DAIMON Ecotox Toolbox in a nutshell

Short practical guidance to explain and apply the Ecotox Toolbox (in simple version)

U. Kammann, Thünen-Institute of Fisheries Ecology, January 2021

Starting Scenario: For a certain marine area you want to know if there is dumped munition present, and if substances are leaking and may affect biota. You want to use the Ecotox Toolbox which is aiming to answer the three following questions:

Question 1: Is munition present in the respective area (chemical, explosive)?

Question 2: Are related chemical substances detectable in sediment or organisms?

Question 3: Do biological effects indicate a disturbance of the ecosysteme / a possible effect of munition?

These three question are can be answered using the **fact sheets**. Now you have to select fact sheets from www.thuenen.de/de/fi/arbeitsbereiche/meeresumwelt/munition-im-meer/daimon-ecotox-toolbox/ toolbox-fact-sheets/

one fact sheet of group 1 (numbering starting with 1),

one fact sheet of group 2 (numbering starting with 2) and

three fact sheets of group 3 (numbering starting with 3).

Selection and application of the fact sheets should be performed by an expert and an experienced lab. The expert has to take into account the background of the posed question as well as local situation at the sampling site and the lab resources. Considering that, he/she is free in the fact sheet selection. The Ecotox Toolbox gives no further guidance in fact sheet selection.
The expert has to use thresholds (analytical detection limits, ecotoxicological threshold levels or comparison to reference areas) specific for every chosen method, species or area to express result as „**yes**“ or „**no**“. Like the following examples:

„**Yes**, munition is present in the respective area, because we are operating in a documented dumping site.“

„**No**, chemical analysis did not detect the relevant substance X in the selected matrix. Results are below analytical detection limit of X“,

„**Yes**, the biological effect method Y showed positive results in my selected organism because the results are above environmental assessment criteria“,

„**No**, the biological effect method Z showed no difference between contaminated and reference area – so there is no biological effect Z detectable which could be related to munition.

Questions 1 and 2 are answered with "yes" if the respective fact sheet of group 1 and/or 2 produces the answer "yes" – quite simple

Questions 1 and 2 are answered with "no" if the respective fact sheet of group 1 and/or 2 produces the answer "no" – quite simple

Question 3 is answered with "yes", if two or all three fact sheets of group3 are answered with "yes". (Two out of three)

Question 3 is answered with "no", if one or none of the three fact sheets of group 3 are answered with "yes".

Why do we need three fact sheets for Question 3? The biological effects methods are not specific for munition effects. However, biological methods may reflect munition impact as well as multiple other factors too. To overcome this uncertainty, three facts sheets are used in combination instead of one. Methods for Question 1 and 2 are specific – so one result is sufficient here. Positive biological effects do not prove a munition impact. But they indicate its possibility.

Now you have three answers for the three questions, which are interpreted together The Interpretation is the result of the Ecotox Toolbox like shown below.

DAIMON Ecotox Toolbox results (examples)
Question 1 Yes Question 2 Yes Question 3 Yes Munition is present in the area, substances are leaking, contamination in organisms/sediment and biological effects have been detected. Munition may affect the ecosysteme here.
Question 1 Yes Question 2 Yes Question 3 No Munition is present in the area, substances are leaking, contamination in organisms/sediment but no biological effects are present. Munition is present but not likely to affect the ecosysteme here. Situation is unclear and should be further observed or investigated with Toolbox in advanced mode or with DSS.
Question 1 Yes Question 2 No Question 3 No Munition is present in the area, substances are not leaking to sediment/organisms and no biological effects are present. Munition is not likely to affect the ecosysteme here.
Question 1 No Question 2 No Question 3 No Munition is not present and no contamination or effect have been observed. No action is needed.
Question 1 No Question 2 Yes Question 3 Yes No munition is present but chemicals have been detected in organisms/sediment and biological effects are present. In this situation, the cause of the contamination should be looked up – maybe with DSS. Then Toolbox analysis should be repeated.