THE AMOEBA APPROACH: QUANTITATIVE DESCRIPTION AND ASSESSMENT OF ECOSYSTEMS

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For the Third Water Management Plan of the Netherlands, a conceptual model called the AMOEBA approach has been developed for the description and assessment of marine ecosystems. The AMOEBA approach is based on the concept of sustainable development and the Brundtland Commission.

Three fundamental values for sustainable development are taken into account: sustainable production and yield, sustainable species diversity, and sustainable self-regulation. It is assumed that the ecosystem which is not, or hardly, manipulated, offers the best guarantee for preservation of these values, the reference system. The closer to the reference system, the larger the guarantee for ecological sustainability.

To compare the present ecosystem with the reference system (ca. 1930), an estimation has been made for the numbers of 32 plant and animal species of the Dutch part of the North Sea, as visualized by a radar diagram (see Figures). The distance from the center to the circle represents the reference numbers. The present numbers have been placed and connected by a line, constituting the amoeba-like figure. The displacement of the numbers is striking. In general, a shift from long-living to short-living species is observed.

Prognoses have been made for six policy options, the so-called effect amoebas. It is found that the present policy-a 50% reduction of pollutants and nutrients, the North Sea Action Plan-offers no improvement, only serving to stop the ecological decline. Even an overall reduction of 90 percent by itself has relatively little effect. Selective reduction of loads in combination with supplementary physical and biological measures is most effective, with relatively low costs.

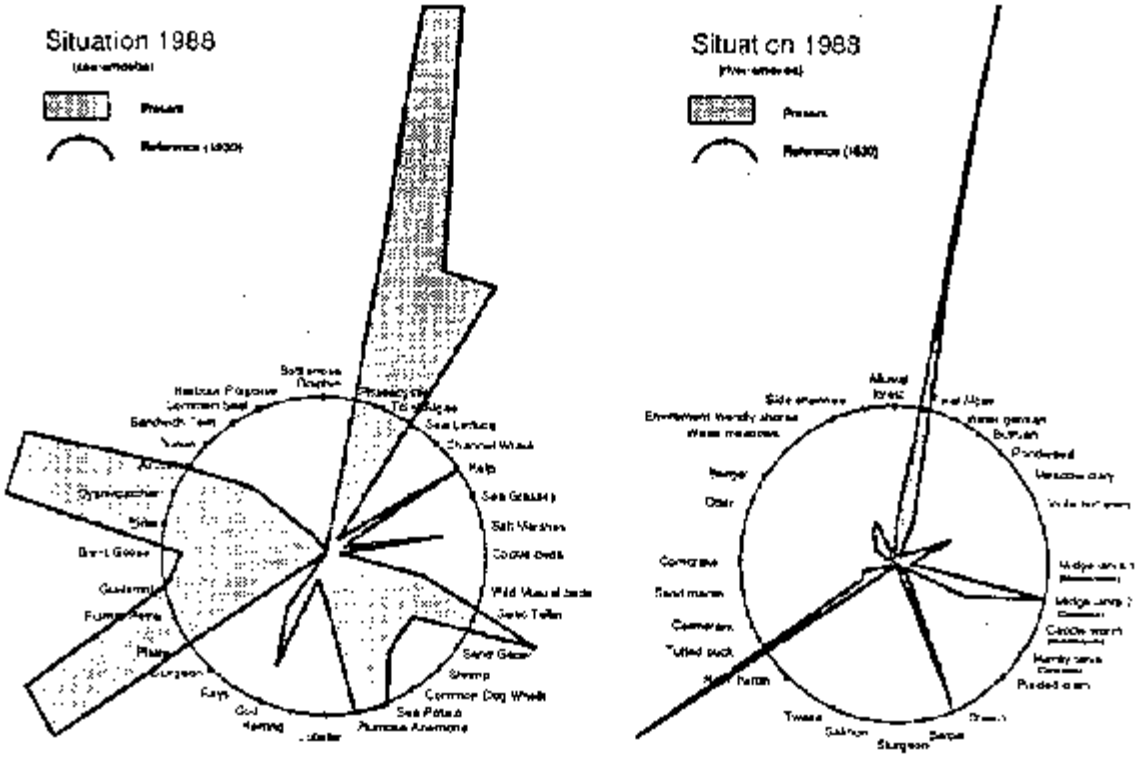

Figure 1a: The selected target variables, showing the present ecological situation in the sea (a) and the major rivers (b).

The AMOEBA approach is now used as a tool for setting up physical, chemical, toxicological and biological research in such a way that it gives adequate, integrated information for environmental policy-making, aiming at sustainable development.

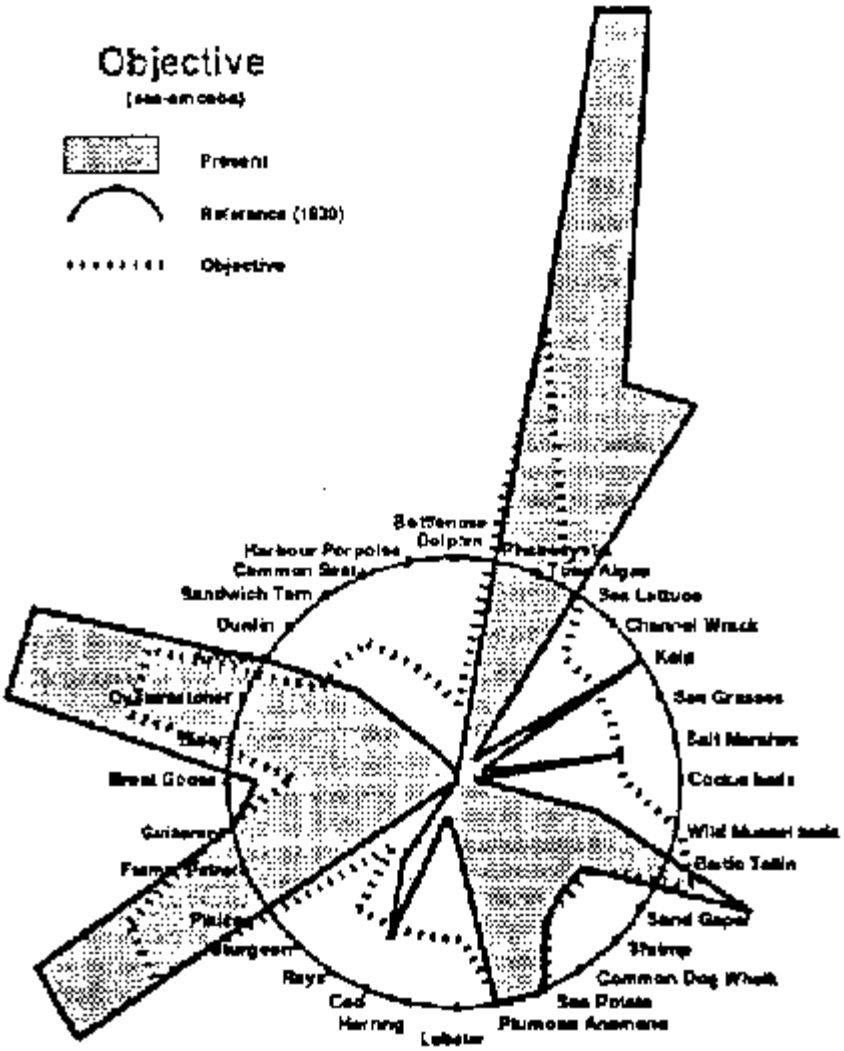

Figure 1b: The desired objectives.

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