Marine fisheries: is the glass half full or half empty?

Boris Worm
Dalhousie University, Halifax, Nova Scotia, Canada
Voyage of the Beagle 1831-36
St. Paul’s Rocks

The smallest rock [...] supports likewise a large number of fish. The sharks and the seamen in the boats maintained a constant struggle which should secure the greater share of the prey caught by the fishing-lines.
Since Darwin: >99% loss of oceanic whitetip sharks

Keeling (Cocos) Island

There is to my mind much grandeur in the view of the outer shores of these lagoon islands. […] It is excusable to grow enthusiastic over the infinite number of organic beings with which the sea of the tropics teems.
Since Darwin: Coral reef degradation

Part I: Half-empty
Loss of coastal biodiversity

Loss of diversity

Loss of services

Increased risks

Oyster example

• Removal of Oysters

• Algal blooms
1970s

1990s

Burning through our natural capital

Declining global seafood supply

Seafood per person

kg per person

Ecosystem changes

- Loss of large fish
- Fisheries shift to lower levels
- Diversity decreases
- Ecosystems become
  - less resilient
  - less predictable
  - less productive

Source: Pauly & MacLean 2003, Island Press
Half-empty?

- Large declines in marine biodiversity
- 25-35% of fisheries collapsed
- Wild catches of food fish declining
- Other services declining even faster
- Marine species increasingly listed as threatened and endangered
Part II: Half-full
Most large fisheries still producing

http://www.fao.org
Rebuilding efforts pay off

Diversity and services recover

Catch shares can halt collapse

Half full?

- 65-75% of high-yielding seafood stocks are thought to be still viable
- Some regions are successfully rebuilding
- Catch-share systems have proven useful
- Protected areas often achieve rapid recovery
Fishing and conservation

A rising tide

Scientists find proof that privatising fishing stocks can avert a disaster

For three years, from an office overlooked, they found that it was halted the collapse of

ermen as a long-term right. Fishermen therefore have an interest in good management and conservation because both increase the value of their fishery and of their share in it. And because shares can be traded, fishermen who want to catch more can buy additional rights rather than resorting to brutal fishing tactics.

The Alaskan halibut and king crab fisheries illustrate how its can change behaviour. Fishing in these waters had
Part III: Solutions
Reduce fishing mortality below $F_{\text{msy}}$

Source: Collie et al., unpublished
Control effort displacement

Fisheries Centre Report

Annual Landings (million tonnes)

Fisheries Centre Report
Realign incentives

- Remove harmful subsidies
- Re-invest in rebuilding
- Build catch share systems where feasible
- Improve ocean governance, transparency, and enforcement
Protect biodiversity

• Increase protected areas
• Improve gear selectivity
• Protect vulnerable habitats
• Fight climate change
Ban wasteful practices

Photos from: www.marinephotobank.org
Bottom line

- The situation is dire, but we know how to fix it
- We can not give up on wild fisheries
- Biodiversity maintains fisheries and other ocean ecosystem services
- New focus on REBUILDING FISHERIES ECOSYSTEMS
- It’s not too late – we just need to do it
Thank you

- Ransom Myers †
- Heike Lotze

- NSERC
- NSF
- Lenfest Ocean Program
- Census of Marine Life

- NCEAS Group: Linking marine biodiversity to ecosystem functions and services
- NCEAS Group: Finding common ground in marine conservation and management