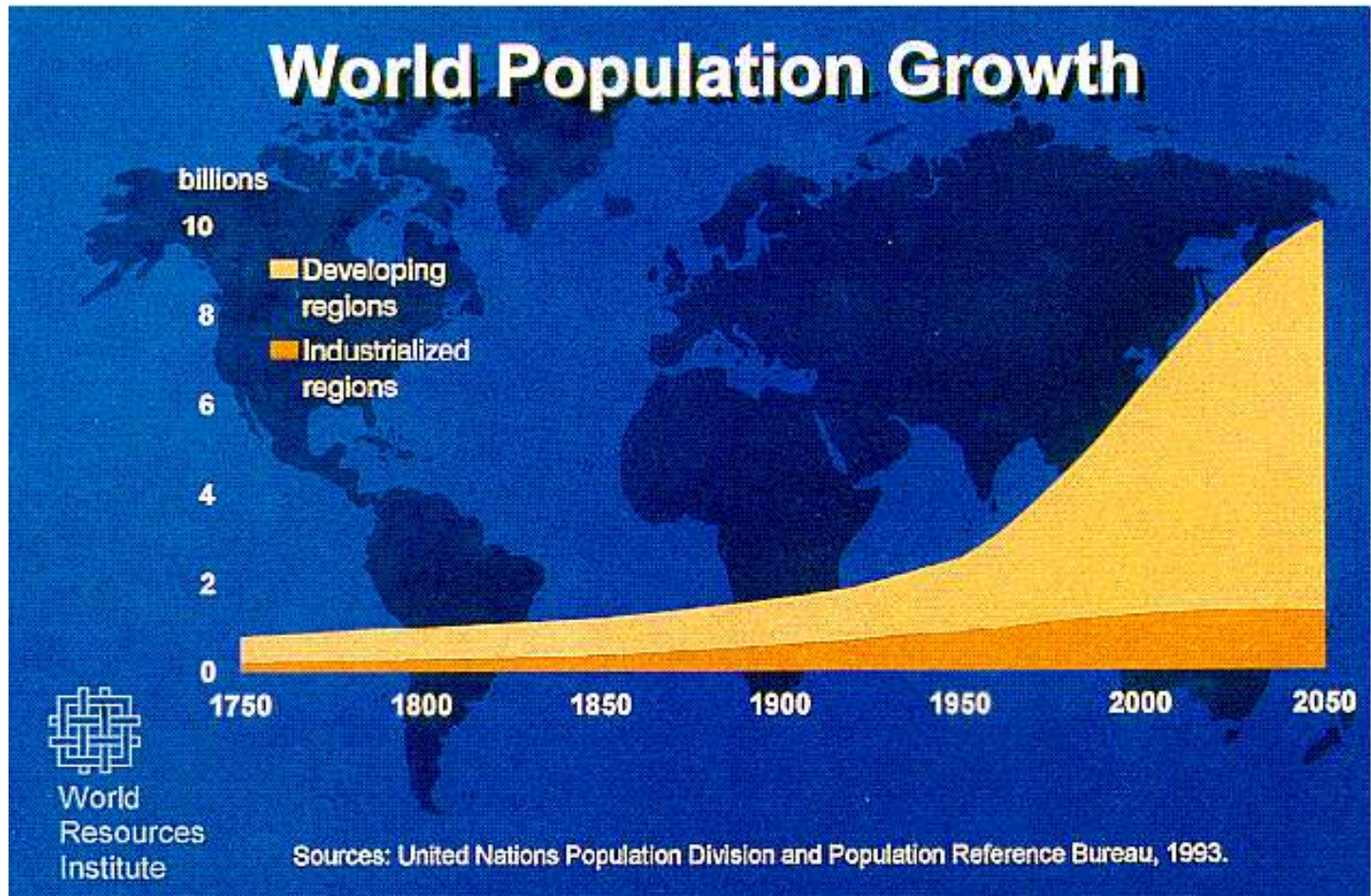


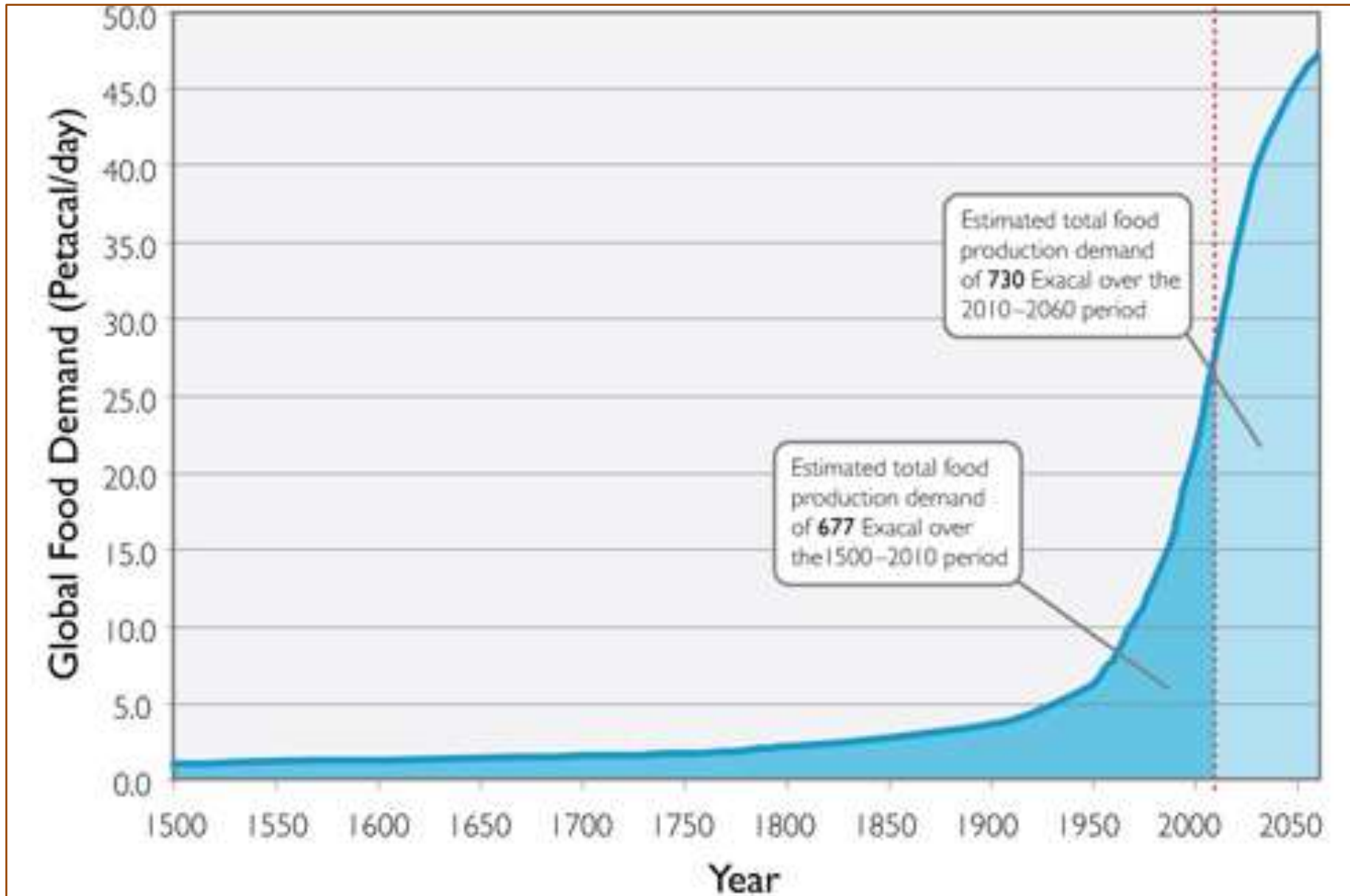
Assessing the importance of Artisanal Fisheries



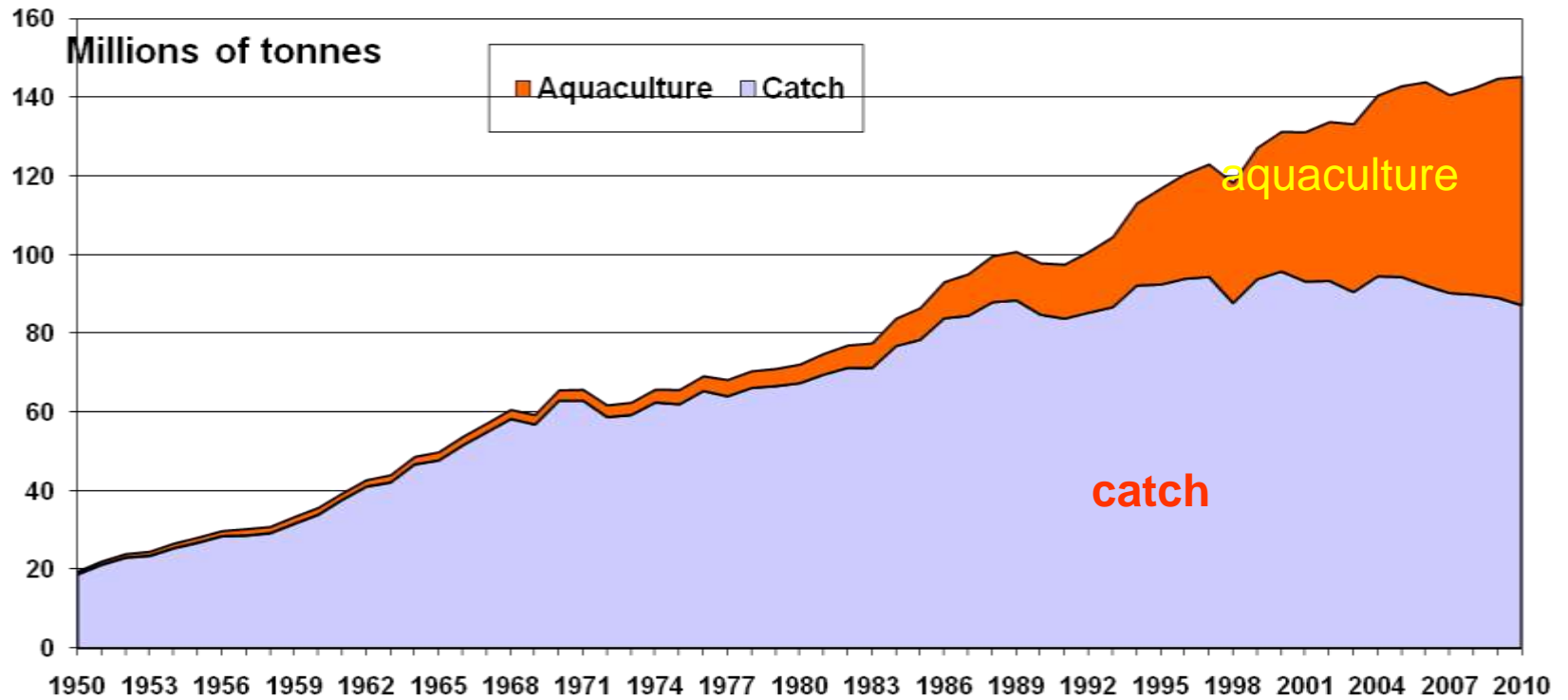
More people = more food demand



The World Urgently Needs More Food



World Fish Production



To meet the needs of the predicted human population of 2050, an additional 75 million tonnes of protein from fish and aquatic invertebrates will be required, representing a 50% increase in current supply.

What is an “artisanal” or “small-scale” fishery?

- A fishery that is not mechanized
- an activity that is resident or migrant; occasional, seasonal, part-time or full-time.
- “Traditional”, “small-scale” or “artisanal” as antonyms of “modern”, “large-scale” or “mechanized”, and “industrial” fisheries.
- Artisanal can be characterized as labor intensive
- For small-scale, there are numerous highly diverse definitions



What is an “artisanal” or “small-scale” fishery?

Artisanal, small-scale fisheries refer to the smallest viable fishing units in a country or a province, with downward or lateral compatibility in fishing gear operation.


They refer to a specific regime of fishing craft, gear—or both in combination—at the bottom-end of the fishing power hierarchy in a country or province.



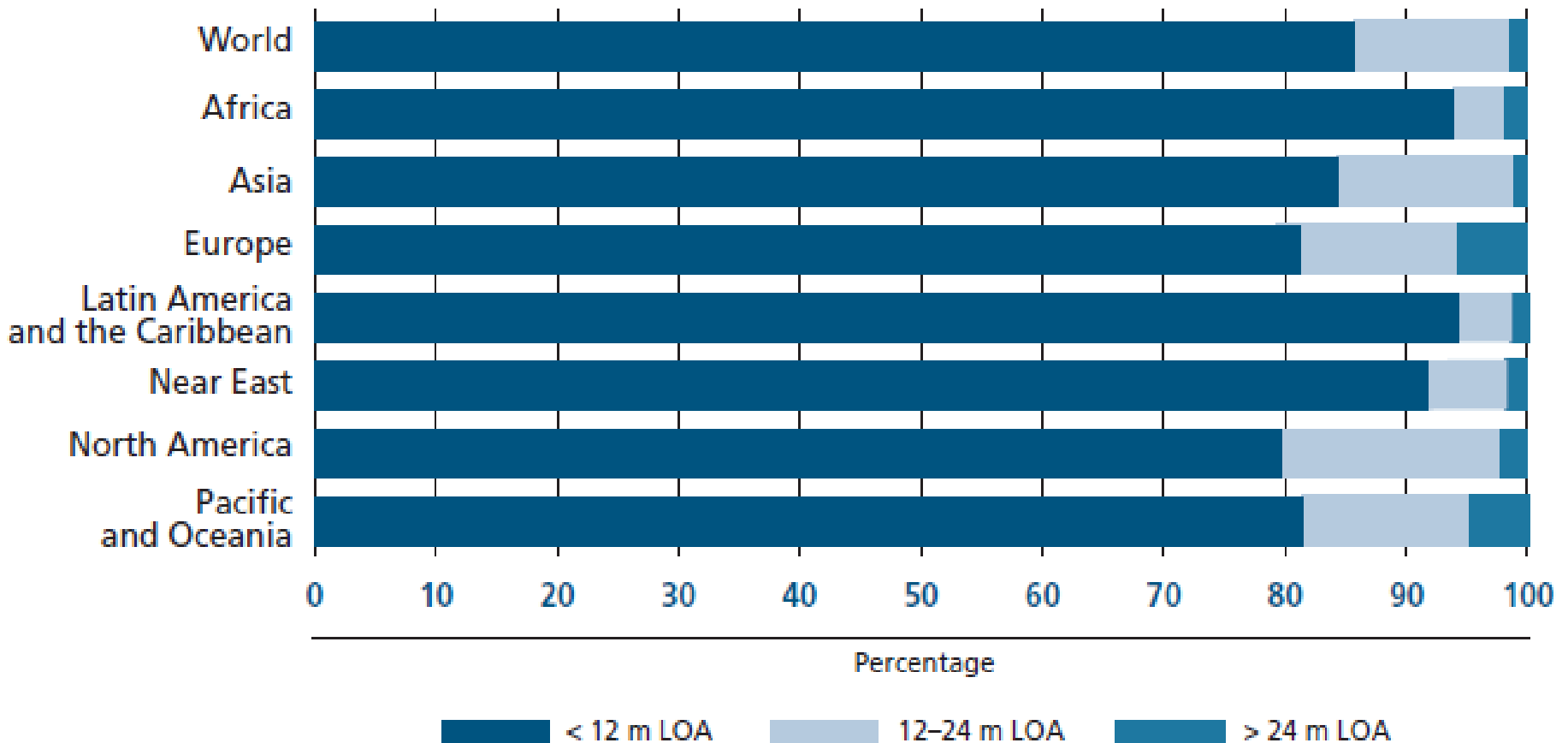
What is an “artisanal” or “small-scale” fishery?

- Includes a range of fishing activities targeting sedentary molluscs in the littoral waters to highly migratory tuna stocks in the distant waters.
- Includes *highly individualized* fishing operations, *small-crew* operations and *labour-intensive* operations.

Employment in Fishing

- In 2008, 44.9 million people engaged in capture fisheries or aquaculture worldwide.
 -  of 167% since 1980
 - Majority of increase in developing countries, mostly in Asia
- In developed countries, employment in fishing decreasing
 - In 2008, ~ 1.3 million people employed in developed countries
 -  of 11% since 1990.

Size distribution of motorized fishing vessels (FAO State of World Fisheries and Aquaculture, 2010)



Note: LOA = length overall.













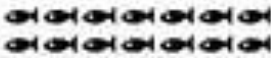



The hidden harvests: the global contribution of capture fisheries

(World Bank, FAO and WorldFish Center, 2010)

- Small-scale capture fisheries contribute **> half** of the world's marine and inland fish catch
- Nearly **all used** for direct human consumption
- Employ **> 90%** of the world's fishers
- Substantial underestimation of the small-scale sector



FISHERY BENEFITS	LARGE SCALE 	SMALL SCALE 
Subsidies	\$\$\$\$\$ 25-27 billion	\$ 5-7 billion
Number of fishers employed	 about 1/2 million	 over 12 million
Annual catch for human consumption	 about 30 million t	 same: about 30 million t
Annual catch reduced to fishmeal and oils	 35 million t	 Almost none
Annual fuel oil consumption	 about 37 million t	 about 5 million t
Catch per tonne of fuel consumed	 1-2 t	 4-8 t
Fish and other sealife discarded at sea	 8-20 million tonnes	 Very little

The Importance of Fisheries

- Protein Source
- Income Source
- Exports
- Culture



Importance of small-scale fisheries sub-sector

- Contributes 25 per cent of world catch, and account for 50 per cent of fish used for direct human consumption.
- Employs about 25 to 30 million people in production, processing and marketing, especially in developing countries.
- Plays an important role in poverty alleviation.
- Contributes to foreign exchange earnings significantly more than small farming or peasant agriculture in many developing countries.



No distinction drawn between “small” and “large”

- The effects of fishing on fish stocks and fish habitats are bound to vary from small- to large-scale fishing units.
- Small-scale fishing units are individually less threatening to the marine ecosystems.
- SSF are better adapted to the aquatic ecosystems.
- Large-scale sub-sector employing non-selective fishing gear like bottom trawls often has a negative impact on fish stocks. E.g. Canada, China.



Why small-scale fisheries are better than large-scale?

- Far more dispersed in a geographic sense; are better adapted to the aquatic milieu; cater to the livelihood interests of fishers; and are the most equitable in terms of distributing benefits of fishing to the largest number of coastal peoples.

From Subsistence to Commercialisation

Shared locally

Local Markets

Exports

Traditional Exports
(Dried Shark, Ray, Octopus
and Seacucumber)

Live Fish & Lobster

Octopus

Tuna

Conch



Livelihood strategy	Livelihood functions of fishing
'Survival' (fishing is sole activity)	<ul style="list-style-type: none"> ▪ Subsistence (food production and income) ▪ Nutrition – protein, micronutrients and vitamins
'Semi-subsistence diversification' (fishing is one of a range of activities, e.g. farming)	<ul style="list-style-type: none"> ▪ Own consumption – food security and nutrition ▪ Complementarities in labour use with farming ▪ Means for barter, or for participation in reciprocal exchange and social networks ▪ Occasional cash source ▪ Diversification for; labour and consumption smoothing; risk reduction; as a coping strategy/buffering against shocks
'Specialisation' (fishing as sole activity, but a lot more resources are invested to ensure maximum returns possible)	<ul style="list-style-type: none"> ▪ Market production and income ▪ Accumulation
'Diversification for accumulation' (fishing is one activity in a portfolio of activities that produce surplus to subsistence requirements)	<ul style="list-style-type: none"> ▪ Accumulation ▪ Retention in a diversified accumulation strategy ▪ Recreation

Table 2.1. The role of fishing in different livelihood strategies, and the function of fishing within these strategies. Adapted from Smith *et al.* (in press)

Patterns in Chaos

- Temporal & spatial variation in fishing technique, effort and catch composition and weight
- Fishing Techniques
 - hand line
 - net (gillnets, seines, fykes, otter and beam trawl)
 - traps
 - combination of speargun/freediving (sometimes with compressors, explosives & cyanide)
 - range gleaning methods (on foot, by canoe, day or night and with or without a spear).

Daily observations from
viewing point

Fisher census

Understand local
population
characteristics

Fisher interviews

Assessment of an artisanal fishery is multifaceted

Middleman
interviews

Market surveys

Stock assessment
(fisheries independent
i.e. fish surveys)

Multiple different types of
landing surveys (fisheries
dependent)

Monitoring programme
required to assess fishery and
determine any impacts

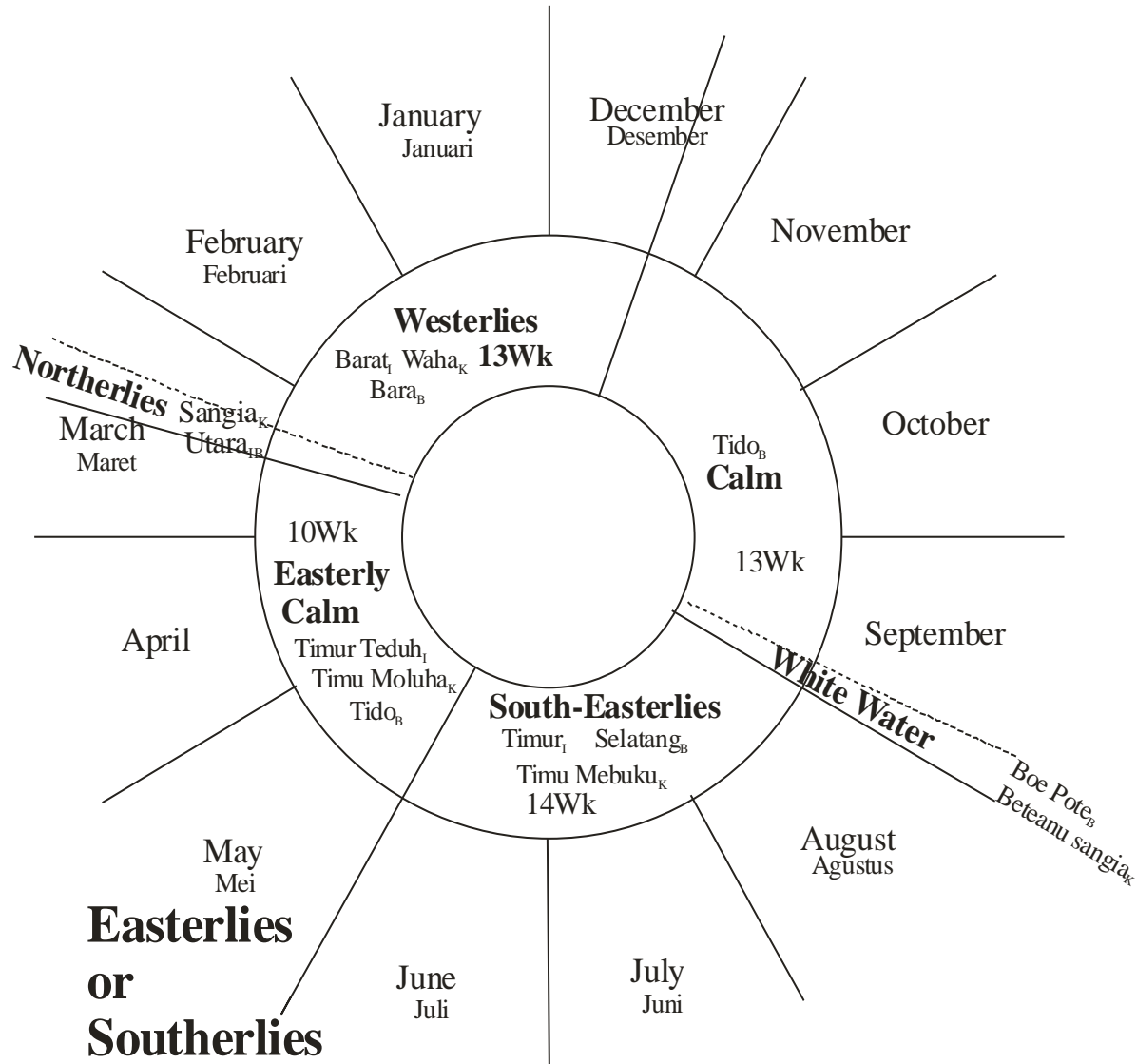


Random Stratified Catch
Surveys



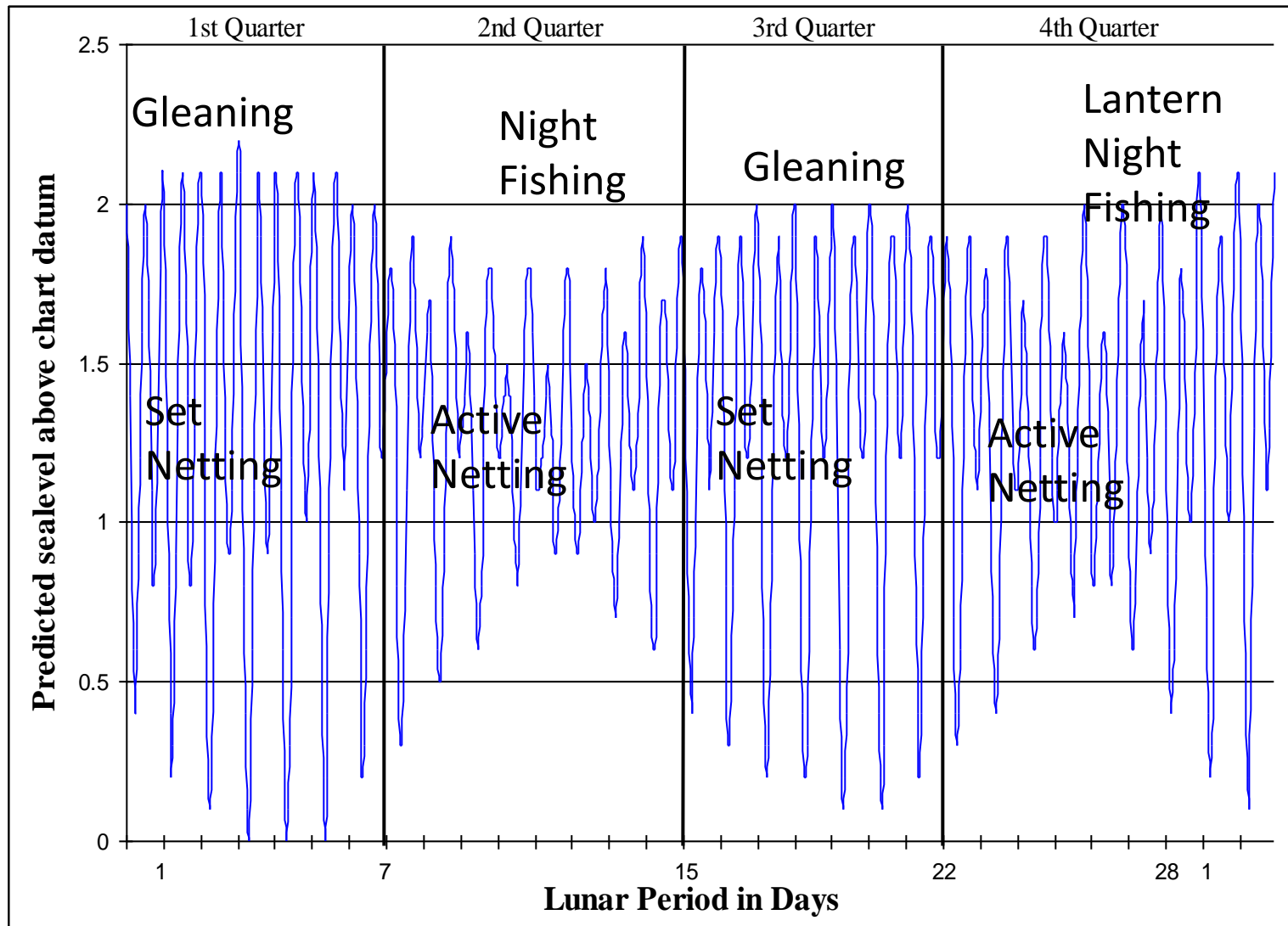
Fishing Seasons

Westerlies





Fishing Techniques and Tidal Variations



Tides: mixed, prevailing semi-diurnal

Landings Assessment techniques

Fisheries dependent

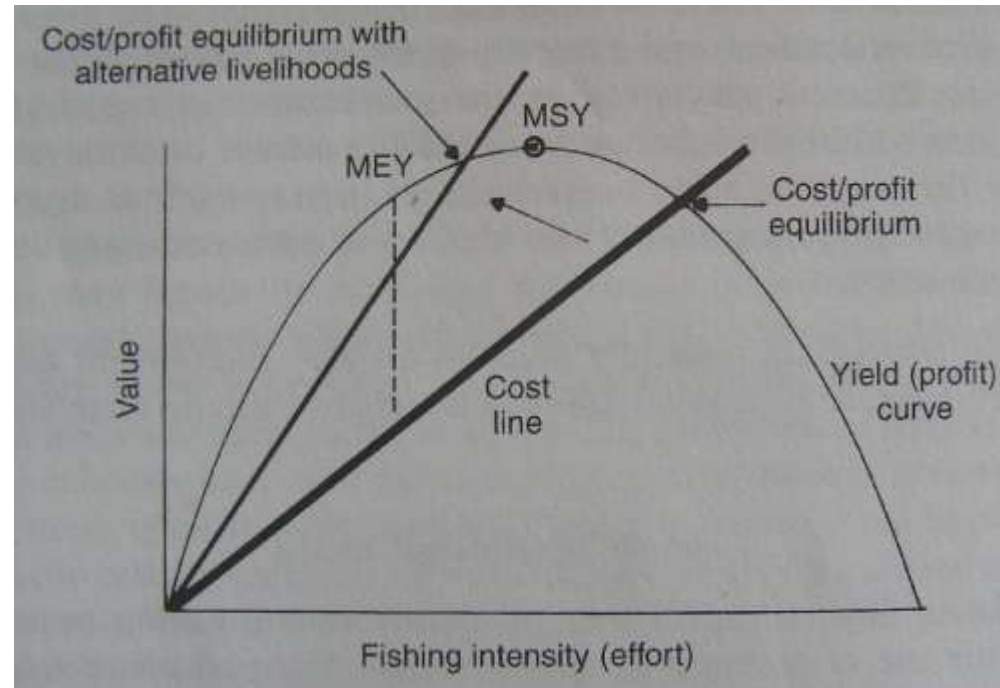
- Species Diversity
- CPUE
- % mature fish
- Yield

Fisheries independent

- Standing Stock biomass
- Species diversity
- % mature fish

Economics – Bionomic Equilibrium

- CVPUE (catch value)
- Economic and food value of species and sizes to fishers.
- Mean size of species in Catch.
- Number of external fishers.
- Number of damaging techniques.
- Number of individual fishing techniques and their fishing power.



Surveys fit for the Job



Best practical estimate to these parameters

Random Stratified Sampling, by technique, area, lunar quarter, season

Accounts for short term variability and diverse landing sites

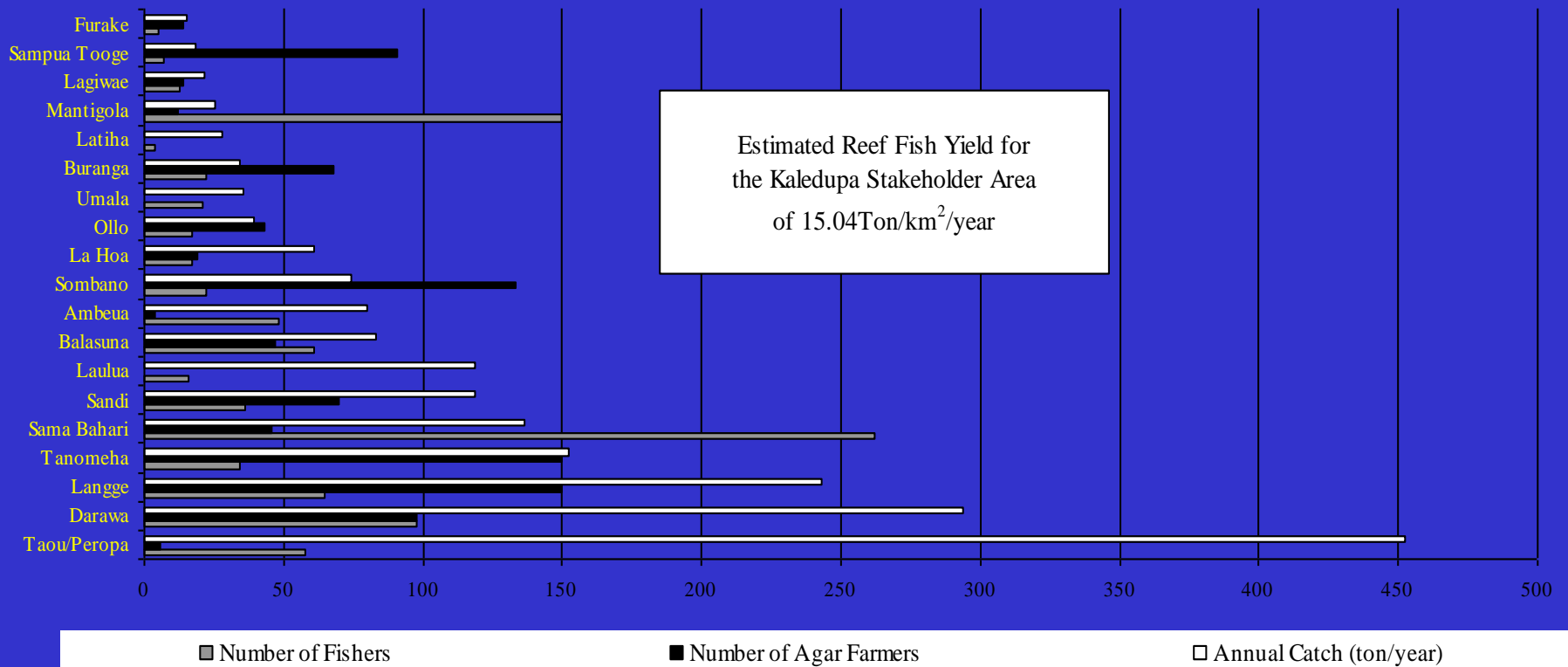
Seasonal Structured Interviews (Fishers Ecological Knowledge)

Annual or seasonal Fisher Census of all Kaledupans

Fisher Census

- Fisher Census identified 956 people who said that fishing was a important source of income or depended on fishing for subsistence (5.7% of the population of Kaledupa).
- The Bajau represent 45% of fishers & only 11% of the Reef Fish catch (excludes, Tuna, Atoll, Gleaning and Octopus).
- In 2002-2003 the catch of reef fish has been estimated to be **2031 ton/year**

Estimated Annual Catch of Reef Fish, Number of Fishers and Number of Agar Farmers within the Kaledupan Stakeholder Area



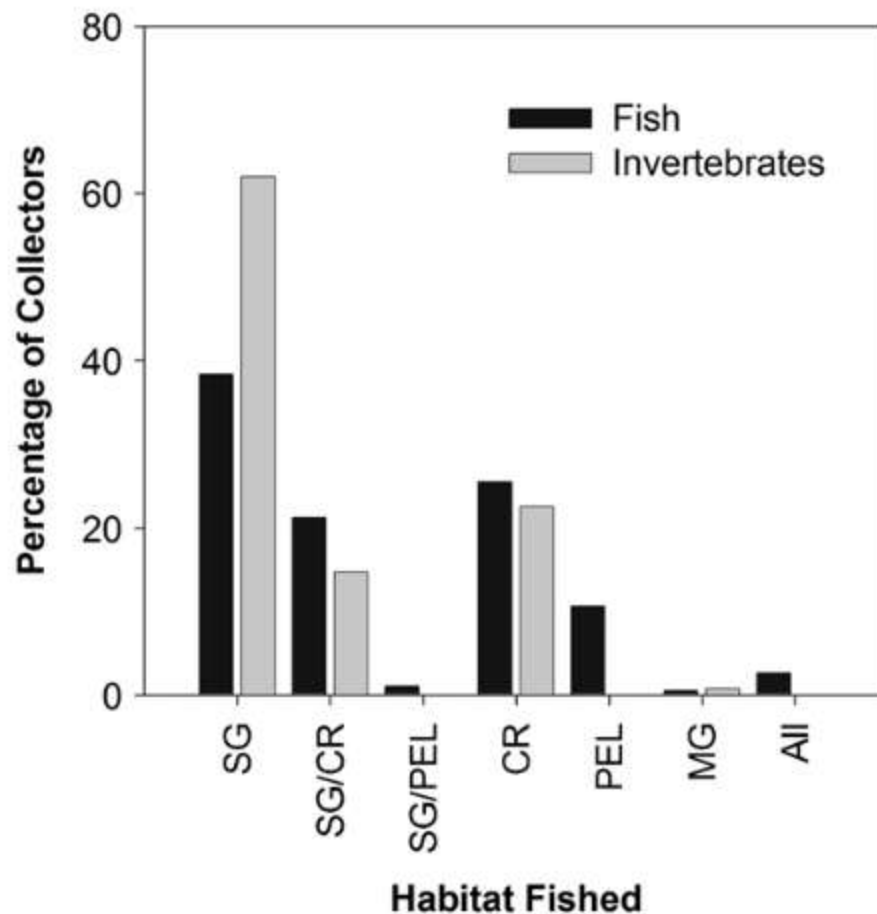


Fig. 2. Percentage of invertebrate and fish collectors (fishermen and subsistence collectors/fishers) that used each marine habitat type as their major collection ground in the Kaledupa sub-district of the Wakatobi Marine National Park, Indonesia (SG = seagrass, CR = reef, MG = mangrove, PEL = pelagic).

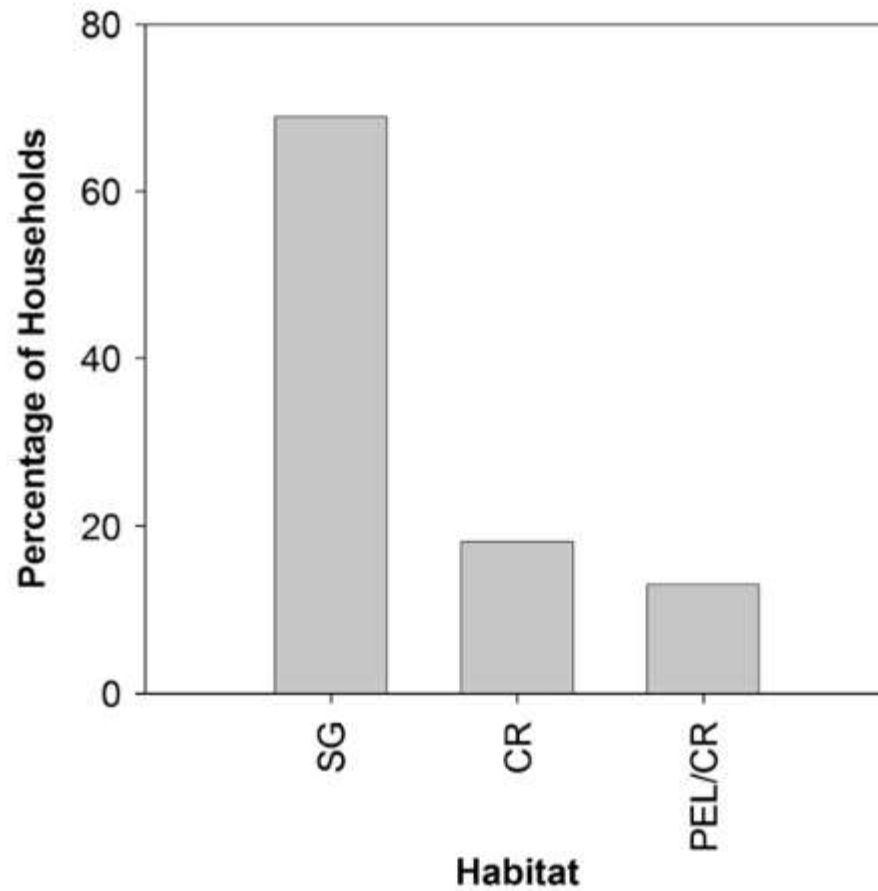


Fig. 3. Percentage of households within the Kaledupa sub-district of the Wakatobi Marine National Park, Indonesia preferentially consuming food from each marine habitat type (SG = seagrass, CR = reef, PEL = pelagic).

Malthusian overfishing

- “...occurs when poor fishermen, faced with declining catches and lacking any alternative initiate wholesale resource destruction in order to maintain their incomes.
- This may involve in order of seriousness, and generally in temporal sequence...

Ecosystem effects of fisheries

- Removal of predators
- Removal of algal grazers
- Change in dominance
 - Californian Sea Otters
 - Urchins
 - Crown of Thorns starfish “COTS” (*Acanthaster planci*)
- Changes in size frequency of animals



Impacts on artisanal fisheries

The complex nature, diversity of operations and lack of leadership makes the impacts of environmental damage on artisanal fisheries difficult to determine

Lack of quality standards in artisanal fisheries means that fish caught that is unfit for human consumption (e.g. an oil pollution event) will go unnoticed/untested for

The spatial extent and high temporal variability of artisanal fisheries means that an environmental impact might not become clear quickly and there might be inertia.