Swedish Society for Nature Conservation

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SEAS AT RISK

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The North Sea Foundation

Joint NGO guidance factsheet on "Concentrations of contaminants are at levels not giving rise to pollution effects" (Descriptor 8) &"Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards" (Descriptor 9) on the implementation of the MSFD

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Introduction

Chemical pollution is one of the main pressures affecting the marine environment today. The main sources of pollution include municipal and industrial discharges (including wastewater and waste), agriculture and aquaculture runoffs, maritime traffic, ship generated and other oil spills, and nuclear accidents/discharges.

Over the past few decades approximately 100.000 chemicals[1] have been produced for commercial uses and have entered the European market. About 30.000 of these chemicals have a production volume higher than one ton per year, and many of these end up in the marine environment, with potentially damaging effects on marine organisms, ecosystems and processes, and potentially, on human health.

Knowledge in terms of concentrations, input and removal fluxes, fate and behaviour within the water and sediment columns and toxicological impacts on ecosystems varies and depends on the group of contaminants being considered. Chemical contaminants are generally divided into three main groups: trace elements (e.g. Cu, Cd, Pb, Hg, Sn, etc.), organic substances (e.g. Persistent Organic Pollutants – POPs such as DDT, PCBs, dioxins, etc.; hormones; veterinary medicines and pharmaceuticals) and radionuclides.

The compounds of higher concern in the marine environment are generally those that are persistent, toxic and bioaccumulative. In addition, high risks are posed by compounds which have the potential to travel long distances and contaminate remote areas far from pollution sources.

Chemicals can cause not only direct intoxication and acute effects such as death of marine biota, but they can also cause more subtle adverse effects (nevertheless reducing their viability) such as cellular and biochemical alterations, anatomical malformations, and impairment of the reproductive, hormonal and immune systems. Furthermore, chemical pollution can cause changes in species distribution and abundance, habitats, energy-flow patterns, and biogeochemical cycles. Marine biota are threatened by loss of species, habitat destruction, new or unusual interspecies interactions that affect community structure and function, and decreased ability to recover.

1. The Marine Strategy Framework Directive & Pollution Effects

The Marine Strategy Framework Directive (MSFD) lists 11 qualitative descriptors which represent high level aims for which Good Environmental Status (GES) should be achieved by 2020 at the latest. Two MSFD descriptors focus on contaminants and pollution effects and are closely linked with each other: Descriptor 8 is formulated as **"Concentrations of contaminants are at levels not giving rise to pollution effects"**. Descriptor 9 is formulated as "**Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards**".

Specific indicators have been formulated to assess each descriptor. Guidelines on how to approach these indicators can be found in the recent publications of the MSFD Task Groups on "Contaminants and pollution effects"[2] and "Contaminants in fish and other seafood"[3].

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[1] *European Inventory of Existing Commercial Chemical Substances - EINECS, 1981*

[2] *R. Law, G. Hanke, M. Angelidis, J. Batty, A. Bignert, J. Dachs, I. Davies, Y. Denga, A. Duffek, B. Herut, K. Hylland, P. Lepom, P. Leonards, J. Mehtonen, H. Piha, P. Roose, J. Tronczynski, V. Velikova& D. Vethaak R. MARINE STRATEGY FRAMEWORK DIRECTIVE, Task Group 8 Report Contaminants and pollution effects, APRIL 2010 (http://www.ices.dk/projects/MSFD/TG8%20Report_Final_vII.pdf).*

[3] *F. Swartenbroux, B. Albajedo, M. Angelidis, M. Aulne, V. Bartkevics, V. Besada, A. Bignert, A. Bitterhof, A. Hallikainen, R. Hoogenboom, L. Jorhem, M. Jud, R. Law, D. LichtCederberg, E. McGovern, R. Miniero, R.*

Descriptor 8: Concentrations of contaminants are at levels not giving rise to pollution effects.

Criterion 8.1: Concentration of contaminants

Indicator 8.1.1: Concentration of the contaminants mentioned above, measured in the relevant matrix (such as biota, sediment and water) in a way that ensures comparability with the assessments under Directive 2000/60/EC.

Criterion 8.2: Effects of contaminants

Indicator 8.2.1: Levels of pollution effects on the ecosystem components concerned, having regard to the selected biological processes and taxonomic groups where a cause/effect relationship has been established and needs to be monitored.

Indicator 8.2.2: Occurrence, origin (where possible), extent of significant acute pollution events (e.g. slicks from oil and oil products) and their impact on biota physically affected by this pollution.

In view of Descriptor 8, “contaminants” are defined as substances or groups of substances that are toxic, persistent and liable to bioaccumulate, and other substances or groups of substances which give rise to an equivalent level of concern. The definition is in line with the definition of hazardous substances used in the Water Framework Directive (WFD). “Pollution effects” are defined as direct and/or indirect adverse impacts of contaminants on the marine environment, such as harm to living resources and marine ecosystems, including loss of biodiversity, hazards to human health, the hindering of marine activities, including fishing, tourism and recreation and other legitimate uses of the sea, impairment of the quality for use of sea water and reduction of amenities or, in general, impairment of the sustainable use of marine goods and services.

Descriptor 9: Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards

Criterion 9.1: Levels, number and frequency of contaminants

Indicator 9.1.1: Actual levels of contaminants that have been detected and number of contaminants which have exceeded maximum regulatory levels.

Indicator 9.1.2: Frequency of regulatory levels being exceeded.

Regarding Descriptor 9, the terms "fish and other seafood" are interpreted as only wild caught fish, crustaceans, molluscs, echinoderms, roe and seaweed harvested in the different (sub) regions, all destined for human consumption. "Levels established by Community legislation" are considered to be the regulatory levels set in Community legislation for public health reasons; and "Other relevant standards" could be other national and international (WHO, FAO, etc.) standards and recommendations set for fish and other seafood for consumption, which are not in contradiction with the EU legislation.

Due to the obvious inter-linkages and interdependencies of Descriptors 8 and 9, they are jointly addressed throughout this document.

Schneider, V. Velikova, F. Verstraete, L. Vinas& S. Vlad. MARINE STRATEGY FRAMEWORK DIRECTIVE, Task Group 9 Contaminants in fish and other seafood, APRIL 2010 (http://www.ices.dk/projects/MSFD/TG9%20report%20Final_vII.pdf).

2. How to contribute? Issues of concern and recommendations

While the European Commission recognizes that progress has been made in certain areas, such as in reducing pollution of metals, it is also clear that the state of the marine environment has been deteriorating significantly over recent decades (European Commission, 2005) and that the existing policy framework has not delivered the high level of protection of the marine environment that is needed.

Within the framework of the MSFD, NGOs have a unique opportunity, through their involvement and active participation, to ensure the improvement and protection of the marine environment in Europe and the conservation of its resources. In the framework of the national consultations they should voice their concerns and demands outlined below:

2.1. Setting environmental targets and associated indicators

Descriptor 8

- A combination of biological effects and chemical measurements (or additional effects measurements) should be used, to provide an improved assessment due to the ability to address effects that are potentially caused by a wide range of contaminants as well as those that are more clearly linked to specific compounds or groups of compounds.
  - In agreement with the recommendations made by the MSFD Task Group on contaminants and pollution effects, for the purpose of implementing Descriptor 8 under the MSFD, the Member States are urged to ensure that:
  - Concentrations of contaminants in water, sediment and/or biota are set below environmental target levels identified on the basis of ecotoxicological data;
  - Levels of pollution effects are below environmental target levels representing harm at organism, population, community and ecosystem levels;
  - Concentrations of contaminants in water, sediment and/or biota, and the occurrence and severity of pollution effects, decrease.
- It is very important to take into account the synergistic effect of contaminants, as in that case, the effects of a mixture of contaminants, even though each contaminant is at concentration lower than the regulatory levels, can be more significant than the effects to single contaminants exceeding maximum regulatory levels. In addition, the frequency of the occurrence of extremely high concentration values and of course the average concentration value, are very important too.
- Appropriate species should be used as indicators.

Descriptor 9

- A distinction should be made between contaminants for which regulatory levels have been set and other contaminants of relevance in fish and other seafood. A realistic target in order to achieve GES would be for all contaminants to be at levels much lower than those established for human consumption by relevant regulations. In addition, regarding those contaminants for which monitoring is ongoing, but regulatory levels have not yet been set, a downward trend should be demonstrated.
- Assessment of the indicators should at least take into account the actual levels that have been detected, the frequency that levels exceed the regulatory levels, the number of contaminants for which exceeding levels have been detected in parallel and the origin of the contamination.

- The significance of an increase for specific contaminants under Descriptor 8 should be regarded as an important element for inclusion in monitoring under Descriptor 9.
- Besides the issue of aggregation within a given descriptor, when aggregating information from individual descriptors into an overall assessment, care should be taken not to lose information, nor to oversimplify the outcome of complex monitoring schemes by aggregating numerous individual results into a single score. A joint aggregation of information for Descriptors 8 and 9 for contaminants covered by both descriptors might bring a solution to the problem of the unclear situation towards GES at levels below the regulatory levels set for human consumption in Descriptor 9.
- Monitoring and setting of GES for contaminants in fish and other seafood for human consumption should at least consider the following contaminants for which regulatory levels have been laid down:
    - Heavy metals: lead, cadmium and mercury;
    - Polycyclic aromatic hydrocarbons (PAHs);[4]
    - Dioxins including dioxin-like Polychlorinated Biphenyls (PCBs);[5]
    - Radionuclides;

In addition, the following contaminants of concern should be monitored:

- Non-dioxin like PCBs;
- Brominated flame retardants (BFRs);
- Polyfluorinated compounds (PFCs), such as perfluorooctanoic acid (*PFOA*) and perfluorooctanesulfonate (PFOS);
- Arsenic;
- Organotin compounds, preferably tributyltin (TBT), triphenyltin (TPT) and dibutyltin (DBT);
- Phthalates, preferably butyl-benzyl phthalate (BBP), di-butylphthalate (DBP), bis(2-ethylhexyl)phthalate (DEHP), di-isodecylphthalate (DIDP), di-isononylphthalate (DINP) and di-isobutylphthalate (DIBP).

- Radioactivity in fish and other seafood should be assessed through radiation dose estimates for consumers and not by concentration measurements. Radiation dose estimates for humans are an important measure to use in establishing Good Environmental Status in respect of radioactivity since they provide a direct indication of health risk. GES could be achieved when doses of radioactivity for a consumer in a given region are well beneath limits specified in EC legislation.
- Existing national monitoring programmes often do not cover the data needs for monitoring compliance to GES under Descriptor 9. Results from monitoring of contaminants under descriptor 8 and descriptor 9 should be integrated. Results from monitoring under descriptor 8 are an important element in selecting contaminants for Descriptor 9. Since Descriptors 8 and 9 largely deal with the same topic, it should be avoided to use different methodologies in parallel trend programmes for these descriptors.
- Given the facts that Descriptor 9 focuses on fish and seafood for human consumption and that commonly eaten species do not necessarily represent a good coverage of the (sub) region, care should be taken to make a selection of appropriate/represenative species for monitoring in order to ensure a correct assessment of the entire region and/or sub-region.
- Depending on the contaminant a tendency of decreasing, stable levels or increasing can be observed over various time-scales. In order not to lose details of temporal trends, levels must be expressed in absolute figures rather than relative to the regulatory level (below, at or above the

[4] *Regulatory levels for PAHs set in community legislation for public health reasons currently consider only benzo(a)pyrene, since benzo(a)pyrene is used as a marker for the presence of the whole class.*

[5] *Regulatory levels for dioxins and dioxin-like PCBs set in community legislation for public health reasons consider sum of dioxins (WHO-PCDD/F-TEQ) and sum of dioxins and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ).*

relevant limit). Because regulatory levels are generally too high to be used as an early indicator of increasing pollution of the marine environment, expressing results relative to the regulatory level would only trigger a change in environmental status at a very late stage.

2.2. Good environmental status

The current situation is already far away from GES. Pollution effects on biota have been demonstrated for all European seas. In some European seas, fish and seafood is currently not safe to eat, not for humans, nor for other top consumers. Therefore it is important that:

GES should not be set at the status quo. GES descriptors, indicators and targets must be set at ambitious levels, and not just at levels that are easily achievable within the given timeframe.

2.3. Future steps: research and monitoring needs

Descriptors 8 & 9

- Given the production of new chemical compounds and their potential release into the marine environment, more elaborated and targeted monitoring schemes should be developed to detect potentially toxicologically or ecotoxicologically significant concentrations or biological effects.
- MSFD GES target setting implies an understanding of the processes affecting contaminant cycling and availability, the responses of marine organisms to contaminants, the identification of sources and the availability of appropriate monitoring tools. Member States should be urged to address the relevant fundamental knowledge gaps and uncertainties already identified by the MSFD Sub-Group listed below:
  - Understanding of the ecosystem responses, including mixture effects and/or interactions between contaminants and other environmental stressors on marine biota;
  - Knowledge on marine foodwebs with regard to contaminants, including bioaccumulation and biomagnification, and the possibility of additive, synergistic and antagonistic effects;
  - Contaminant uptake and effects in marine top predators;
  - Pollution source identification and quantitative apportionment;
  - Development of methods for the monitoring of pollutants;
  - Deep Sea Research;
  - Passive sampling techniques;
  - Biological effects techniques.
- In the case of knowledge gaps and scientific uncertainties on the effects of contaminants on marine biota (as described above), Member States should be urged to apply the precautionary principle.
- Taking into account that there is rarely a well-defined established simple quantitative link between levels of contaminants in marine environment and levels in fish and other seafood, there is an imperative research need on the transfer mechanisms of contaminants from the marine environment to the fish/fishery species.