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BSR MARITIME SAFETY

From vision to action

BalticMasterII maritime safety across borders – highlights

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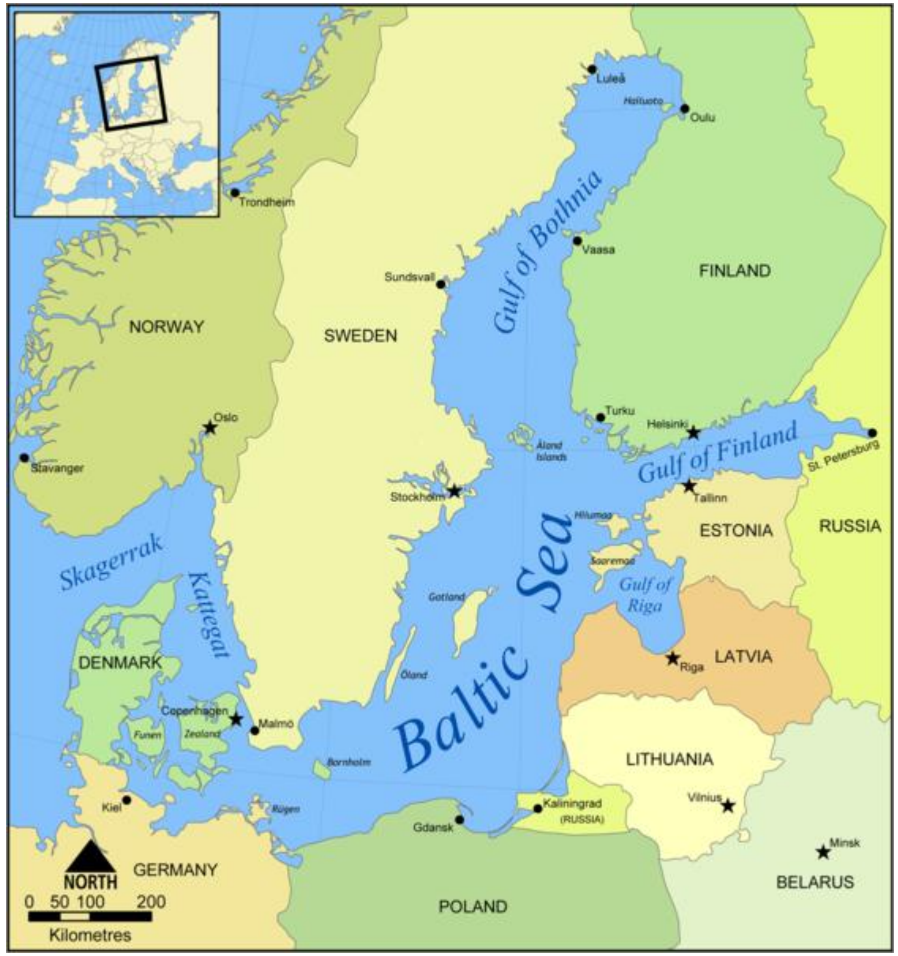
THE BALTIC SEA REGION



THE BALTIC SEA REGION IS ENVIRONMENTALLY VULNERABLE IN MANY RESPECTS – AMONG THEM THE EXPOSURE OF THE BALTIC SEA TO MARITIME TRAFFIC WITH FREQUENT PASSAGE OF OIL AND CHEMICAL CARRIERS.

Baltic Sea Region (BSR)

- **Catchment area:** In Germany, Denmark and Poland as much as 60-70% of the Baltic's catchment area consists of farmland. Forests, wetlands and lakes make up between 65% and 90% of the catchment area in Finland, Russia, Sweden and Estonia.
- **Shipping:** Around 2,000 sizeable ships are normally at sea at any time in the Baltic, including large oil tankers, ships carrying dangerous and potentially polluting cargoes, and many large passenger ferries. The Baltic Sea has some of the busiest shipping routes in the world.

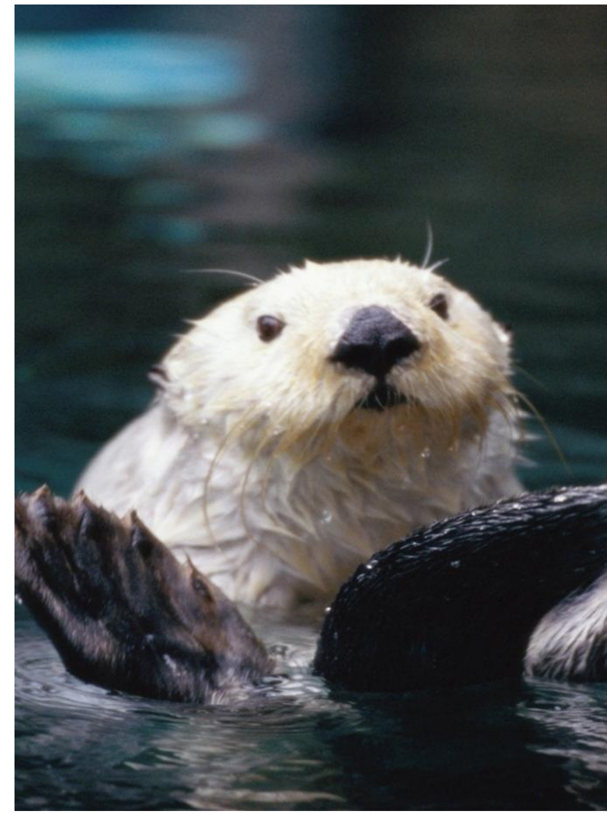
BalticMasterII

maritime safety across borders

www. balticmaster.org

Baltic Master II

is an international project which aims to improve maritime safety by integrating local and regional perspectives. The focus is on the Baltic Sea Region and issues concerning pollution prevention, coastal zone management and on-land response capacity to an oil spill at sea.



Main Objectives :

- **Improved on-land response capacity to oil spills**
- **Enhanced pollution prevention from maritime transport**
- **Highlight the local and regional perspective**

Baltic Master II input to the implementation to the BSR strategy

Priority area 4: To become a model region for clean shipping

Research brief on maritime conventions
Recommendations for improved and harmonized waste management onboard and in ports
Guidelines on how to implement the Ballast Water Convention
Suggestions of new APM´s within the PSSA-classification, including local and regional priorities

Priority area 14: To reinforce maritime accident response capacity protection from major emergencies

Many local and regional authorities are developing oil contingency plans, also including regional cooperation. One of the results from the project will be to integrate coastal management into oil contingency planning

Oil spill example in Baltic Area

In the mid of Summer the Full City ran aground off the Norwegian coast. The ship had over 1000 m^3 of heavy oil and 120 tons of diesel on board; approximately **1100 tons of fuel leaked out**. The oil mixed up with the seawater and sank or floated, depending on currents and winds, thus making it difficult to get an overview of the oil spread.

1 100 tonnes of oil is a considerable oil spill but still relatively small. Yet about 500 people participated in the work with the accident. This shows that even small oil spills have major impacts, especially at the local and regional level.

Developing safety standards

Traditionally safety standards are developed in reaction to catastrophes, i.e. :

- Following the „Estonia" ferry disaster Sweden organised a conference with signing of the so called Stockholm Understanding on ferry safety in damaged condition;
- The „Prestige" case, stimulated IMO to focus on developing technical safety standards for the first time in the history of the organisation. Work started with bulk carrier and tanker structural issues. In the past it has been the domain of classification societies.
- IACS developed „Common Structural Rules for tankers and bulk carriers".
- IMO began to work on safety standards for bulk carrier and tanker hull structure applying risk analysis. The work for the Polish government is performed by Polski Rejestr Statków.

The last 25 years witnesed the sinking of 419 bulk carriers, and loss of life of about 2000 crew members.

In most cases sinking was caused by structural failure in severe weather conditions.

Source: Polski Rejestr Statków

In 1999, the tanker „Erica" broke up on passing the French coast causing an environmental disaster. The causes underlying the incident lay in the bad technical condition of the hull structure.

The Spanish coast suffered similar consequences after the catastrophe of the tanker „Prestige".

Technically safe ship and safe ship operation

Shipping is a vulnerable type of activity not only due to uncontrolled atmospheric and sea waving conditions but also arbitrary loading condition, shipping routes and decisions of the crew, sometimes tired or with limited experience. The process of ship designing and construction as well as its technical maintenance is also an arbitrary process.

We cannot change the weather or sea waving conditions but safety can be enhanced by looking to the technical state of the ship and reducing the number of human errors.

<u>A ship technically safe</u> is the necessary condition for safe shipping, whereas the sufficient condition to be met is <u>safe ship operation.</u>

RISK ANALYSIS

Risk analysis requires development of theoretical models (based on mathematical and physic theories), which provide background for developing simulation of ship motion in waves and the ship structure reaction to waves. Simulations are used to identify elements and situations that influence safety.

Risk based analysis assumes different scenarios of ship structure failure, which enables calculation of:

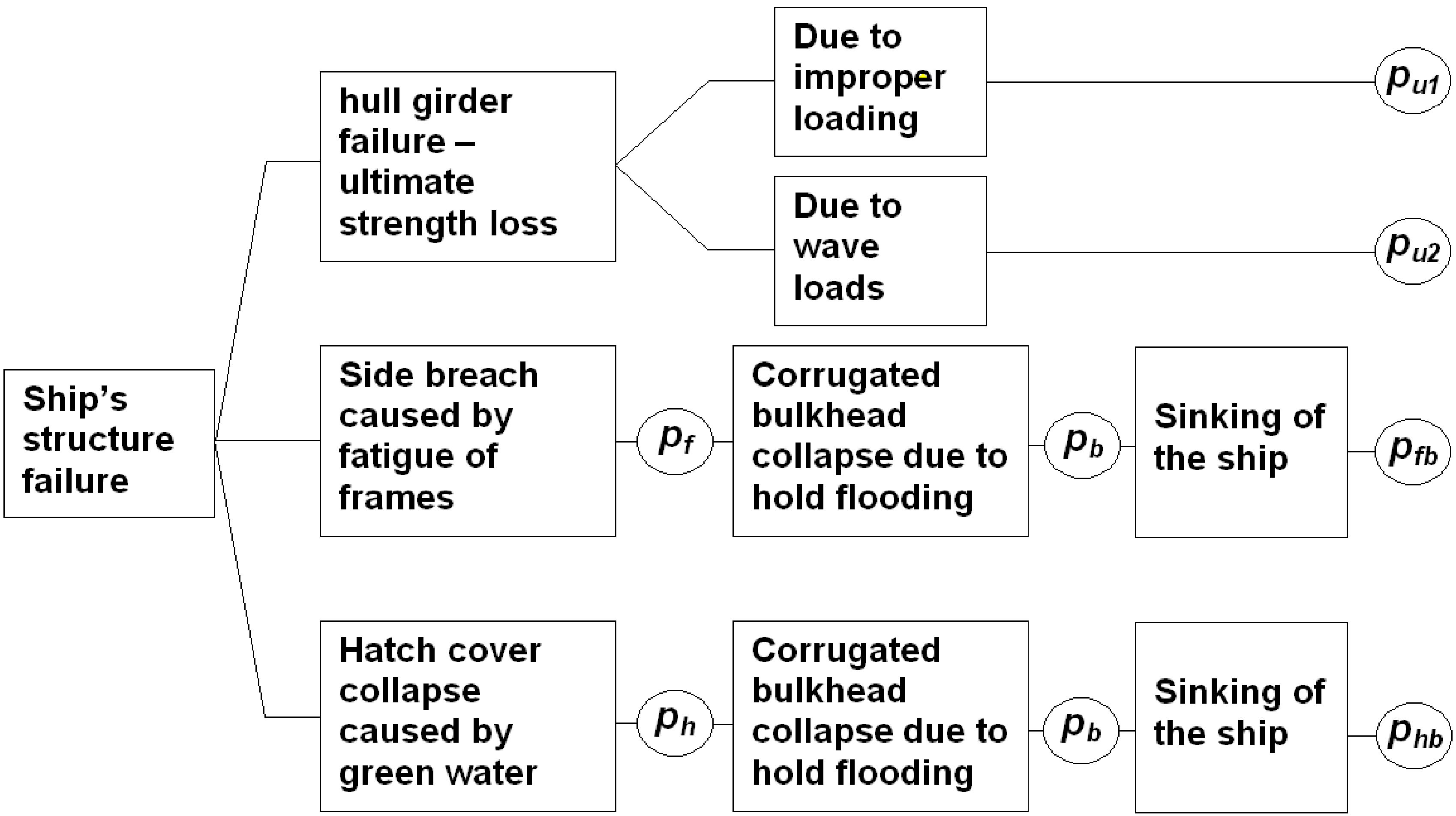
- **probability of specific structure failure modes in assumed scenario**
- **probability of ship sinking due to combination of different scenarios.**

Risk analysis

- Shipping is random in nature, therefore, it is difficult to project potential events and to assure safety at sea.
- Following the series of catastrophes, IMO decided to take over the task of defining ship standards for ship structures and fittings from classification societies.
- The proposed risk analysis methodology, which involves reviewing possible events provides an opportunity to significantly improve technical safety of ships.
- Safety of ship operation depends on many factors, e.g. crew training and their good marine practice, or equipment. Safety can also be enhanced by installing software packages assisting control and decision making processes by projecting potential events. These in turn facilitate taking appropriate action to assure safety. IT development enable the programming of software packages, which installed on board ships provide better control over the loading process and assist the ship master in decision making in difficult situations.
- The risk model should enable to derive criteria for particular mode of failure.

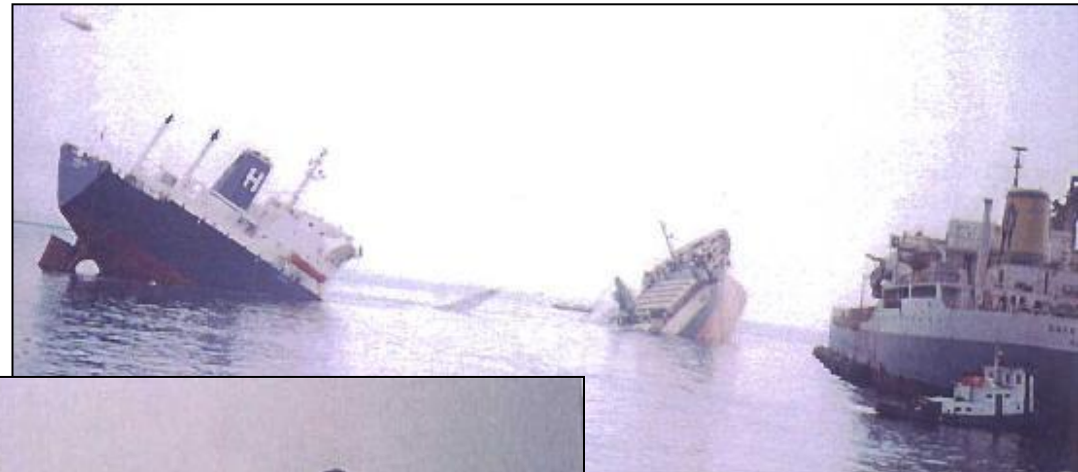
Simulation of ship's sinking due to structural failure

Example of bulk carrier structure failure scenarios (risk model)



Source: Polski Rejestr Statków

Due to improper loading

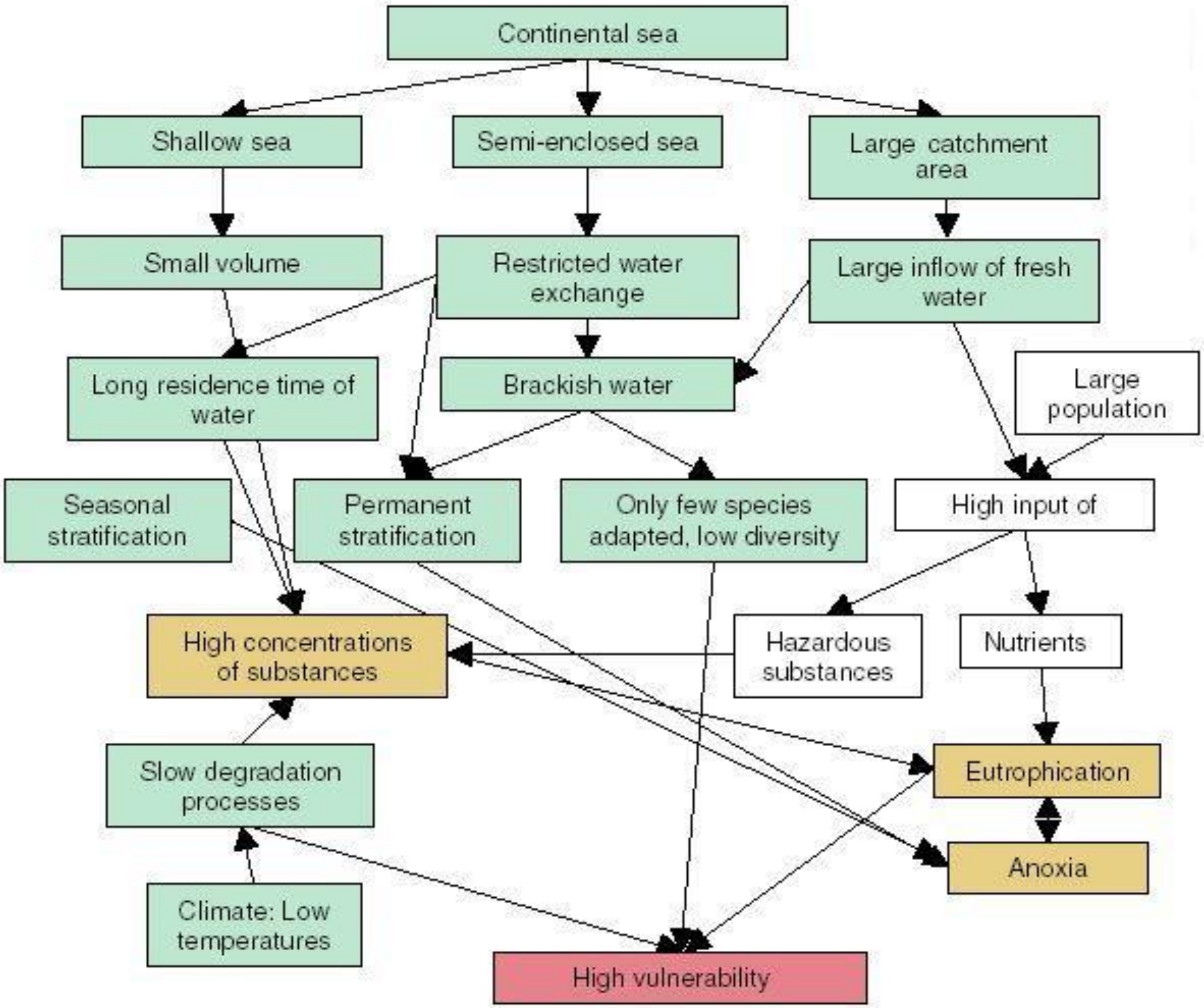


Source: Polski Rejestr Statków

Due to wave loads.   Hull girder failure

Source: Polski Rejestr Statków

PSSA


Continental sea
Shallow sea
Semi-enclosed sea
Large catchment area
Small volume
Restricted water exchange
Large inflow of fresh water
Long residence time of water
Brackish water
Large population
Seasonal stratification
Permanent stratification
Only few species adapted, low diversity
High input of
High concentrations of substances
Hazardous substances
Nutrients
Slow degradation processes
Eutrophication
Anoxia
Climate: Low temperatures
High vulnerability

PSSA and Associated Protective Measures in oil spills risk

- Main issues dealt with – oil spill risk
  - How to model it?
- How to distinguish between different aspects of maritime traffic?
- How to include APM’s impact on oil spill risk?

(Maritime Institute in Gdansk - first results of modeling oil spill risk)

How to model oil spill risk?

- First step - preparation of probability density function of oil spills
  - Form of amount per space unit per time unit
  - In our case we have done it in g/h/sq.km.
  - Prepared only for accident in Polish Marine Areas
- Second step – to run multi-forecasts of oil spills based on particles released from each grid cell depending on above function
- Third step - to integrate results of different trajectories over time and space

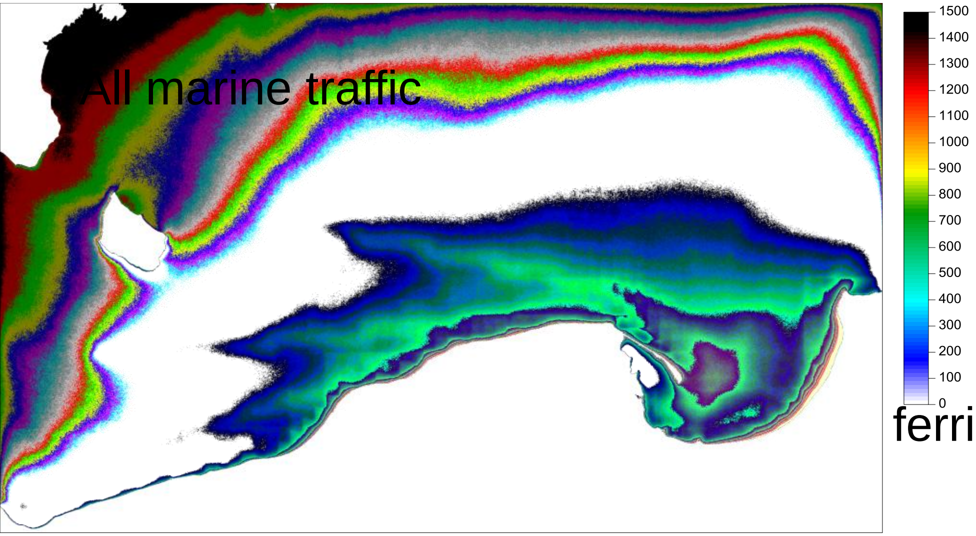
How to model oil spill risk?

- Repeat the above for as many scenarios as is required
  - This might be done for different sources e.g.:
    - All marine traffic
    - Ferries
    - Fishing boats
    - Tankers
    - Etc.
  - This might be done based on different density functions, e.g.:
    - Situation as it is now and/or
    - Situation after implementation of Associated Protective Measures as possible in PSSAs:
      - Traffic Separation Schemes
      - Navigation Routes
      - Exclusion Areas
      - Etc.
- Assess differences …

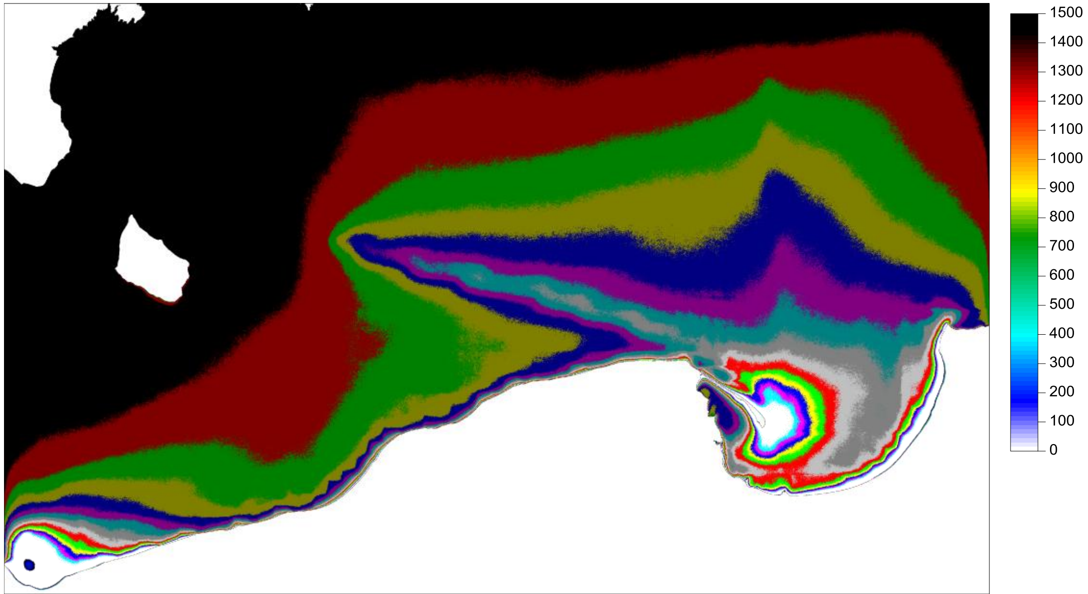
How to include APMs impact on oil spill risk into risk assessments?

- Major methodological difficulty – expert/objective judgement on potential impact of APMs on oil spill risk is missing.
- Required probability density function for amount of oils spill per time unit per space unit in order to run multi-run oil spill models.
- Further discussion is needed.

Some examples – winter oil spill risk pattern



ferries



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Some examples – winter oil spill risk pattern

The first one of maps is superposition of following ones:

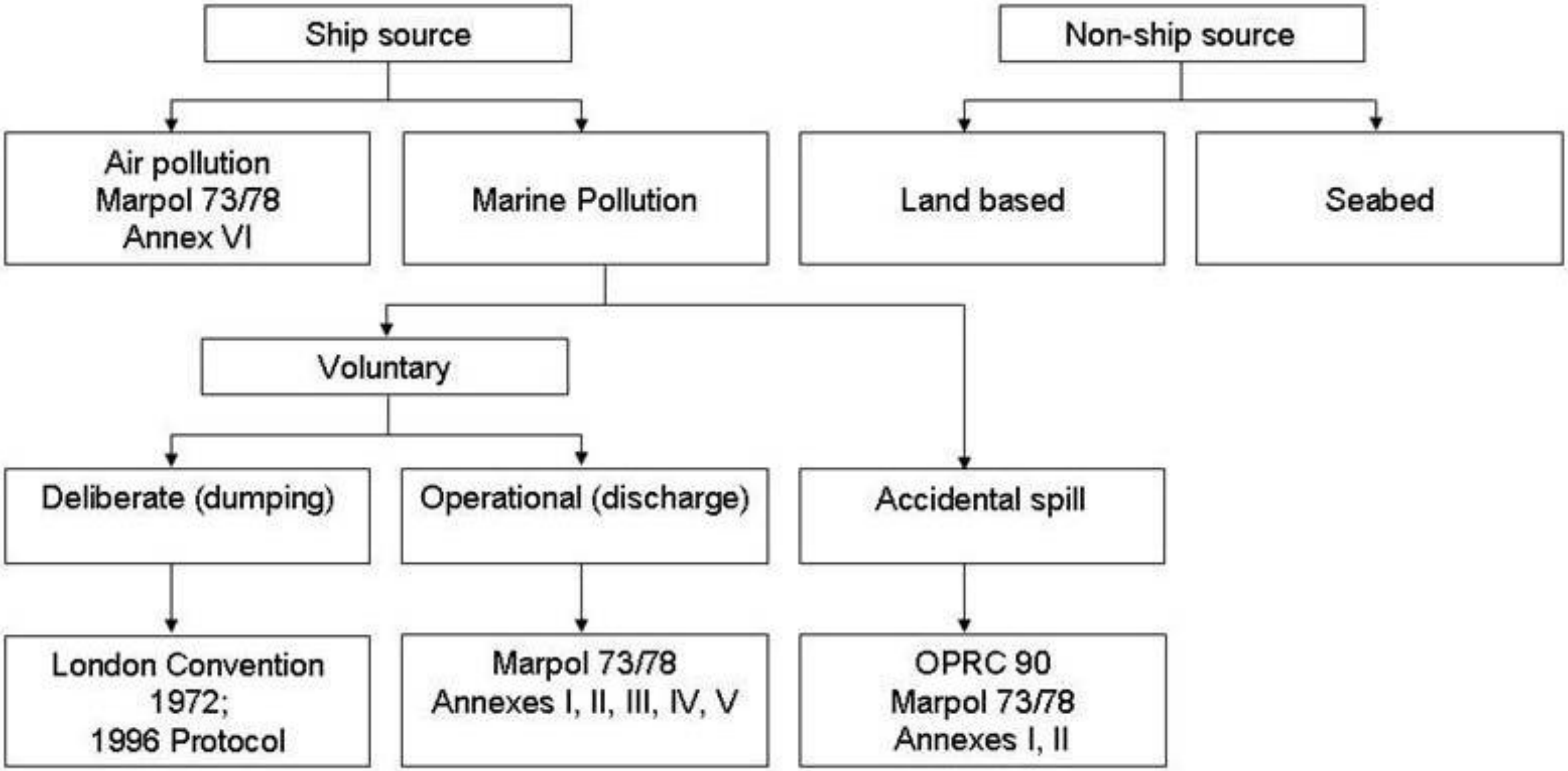
- Oil spill risk from tankers is at the same level as for fishing vessels and ferries
- Major impact from all other vessels
- Strong argument for all measures to reduce oil spill risk not only from tankers especially

Future work

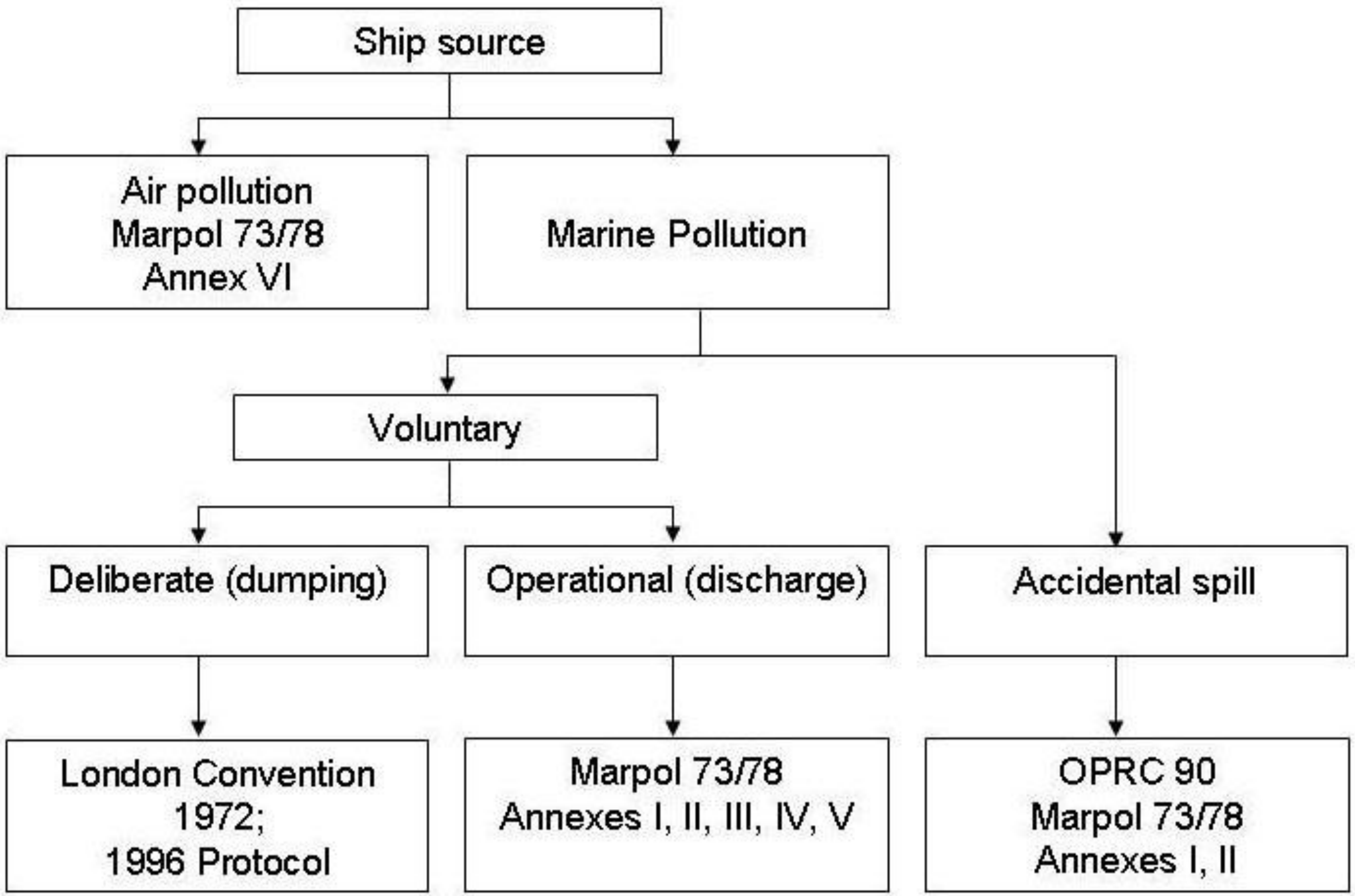
- There is need to test influence of potential APMs in pattern of oil spill risk.
- There is need of extension of the work done so far from Polish Marine Areas to South Baltic.
- Preparation of conclusions on possible positive impact of implementation of APMs, giving hints on how to develop them to be most effective.
- Preparation of set of examples of impact of APMs on oil spill risk pattern.
- There is big potential with the use of extremely high parallelised computers to bring these methods to operational dynamic risk assessment.
- Imagine making risk assessment based on actual maritime traffic in an area accompanied with information on short-term targets of the vessels and short to medium range weather forecasts.
- Might be helpful in Vessel Traffic Systems' daily work.

MODELING

- Limited access to data or lack od data (not collected or not registered),
- Reliability of data – enchance cooperation with local communities and top administration on national level
- Weakness of human nature – routine (ex. inlude N.Stream in traffic density model)


Ship source
Non-ship source
Air pollution
Marpol 73/78
Annex VI
Marine Pollution
Land based
Seabed
Voluntary
Deliberate (dumping)
Operational (discharge)
Accidental spill
London Convention
1972;
1996 Protocol
Marpol 73/78
Annexes I, II, III, IV, V
OPRC 90
Marpol 73/78
Annexes I, II


Prevention
Event/Incident
Mitigation
Remedy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Annexes I, II, III, IV, V
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Annexes I, II

Marine Pollution Conventions

Public | **Regulatory** | **Private**

UNCLOS Part XII, Intervention, Salvage

MARPOL, Dumping, AFS, BWM, Basel, OPRC, OPRC-HNS PROT

FUND, SUPP FUND PROT, CLC, HNS, Bunkers, Salvage

Interfaces (Public – Regulatory)

UNCLOS Art. 211 ↔ MARPOL
UNCLOS Art. 210, 216 ↔ Dumping
UNCLOS Art. 212 ↔ MARPOL Annex VI
UNCLOS Art. 196 ↔ BWM
UNCLOS Art. 199 ↔ OPRC
UNCLOS Art. 195 ↔ Basel

Interfaces (Regulatory – Private)

MARPOL Annex I ↔ CLC, FUND
MARPOL Annex II ↔ HNS
OPRC ↔ CLC, FUND
OPRC-HNS PROT ↔ HNS

Interfaces (Public – Private)

UNCLOS Art. 229, 235 ↔ CLC, FUND, SUPP FUND PROT, HNS, Bunkers
Salvage Art. 9 ↔ Salvage Art. 14

Regional: Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992 (Helsinki Convention) administered by the Baltic Marine Environment Protection Commission (HELCOM)

Convention instruments that govern ship-source marine pollution

IMO Conventions

Int. Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Intervention), 1969

Int. Convention for the Prevention of Pollution from Ships, 1973, as modified by the Prot. 1978 relating thereto (MARPOL 73/78)

Int. Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), 2001

Int. Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), 2004

Int. Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990; HNS Protocol (OPRC-HNS), 2000

Int. Convention on Civil Liability for Oil Pollution Damage (CLC), 1992

Int. Convention on the Establishment of an Int. Fund for Compensation for Oil Pollution Damage (FUND), 1992; Supp. Fund Protocol (SUPP FUND PROT), 2003

Int. Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996

Int. Convention on Civil Liability for Bunker Oil Pollution Damage (Bunkers), 2001

Int. Convention on Salvage (Salvage), 1989

The Hong Kong Int. Convention for the Safe and Environmentally Sound Recycling of Ships (SRC), 2009

Non-IMO Conventions

United Nations Convention on the Law of the Sea (UNCLOS), 1982

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel), 1989

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (Dumping), 1972; Protocol of 1996

Conventions related to ship-source marine pollution

IMO conventions

	MARPOL 73/78 (Annex III)	MARPOL 73/78 (Annex III)	MARPOL 73/78 (Annex IV)	MARPOL 73/78 (Annex V)	MARPOL Protocol 97 (Annex VI)	London Convention 72	London Convention Protocol 96	INTERVENTION Convention 69	INTERVENTION Protocol 73	CLC Convention 69	CLC Protocol 76	CLC Protocol 92	FUND Convention 71	FUND Protocol 76	FUND Protocol 92	FUND Protocol 2003	SALVAGE Convention 89	OPRC Convention 90	HNS Convention 96	OPRC/HNS 2000	BUNKERS CONVENTION 01	AFS 2001	BALLASTWATER 2004	HONG KONG SRC 2009
Denmark	x	x	x	x	x	x	x	x	x	d	x	x	d	x	x	x	x	x		x	x	x		
Estonia	x	x	x	x	x			x	x	d		x	x		x	x	x	x		x	x	x		
Finland	x	x	x	x	x	x		x	x	d	x	x	d	x	x	x	x	x			x			
Germany	x	x	x	x	x	x	x	x	x	d	x	x	d	x	x	x	x	x		x	x	x		
Latvia	x	x	x	x	x			x	x	x		x			x	x	x	x			x	x		
Lithuania	x	x	x	x	x							x			x	x	x	x	x		x	x		
Poland	x	x	x	x	x	x		x	x	d	x	x	d	x	x	x	x	x		x	x	x		
Russian Federation	x	x	x	x		x		x	x	d	x	x	d	x	x		x	x	x		x			
Sweden	x	x	x	x	x	x	x	x	x	d	x	x	d	x	x	x	x	x		x		x	x	

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Conventions related to ship-source marine pollution

Non-IMO conventions

- United Nations Convention on the Law of the Sea (UNCLOS), 1982
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel), 1989

Regional convention related to ship-source marine pollution

- Protection of the Marine Environment of the Baltic Sea Area, 1992 (Helsinki Convention)

MARPOL Convention

- There are 5 regulations and 20 directives.
- Further national legislation with cross-references to MARPOL provisions.
- In Baltic Master further details of EU legislation addressing the other convention instruments will be reported together with information on national legislation.
- An analysis will be carried out pointing out gaps, if any, in the legislation of the various states which may require appropriate action to ensure full and complete implementation of the relevant instruments within each national domain.

Care about safety in reality!

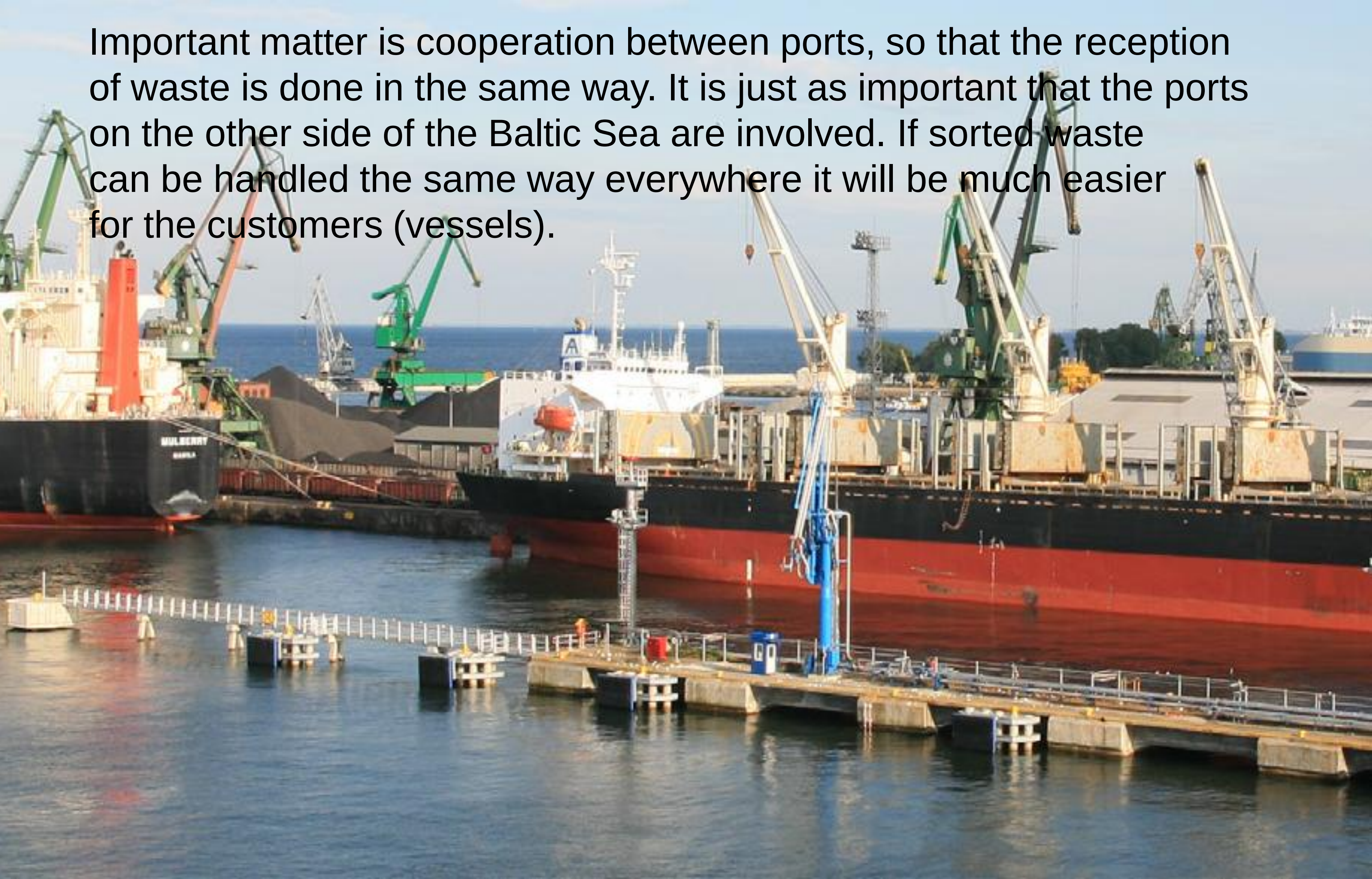
There are to many regulations

– how to take care of safety and security when there is no time for doing the job due to burocratic requirements and reports

– lawyer on board of each ship???

WASTE - DISCHARGE

Important matter is cooperation between ports, so that the reception of waste is done in the same way. It is just as important that the ports on the other side of the Baltic Sea are involved. If sorted waste can be handled the same way everywhere it will be much easier for the customers (vessels).



Oil contingency planning

Oil spill contingency planning requires the quantitative comparison of alternative response options so that the most appropriate, effective and/or cost-effective option can be recommended. By providing a quantitative and more objective assessment of response performance, the response can be dimensioned based on physical or biological criteria set for the region in question. The cost, effectiveness (as defined on the basis of various criteria) and environmental benefit of various options can be compared (see OSCAR for Norway and North Sea), for ex. how weathering studies combined with modelling of probable spill scenarios can be used to develop relevant, site-specific contingency plans. The effect of oil type, spill size and release conditions on response performance is clearly demonstrated.

PRINCIPLES AND FRAMES

(Denmark example)

- Quality over quantity
- What are the priorities – what you value, what is most important (human life? Nature?...)
- Good safety management means commitment from the top.
- Going only up to down means going nowhere

INCIDENT COMMAND SYSTEM: organisational structure of what to do according to the needs

- No second guess when the pressure is off
- The moment you are under pressure there is no time to discuss what is better – the action should be taken immediately
- Who will take the responsibility next time if the community denied financial compensation – no motivation to take quick action!
- The key is the leadership

KISS
keep it short and simple

- Principles and value over rules
- Quality over guantity
- Work with best knowledge and direct experience – always work for the best not the second best
- Dealing with unexpected - give support to the brave (not fool or crazy), enncourage the people
- Learn from mistakes – it is a way for improvement
- Work together
- Raise awarness

- It is easier to work together when disaster happens.
- We need some actions not just talking about safety
- Compatible equipment
- Common standards in oil contingency planning and other segments
- Botom up is as important as top down

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