

# BETTER SCIENCE, BETTER FISH AND BETTER LIFE



**MERYL J WILLIAMS**

@ 9<sup>TH</sup> ASIAN FISHERIES AND AQUACULTURE FORUM  
SHANGHAI OCEAN UNIVERSITY  
SHANGHAI, CHINA  
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# Asia-Pacific Fish

Where are we now?

What can be done better?

25 years of the ASIAN FISHERIES AND AQUACULTURE FORUMS

BETTER SCIENCE

CURRENT SITUATION

BETTER FISH

MAJOR ISSUES

BETTER LIFE



# Asian Fisheries and Aquaculture Forum @ 25

9<sup>th</sup> 2011 Shanghai, China

8<sup>th</sup> 2007 Kochi, India

7<sup>th</sup> 2004 Penang, Malaysia

6<sup>th</sup> 2001 Kaohsiung, Taiwan

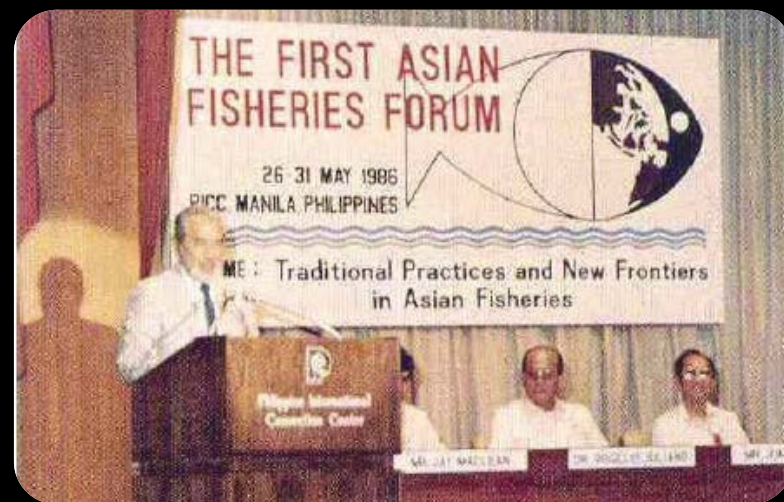
5<sup>th</sup> 1998 Chiang Mai, Thailand

4<sup>th</sup> 1995 Beijing, China

3<sup>rd</sup> 1992 Singapore

2<sup>nd</sup> 1989 Tokyo, Japan

1<sup>st</sup> 1986 Manila, Philippines



Opening ceremony, 1<sup>st</sup> Asian Fisheries Forum

# Asian Fisheries Society assets



Gender and Fisheries Network meeting  
Kochi 2007 (Nai-Hsien Chao)

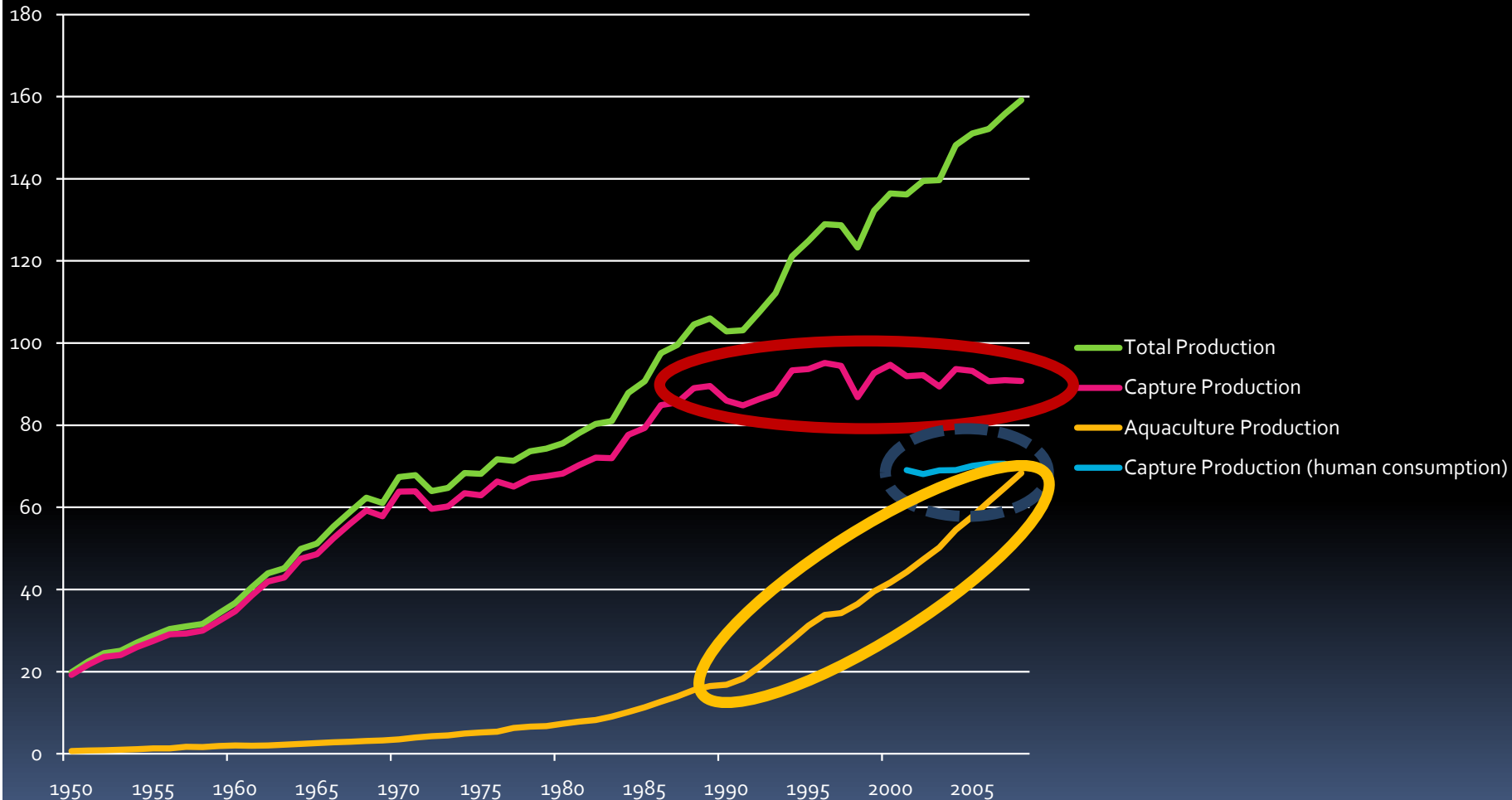
- Triennial Asian Fisheries and Aquaculture Forums + symposia
- Worldwide membership
- Council of eminent experts
- National branches and affiliated societies
- Special interest groups and conferences
- *Asian Fisheries Science*
- Communications
- AsiaPacific-FishWatch
  - Fish facts for all – being developed



# CURRENT SITUATION

- World fisheries and aquaculture trends
  - How is Asia-Pacific positioned?
- The challenges of ocean and land degradation and climate risk
- Where is the cutting edge of science for fisheries and aquaculture?

# “Nearly half of all fish eaten today is farmed, not caught” (FAO)



World fish production trends (millions Metric Tonnes): source FAO

# How is Asia-Pacific positioned?

- In 2008, Asia-Pacific countries produced 70% of world fish
  - Vs 33% in 1950
  - 53% of capture fish, 92% of aquaculture
- The “F20” top fish countries produced 82%
  - 12 Asian countries, 4 American, 4 European
- Asia-Pacific fish are the most diverse
  - SE Asia is world marine biodiversity center
  - Inland diversity also large, e.g., Mekong, India
- High domestic, foreign demand
  - The most heavily traded food commodity
  - Dynamic supply chains, e.g., supermarkets

1. CHINA
2. INDONESIA
3. INDIA
4. PERU
5. JAPAN
6. PHILIPPINES
7. USA
8. CHILE
9. VIETNAM
10. THAILAND
11. RUSSIAN FED.
12. KOREA
13. NORWAY
14. MYANMAR
15. BANGLADESH
16. MALAYSIA
17. MEXICO
18. TAIWAN
19. ICELAND
20. SPAIN



# How is Asia-Pacific positioned?

Trawler crew, Penang



Aquaculture w/out Frontiers



- ~ 40 mill Asia-Pacific workers in fish production
  - 85% of world fish producers (producing 70% of harvest)
  - Many are men; women also active
  - Small scale fishers and labourers often have low social status
- Women very active in aquaculture, post-harvest and fish marketing
  - India - 24% fishers and fish farmers are women (FAO 2011)
  - Rural aquaculture workforce (Kusakabe and Kelker 2001)
    - China 33% women
    - Indonesia 42%
    - Vietnam 80%



# How is Asia-Pacific positioned?

- But Asian fish trade suffers from trade wars and market shocks,
  - E.g., *Pangasius* woes, antibiotic and melamine scares, farmed shrimp tariffs, environmental concerns and campaigns
  - Free trade before sustainability
  - Information hard to find
- Asia-Pacific production dominance is not enough



*Pangasius hypophthalmus* (Tra)  
N.T. Phuong et al CAA2 2006



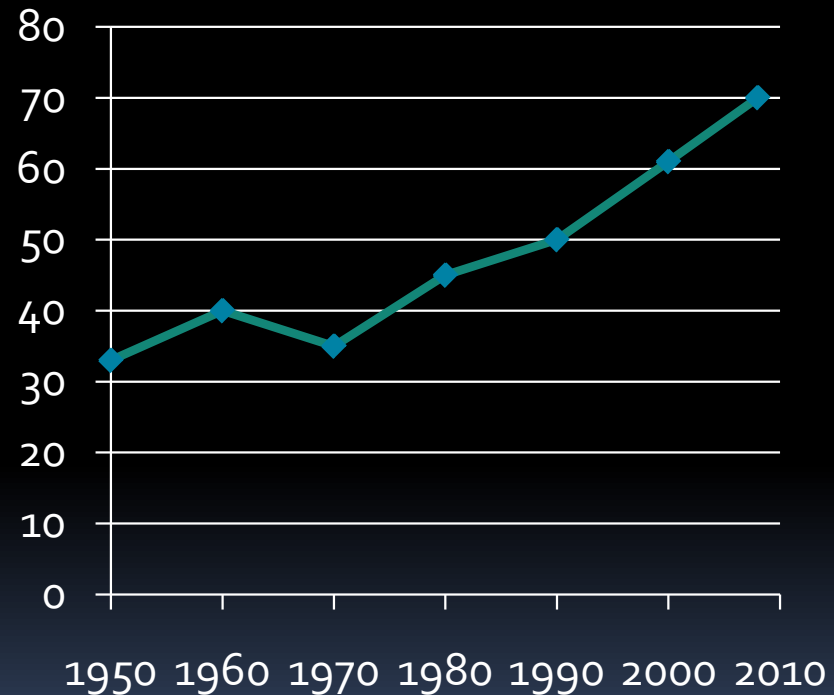
# How is Asia-Pacific positioned?

- Asian aquaculture has been the dominant factor since 1980s
  - Growth in production
  - Growth in world shares
  - Is growth manageable?



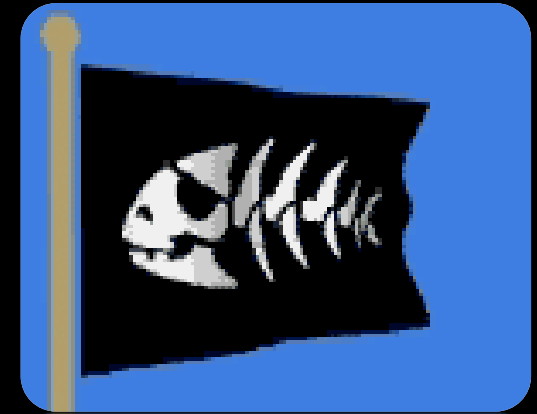
Photo: CAPPMA, China

## Asia-Pacific Percentage of World Fish Production



# How is Asia-Pacific positioned?

- Capture fisheries management lacks capacity to control effort
  - Increasing fleets and fishing power
  - Domestic and foreign IUU increasing
  - Fishers lives are not improving
  - Many fishers are losing their rights

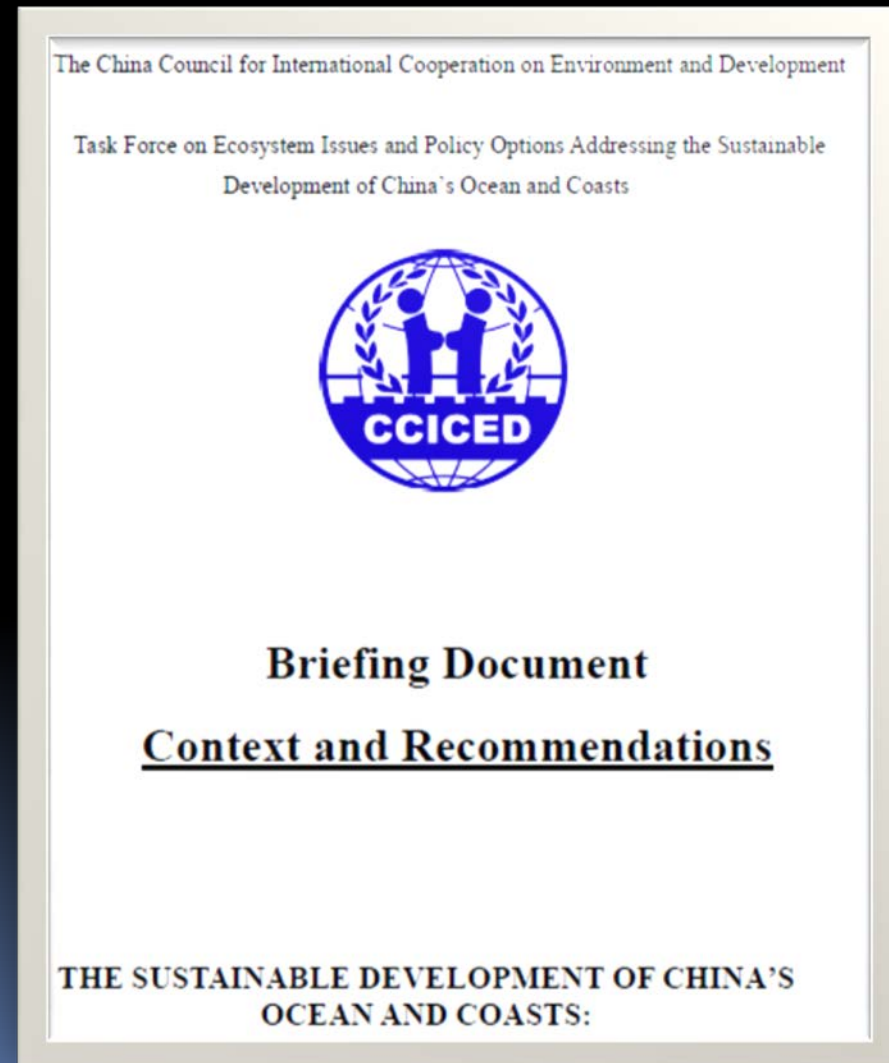


Land reclamation, fishing village  
Penang

# Natural resources: ocean and land degradation and climate risk

- The largest challenge for fisheries and aquaculture?
- Land and coastal development get priority
- China shows typical problems
- Sustainable Development of China's Oceans and Coasts (2010)
  - China Council for Int. Coop. in Env. & Dev.

[http://www.sfu.ca/international-development/cciced/pdf/2010\\_ReportofOcean.pdf](http://www.sfu.ca/international-development/cciced/pdf/2010_ReportofOcean.pdf)



# Large-scale sea enclosing and reclamation, weakening marine ecosystem services

## Four stages of land reclamation in China

1949 ~ 1960s	Sea salt industry
1960s ~ 1970s	Farmland
1980s ~ 1990s	Aquaculture
1990s ~ now	Harbour, industry and urban development



CCICED Report: *Sustainable Development of  
China's Oceans and Coasts* 2010



HAB resulted in tens of millions of RMB loss  
in aquaculture in Zhejiang Province, June 2005

CCICED Report: Sustainable Development of  
China's Oceans and Coasts 2010



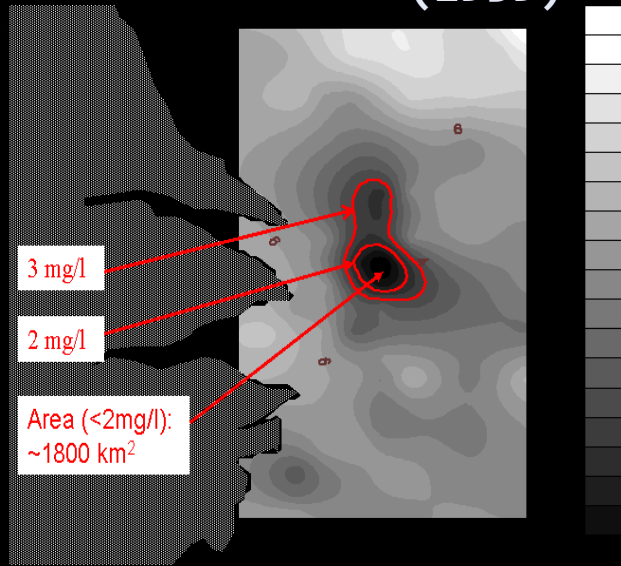
*Karenia mikimotoi*  
(red-tide dinoflagellate)  
2005-06 Photo: JH Wang



# Sharp increase in “dead zone” area off Changjiang/Yangzi Estuary

(Huang Daji, 2010)

(1959)



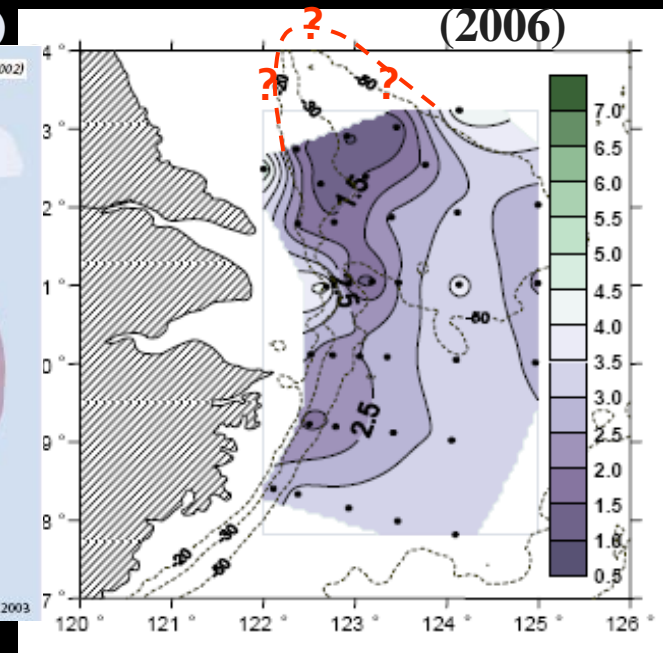
1,800km<sup>2</sup>

(1999)



13,700 km<sup>2</sup>

(2006)



>15,400 km<sup>2</sup>  
(20,000~30,000)

“Dead zone” or hypoxia area ( $DO \leq 2.0 \text{ mg/l}$ )

CCICED Report: *Sustainable Development of China's Oceans and Coasts* 2010

# *Penaeus chinensis* life-cycle – affected by many factors

Reduced discharge

Eutrophication

Reclamation

Over-fishing



# Climate risk

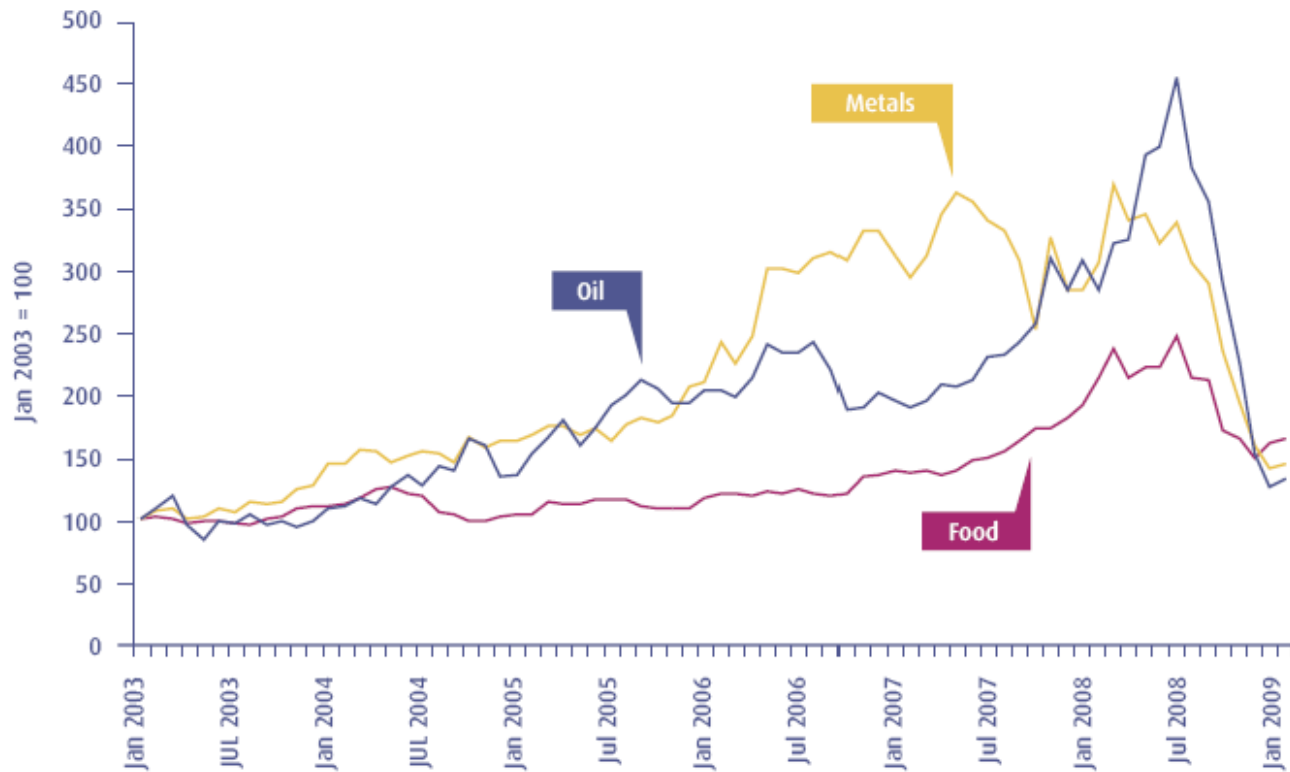
- Great vulnerability
  - the debate needs more substance on what fisheries and aquaculture can do
- Fishing affected by and affects climate change
  - Fish production becoming more C/energy intensive
  - Energy and food/fish price nexus



The Star, Pulau Pangkor 2011

# Food and energy prices

Global commodity prices: Jan 2003 – Feb 2009



Source: Tim Jackson, *Prosperity without growth* report, Sustainable Development Commission

# Where is the cutting edge of science?

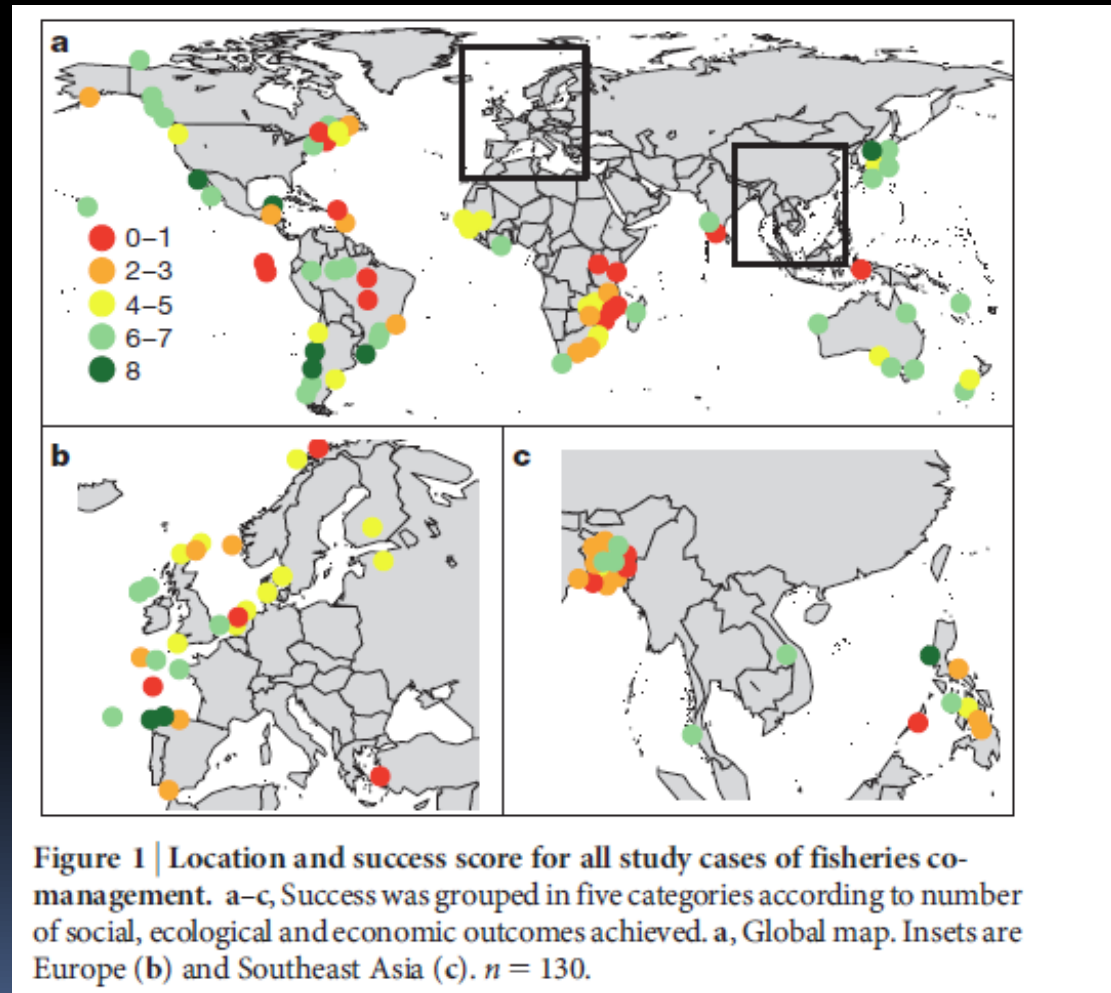
- Fisheries science advances
  - Harvest strategies
    - Explicit management actions to achieve biological and economic objectives (assessments and control rules)
  - Understanding how fishing changes the trophic level of catches (Branch et al *Nature* 2010)
    - Fishing down, fishing up, fishing through, fishing 'the available'
  - Ecosystem approach to fisheries management – theory to practice
    - Broadening traditional fisheries management objectives to include, e.g., biodiversity, habitat conservation
    - Going beyond fisheries to cross-sectoral, integrated approaches to conserving/restoring ecosystem services
    - Selective fishing and 'balanced harvest' (IUCN 2010)
  - Meta-analyses of lessons learned from fisheries management
    - Myers and Worm (2003), Worm et al (2006), Hilborn et al (several)
    - Little readily accessible Asian information

# Where is the cutting edge of science?

Gutierrez, Hilborn  
and Defeo

'Leadership,  
social capital and  
incentives  
promote  
successful  
fisheries'.

*Nature* 2010





# Where is the cutting edge of science?

Branch, Watson,  
Fulton, et al

'The trophic  
fingerprint of  
marine fisheries.'

*Nature* 2010

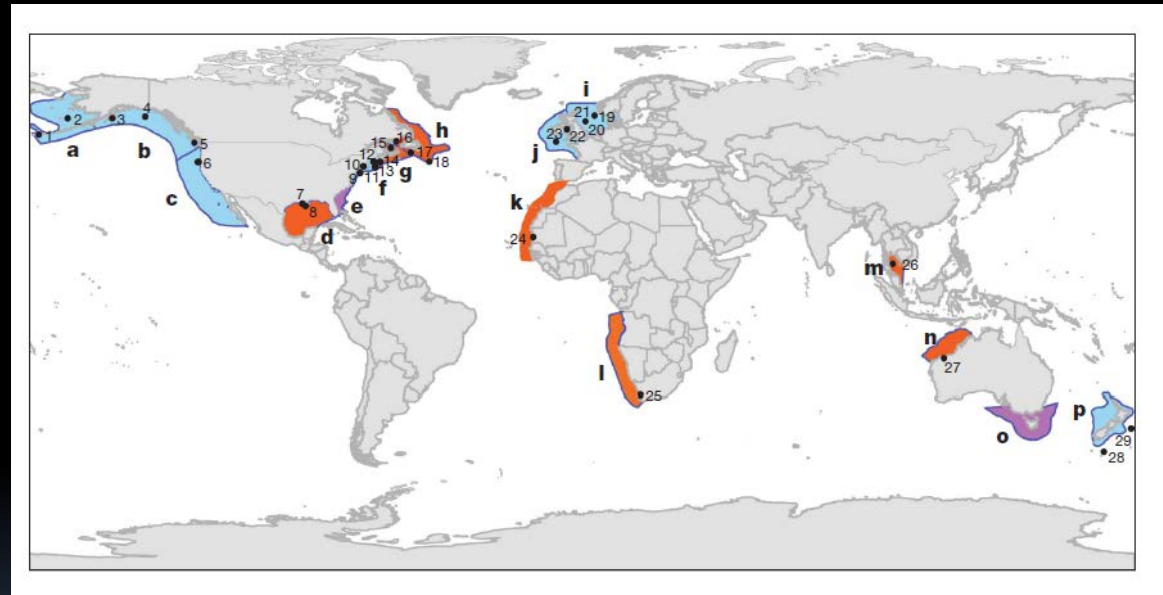


Figure 4. (Map of cases used to show marine trophic level)

# Where is the cutting edge of science?

- Fisheries economics, policy highlights
  - Certification gains traction
    - Multiple roads, e.g, MSC, FishSource, ISSF for tunas
    - Large Asia-Pacific gaps
  - Technical change finally receiving attention
    - 'Technical Change and the Commons,' Squires & Vestergaard, USCD Center for Environmental Economics, Working Paper 2009
    - Endogenous and exogenous technologies, e.g., gear developments, telcoms, navigation

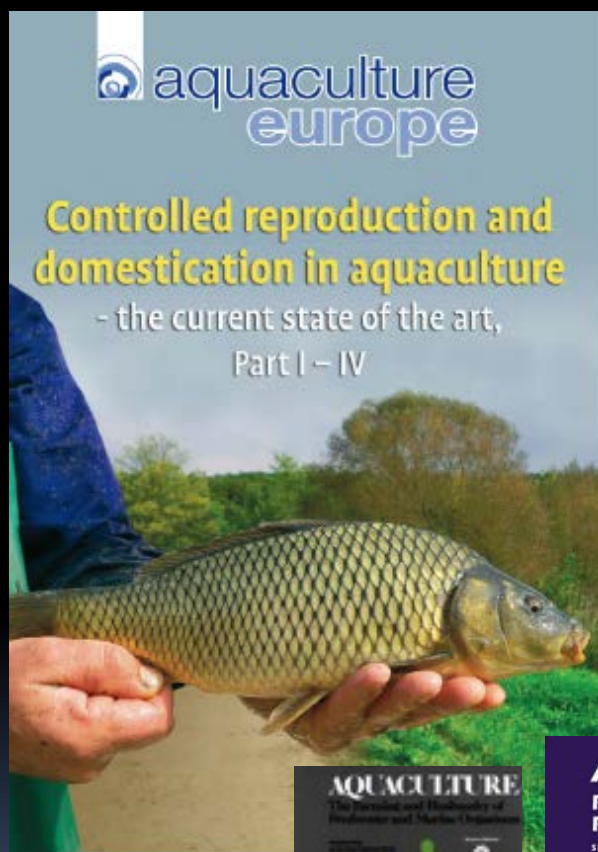


Fishing vessel lights  
G. of Tonkin  
28/11/2010



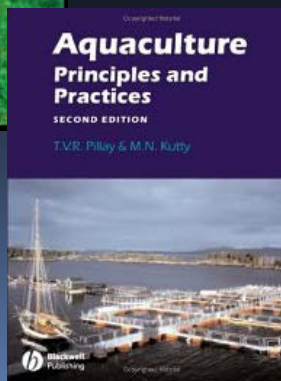
Purse seiner lights  
Sarawak Malaysia  
The Star 24/09/2010

# Where is the cutting edge of science?



M. Bilio (2008)

- Aquaculture science highlights from literature searches
  - Fish health and farming systems
    - Probiotics, immunostimulants, vaccines, fish welfare
  - Feed reviews
  - Genetics – genomics, markers
  - Domestication review (Bilio 2008)
    - Barely cited -yet!
  - Aquaculture texts, outlooks
    - Including aquaculture warnings
  - Much of the aquaculture science literature is not from Asia-pacific
  - Economics studies are sparse



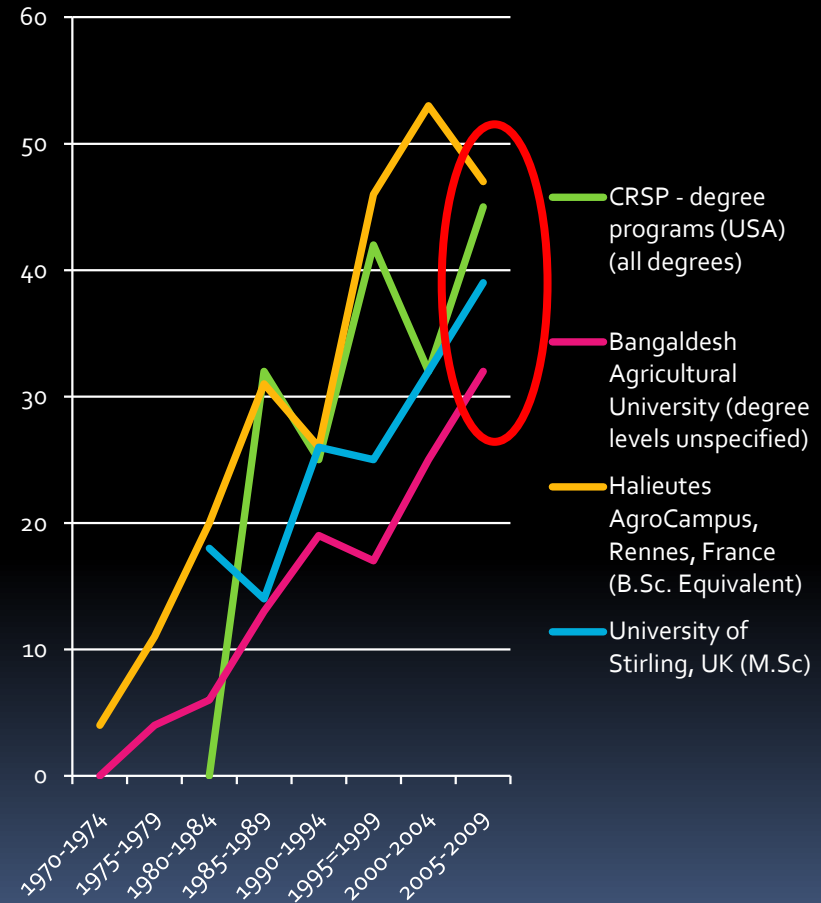
# Where is the cutting edge of science?

- Social science
  - Fisheries governance, participatory approaches
  - Fisheries vs other sectors, e.g., coastal
  - Linking social and ecological systems
  - Aquaculture social studies languish
  - Gender research at low level
  - Social science papers often by 'converted' biologists
- Science often 'on the outer'
  - Needs to be in touch with fisheries management and aqua culture needs



# Human Capacity Development, and gender

- Graduates cannot meet Asian aquaculture industry needs
  - But many grads are not entering aquaculture
- Women aquaculture graduates have increased considerably
  - 0% → 32% in Bangladesh; 45% in VN; 25% in France
  - Women's ratio as aquaculture graduates do not coincide with global gender gap
  - BUT aquaculture research, teaching dominantly led by men
  - Gender difference in career path?
    - Difficulty in field work





# Major Issues

- Mismatches between fish production dominance and
  - Trade and market power
  - Fish and environmental quality and food safety
  - Fisheries management performance
  - Managing the explosive growth of aquaculture
  - The skills, education and conditions of the labour force
  - Too little invested fisheries and aquaculture science
  - Fisheries voice in policy decisions that favour development and allow ocean and land degradation and climate risk





# How can we do better?

Better Science

Better Fish

Better Life



# Better Science

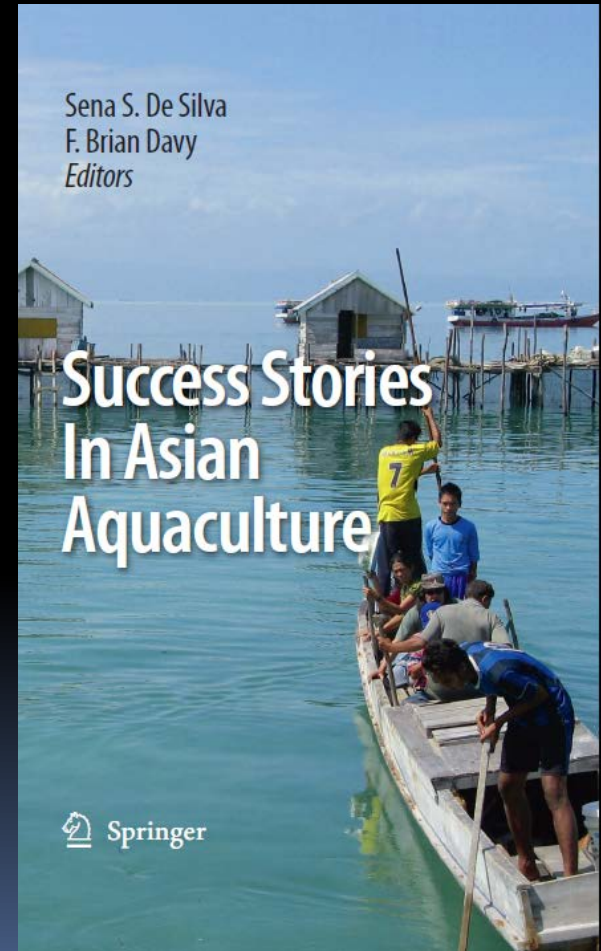
- Science based fisheries management starts with fish stock assessment
- Fish stock assessment needs revitalization
  - Improve data collections
  - Train analysts
  - Publish the results
  - Network and collaborate within the region and with world leaders
    - Explore and develop new methods suitable for Asia-Pacific fish and fishing



ISSF Tuna Stock Assessment Workshop  
Rome, 14-17 March 2011

# Better Science

- Aquaculture surge demands a major research investment to sustain
  - Success has come from science plus farmer innovation
  - Agricultural experience teaches that productivity growth needs continuing research investments
    - Learn also from Norway's salmon industry



# Better Science

- Policy research and social science
  - Need to be professional and rigorous
  - Gender needs to be mainstreamed into research programs, where applicable



ICSF, Yemaya March 2011



# Better Science



China: laver harvest 2010

- Science is needed to help cope with climate
- Learn from agriculture
  - Analysis of local vulnerabilities
  - Best local and regional forecasts
  - Technical, policy and economic strategies to suit

# Better Science



CIBA, India March 2011

- Performance is important
  - Relevant, peer reviewed publications still the gold standard – publish or be ignored
  - Scientists need to connect with each other, stakeholders and users
- Science is built on education and training
  - Act on outcomes of 2009 AFS-AIT International Symposium on Aquaculture and Fisheries Education
  - FAO to follow-up on Global Aquaculture Conference Expert Panel on Human Capacity Development and Gender Issues, and HCD Framework and Strategy



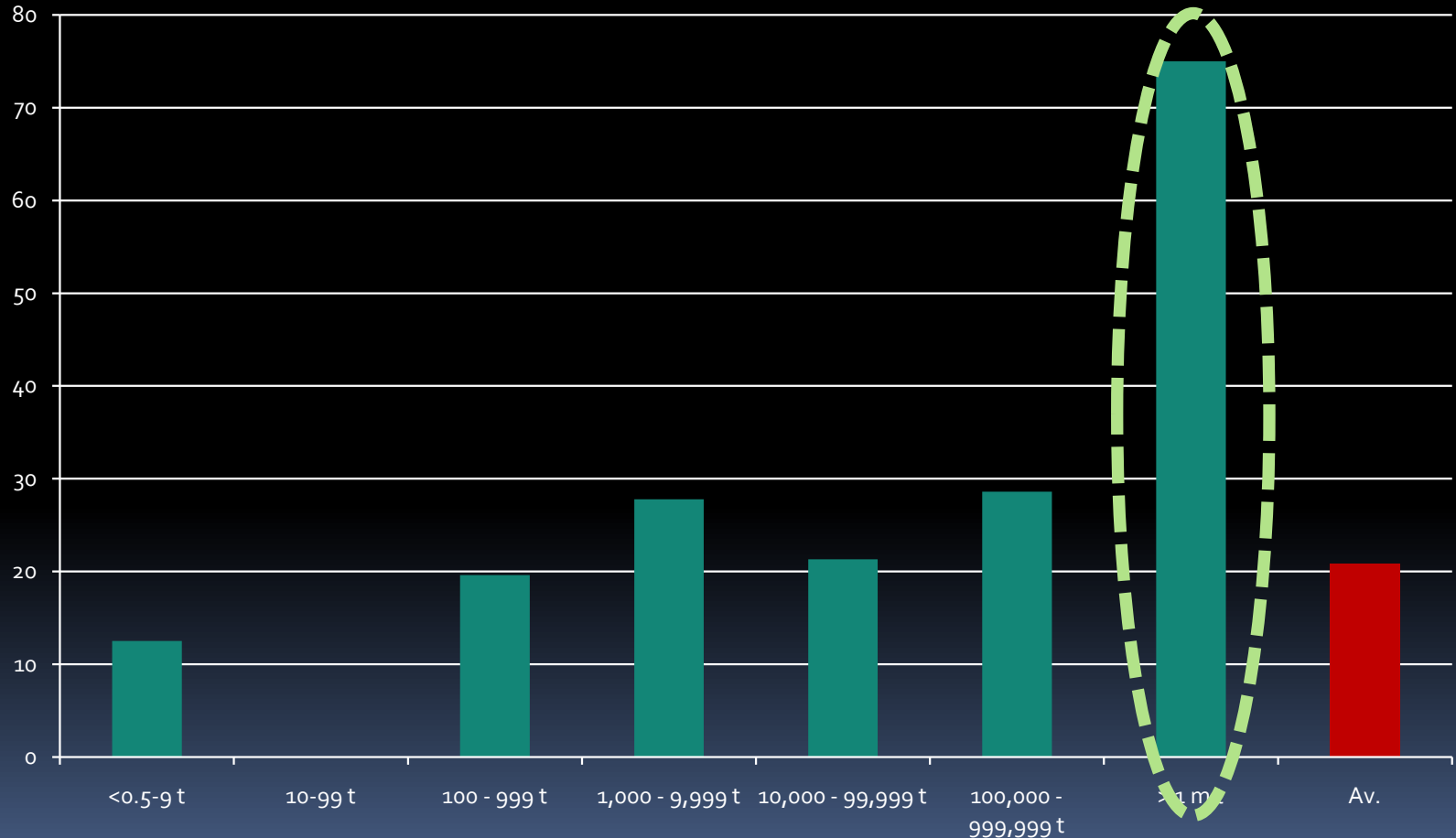
# Better Fish

## Better breeds and seeds

- The overlooked core of aquaculture
- Public and private sector roles in breeding, multiplication and dissemination are still in the melting pot
- Focus on key species will help focus aquaculture development
  - First close the life cycle
  - Next embark on genetic improvement
  - Fewer sub-sectors, better serviced
- Most world production comes from improved breeds



# Percent domesticated aquatic species (FAO 2004, Bilio 2008) N=202 spp



# Better Fish

- Fish quality and food safety
  - Essential for good market returns
  - Essential to avoid many trade shocks
  - Starts with the environment and production
  - Science and good practices needed
    - Women add value to fish
  - Consumers and experts need more accessible information



Catfish line  
N.T. Phuong et al. CAA2 2006

# Better Life

- Create better informed public and experts
  - Remove confusion with authoritative information
  - AsiaPacific-FishWatch is being initiated by AFS to inform consumers and experts - Fish Facts for All
  - <http://asiapacfishwatch.org/>



# Better Life

- Build the skills and knowledge of people on fisheries and aquaculture
  - Skilled people run better businesses and develop better policies
  - A stronger, more entrepreneurial private sector with better business skills
  - Higher quality fisheries management
  - Better skilled, more prosperous fish workers
- Better fish, science and lives can put Asia-Pacific into the driver's seat among the 'F20' fish producers

G5 G8 G20

BRICS ASEAN APEC

WTO CBD BOAO UNGA

FAO UNFCCC

GEF CTI WCPFC IOTC

Rio+20 RPOA

**F20**