Philippine Marine Aquatic Resources: The Best and Worst Situation in the World

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Talk Outline

- Brief context review in the Philippines

- Policy responses

- Social research related to marine conservation

The Philippines

- Spanish colony beginning in the 16th century

- Ceded to the US in 1898 following the Spanish-American War.

- "300 years of the Spanish, 50 years of Hollywood…"

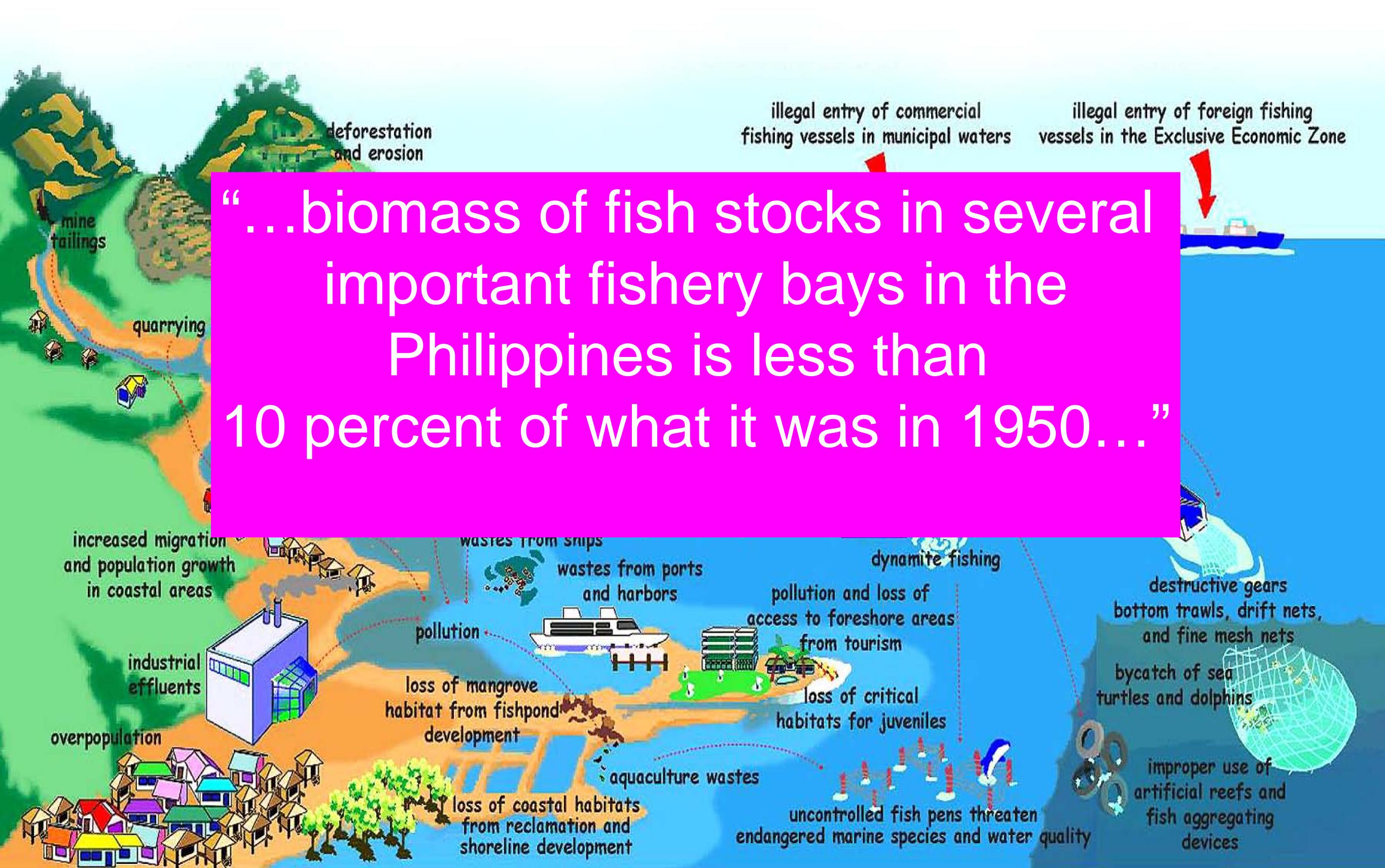- More than 170 languages and dialects are spoken in the country

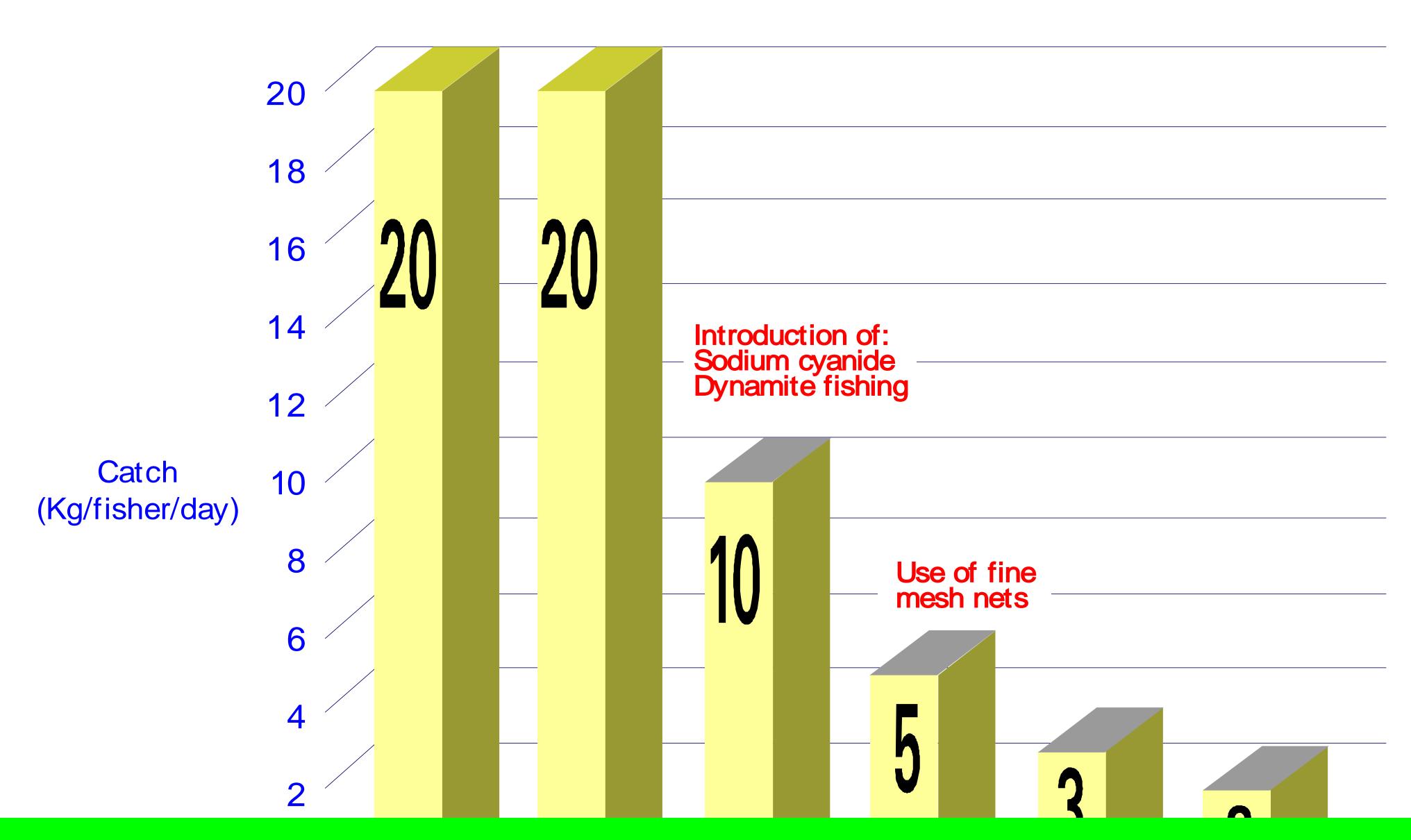|	Philippines
Land Area:	298,170 sq km
Coral Reefs:	27,000 km^2
Coastline:	18,000 km
Population below poverty line:	40% (2001 est.)
External Debt:	$53.48 billion (31 September 2008 est.) 2 x national budget
Population:	97,976,603 (July 2009 est.) (79 million in 1999)

Collaborative planning learned from adversity

Human dimensions of the ocean

Forces Impacting the Philippine Coastal and Marine Environment

"…biomass of fish stocks in several important fishery bays in the Philippines is less than 10 percent of what it was in 1950…"
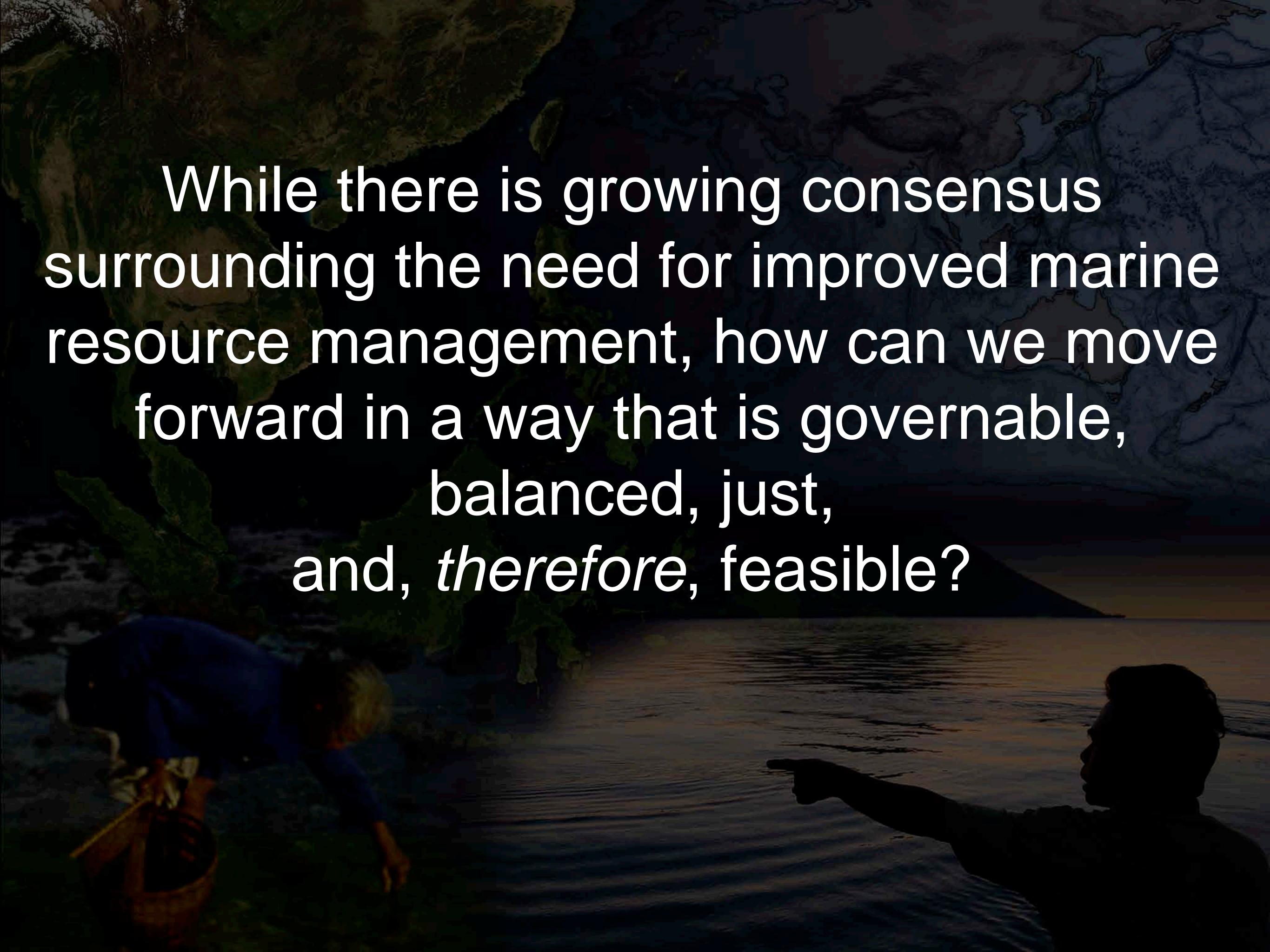
Trend in estimated daily fish catch per municipal fisher for Olango Island

Catch (Kg/fisher/day)

20 — 20

20 — 20

Introduction of:
Sodium cyanide
Dynamite fishing

10

Use of fine mesh nets

5

3

Food: Approximately 50% of animal protein derived from marine fisheries and aquaculture in many Filipino communities

CRMP 1998

While there is growing consensus surrounding the need for improved marine resource management, how can we move forward in a way that is governable, balanced, just, and, *therefore*, feasible?

MPAs
A favored tool

Highly influential papers on ocean ecosystem decline

Rapid worldwide depletion of predatory fish communities

Ransom A. Myers & Boris Worm

Biology Department, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1

Serious concerns have been raised about the ecological effects of industrialized fishing, spurring a United Nations resolution and restoring fisheries and marine ecosystems to health. However, a prerequisite for restoration is an understanding of the composition and abundance of unexploited fish communities, relative to contemporary ones. We compiled trajectories of community biomass and composition of large predatory fishes in four continental shelf and nine oceanic systems, using all available data from the beginning of exploitation. Industrialized fisheries typically reduced community biomass by 80% within 15 years of exploitation. Biomass extends in fast-growing species were observed in some systems ... Our analysis suggests that management by ... global ocean, with potentially serious consequences ... recent data alone may be misleading, and ... 'missing baseline' needed for future restoration ...

Ecological communities on continental shelf ... ocean contribute almost half of the global fishery yield, and sustain three-quarters of major fish stocks ... the effects of overfishing on these communities ... decline and collapse of major fish stocks ... from coastal ecosystems suggest that losses ...

as well as mammals and reptiles, were especially pronounced, and precipitated marked changes in coastal ecosystem structure and function. Such baseline information is scarce for shelf and oceanic ecosystems. Although there is an understanding of the magnitude of the decline in single stocks, it is an open question how entire communities have responded the trajectories of entire communities, and paper, we examine the trajectories of decline for large predatory fishes in shelf and oceanic ecosystems.

We attempted to compile all data from which relative biomass at the beginning of industrialized exploitation could be reliably estimated. For shelf ecosystems, we used standardized research ... off South Georgia, which were designed to ... in the northwest Atlantic Ocean, the Gulf of Thailand, ... general fish such as codfishes ... rays (Rajidae) ...

Figure 1 Time trends of community biomass in ... ecosystems. Relative biomass in ...

Fishing Down Marine Food Webs

Daniel Pauly,* Villy Christensen, Johanne Dalsgaard, Rainer Froese, Francisco Torres Jr.

The mean trophic level of the species groups reported in Food and Agricultural Organization global fisheries statistics declined from 1950 to 1994. This reflects a gradual transition in landings from long-lived, high trophic level, piscivorous bottom fish toward short-lived, low trophic level invertebrates and planktivorous pelagic fish. This effect, also found to be occurring in inland fisheries, is most pronounced in the Northern Hemisphere. Fishing down food webs (that is, at lower trophic levels) leads at first to increasing catches, then to a phase transition associated with stagnating or declining catches. These results indicate that present exploitation patterns are unsustainable.

Exploitation of the ocean for fish and marine invertebrates, both wholesome and valuable products, ought to be a prosperous sector, given that capture fisheries—in contrast to agriculture and aquaculture—reap harvests that did not need to be sown. Yet marine fisheries are in a global crisis, mainly due to open access policies and subsidy-driven over-capitalization (1). It may be argued, however, that the global crisis is mainly one of economics or of governance, whereas the global resource base itself fluctuates naturally. Contradicting this more optimistic view, we show here that landings from global fisheries have shifted in the last 45 years from large piscivorous fishes toward smaller invertebrates and planktivorous fishes, especially in the Northern Hemisphere. This may imply major changes in the structure of marine food webs.

Two data sets were used. The first has estimates of trophic levels for 220 different species or groups of fish and invertebrates, covering all statistical categories included in the official Food and Agricultural Organization (FAO) landings statistics (2). We obtained these estimates from 60 published mass-balance trophic models that covered all major aquatic ecosystem types (3, 4). The models were constructed with the Ecopath software (5) and local data that included detailed diet compositions (6). In such models, fractional trophic levels (7) are estimated values, based on the diet compositions of all ecosystem components rather than assumed values; hence, their precision and accuracy are much higher than for the integer trophic level values used in

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Historical Overfishing and the Recent Collapse of Coastal Ecosystems

Jeremy B. C. Jackson, Michael X. Kirby, Wolfgang H. Berger, Karen A. Bjorndal, Louis W. Botsford, Bruce J. Bourque, Roger H. Bradbury, Richard Cooke, Jon Erlandson, James A. Estes, Terence P. Hughes, Susan Kidwell, Carina B. Lange, Hunter S. Lenihan, John M. Pandolfi, Charles H. Peterson, Robert S. Steneck, Mia J. Tegner, Robert R. Warner

In response: new frameworks emerge

Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to **maintain an ecosystem** in a healthy, productive and resilient condition so that it can provide the services humans want

In response to crisis, ambitious targets for MPAs are set

WPC RECOMMANDATION 5.22
APPROVED

WPC Recommendation 22
Building a Global System of Marine and Coastal Protected Area Networks

The 17th IUCN General Assembly (San Jose, Costa Rica; 1988) adopted Recommendation 17.38 (Protection of the coastal and marine environment), which called on international bodies and all nations to establish a global representative system of marine protected areas (MPAs) to provide for the protection, restoration, wise use, understanding and enjoyment of the marine heritage of the world in perpetuity. Also, delegates attending the IVth World Parks Congress (Caracas, 1992) adopted Recommendation 11 (Marine Protected Areas), which called for the establishment of a global network of marine protected areas.

And, more recently, the 8th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the convention on biological diversity noted in March 2003 that "... the da [...] indicate that [...] are severely deficient, and probably prote [...] coastal environments."

WORLD PARKS CONGRESS 2003 DURBAN BENEFITS BEYOND BOUNDARIES

Federal Register / Vol. 65, No. 105 / Wednesday, May 31, 2000 / Presidential Docum[...]

Presidential Documents

Executive Order 13158 of May 26, 2000

Marine Protected Areas

By the authority vested in me as President by the [...] laws of the United States of America and in furth[...] of the National Marine Sanctuaries Act (16 U.S.C. [...] Wildlife Refuge System Administration Act of 196[...] National Park Service Organic Act (16 U.S.C. 1 e[...] Preservation Act (16 U.S.C. 470 et seq.), Wildern[...] et seq.), Magnuson-Stevens Fishery Conservation [...] U.S.C. 1801 et seq.), Coastal Zone Management [...] seq.), Endangered Species Act of 1973 (16 U.S[...] Mammal Protection Act (16 U.S.C. 1362 et seq.)[...] (33 U.S.C. 1251 et seq.), National Environment[...] (42 U.S.C. 4321 et seq.), Outer Continental S[...] 1331 et seq.), and other pertinent statutes, it is or[...]

Section 1. Purpose. This Executive Order will [...]

The Nature Conservancy

The Nature Conservancy's
Marine Initiative

Although once considered a limitless and inexhaustible resource, the oceans of the world are increasingly in jeopardy. The cycle of influence between land and sea is delicate, and human activities are taking a heavy toll on the health of all ocean systems, from marshes and mangroves to reefs and the deepest reaches.

In response, The Nature Conservancy has launched the Marine Initiative to link land and sea conservation in an effort to protect the rich array of plant and animal life and safeguard the tremendous benefits the oceans provide.

TEN-YEAR HIGH SEAS MARINE PROTECTED AREA STRATEGY:
the development of a glob[...]
A ten-year strategy to promote [...]sentative system of [...]cted area networks

Summary Version
[...]heme Participants at the [...] World Parks Congress, [...](8–17 September 2003)

WCPA
WORLD COMMISSION ON PROTECTED AREAS

What is a Marine Protected Area?

Larval and fish dispersal

Non-fishery reserve

Fishery reserve

The ecology is elementary: Don't fish and fish get big…
But the human dimension of MPAs is highly complex
(and poorly understood)

36 MPA Research Sites

Highly decentralized context

socio-ecological research on two emerging MPA networks under in the Central Philippines

Survey Research to Identify General Principles

- **500+ Interviews** of Fishers, Community Project Participants, Community Leaders, Local Government Officials, Scientists, Practitioners

- Questions about context, process, leadership, condition of environment

- Using statistical analysis to identify general principles derived from many sites

- Qualitative interview analysis to validate and provide detail and richness

Perceived increase in number of fish by fishers in MPA area is significantly correlated to:

CONTEXT

- Fishing grounds threatened by illegal commercial fishing (.38*)

- Distance from municipal center (.40*)

- Clear leader for MPA (.42**)

- Population size (-.45**)

n=36; p<.05 = *; p<.01=**

MPA MANAGEMENT

- Increased compliance (.39*)

- Improved enforcement (.36*)

- Strict punishment for rule infraction (.39*)

- Local community enforcement group strength (.34*)

- Municipal govt. skill level (.34*)

- NGO skill level (.36*)

- Increased intra-community conflict (.38*)

- Increased seriousness of conflict (.37*)
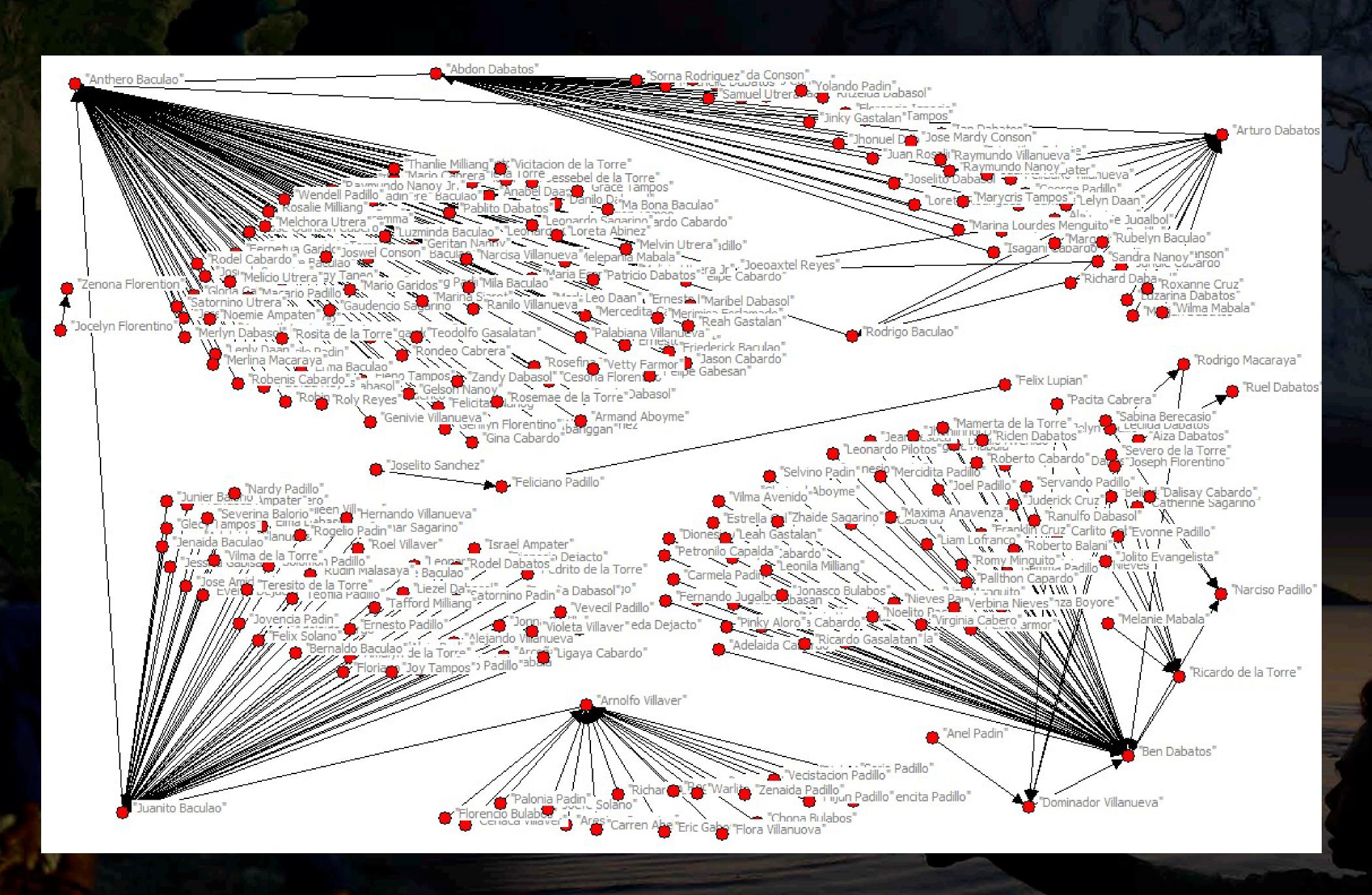
Dependent Variable: Perceived increase in number of fish by fishers in MPA area

Significant independent variables	Coeff	t	p 2-tail
Clear leadership for MPA	.30	2.0	.05
Bantay dagat strength	.43	3.0	.01
Threat from commercial fishing	.41	2.6	.01

$R=0.66$ $R2= 0.44$ Adj $R2=0.38$ $F=8.0$ $p<0.001$ $n=33$
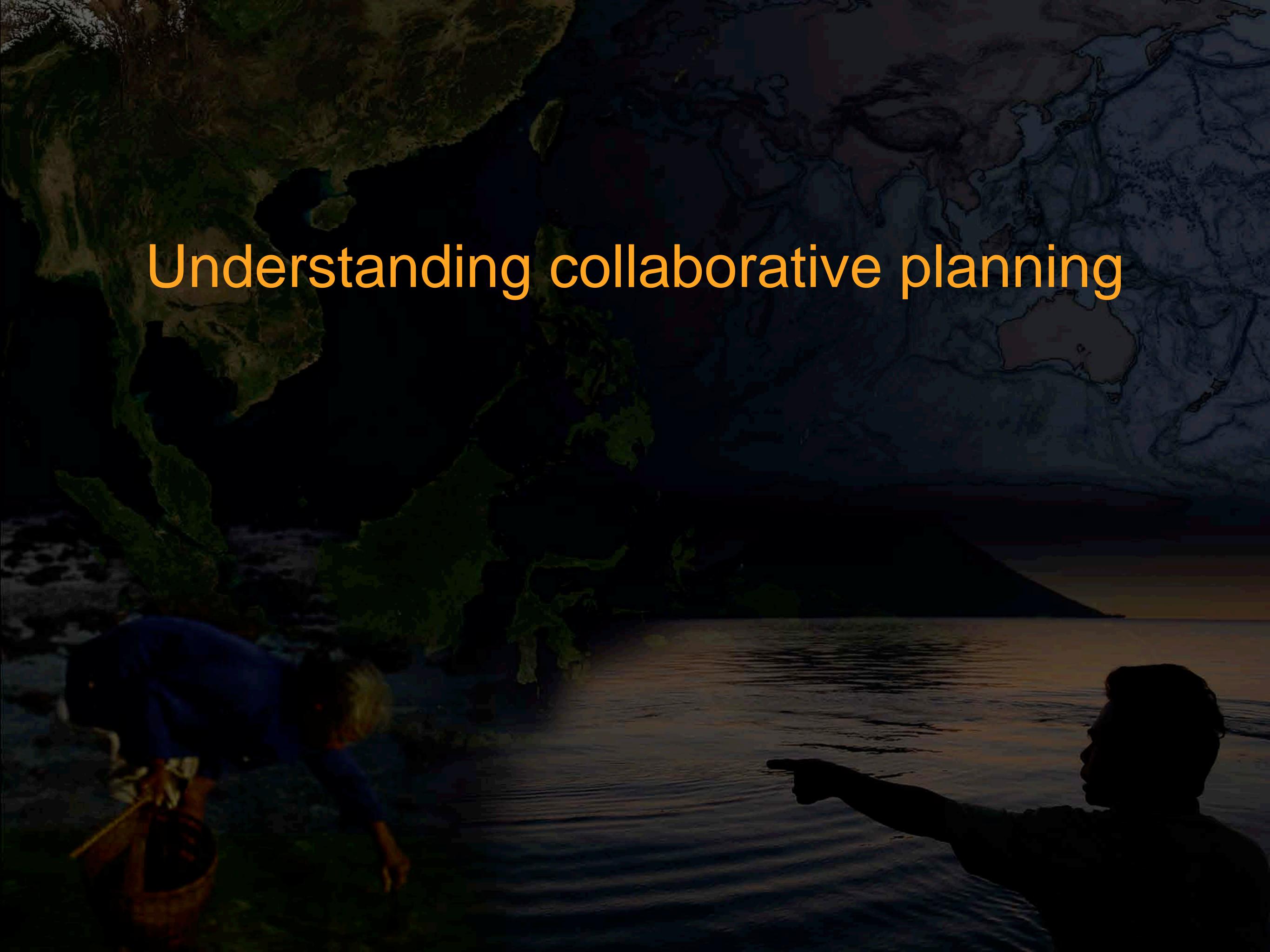
Clear leadership for MPA
Social network analysis for a successful MPA

There are clear MPA leaders that need support and back up!!!

Dependent Variable: Perceived increase in number of fish by fishers in MPA area
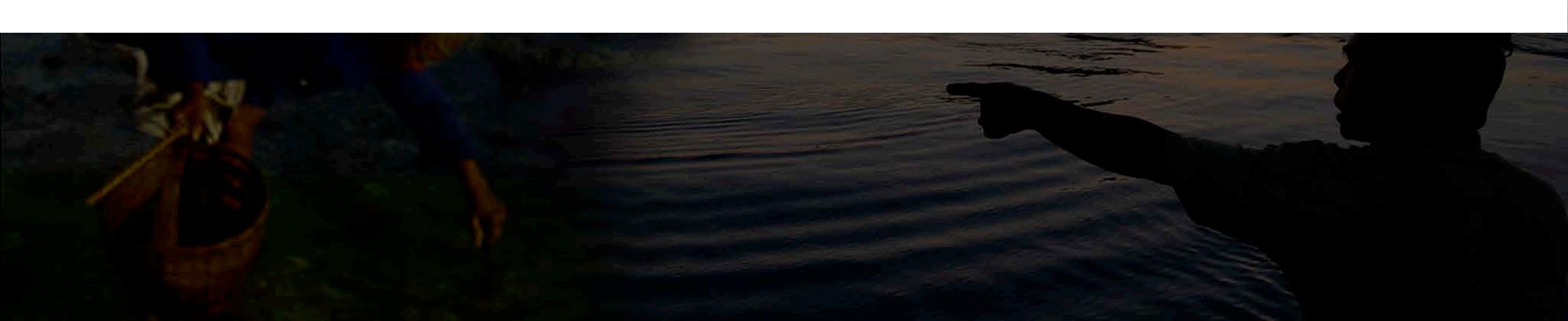
De la Victoria: "I'll be six (6) years in this job by October – my work is difficult because of the hazards that goes with it. When we do market denial, one box, for example coming from Zamboanga which we are able to confiscate will cost Ps100,00.00 to Ps150,00.00. About 100 kilos of dynamited fish. I received many death threats but I never carried a firearm even if I am authorized. For me, it's enough that I am doing my job well and I have a clear conscience."

Understanding collaborative planning

Creating multiple measures of Institutional Collaboration (dependent variable)

Table 8. Rotated component matrix for institutional collaboration for enforcement
[B] = Barangay Council member; [C] = Management committee member

	Enforcement Coordination
Mayors collaborating to improve sanctuary management [B]	.791
Inter-sanctuary management committee collaboration [C]	.807
Coordinate sanctuary enforcement with neighboring *barangays* [C]	.889
Total variance explained	69%

Dependent Variable: Collaboration of Barangays, Mayors and MPA Mgt Committees

Significant independent variables	Coeff	t	p 2-tail
NGO technical skill level	.60	4.33	<.001
Training involvement	.50	3.70	.001
Consultation with community during planning	.46	3.43	.002

R=0.74   R2= 0.55 Adj R2=0.50   F=10.55 p<0.001 n=30

Dependent Variable: Collaboration of Communities, Mayors and MPA Management Committees

"What is the role of outside organization like the CCE Foundation in the cluster?

"Its role is to give seminar and disseminate the guidelines of our seaborne patrol if there are any, including the purpose of patrolling. There should always be a seminar."

"If we need legal opinion, they provide us the lawyers of The Environmental Law Center. If we need trainings for our additional Special Enforcement Team, they provide us technical assistance."

Dependent Variable: Increased Level of Conflict Surrounding MPA According to Resource Users

Significant independent variables	Coeff	t	p 2-tail
Perception that enforcement is fair	-.57	-4.94	<.001
Community consulted during MPA planning	-.43	-3.8	.001
Number of community groups	-.38	-3.3	.003
Community decision where MPA located	-.24	-.2.1	.05

R=0.80   R2= 0.64 Adj R2=0.59   F=12.81 p<0.001 n=34

Future directions

- Data-based educational toolbox with: booklet, PPTs, GIS
- Extension to coral triangle level

Thank you!

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