

**Name of Method:** Carrying capacity analysis

**Summary of Method:** Carrying capacity can be defined as the maximum of a given element (such as a particular species) that can be supported in a set area. The method tends to use mathematical modelling techniques to take consideration of the physical and biological processes involved, to determine the maximum number of a particular species that can be supported without significant detrimental effect on the remaining species and processes. For example, a common application relates to shellfish farming, where carrying capacity is generally understood as being the standing stock of a particular species at which production is maximised without negatively affecting growth rates. Considerations for such a model may include the transport of dissolved and particulate matter and the removal of such matter by shellfish. For a basic shellfish model, the potential for effects on primary productivity due to removal of dissolved and organic matter by shellfish are assessed, to enable the carrying capacity for shellfish to be estimated. The complexity of the environment means that more complex models are required to enable all interactions between species and the physical and chemical environments to be assessed.

**Advantages of Method:** The method addresses accumulation of impacts against thresholds and considers trends. It also enables the assessment to focus on a particular species, to study potential impacts in detail.

**Limitations of Method:** The method is limited by data availability and the detail to which the model is subject to. More detailed models can provide a greater amount of information and certainty but tend to be more time consuming and expensive. It is not always possible to establish the threshold or carrying capacity for a receptor.

**References:** Duarte, P, Meneses, R, Hawkins, AJS, Zhuc, M, Fangd, J, Grant, J, 2003. Mathematical modelling to assess the carrying capacity for multi-species culture within coastal waters. *Ecological Modelling* 168 (2003) 109–143  
European Commission Directorate General – Environment, Nuclear Safety and Civil Protection, 1999. Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.