

A photograph of three fishermen in a boat at sunset. The sky is a mix of blue, orange, and yellow, with a fish jumping out of the water in the center. The fishermen are silhouetted against the bright sunset. The boat has some text on its side, including "NEW INDIAN" and "2013-3".

Hope for People and the Ocean

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Blue Planet Prize + 25 Lecture

08 September 2017

5 Key Points



- 1. The futures of the ocean and of people are tightly linked together.**
- 2. Both are at risk due to climate change, ocean acidification, overfishing and habitat destruction.**

5 Key Points



- 3. Solutions exist to fix these problems**
- reduce carbon emissions
 - end overfishing & recover depleted fisheries, and
 - protect biodiversity and habitats.

5 Key Points



4. We have the tools and knowledge to change course, but the will to use them at a large scale has been missing.
5. Now is the time to act.

In short: a message of urgency and hope

Marine ecosystems provide multiple benefits:



food, oxygen, medicine, fuel, climate regulation,
disease & pest regulation, coastal protection,



cultural and spiritual values, nutrient cycling

But overfishing, habitat loss, climate change and



acidification deplete & disrupt ocean ecosystems,



threatening economic, social & environmental
benefits

Is this hopeless?



A large, powerful wave is crashing against a rocky coastline. The water is a vibrant turquoise color, and the wave is curling over, creating a white spray of foam. The sky is a clear, bright blue. In the background, there are dark, rugged mountains or hills. The overall scene is one of natural power and beauty.

**Positive progress is underway,
But it's not at the scale needed.**

Scientists are now working with society to propose solutions, not just identify problems



Citizens are becoming engaged. Policy makers are taking action. Business leaders are leading. They are collaborating & using new technologies.

How can we accelerate the
progress?

What have we learned about what
works?

An important emerging theme

The right **incentives** can convert a vicious cycle of unsustainable practices to a virtuous cycle of sustainable practices

1) **Economic** incentives

2) **Social** incentives

a) social norms

b) personal norms

Two examples:

1. Fisheries

2. Marine Reserves

1. Fisheries management

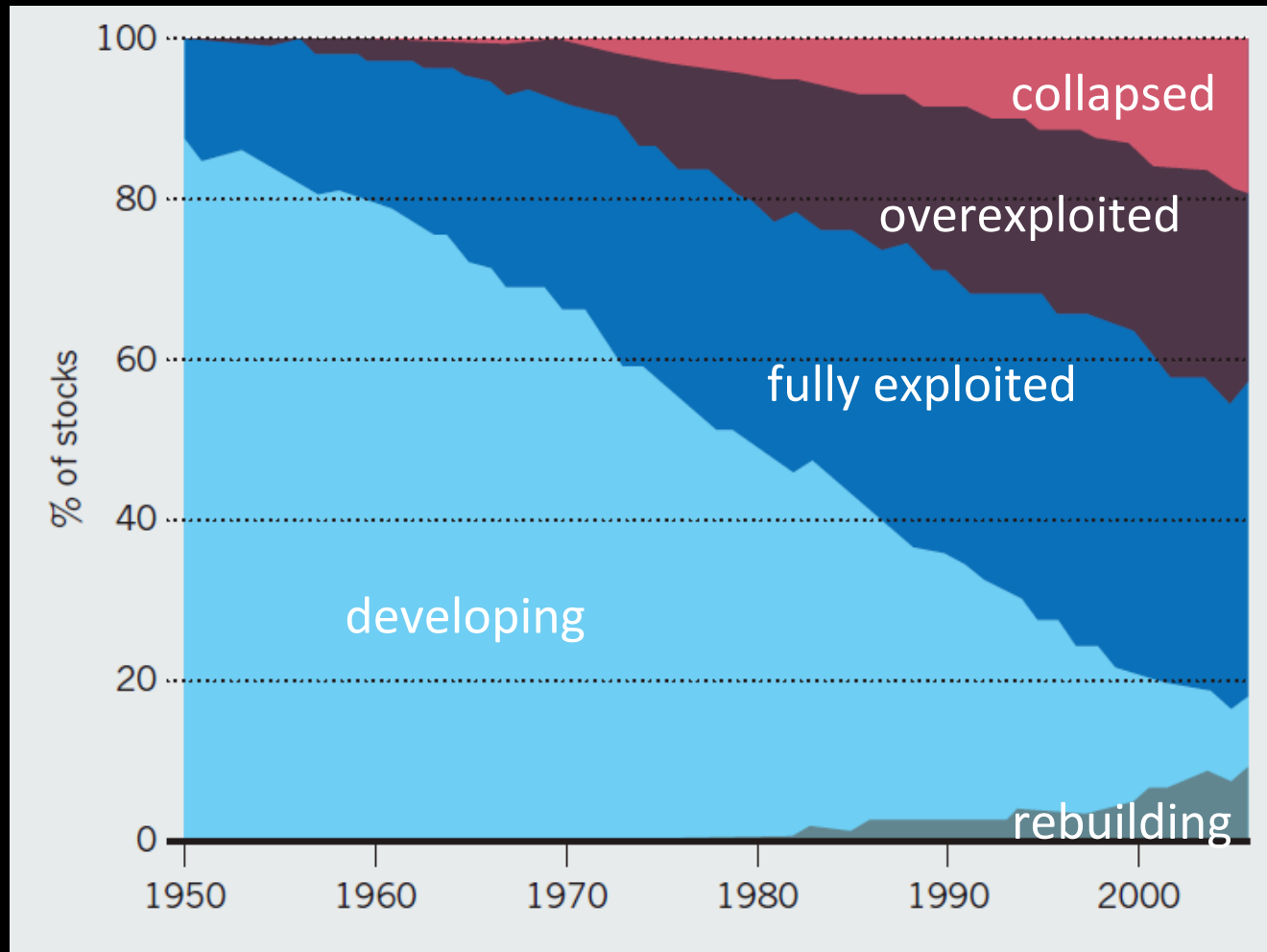


Photo: K. Ellengoben

1 in 7 people rely on seafood for their protein



Unsustainable fishing policies & practices Have resulted in depletion & disruption



FAO data, Pauly 2013 *Nature*, adapted from Pauly 2007 *AMBIO*

Fishing *harder* and *harder* for *fewer* and *fewer* returns



Plus illegal fishing...

Solution:
*Fish smarter
not harder*
by changing
incentives for
fishermen &
industry and
cooperating
internationally



Photo: <http://mutuamatheka.co.ke/blog/my-trip-to-kisite-mbunguti/>

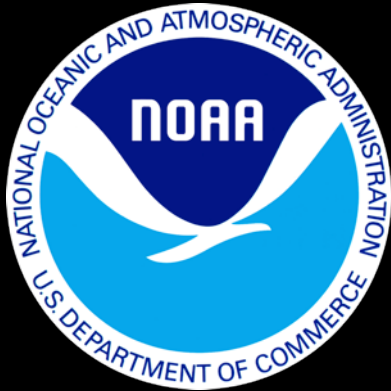
Policy reforms are resulting in more sustainable fishing, e.g., U.S.



4th producer globally
3rd importer globally

Reforms in 2006:

1. **Mandate to end overfishing** – science-based limits, accountability, ecosystem focus
2. **Rights-based approaches** – give fishermen a voice and a stake in the future.



U.S. Federal Fisheries

	2000	2015
• # Overfished stocks	92	38
• # Rebuilt stocks	0	41

Since 2008:

- 23% increase in catch; 32% increase in value; 35% increase in jobs

White House: Fishermen as Champions of Change for Sustainable Seafood



Chris Brown, RI

Jason
DeLa Cruz, FL

Brad
Pettinger, OR

Policy reforms are resulting in more sustainable fishing



4th producer globally
3rd importer globally
in 2006



5th producer globally
1st importer globally
in 2013

1. **Mandate to end overfishing** – science-based limits, accountability, ecosystem focus
2. **Rights-based approaches** – give fishermen a voice and a stake in the future.

Adoption of rights-based fisheries around the world: *by species*



COUNTRY	NO. OF SPECIES
New Zealand	107
United States	117
Australia	106
Fiji	20
Papua New Guinea	20
Samoa	20
Solomon Islands	20
Vanuatu	20
Chile	55
Canada	64
Russian Federation	41
Iceland	22
Denmark	8
Japan	8
South Africa	8
Norway	8
Mexico	8
Netherlands	8
Italy	8
Portugal	8
Namibia	8
Sweden	8
Argentina	8
Sri Lanka	8
United Kingdom	117
Estonia	6
Latvia	6
Lithuania	6
France	6
Peru	6
Poland	6
Spain	6
Cook Islands	6
Croatia	6
Falkland Islands	6
French S. Territories	6
Greenland	6
Malta	6
Morocco	6
Vietnam	6



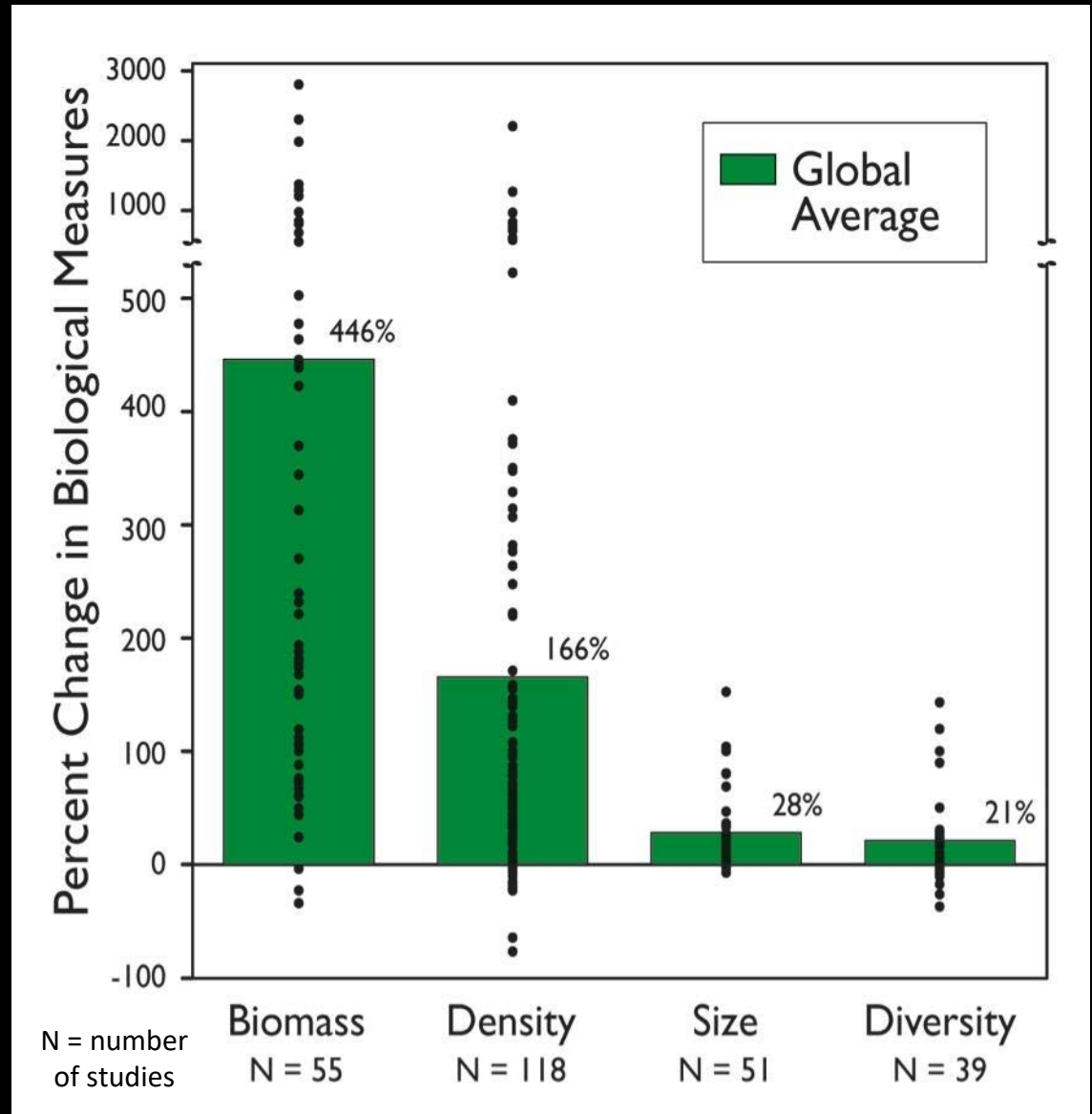
- ~ 200 rights-based fisheries
- > 500 species
- In 40 countries

2. Marine Reserves

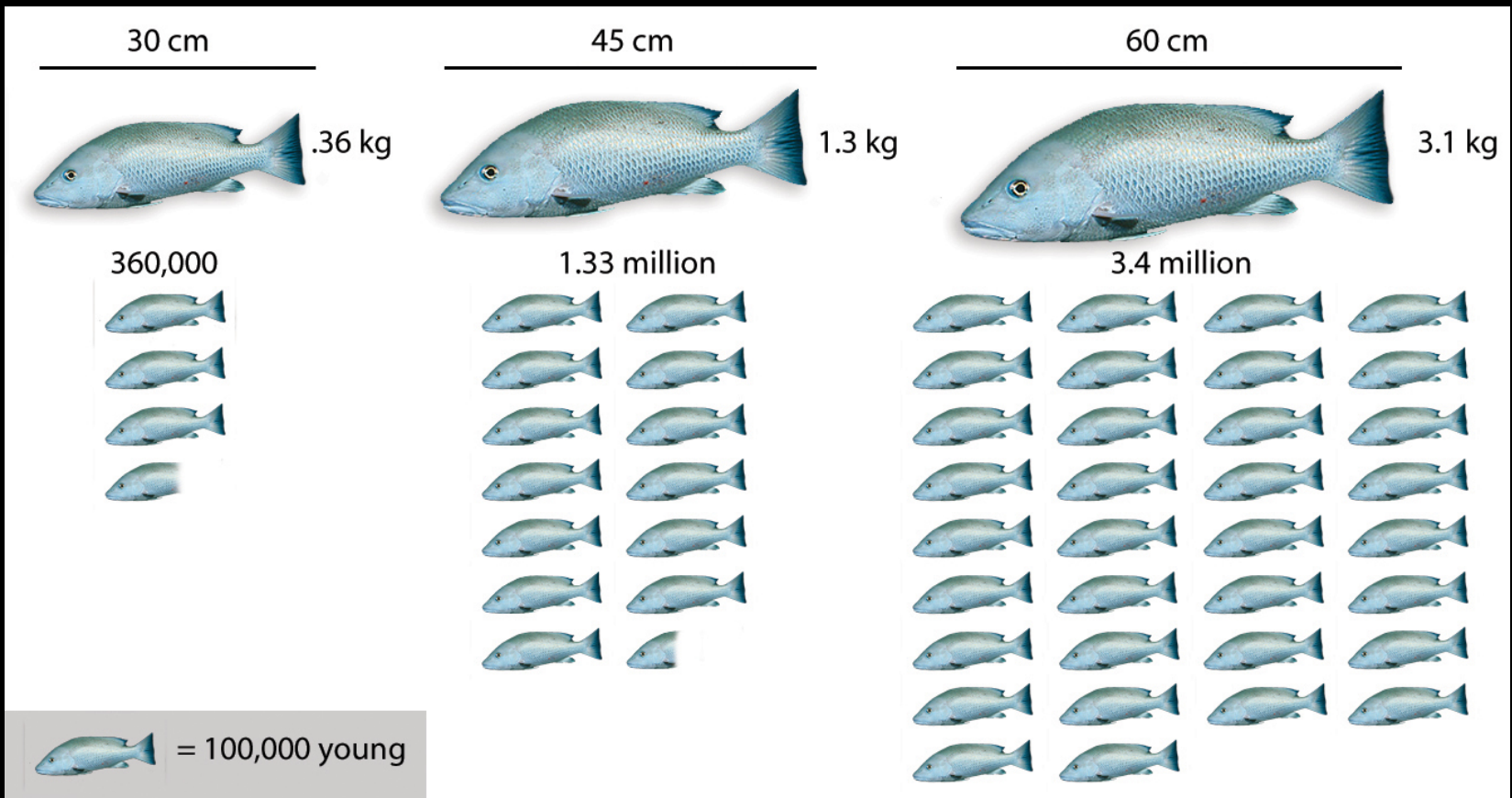
protect biodiversity and recover depleted fishery stocks...



When areas
are fully
protected
from fishing,
ecosystem
usually
recovers:
Individuals
become larger,
more abundant,
and more
diverse



Marine Reserves protect the large fish that produce more young



Average numbers of young produced by three different sizes of gray snapper.
Data: Bortone & Williams (1986) US Fish and Wildlife Service Biological Report

An underwater photograph showing a large school of striped snappers swimming over a coral reef. A shark is visible in the upper right corner, swimming towards the left. The water is clear and blue.

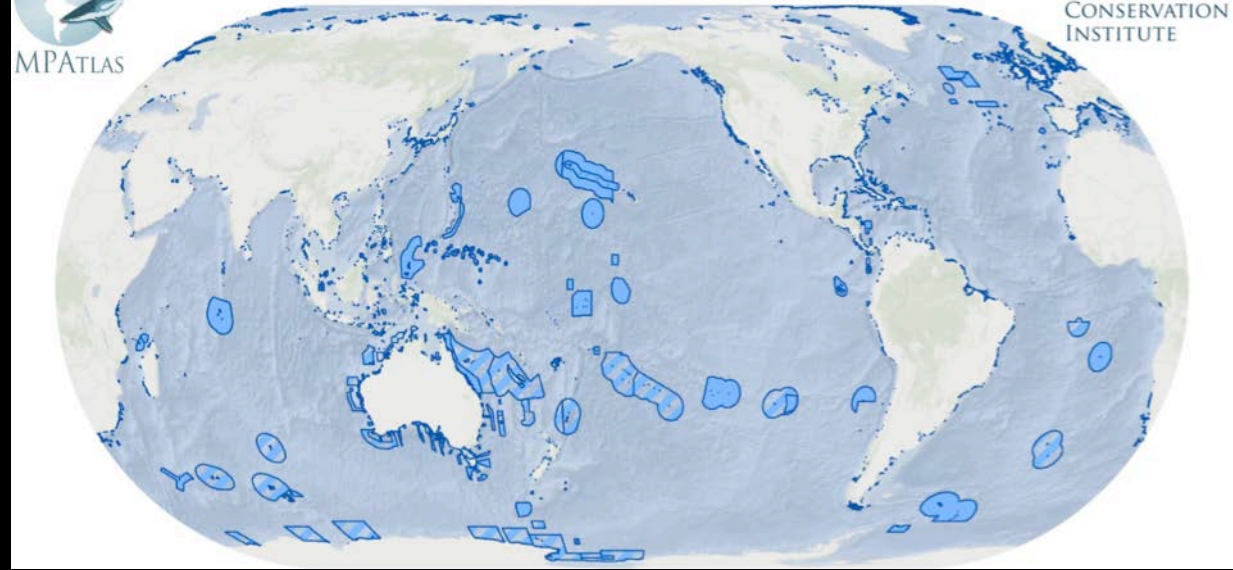
Moreover, large reserves are
more resilient to
environmental changes

Compelling scientific evidence about benefits of
reserves + courageous leadership have resulted
in a recent flurry of activity...

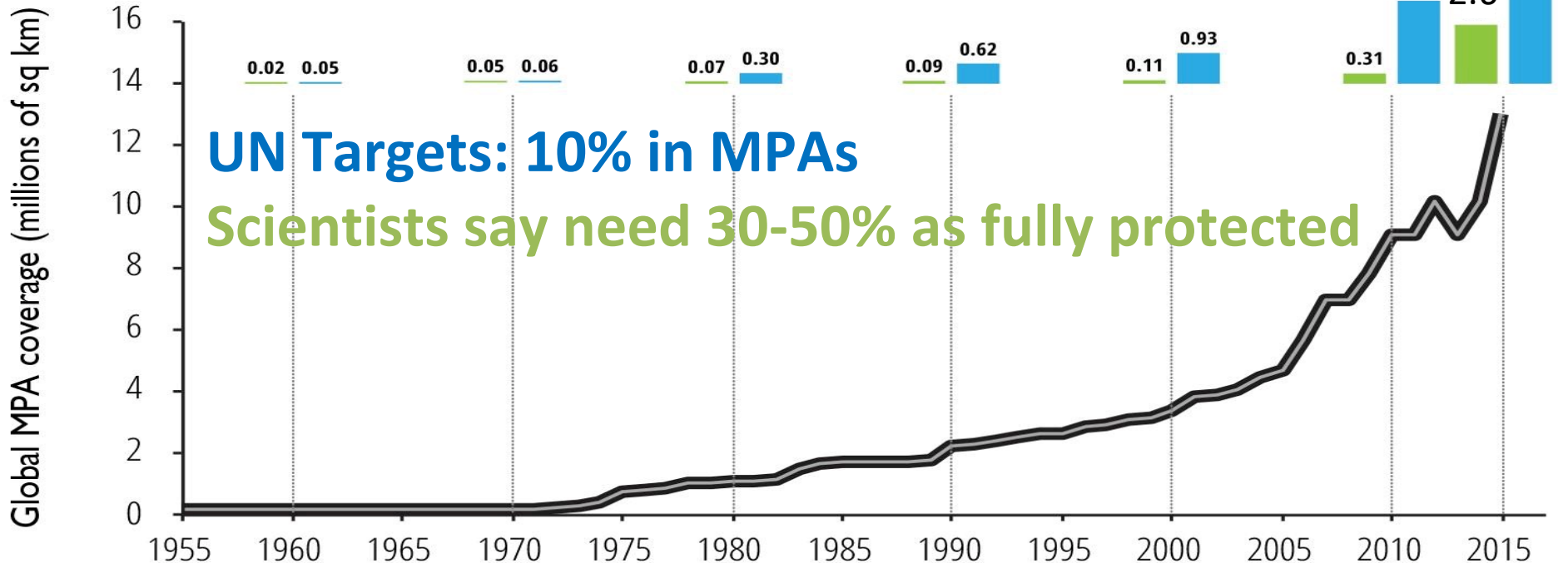
Roberts et al., 2017 PNAS

Photo credit: Enric Sala, Pristine Seas, National Geographic Society

In the last decade: from 0.1% to 2.6% of ocean strongly protected



Global MPA coverage (millions of sq km)
 Strongly protected MPAs (%)
 All MPAs (%)



UN Targets: 10% in MPAs

Scientists say need 30-50% as fully protected



2015 & 2016: large marine reserves announced
Palau (83% EEZ), Chile (24% EEZ), UK (22% EEZ), New Zealand (15% EEZ), Seychelles (15%) , US (23%)



Photo: James Watt



NOAA



President Obama expanded the fraction of the U.S. EEZ that is strongly protected from ~5% in 2008 to ~23% in 2016

Photo: James Watt



NOAA



Marine Reserve *Conclusions*

1. Powerful science + partnerships + new political leadership + new social norms have resulted in *> an order of magnitude increase in strongly protected areas globally.*
2. The 2.6% is excellent progress BUT *a far cry from >30% needed.*

Marine Reserve *Conclusions* con't

3. Marine reserves may be especially important in providing greater *resilience against climate change*
4. But active *resistance* from extractive users plus lack of public *awareness* and lack of *commitment to stewardship* impede progress.

Ocean solutions are linked with actions across all of the other Sustainable Development Goals



Biggest Threats:

Lack of Awareness (problems & solutions)

Lack of Responsibility



What can individuals do?

- Stay informed – find reliable sources of information
- Reduce your carbon and water footprints
- Choose sustainably caught or farmed seafood
- Eat lower on the food web
- Join, support or create groups to take action
- Donate part of your time
- Communicate your concerns & recommendations to elected representatives, friends, & family
- Be creative – find new solutions

Can we use the ocean without using it up?

The task is daunting.

Ecological limits are real.

But if we work together,
use science + knowledge,
get the incentives right,
activate our moral compass, and
are courageous,
I believe we can.

My Hope: Recover the bounty;
use it wisely & equitably



Thanks!

Jenna Sullivan, Vanessa Constant, Steve Gaines, Chris Costello,
Amanda Leland, NOAA, UN FAO, Environmental Defense
Fund, Sustainable Fisheries Group at UCSB, David
and Lucile Packard Foundation, The Sea
Around Us Project at UBC, Oregon
State University, NSF



Photo: aussiedestinationtours.com