

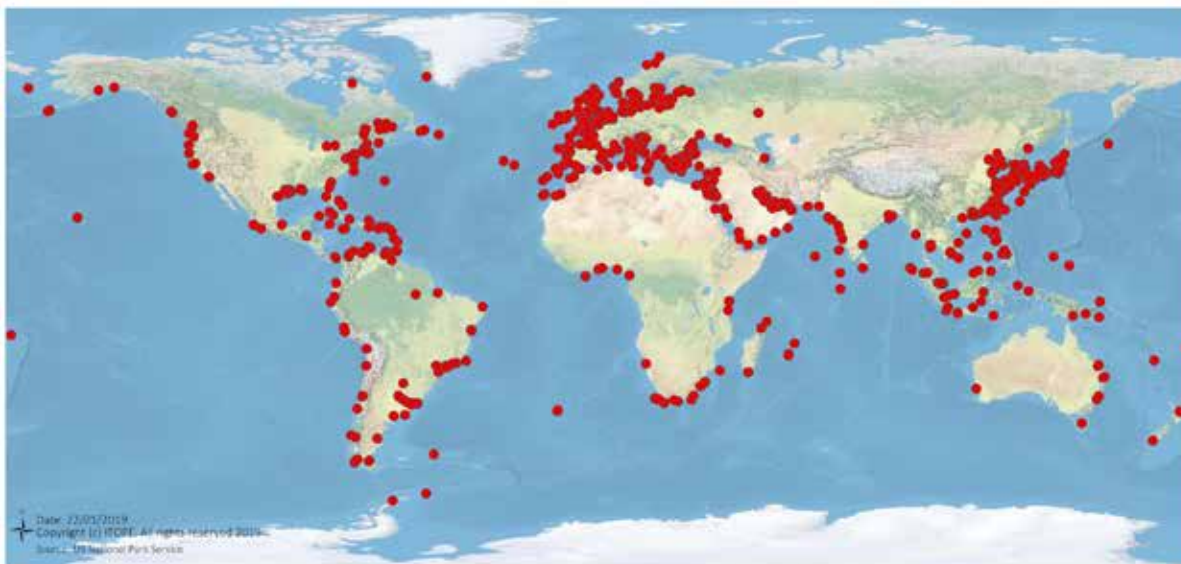


ENVIRONMENTAL AND ECONOMIC IMPACTS OF OIL SPILLS

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GI WACAF Webinar 24 June 2020





- Established in 1968, not-for-profit, based in London
- Provides technical advice worldwide on preparedness and response to accidental marine spills
- Total team of 34, technical team with 12 responders available 24/7
- Primarily funded by the global shipping industry (annual fee)
 - *Members: >97% of the world's ocean going tanker fleet*
 - *Associates: >90% of the world's ocean going non-tanker fleet*

**A golden paradise
buried beneath an
evil black menace**



Oil spill peril spreads



A crime against humanity



ecosystems in peril



'8-11 tragedy'



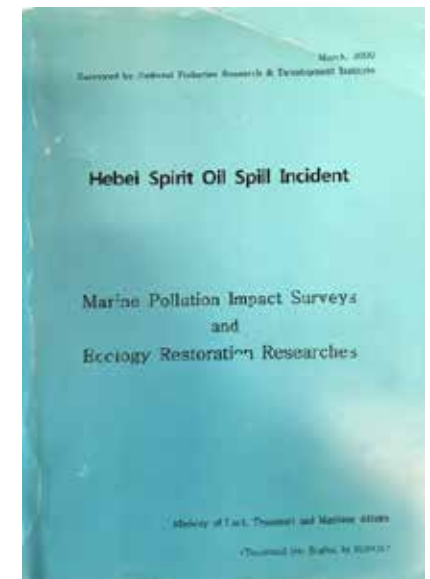
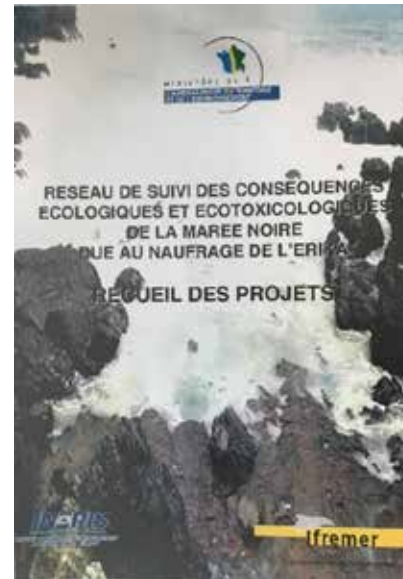
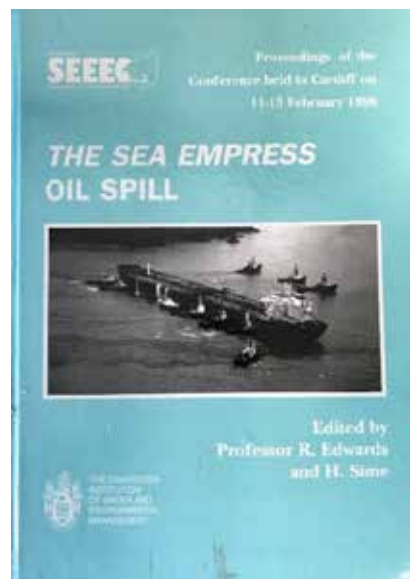
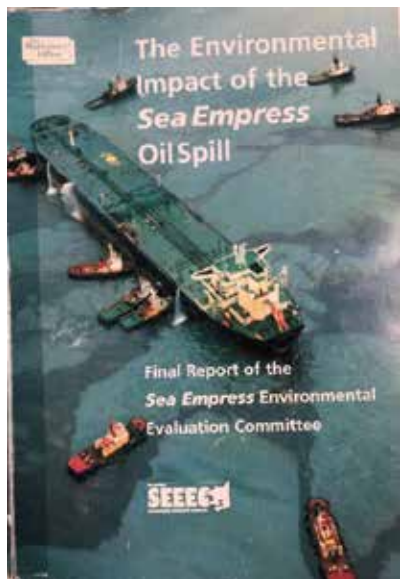
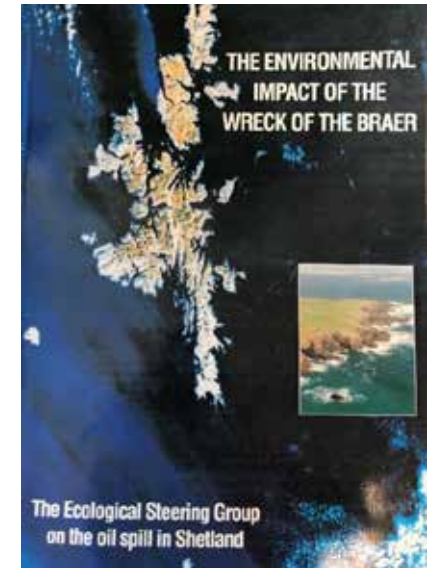
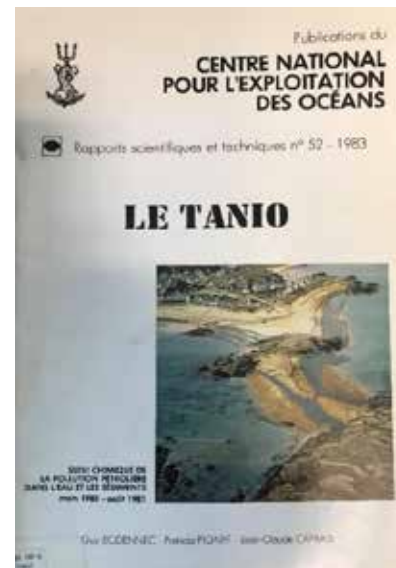
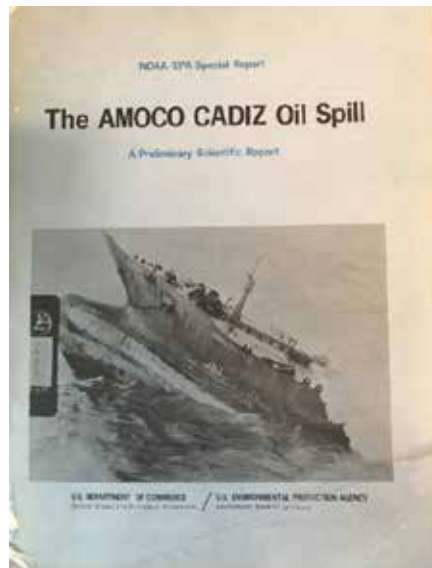
Wrong lessons from Exxon Valdez

**NATIONAL
CALAMITY**

**'Oil spill could kill
whole Visayan Sea'**

'impending disaster'

ENVIRONMENTAL IMPACTS: PAST EXPERIENCES



Numerous Environmental Impact Assessments following major oil spills

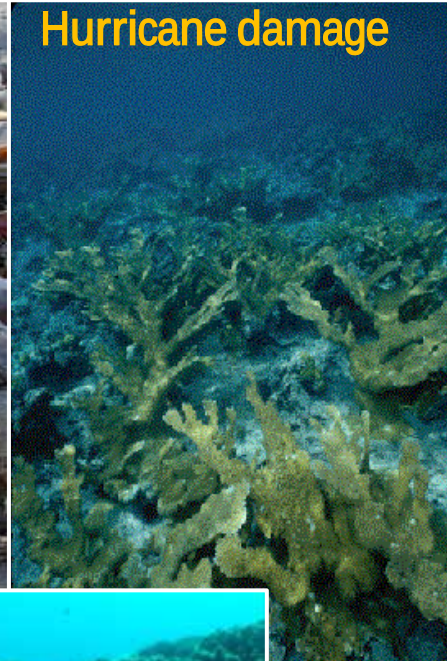


- Widespread mortalities are typical for large spills
- Populations are naturally resilient to acute impacts
- Natural processes are capable of repairing damage
- Ecosystem structure & function is typically restored



Red tide / algal toxic bloom

Hurricane damage



Storms



Proliferations



- Marine ecosystems cope with regular natural disturbances
- Widespread mortalities result from storms, algal blooms, seasonal variations etc. but populations recover rapidly
- Most marine organisms reproduce rapidly and in vast quantities, facilitating recovery

EFFECTS OF OIL ON MARINE ORGANISMS



PHYSICAL SMOTHERING

- Physiological impairment
- Impact on Movement - Feeding – Respiration - Thermal Control



CHEMICAL TOXICITY

- Impairment of molecular/cellular function
- Lethal or sub-lethal effects (narcosis)



ECOLOGICAL CHANGES

- Loss of key organisms from habitat
- Opportunistic species takeover (community changes)



INDIRECT EFFECTS

- Loss of habitat/shelter
- Loss of important food species

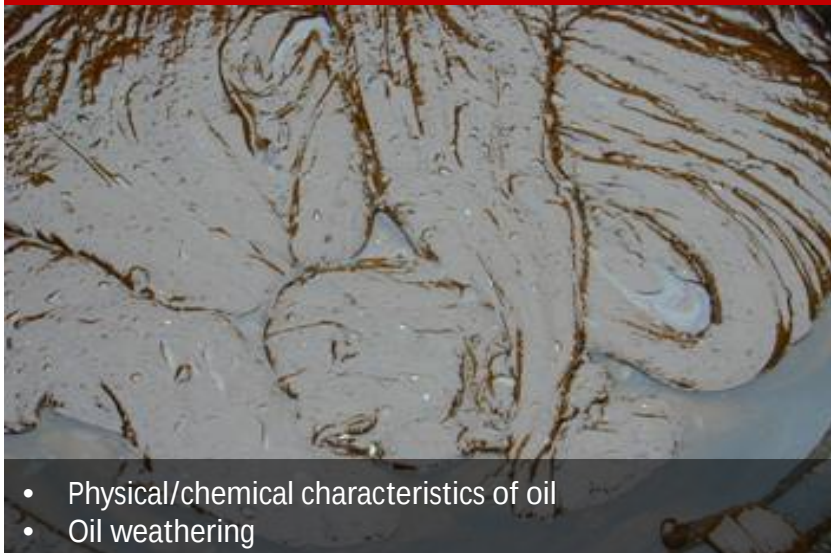
POTENTIAL IMPACTS OF SHORELINE RESPONSE



- Extraction of sediment / erosion
- Marine communities disruption
- Physical damage
- Dispersants / increase of oil bio-availability

SEVERITY OF IMPACT: KEY FACTORS

Type and volume of oil spilled



- Physical/chemical characteristics of oil
- Oil weathering

Characteristics of the affected area



- Sensitivity / vulnerability to pollution
- Nature of resources at risk

Time of year/seasonality



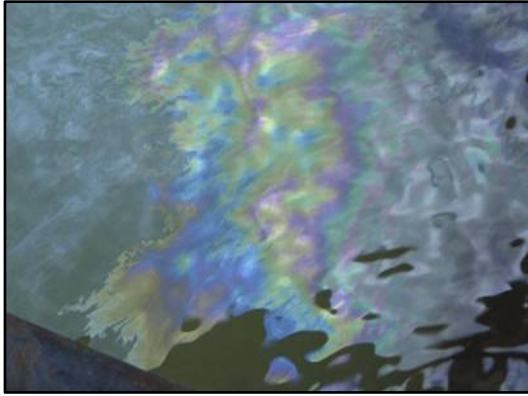
- Weather/sea conditions
- Likelihood of exposure varies depending on season (presence / absence of migratory species)

Nature and effectiveness of clean-up



- Clean-up should seek to mitigate damages and enhance natural recovery

SEVERITY OF IMPACT: TYPE OF OIL



LIGHT OILS



HEAVY OILS

GASOLINE

MARINE DIESEL OIL

LIGHT CRUDE OIL

HEAVY CRUDE OIL

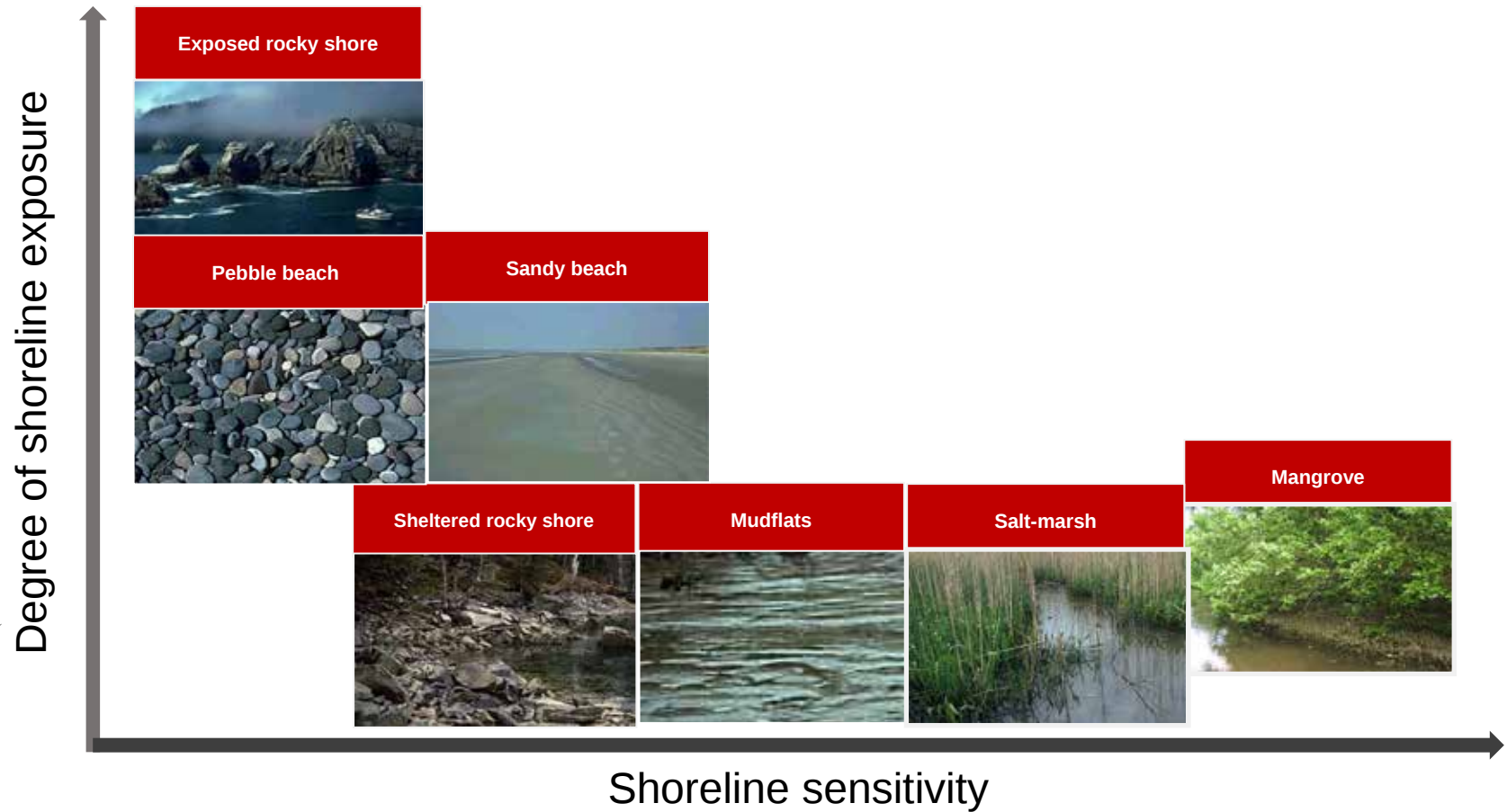
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HFO

TOXIC EFFECTS

SMOTHERING

SEVERITY OF IMPACT: ENVIRONMENTAL SENSITIVITY INDEX





Seabirds

- Highly vulnerable to oil spills / species behaviour dependent
- Mortality typically due to drowning, starvation & hypothermia
- Mass mortalities common, but permanent declines unlikely

Marine mammals

- Very few spills have resulted in observed impacts
- Coastal species & breeding colonies at higher risk than pelagic species
- Mucus membrane irritation & thermoregulation effects are typical



- Rarely severe – large inshore spills of light oil can cause mass mortalities
- Sedimentation of heavy oils can cause localised seabed smothering
- Re-recruitment of benthic organisms occurs usually over a short timescale.
- Coral reefs & seagrass beds: sensitive habitats with slow recovery times



- Impacts usually short-term to medium-term on dynamic exposed beaches
- Massive mortalities rarely seen / organism recruitment and recovery is often rapid
- Upper beach / dune vegetation vulnerable to mechanical clean-up



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- Turtle nesting beaches have increased vulnerability



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- Typical loss of grazing animals & resultant bloom of algae
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- Boulder shores highly vulnerable to heavy machinery damage



- Found on sheltered, less dynamic shorelines, typically highly biologically productive



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- Oil may penetrate sediment & persist for years, relatively slow recovery from seeds and root systems
- Aggressive clean-up leads to aggravation of damages



- Highly productive & biodiverse tropical soft-sediment habitat



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- Light oils may have toxic effect – heavy oils can smother roots
- Slow recovery if widespread tree mortalities, but strong ability to natural recovery
- **Intrusive / aggressive clean-up can increase severity of damage**

MORTALITY / CONTAMINATION / TAINTING

- Low risk: sub-tidal wild stock
- Higher risk: caged & intertidal stock
- Breeding & nursery grounds are sensitive
- Nearshore dispersed oil increases threat



BUSINESS INTERRUPTION

- Oil or response in fishing grounds
- Fishing restrictions imposed
- Oiled vessels or equipment
- Can be severe in short-term.



MARKET CONFIDENCE

- Traders reluctant to purchase
- Public perception of health risks
- Sampling & analysis often required



KEY ISSUE: Identifying spill-specific impacts



TOURISM / RECREATION

- Direct contamination of amenity areas
- Losses for associated business
 - Hospitality businesses
 - Diving / sailing schools
 - Shops relying on tourist influx
- Public confidence needed for recovery

IMPACTS ON PORTS AND INDUSTRY



- Ports, harbours & shipyards oiled/disrupted
- Hulls of ships oiled
- Power stations & desalination plants shut down



- Effects of spilled oil depends heavily on its composition & characteristics
- Weathering processes can increase or decrease bio-availability of oil
- Oil spills can cause a wide range of environmental & economic impacts
- Marine life can recover remarkably rapidly through natural processes
- Socio-economic effects of oil spills can be severe in the short-term
- Effective clean-up response operations can mitigate damage