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SAFGOF – a cross-disciplinary modelling approach to minimizing the ecological risks of maritime oil transportation in the Gulf of Finland

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Maritime traffic, including oil transportation, in the Gulf of Finland (GOF) is predicted to rapidly increase in the near future. This will increase the probability of a major oil accident thus adding the risks directed towards the ecosystem by increasing the amount of oil transported and the total amount of vessels navigating in the GOF.

A multidisciplinary, probabilistic, Bayesian modelling approach to minimizing the risks will be presented. The analysis is based on three economic growth scenarios for the likely development of maritime traffic and oil transportation in the GOF by year 2015. Probability distributions for each as well as one combined distribution to evaluate the total uncertainty were simulated based on the views of an expert group. The approach combines the latest technical maritime accident and human error models with an oil recovery and biological consequence models, all conditioned to the growth scenarios. As the concept of risk consists of not only the probability of an undesired event but also the magnitude of harm caused by it, a novel approach for the valuation of multiple ecological and juridical status criteria by multiple stakeholders is included.

Finally, the entire chain of models will be conditioned to selected national and international legislative and other management actions affecting different parts of the system. The aim is to produce an advisory risk assessment and decision support tool to e.g. governmental decision makers. The approach produces unique information on the oil accident probabilities and their likely biological consequences in the most accident-prone parts of the marine routes used, providing for efficient local evaluation and planning. The probabilistic decision analysis enables realistic assessment of the relative efficacy and robustness of alternative actions under significant amount of uncertainty related to the different parts of the problem field.