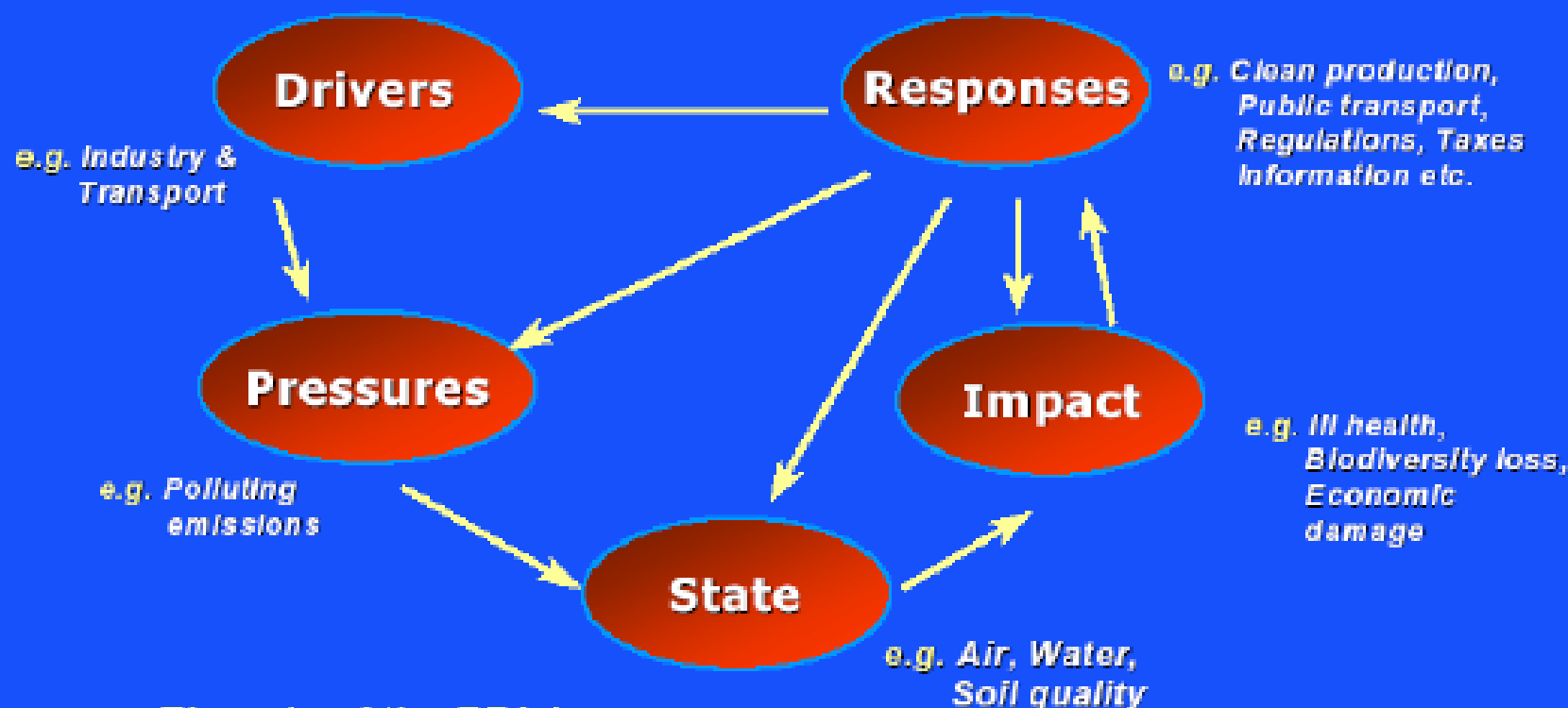
Driver

Geographic scale

OSPAR EcoQO	Regional to International
OSPAR RID / CEMP	Regional to International
WFD	Regional to International
EU Headline	National to International
UK EBS	Regional to National
EU Hab. Dir etc	Local to National



The DPSIR Framework



The role of the EEA is:

To provide information on the DPSIR elements and their interconnections, and on the effectiveness of responses

D P S I R

physical / chemical
habitat

haz. subs input
River inputs

Oxygen
Habitat quality
SSSI condition

OSPAR

nutrients

and discharges

Winter nutrients
nutrients
chlorophyll

EU
Headline

phy / zoo plankton

phyto. Indicators
chlorophyll a
WFD

EBS

benthos

sensitive
opportunistic
dog whelk

zoobenthos kills

OSPAR RID
& CEMP

EA

fish

fish stock status

fish SSB
fish community
sand-eel / birds
stock status

fleet capacity

Hab, Birds
Dir, SSSI

seabirds

sand-eel / birds
oiled guillemots

seabird pops
seabird pops

mercury /
organochl.

marine mammals

cetacean by-catch

seal pops
seal breeding sites

porpoise by-catch

most or all
ecosystem
components

T & D species
BAP ssp & habs
diversity trends
threatened spp

public & biodiv.
protected areas

What have we learnt ??

- Emphasis clearly on measuring the state of the ecosystem,
- Why is this? Pressure indicators (effort, inputs, etc.), are much more useful and we can manage against them,
- Response indicators would show how well we are doing, but...
- we can't afford to fill the matrix with indicators, and it isn't necessary.
- We should make better choices...

Key Messages

- Indicators are important. They assess the performance of management in relation to Limits and Targets.
- Indicators must be useful in a management context.
- Indicators work best with unambiguous Objectives, and these must balance economic, social and ecological goals.
- Showing a reference direction (traffic lights, smileys) is a useful first step in the absence of a more specific target.

Key Messages

- Several years of monitoring data may be necessary to show statistically significant improvements in state,
- We must be more selective, and must coordinate the various national and international indicator initiatives,
- Finding good indicators is quite a challenge.

A Management Framework

3 conceptual areas

Monitoring

Indicators

Management systems

Describe how these concepts are so closely linked they have to be considered together