Mapping the overlap between ocean industries and marine hotspots in the Coral Triangle.

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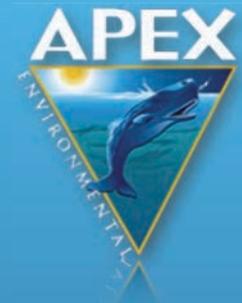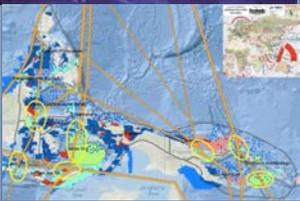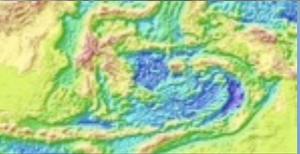
The Coral Triangle (CT)
## An ocean industry perspective

- The largest and most populous archipelagic nations on Earth.

- More than 25.000 islands stretches from east to west, along 1/5th of the equator.

- The largest fisheries for tropical tuna worth of $5 billion per year, as well reef-based fisheries and nature-based tourism.

- Some of Asia's biggest oil and gas fields are located or developed in CT waters.

- In the deep waters of the eastern Coral Triangle, a new ocean industry, Deep-Sea or Marine Mining, is under development.

CORAL TRIANGLE INITIATIVE
ON CORAL REEFS, FISHERIES AND FOOD SECURITY
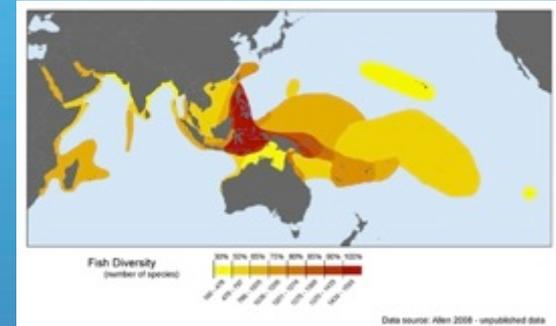
The Coral Triangle (CT)
An ocean industry perspective

- The busiest shipping lane network in the world. CT waters. Sealanes connect Asia's economies with bulk supplies of raw materials and the global market for consumer products.

- Many ships must pass through several narrow inter-island straits (and Sealanes) increasing risk of accidents.

- Several large-scale Marine Spatial Planning initiatives are currently in progress.

- CT is increasingly recognised as an environmentally sensitive marine environment to operate in.

 - Improved collaborations between key stakeholders.
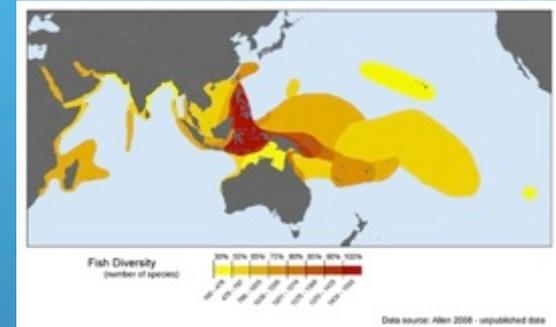
The Coral Triangle's deep-sea waters.

The vast majority of CT waters are over 200m in depth.
Over 85% of the CT's delineated *surface* area (scientific boundary) can be considered deep-sea…

|	CT total	CT <200m (coastal/ shelf)	CT >200m (incl. near shore yet deep-sea)	Reference
area (ha)	549,223,129	81,868,214	467,354,915	http://ctatlas.reefbase.org/
%	100	14.9	85.1	
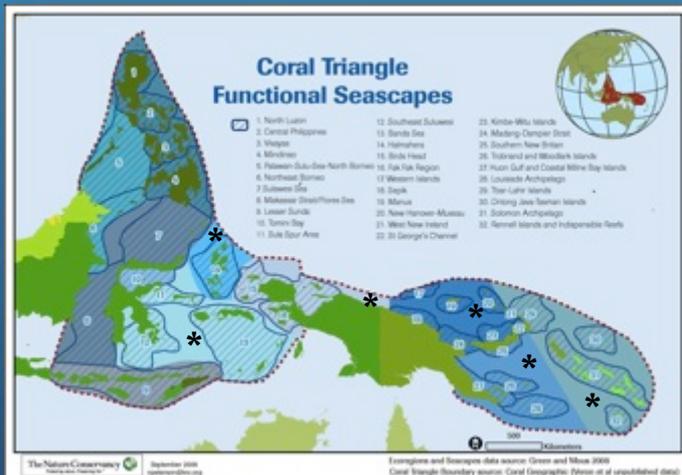
Source: Green and Mous 2008, Kahn 2008

Source: NOAA - Okeanos

Geographical Scope of the Project

1. Coral Triangle
   - CT Scientific Boundary (ecoregional analysis)
   - CTI Implementation Area (CT6 national waters incl. EEZs)
2. South West Pacific (not part of this presentation, but included the technical report*)
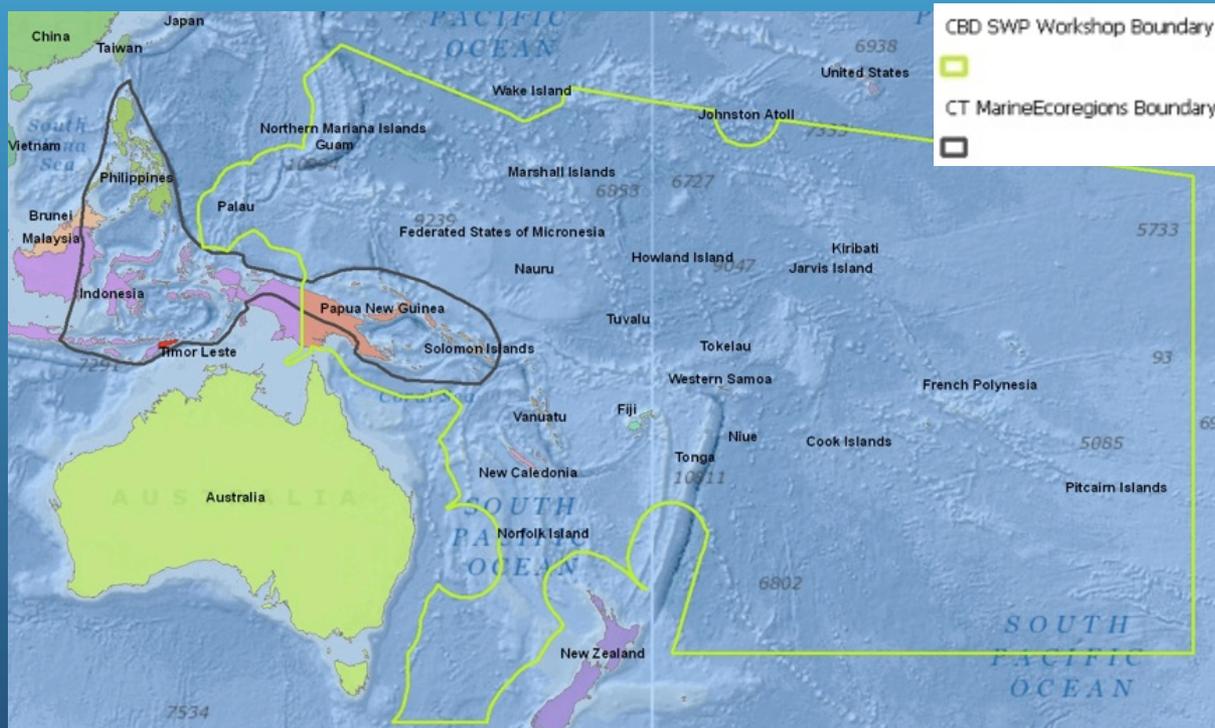
(* Kahn and Vance-Borland, 2013)

Project Introduction

- Starts to assess risks for overlap between
  Priority Conservation Areas and Species of Concern (PCAs)
  with Marine Extraction Blocks (MEBs):

  i.   Oil and Gas & Deep-Sea Mining)
  ii. International Shipping Lanes (ISLs and ASLs)

- Large-scale geographical area with limited resources.
  Hence, the spatial analyses are indicative only.

- Significant new data for the region by digitizing
  public maps of offshore E & P blocks in GIS compatible format.

- Identified numerous hotspots of "maximum MEBs overlap"
  for specific habitats, MPAs and endangered species.

- Facilitated wide-ranging support, data agreements and
  emerging partnerships.

- The project starts to address an urgent management need for the CT region.

Total number of spatial databases of global and regional scope: 41 (these are fully described in Appendix 1 of the report).

Detailed spatial data analysis (GIS-Based) were compiled for all data layers for overlap with:

- Marine Extraction Blocks or MEBs of two types (digitized public maps of offshore E & P blocks):

    i.   Oil and Gas (n=149)
    ii. Deep-Sea Mining (n=10)

  - International and Archipelagic Sea Lanes (n=15).

- Priority Conservation Areas (PCAs)
- Ecologically, Biologically Significant Marine Areas (EBSAs)
- Key Biodiversity Areas (KBAs)

All qualified as "marine hotspots' for this project's overlap analyses and included:

- Coral reefs (n=25,070)
- Marine Protected Areas (n=338)
- Seamounts (n=3824) and a sub-category on seamounts with elevated tuna catches.
- Deep-sea canyons (n=891)
- Migratory marine corridors (n=70)
- Tuna high catch areas (n=4, aggregated from max. CPUE)
- Green turtles marine habitat (n=40, excluding nesting beaches)
- Leatherback turtles breeding habitat (n=19, proximity to a restricted number of CT nesting beaches)
- Dugong habitat (n=25; and a proxy for MEBs overlap for all species with wide-ranging coastal distributions)
- Sperm whale habitat (n=747; historical captures)
- Blue whale critical habitat for breeding/calving (n=6)

Mapping overlap between Marine Extractive Blocks and marine hotspots in the Coral Triangle

Spatial coverage by industry type (% of all marine extractive blocks):
a) Oil and Gas (n=149): 84 %
b) Marine Mining (n=10): 16%

Spatial trends of Industry activity:

a)   Western CT waters:
   • All oil and gas
   • No seabed mining.
b)   Eastern CT waters (E Papua-PNG and Solomon Islands):
   • Limited oil and gas
   • Potential world's first seabed mining operation
c)   Vast areas remain data poor and unsurveyed for marine biodiversity and ecological significance.   Hence, this map shows a (known) underestimate of high overlap areas.
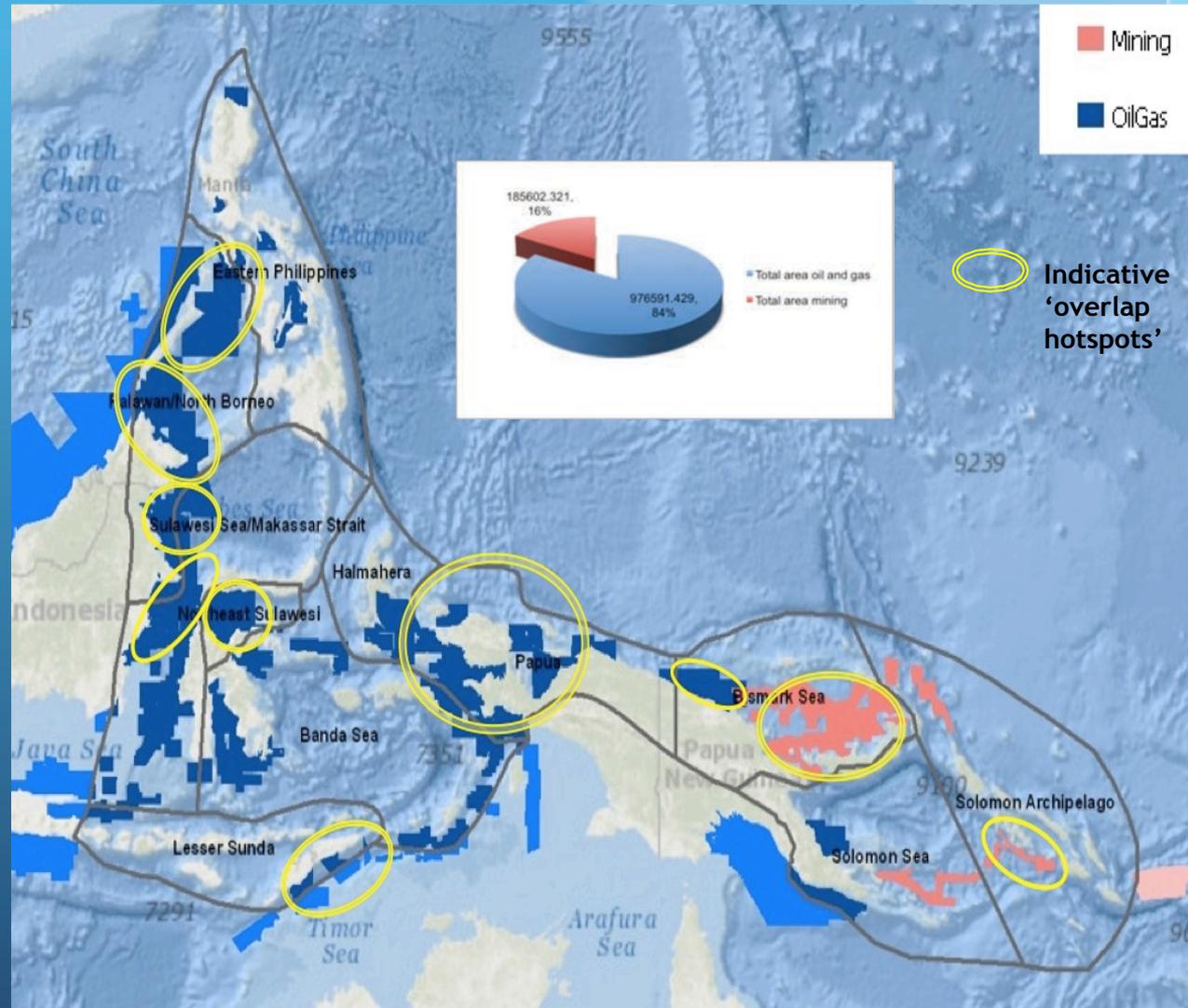
Mapping overlap between ocean industry and marine hotspots: Some examples (overlap in red)

Marine Protected Areas
n=338
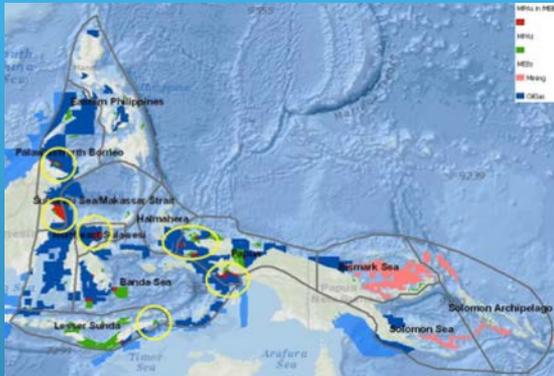
Migration corridors for large migratory species
n=60

Seamounts and canyons
n=4715
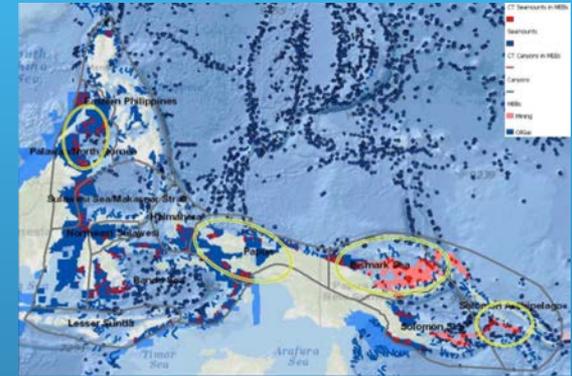
Tuna High Catch Areas
n=4 (aggregated from CPUE)
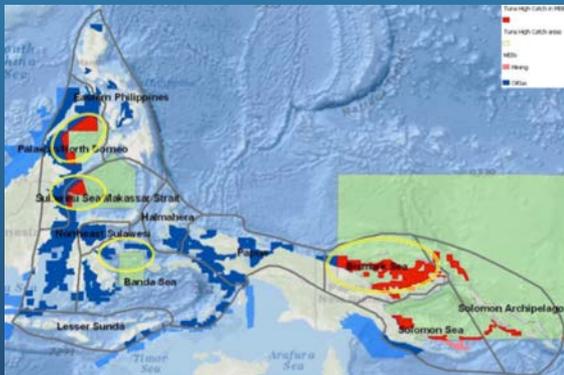
Sperm and blue whales
n=749
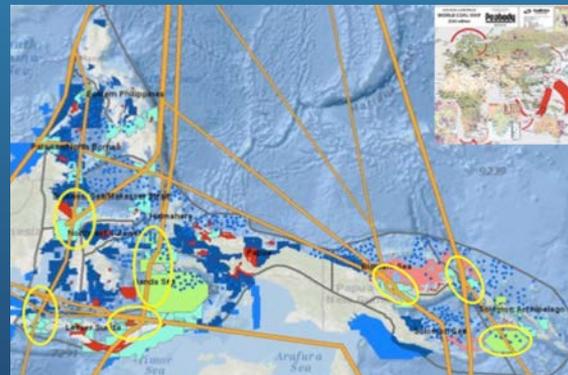
Site focus maximum overlap: Palawan – Kaltim
n=447
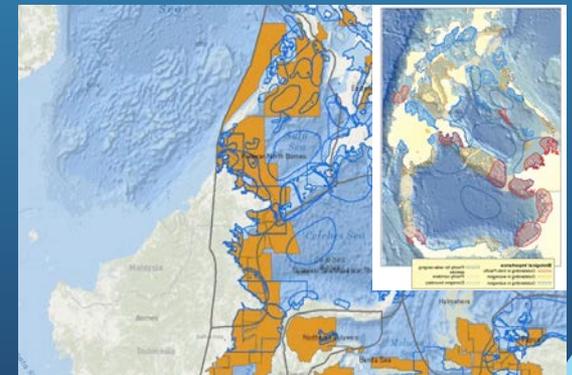
Main outcomes: From a Marine Spatial Planning perspective

- A total of 15.4% of the CTI Implementation area (CT6 including their EEZs) is covered by oil and gas and deep-sea mining permits (combined E & P blocks).

- If the more reef-orientated CT scientific boundary is used, this coverage increases to 20%, or 1/5th of the CT.

- CT shipping lanes cover 10.4% of the total CTI Implementation area (CT6 including their EEZs)

- For several CT countries the combined coverage exceeds 70% of their total maritime jurisdiction, including EEZ (Malaysia, Timor Leste)

- By comparison, the total coral reef area within the same CT area is just over 1.1%.

(as per Kahn and Vance-Borland, 2013)

Benjamin Kahn/APEX Environmental
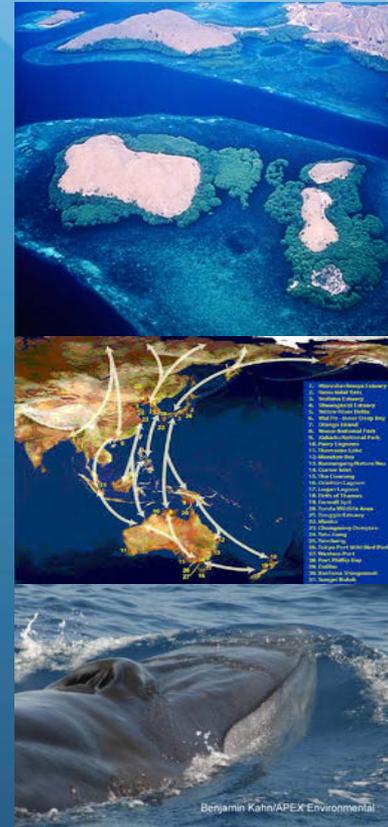
- **Close to 40%** of the total area within existing CT *oil and gas* permits has been identified as important for marine conservation*.

- **Over 50%** of the total area within existing CT *deeps-sea mining* permits have also been designated as important for conservation*.

- The Coral Triangle has been identified as one of three "global hotspots for shipping accidents".

- Major shipping and oil/gas accidents may occur with devastating consequences for industry, ecosystem functions and local communities (see spatial scenarios).

(*Kahn and Vance-Borland, 2013)

- Sealanes quantified according to estimated ship traffic (vessel density).
- 1st study to identify areas of extreme and complex patterns of overlap.
- ASL routing includes narrow inter-island passages and crossings of other ocean industry activities.
- Traffic volume estimated to increase 10-fold in the next decade.
- The spatial analyses start to asses chronic and accidental risks:

- Accidental collisions at sea.
- Accidental wreckage on islands (reefs).
- New port development – support infrastructure.
- Marine pollution from bilge and ballast waters (MARPOL).
- Exhaust emissions (sulphur loading - IMO).
- Direct strikes (whales).
- Noise pollution.
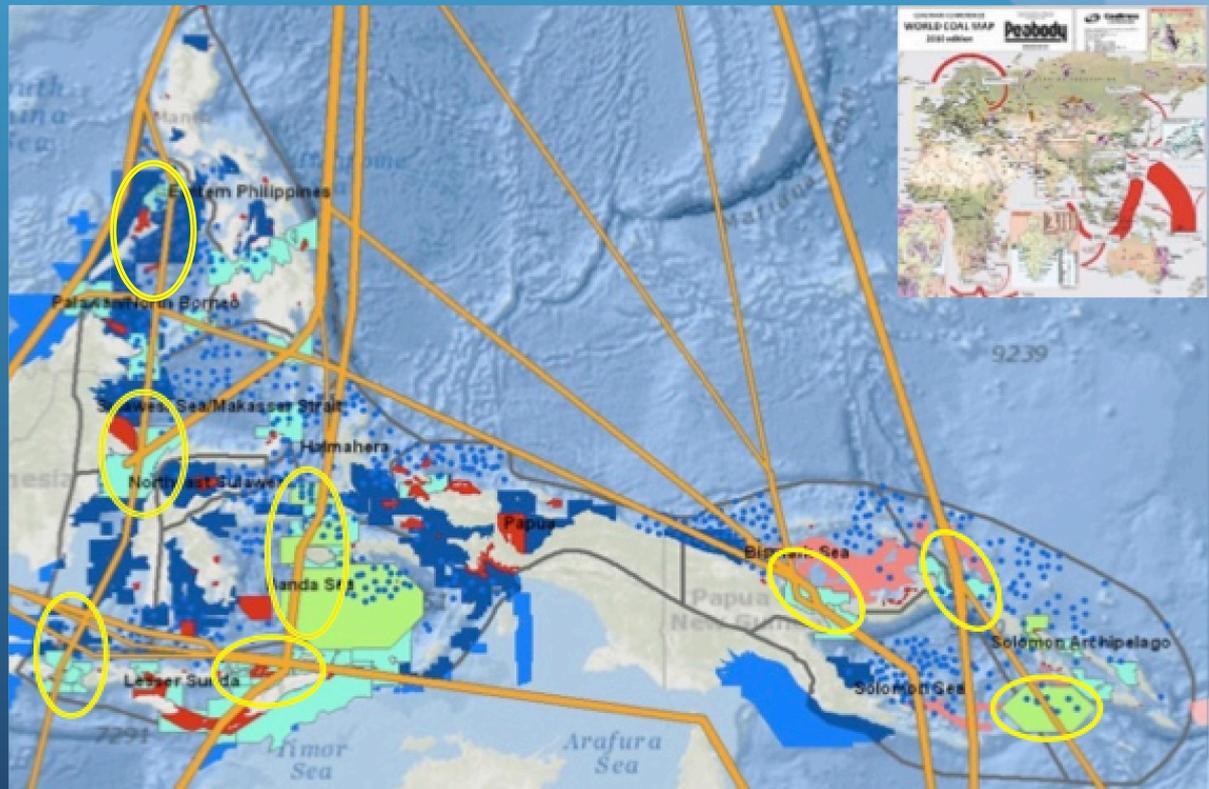
Spatial scenarios: Deep-well oil spill

Potential risks could be ultra-costly to block operators, and industry in general, with devastating environmental and socio-economic consequences.

Scenario 1 - Bali, tourism hotspot
Scenario 2 – Sulu Sea, tuna hotspot
Scenario 3 – Raja Ampat, MPA Network and marine conservation hotspot.

These three areas are recognized for their unique and globally significant values to their respective stakeholders.
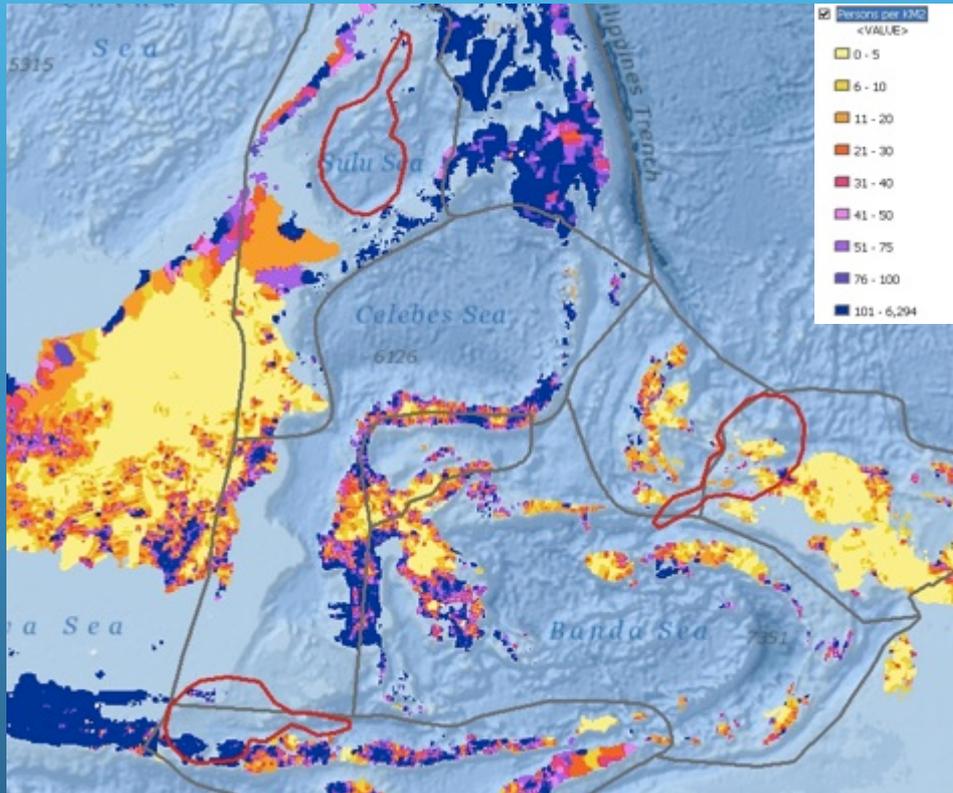
Scenario of an oil spill with a true-size polygon (red) of the Deepwater Horizon oil slick. Directly affected population estimates (World Bank, 2015) range from 100.000 to over 10 million.
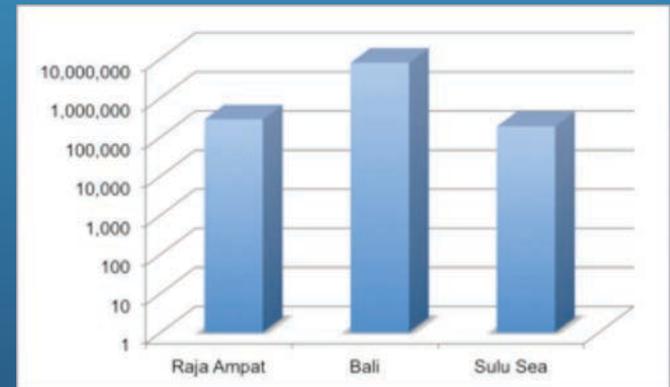
Population affected by this oil spill scenario (note log scale axis)

Shipping: Mitigation of accidents in the CT

In 2013, the first independent study of this kind identified **3 global hotspots** for shipping accidents, based on 15 years of data:

- "The South China **Sea and the East Indies**, the Mediterranean and North **Sea**.

  - "Since 1993, a total of 293 **shipping accidents** in the South China Sea and east Indies" (located within the Coral Triangle).

- "Environmental risk is directly linked to
  - the type and amount of hazardous substances, including oil, being transported and
  - the sensitivity of the marine area."
  - Shipping activity to increase 10-fold in the next decade.

- "Shipping accidents are often the subject of dramatic media coverage, provoking a strong negative response from civil society and politicians."

Overview and next steps

- The spatial overlap in the Coral Triangle between ocean industry and marine hotspots is significant.

- Clearly, there is a need to:

  - Increase collaboration between ocean industries and other stakeholders to develop joint strategies and help develop policies to avoid potential conflicts in resource usage.

  - Design and plan individual projects _early-on_ in order to mitigate risks to:
    - Ocean industry operations and assets.
    - Safeguarding food security.
    - Exceptional wilderness values and important ecosystem services.

  - Assess site-specific management options for certain marine hotspots that have extreme spatial overlap with ocean industries.

(as per Kahn and Vance-Borland, 2013)
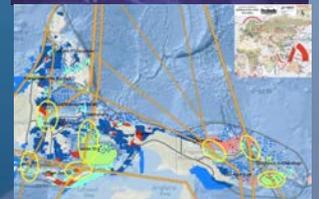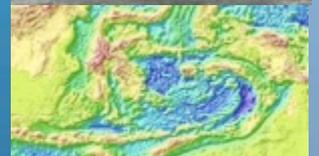
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the opportunity to contribute to the

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Responsible Ocean Industry Operations
in SE Asia's Coral Triangle

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