Balancing food security and biodiversity in the ocean

Prof Heather Koldewey
Head of Global Conservation Programmes
Thinking about biodiversity
Thinking about fish
Oceans: 70% of the Earth
Highly diverse
Oceans: 80% marine species undescribed

Blobfish (*Psychrolutes marcidus*)
Global species richness of fish

Based on 1,500 species
Living Blue Planet Index 2015

Marine populations (1,234 species) 49% decline

Reef associated fish 34% decline

Tunas, mackerels, bonito 74% decline
Global threats to marine species

- Agriculture / aquaculture
- Logging
- Invasive alien species
- Native species
- Hunting / trapping
- Residential / commercial development
- Energy production / mining
- Change in fire regime
- Climate change / severe weather
- Pollution
- Human disturbance
- Transportation / service corridors
- Fisheries
- Dams / water management
IUCN Red List categories

Critically Endangered

Endangered

www.arkive.org
Global fish trade is worth $92 billion p/a at first sale (but whole industry may be >$200 billion)
Commercial fisheries – too many boats catching fewer fish

SUPER TRAWLER
NETS ARE BIG ENOUGH TO HOLD 13 JUMBO JETS

GREENPEACE
Artisanal or subsistence fisheries

- 80% global fish production
- Artisanal fisheries ~ 25% of the global marine catch
Wild caught to aquaculture
Unused and unmanaged catch (by-catch)

- 40% of the global catch
- Tendency to use more of the by-catch as previous target species become depleted
- ‘Biomass fisheries’
Fishing down the foodweb
Ecosystem shifts

Removal of predators along with climatic changes has led to invasions by “jellyfish”.
Vulnerability of economies to climate change impacts on fisheries

Reflects a combination of exposure to climate change, sensitivity of fisheries to climate change or dependence on fisheries and adaptability of the country / economy (Allison et al. 2009)
The Ocean is at crisis point

Figure 1 | Trends in relative abundance of five species of deep-sea fish. Weighted relative abundance (number per tow) over time from research-survey data, showing the estimated exponential decline (red line) and 95% confidence projections of the estimate (dashed lines) for five deep-sea species in the Canadian waters of the northwest Atlantic, 1978–94.
Dramatic changes within our lifetime
Threats to food security
Commitments for sustainable management

• To maintain or restore stocks to maximum sustainable yield (MSY) either regionally or globally by 2015.

• Ecosystem approach to fisheries management.
Removal of harmful subsidies

• Eliminate harmful subsidies that contribute to overcapacity or IUU fishing.

• Valued at $16.2 billion in 2003.

• Reallocate to reduce fleet, more sustainable gear, ocean protection
Illegal, unregulated and unreported fisheries

- Voluntary International Plan of Action
- Illegal fishing $23 billion per year
- Unreported and unregulated catches a pervasive problem.
Biodiversity conservation

• Protect species

Southern right whale (*Eubalaena australis*), Indian Ocean (southern coast of South Africa)

• Change fishing practices

Wandering albatross (*Diomedea exulans*), South Atlantic Ocean (Bird Island, South Georgia)
Increase marine protection to 10% by 2020
Why MPAs?

- Stop fishing completely
- Restrict damaging activities
- Protect biodiversity
MPAs are a form of ecosystem management

Inside MPA
- Fishing ends
- No fish caught
- Habitat improves
- Number and density increases

Outside MPA
- Spillover of adults
- Export of larvae
Ecologically MPAs work

Biomass
Density
Body size
Species density
Marine Reserves Coalition

GREAT BRITISH OCEANS

CREATING THE WORLD’S LARGEST MARINE RESERVE

SECURING OUR GLOBAL ENVIRONMENTAL HERITAGE
Good progress
Global MPA coverage
Global MPA coverage: 3.7%
Fully protected MPAs: 1.2%
Exclusive Economic Zone coverage: 9.2%

www.marinereservescoalition.org
Marine protection in UKOTs
Chagos Marine Reserve
Reef fish biomass by trophic level

Graham & McClanahan 2013 BioScience
How do large MPAs work for mobile species?
Chagos connectivity

Sørensen similarity

% of Chagos corals in common

82%  77%  88%  .727  .745  .567

% of Chagos fish species

84% (79%)  92%  94%
The challenge

100 million people
Reality of subsistence fishing
Community-based solutions
Marine protected areas
Community managed MPAs

Community liaison and training

Watchtowers and patrol boats

MPA monitoring

Community engagement
ZSL and Project Seahorse assisted MPAs

Danajon Bank

Bohol
MPA effectiveness ecological vs socioeconomic

- Even small reserves can increase abundance of most valuable species (for fisheries).
- Enforcement critical

Diverse benefits e.g. social capital (measured as trust, social cohesion, community support, compliance)

Samoilys et al., 2008
Hansen et al., 2011
Philippines – 50% mangrove loss
Protect remaining mangrove forest
Expand mangrove area through replanting
Maintain mangrove biodiversity
Develop mangrove associated livelihoods
Add some science to change current bad practice...
Community training
Mangrove ecopark
Increasing MPA area and resilience

<table>
<thead>
<tr>
<th></th>
<th>Original Area</th>
<th>Increased Area</th>
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<tbody>
<tr>
<td>Lipata MPA</td>
<td>10 ha</td>
<td>104.2 ha</td>
</tr>
<tr>
<td>Sinandigan MPA</td>
<td>50 ha</td>
<td>245.4 ha</td>
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<tr>
<td>Aquino-Ondoy MPA</td>
<td>35 ha</td>
<td>102.8 ha</td>
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Mangroves post-Haiyan

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Ecological resilience – 3 months later

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Mapping damage

~30%

~5%
Opportunity costs of marine conservation

Hill et al., 2012
Durable community institutions
Mangrove nurseries & seaweed farming
Fish meets fashion...
Lead by example

- ‘No endangered fish’
Step 3b: Reach new audiences
Media attention on fish!
Make it easy
What can you do today?