



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

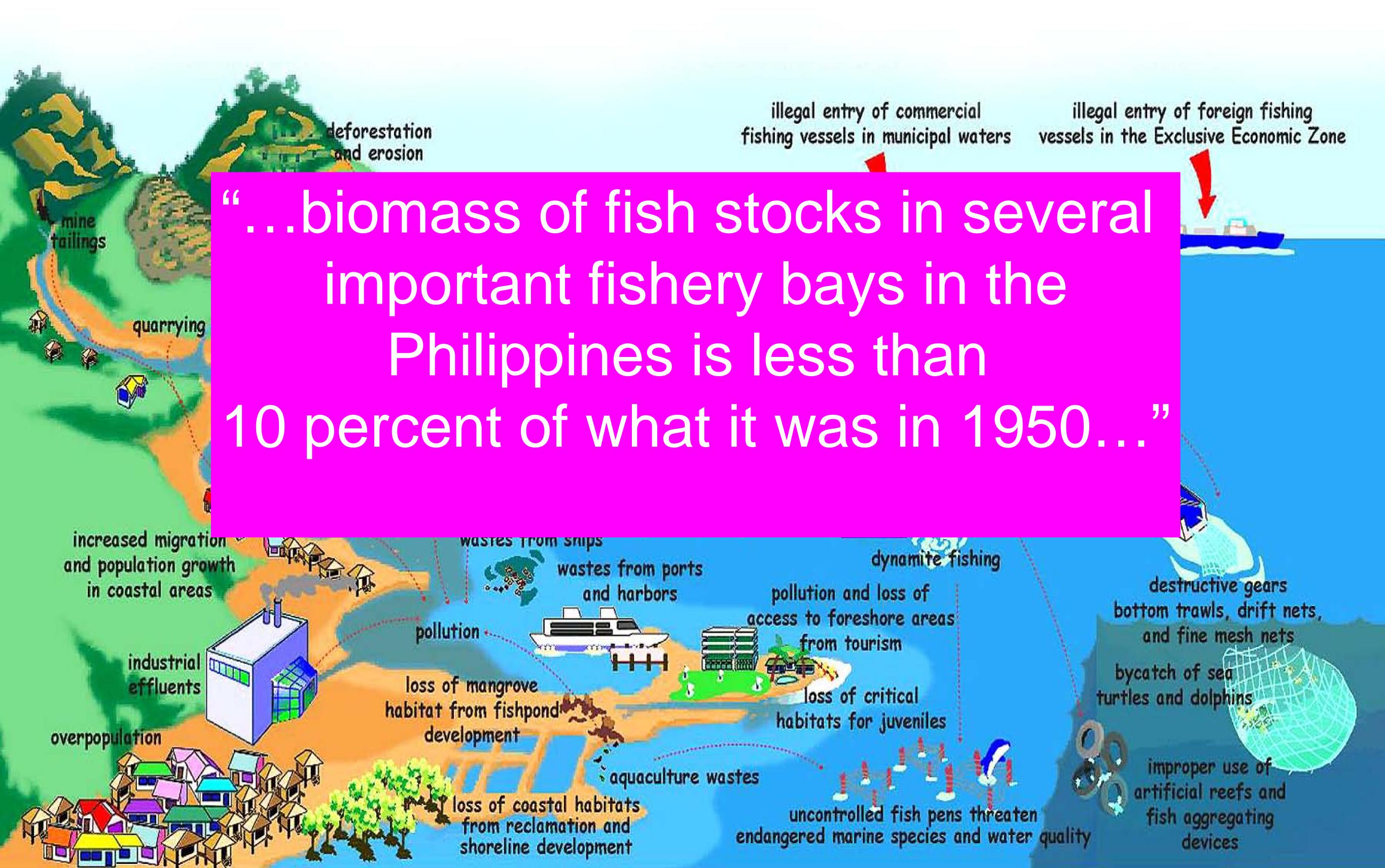
	Philippines
Land Area:	298,170 sq km
Coral Reefs:	27,000 km ²
Coastline:	18,000 km
Population below poverty line:	40% (2001 est.)
External Debt:	\$53.48 billion (31 September 2008 est.) 2 x national budget
Population:	97,976,603 (July 2009 est.) (79 million in 1999)



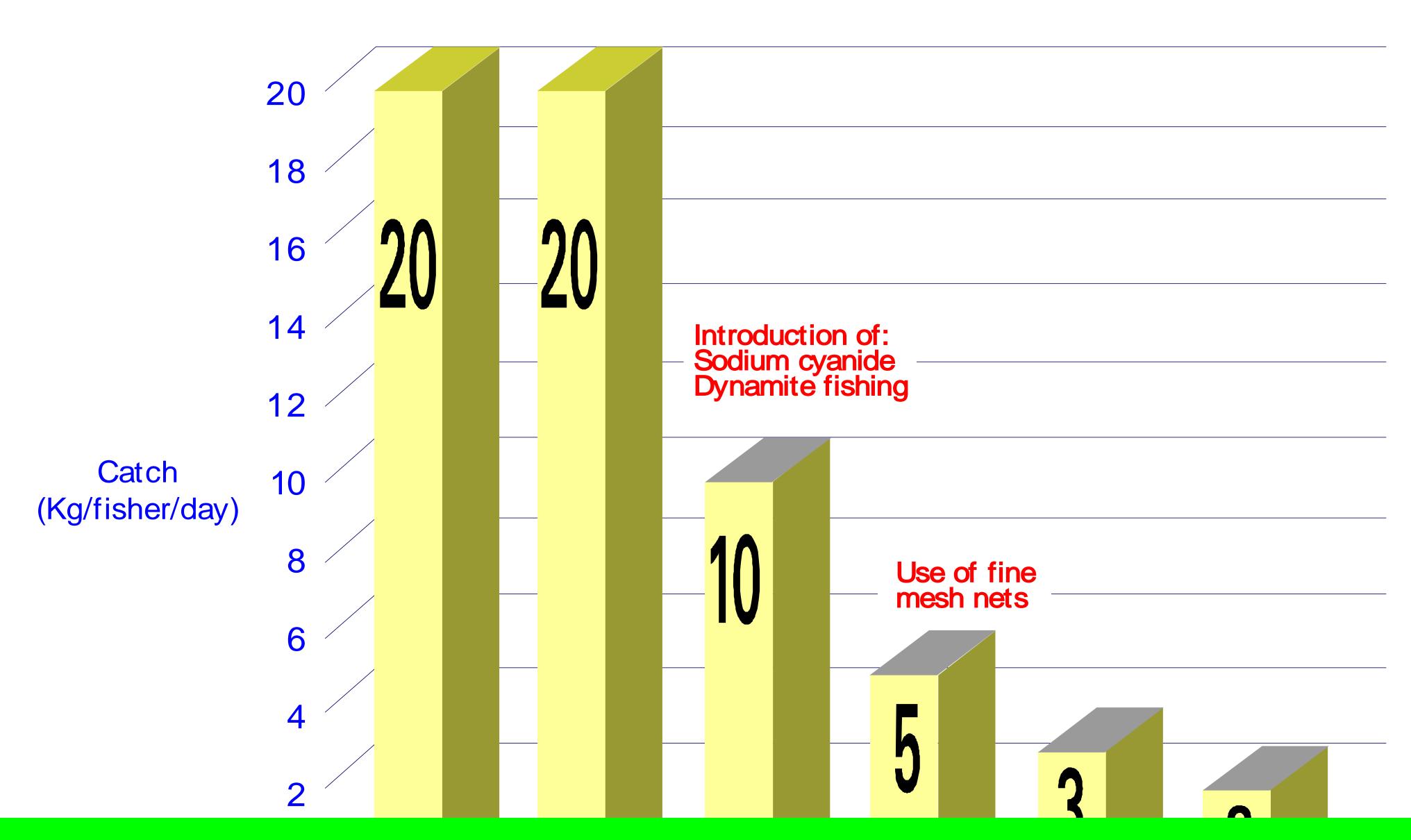




Forces Impacting the Philippine Coastal and Marine Environment

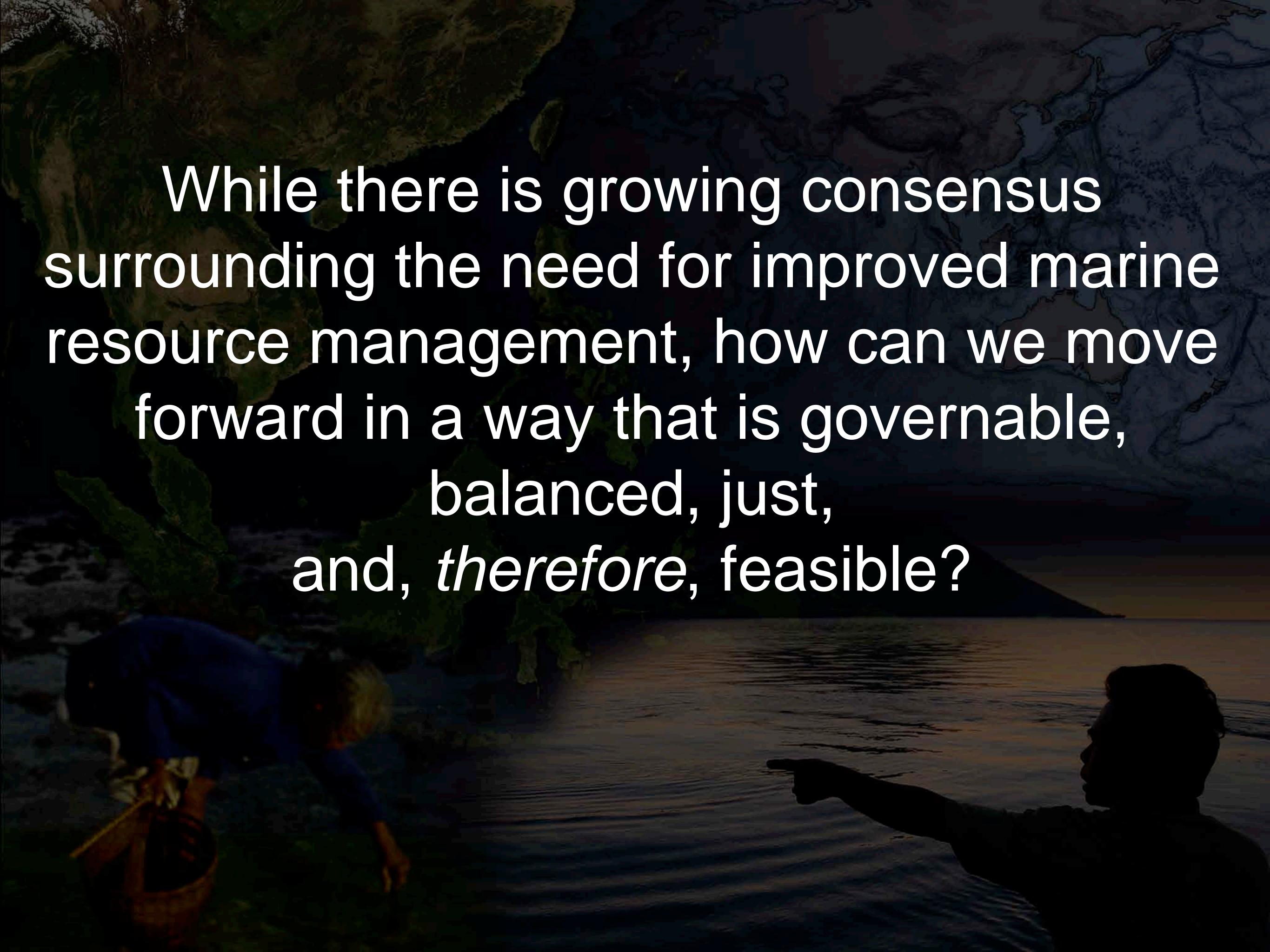


Trend in estimated daily fish catch per municipal fisher for Olango Island



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







Highly influential papers on ocean ecosystem decline Historical overfice to the last of the magnitude of th



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Historical Overfishing and the Recent Collapse of Coastal Ecosystems Jeremy B. C. Jackson, 1.a. Michael X. Kirby, Wolfgang H. Berger, 1 Karen A. Bjørndal, 2 Louis W. Botsford, 2 Susan Kidwell, 11 Carina B. Jarge, 1 Hurder S. Lerihan, 12 John M. pardolff, 12 Charles Tenence p. Hughes, 14 Robert R. Warner, 12 Charles H. Peterson, 12 Robert R. Warner, 13 Charles H. Peterson, 13 Robert R. Warner, 14 Robert R. Warner, 15 Robert R. Warner, 16 Robert R. Warner, 16 Robert R. Warner, 17 Robert R. Warner, 18 Robert R. Warner, 18

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 mass by 80% within 15 years of exploitation. (contain ~3 in fast-growing species were observed with 0 o increases in fast-growing Lising a meta-analytic transition in landings from long-lived, high trophic level, piscivorous bottom fish toward in fast grawing species were observed and with 0.2 increases within a decade. Using a meta-analytic hat fraction of the reversed within a decade. Using a meta-analytic hat fraction of the reversed within a decade. We conclude that Levels of Local large predatory we conclude that a large predatory we conclude the large predatory we can be a large predatory when the large predatory we can be a large predatory when the large predatory we can be a large predatory when the large predatory we can be a large predatory when the large predatory we can be a large predatory when the large predatory we can be a large predatory when the large predator 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. estimate that large predatory ten momase must Levels of U6

10% of pre-industrial levels. We consclude that 112 (13) /E:-Fishing down food webs (that is, at lower trophic levels) leads at first to increasing 10% of pre-industrial levels. We conclude that 112 (13) (Fig. predators in coastal regions have extended focts man better that an interest and the consensus consensus focts and the content a predators in coastal regions have extended fects may be global ocean, with potentially serious managed of the small regions that managed the coastal regions and regions that managed the coastal regions are small regions. catches, then to a phase transition associated with stagnating or declining catches. These results indicate that present exploitation patterns are unsustainable. systems. Our analysis suggests that manages and P80 (1985).

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and sustain three quarters of global fishery princes from the peace of major fish stocks has signed from the peace of major fish stocks has signed from the peace of major fish stocks has signed from the peace of major fish stocks has signed from the peace of major fish stocks has signed from the peace of major fish stocks has signed from the peace of the pea and sustain three-quarters or grown makers for 1993), decline and collapse of major fish stocks has given at decline and collapse of major fish stocks commit ${f E}$ xploitation of the ocean for fish and marine invertebrates, both wholesome and the effects of overfishing on these committees at the URL from constal conspicent suggest that losses drs at the URL 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 ise supershift marine fisheries are in a global crisis, mainly ncentrations, due to open access policies and subsidyvolecules may driven over-capitalization (1). It may be :ontaining exargued, however, that the global crisis is NA as noted mainly one of economics or of governance, nutating for 1 xody and 400 whereas the global resource base itself fluc**ւ∖չ**50 mM NaCl, tuates naturally. Contradicting this more re mixed with optimistic view, we show here that landings hour at 4°C. from global fisheries have shifted in the last ree times with e with phenol d to isolate

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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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

Released on March 21, 2005

Scientific Consensus Statement on Marine Ecosystem-Based Management

Prepared by scientists and policy experts to provide information about coasts and oceans

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Scott A. Heppell

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Scientific Consensus Statement on Marine Ecosystem-Based Management

Prepared by scientists and policy experts to provide information about coasts and

The following scientists and policy experts have approved this statement. All hold either Ph.D. or J.D. degrees and are based at U.S. academic institutions

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Signatories undated on October 18th 2006

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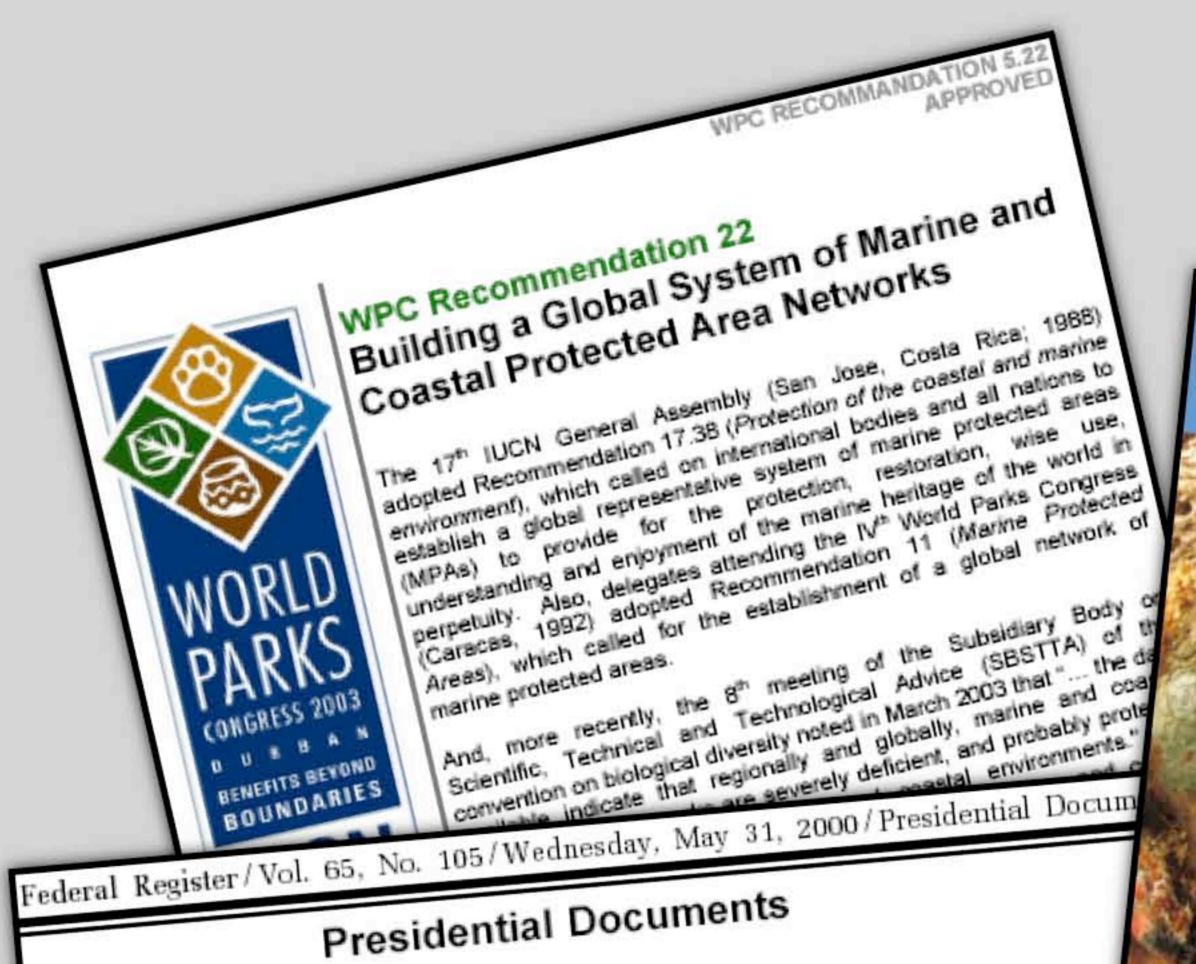
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In response to crisis, ambitious targets for MPAs are set



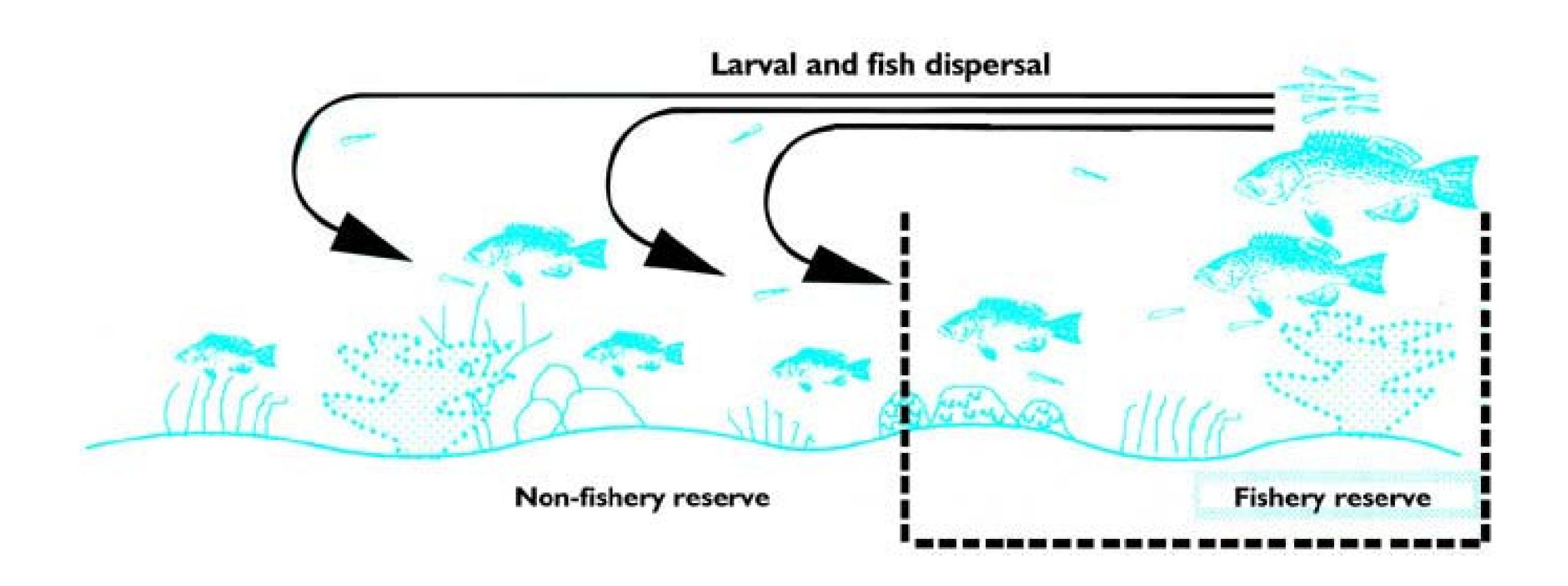
Executive Order 13158 of May 26, 2000

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 et 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 ore Section 1. Purpose. This Executive Order will

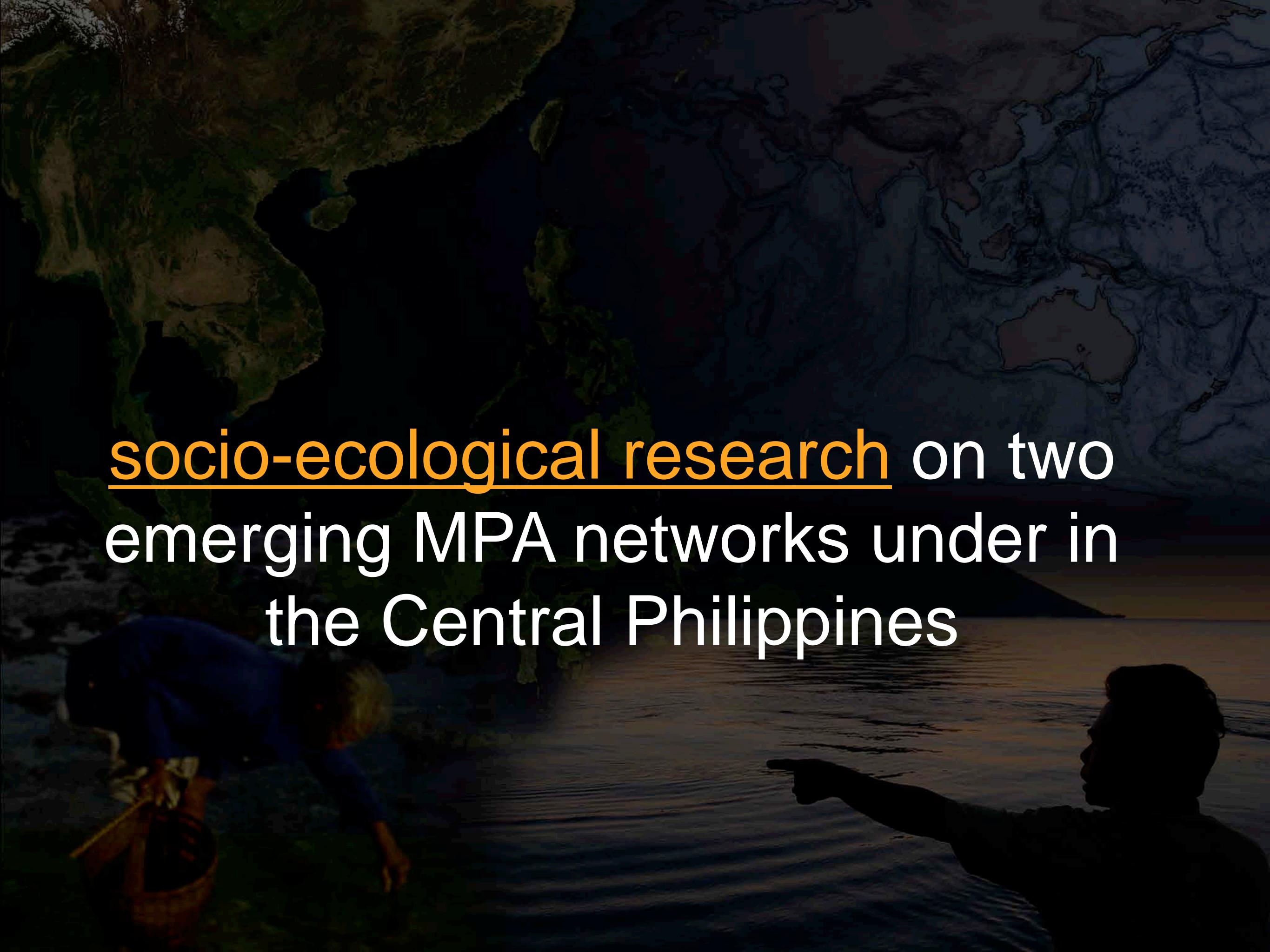


What is a Marine Protected Area?



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 123°30'0"E 123°15'0"E 123°45'0"E 124°15'0"E 124°30'0"E Survey sites for Danajon Bank (Northern Bob Tanon Strait (Southwest Cebu) and Cebu-Bob Strait (Southeast Cebu) Sources of Information: NAMRIA, actual GPS (July 26 and Nov. 9- 11, 2007) Projections and Datum: WGS84 Boundaries not authoritative and for ref Prepared by: Dalto TOLEDO CITY PINAMUNGAJAN Survey Site for Southeast and Southwest Cebu Highly decentralized context Survey Site for Danejon Bank Northern Bohol 123°30'0"E 123°45'0"E 124°30'0"E



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**)

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*)

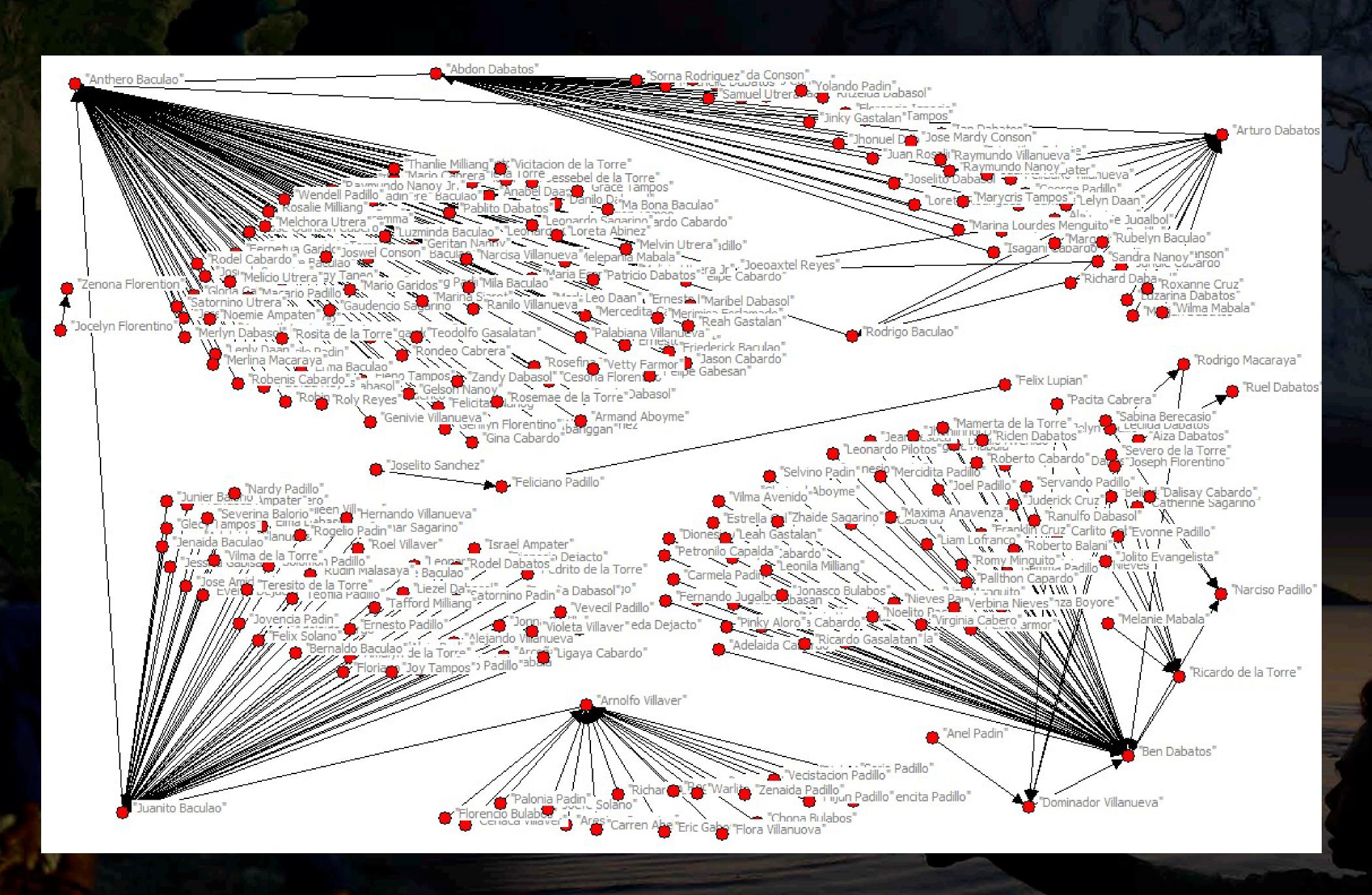
$$n=36$$
; $p<.05 = *; $p<.01=**$$

Dependent Variable: Perceived increase in number of fish by fishers in MPA area

Significant independent variables	Coeff		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

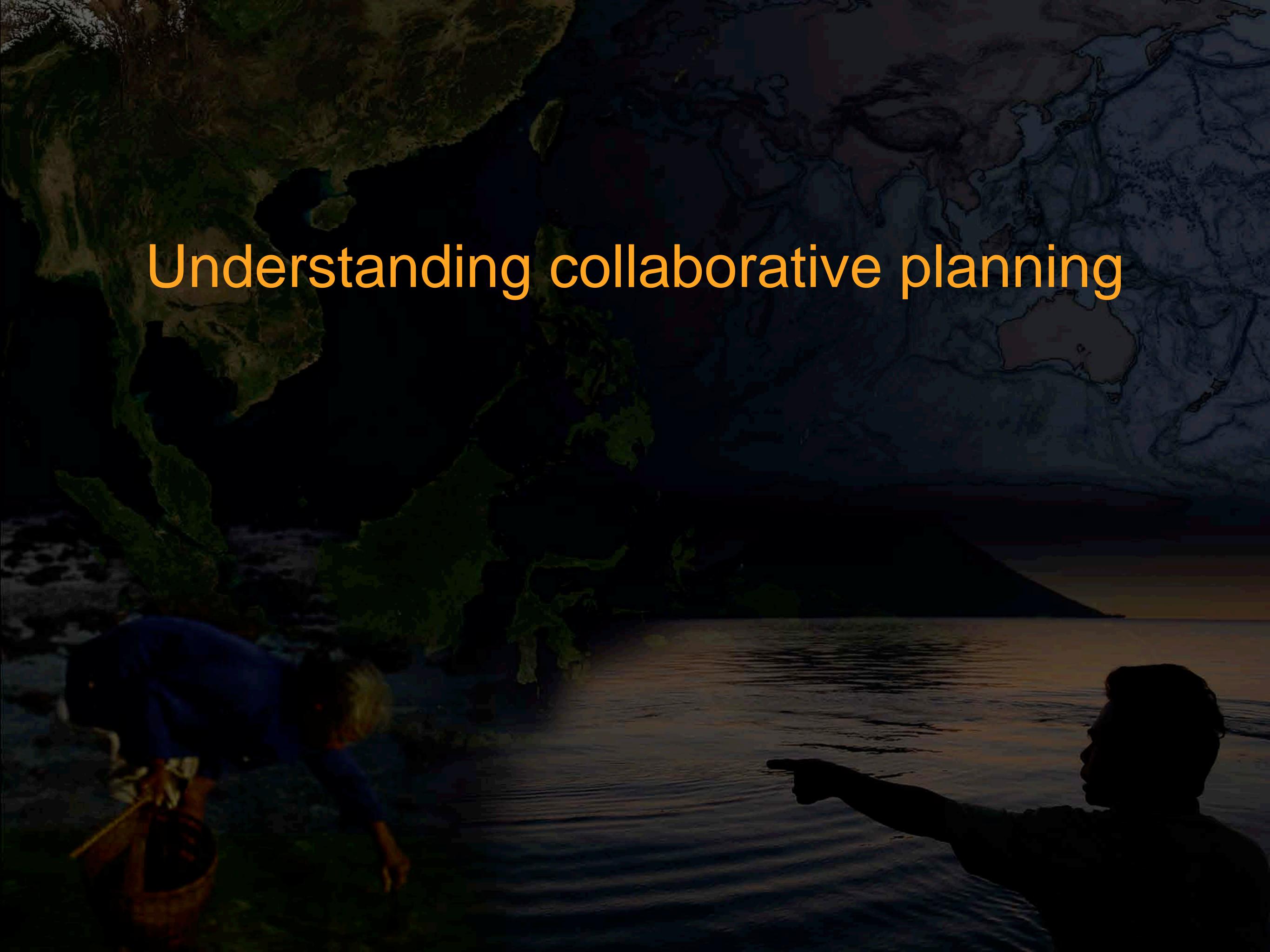
Clear leadership for MPA Social network analysis for a successful MPA



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

Dependent Variable: Perceived increase in number of fish by fishers in MPA area

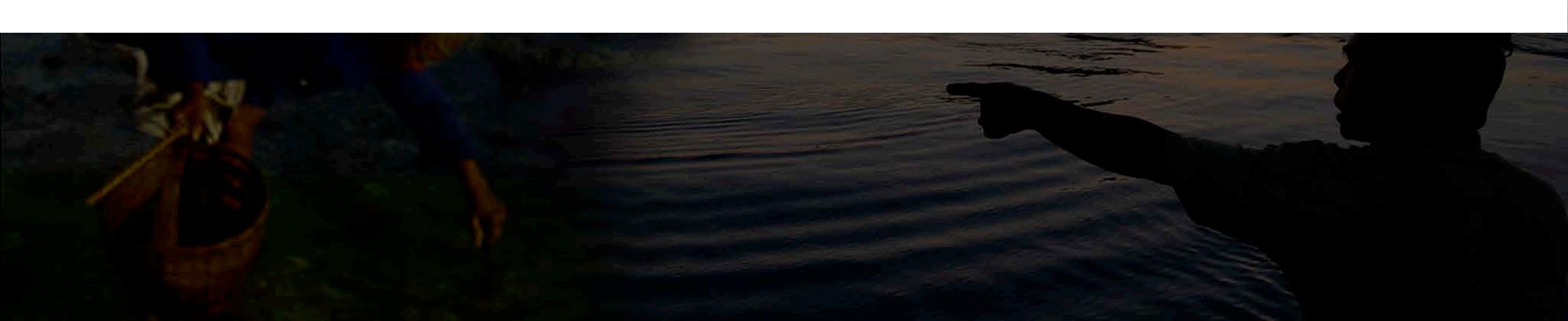
De la Victoria: "I'll be six (6) years in this job by October – my work is difficult because of the hazards that goes with it. When we do market denial, one box, for example coming from Zamboanga which we are able to confiscate will cost Ps100,00.00 to Ps150,00.00. About 100 kilos of dynamited fish. 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."



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		p 2-tail
NGO technical skill level	.60	4.33	<.001

Consultation with community during planning

Iraining involvement

.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

