MARINE ENVIRONMENTAL HIGH RISK AREAS (MEHRA'S)

FOR THE ROPME SEA AREA

1. Objectives & Methodology

1.1 Introduction

This section presents the major and secondary objectives of the project as well as presenting an overview of the methodology to be applied.

1.2 Major Objective

The major objective of this project is as follows:

- To identify the areas within the ROPME state which should be designated as Marine Environmental High Risk Areas (MEHRAs). It should be noted that the same process can be applied should any of the states wish to apply to IMO for the establishment of a Particularly Sensitive Sea Area (PSSA).

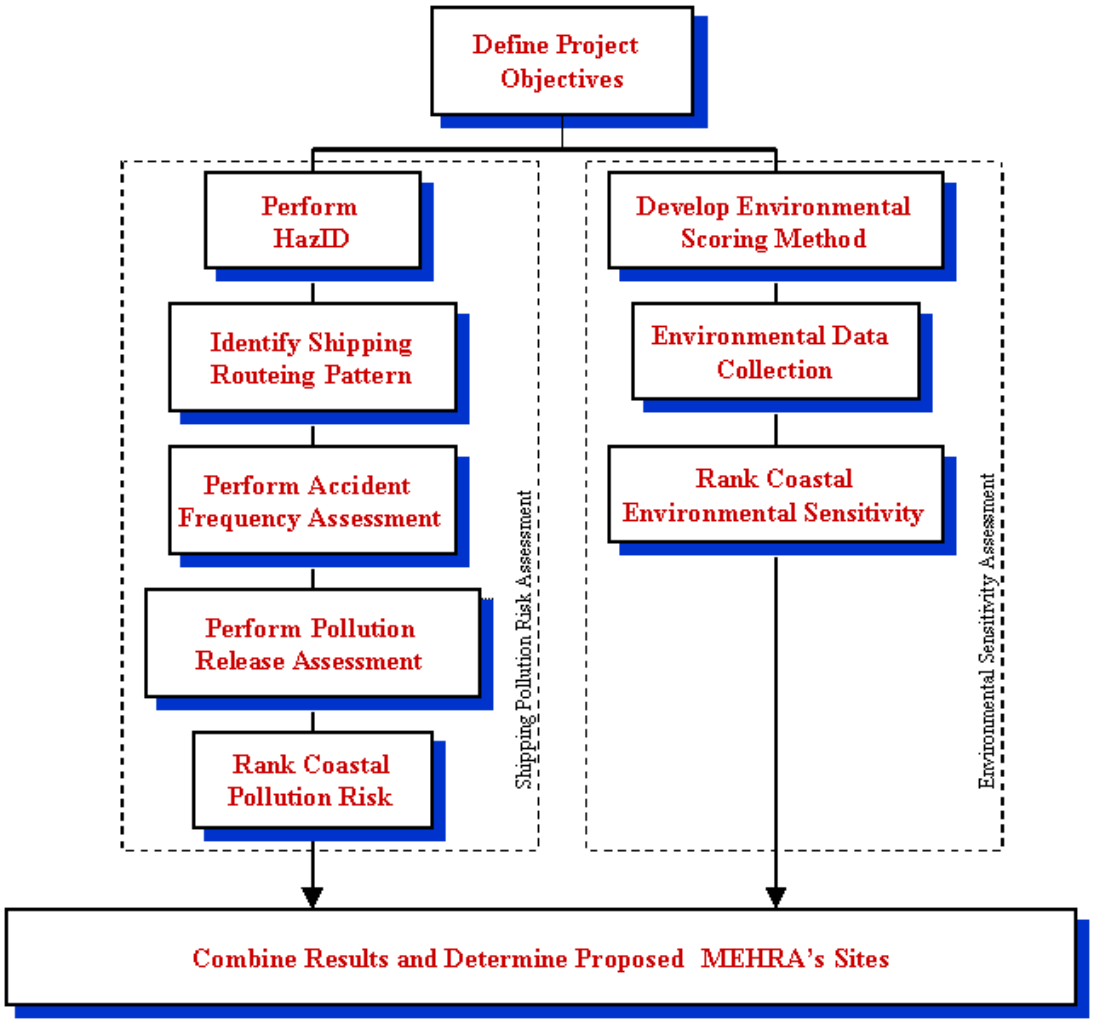
1.3 Secondary Objective

The secondary objective of this project is as follows:

- To establish a toolkit (GIS model), which can be updated as new information on environmental sensitivity and/or shipping risks becomes available. The toolkit will be made available to each Member State.

1.4 Methodology Overview

The following figure presents an overview of the methodology which will be applied to establish MEHRAs for the ROPME Member States.



Methodology Overview for MEHRAs for ROPME Member States

2. Scope of Work

The scope of work for the study is presented in the following subsections.

2.1 Familiarisation/Project Planning/Initial Review of Data

This task will involve the project team becoming familiar with the tasks involved within the project as well as meeting with the project steering group. It is proposed that the steering group will consist of personnel from Anatec and MEMAC as well as personnel from each of the Member States participating. It is proposed that the persons representing each state be responsible for the marine environment and marine pollution. The states currently noted as participating are as follows:

- Bahrain
- Iran
- Kuwait
- Oman
- Qatar
- Saudi Arabia
- U.A.E

2.2 Collation of Environmental Data

This task will involve collating all of the coastal environmental sensitivity data for each of the Member States included within the assessment. This will include sites designated with the following importance:

- International
- National
- Regional

Where possible, data that relates to commercial sensitivity will also be identified, e.g., power stations which could result in economic difficulties for a country in event of a major pollution incident. This will be discussed at the meetings with each of the individual Member States.

The format in which the data is to be provided will be presented by Anatec following the initial review of environmental data for the region. The analysis of environmental sensitivity in the UK assessed features under the following six categories:

- Wildlife
- Landscape
- Seabird vulnerability
- Fishing
- Amenity/economy
- Geology

Mapping of GIS Data on Environmental Sensitivity
Whilst some of the data for each of the Member States will be provided in a suitable GIS format, it is anticipated that some of the data which is provided will require to be digitised and mapped in GIS. Within the scope, an allowance has been made for data processing of information from each Member State. This will be confirmed following review of all of the data received.

2.3 Establishment of Environmental Sensitivity

Once the environmental datasets for each of the regions has been collated and mapped within the GIS system a scoring model will require to be developed to rank the environmental sensitivity of the coastline of each Member State. Anatec will carry this out independently based on the MEHRAs experience together with environmental specialists who have worked on a number of similar projects.

The scoring system developed will be transparent so that the Member States can understand and review the process. The system will be developed such that sensitivities can be carried out on any of the factors applied.

2.4 Collation of Shipping Data

The collation of shipping data will be carried out by Anatec personnel with experience in developing shipping databases for several World regions.

Annual port callings data for the area will be obtained including full details on the vessel characteristics, including type, size, service speed and number of engines for all ships over 250 GRT.

The routes taken by ships between ports will be compiled from several data sources, including:

- Detailed navigational charts of the area.
- Routeing measures such as traffic separation schemes in the region, e.g., Strait of Hormuz.
- Navigational literature, e.g., routeing guides and passage plans.
- Consultation with Ship Operators.

A review will also be carried out of any data held by each Member State which will be utilised to validate the above information. This could include radar tracking data and passage plans for movements to and from offshore oilfields within the waters of each Member State.

An investigation will also take place of any satellite tracking information available on ship routeing in the area. Once all of the data is collated the comprehensive shipping route database will be developed for the region.

2.5 Establishment of GIS Shipping Database for Region

Once all of the data has been collated, a GIS database will be developed for the sea area being considered. The development will include ship routeing as well as shipping density maps of the area for different sizes and types of vessels which present a pollution risk to the sea area and coastlines of the region.

Examples of vessel types and size categories which will be included within the shipping database are given in

Table 1 and
Table 2. There is flexibility to tailor the categories used to maximise the sensitivity of the assessment.

Table 1 Ship Type Categorisation

Category	Subtypes included
Container	Container carrier, bulk/container carrier, refrigerated container carrier, ro-ro/container carrier, barge carrier.
Cargo	General cargo, refrigerated cargo, etc.
Tanker	Acid, asphalt, bunkering, chemical, crude oil, edible oil, fruit juice, fish oil, gas carrier, molasses, oil products, wine, water, etc.
Ferry	Passenger ferries, passenger ro-ro and cruise ships.
Offshore	Offshore service vessels such as supply, survey, standby and diving.

Table 2 Ship Size Categorisation

Category	Size (Deadweight Tonnes)
1	< 1,500
2	1,500 to 5,000
3	5,000 to 15,000
4	15,000 to 40,000
5	>= 40,000

This database can be utilised for future marine risk assessment studies being carried out by any of the Member States for example considering the risks associated with future oil and gas installations, which may be in close proximity to shipping lanes.

2.6 Development of Shipping Risk Models for Region

This task will involve modifying Anatec's risk models for the region. Anatec have a number of state of the art shipping risk models for estimating the risk of:

- Ship Collision
- Drifting Grounding
- Powered Grounding
- Fire & Explosion
- Foundering and Structural Failure

The following tables present examples of the factors considered within the different models.

Table 2.3 Factors Considered within Different Frequency Models

Models	Parameters used within Models
Ship Collision	Route positions, number of vessels on route, vessel type, size and speed distributions, visibility, encounter angle, VTS areas.
Powered Grounding	Number of vessels on route, vessel type and size distributions, proximity of route to coastline, coastal rockiness, VTS areas, sea state, geometrical probabilities, navigational error probabilities.
Drifting Grounding	Route positions, number of vessels on route, vessel type and size distributions, wind strength and direction, sea conditions, self-repair probabilities, mechanical failure probabilities, drift speeds.
Fire & Explosion	Number of vessels on route, vessel type and size distributions.
Foundering & Structural Failure	Number of vessels on route, vessel type, size and age distributions, traffic densities and probability of severe weather in different geographical locations.

The models will require to be calibrated for the region. This will involve collating major shipping incident data for the sea area for the last 10-15 years. This will be collated through sources such as Lloyd's casualty data, ITOPF, Marine Pollution Bulletin and MEMAC.

In addition, local data will be researched and incorporated into the models. This will include meteorological data (visibility, wind speed and direction, tidal data) and mitigation/risk management measures in place in the region e.g., pilotage directions, general directions for navigation, VTS radar coverage etc. These local features will be considered within the models. The models will then be updated and calibrated in order for them to be valid for the region.

2.7 Pollution Risk Modelling

This task will involve running the shipping risk models to estimate the pollution risk in terms of oil and chemical spills in the region, divided by frequency and size of spill in each sea and coastal area.

The models estimate the probability of different spill sizes resulting from different types of incidents as well as from different vessel types, taking into account the likely location of the incident and drift direction. Tankers transporting bulk liquid cargoes have the greatest potential for large spills but all vessels carry oil as fuel which could also lead to outflow of pollutants following an accident.

2.8 Identification of MEHRAs

This task will involve combining the results of the shipping pollution risk assessment together with the environmental sensitivity to establish MEHRAs for the region.

The method will give equal weighting to both pollution risk and environmental sensitivity. Once the results have been generated, the final results maps will be produced.

Discussions will be held with the steering group to establish what percentage of the coastline in the ROPME sea area should constitute MEHRAs and whether this should be performed for individual states or for the region as a whole. In the UK, a limit of 10% of the coastline was applied to ensure MEHRAs were kept special and unique.

2.9 Sensitivities & Case Studies

This task will involve carrying out sensitivities on the main assumptions applied. Based on previous experience, this task will mainly relate to the scoring methodology applied to the environmental risk ranking of the coastline and assessing the impact of this on the MEHRAs established. In addition, it is proposed that case studies of 3-4 selected areas be carried out to demonstrate the methodology and results for a specific area as opposed to the entire region. The areas to be selected for case studies will be agreed with the steering group.

2.10 Model Programming & Software Provision

This task involves programming the model interfaces in order for the toolkit and models to be integrated and made available to each of the Member States.

2.11 Reporting & User Manual

A report will be prepared to outline the assessment, detailing the methodology, data sources and models applied. In addition to the report a user manual for operating the system for future assessment (modeling) and update of environmental datasets will be developed. All reports and manuals will be made available on CD-ROM media.

2.12 Training

On completion of the project and toolkit development, it is proposed that a training session be held for users from each participating state. This can be carried out by Anatec training MEMAC staff who can then train each Member State or Anatec can provide training directly to each Member State. The initial budget is based on the assumption that Anatec will train MEMAC staff who will in turn train the Member States' personnel.

3. DELIVERABLES

An electronic copy of the report and user manual will be provided to each Member State on completion of the work. On incorporation of any comments received an electronic copy of the final report will be made available on CD-ROM.