

# What Do We Mean by Human Dimension Indicators?

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# Health indicators

- They are quantifiable characteristics of a population, which are used as supporting evidence for describing the health of a population;
- Examples:
  - life expectancy; body temperature, blood pressure; BMI.
- Health indicators are often used by governments to guide health care policy.

# Economic indicators

- They are measures that allow analysis of economic performance and predictions of future performance;
- Examples:
  - Unemployment rate;
  - Housing starts;
  - Consumer Price Index (a measure for inflation);
  - Gross Domestic Product;
  - Stock market prices.

# Social indicators

- Social indicators are quantitative measures that describe the well-being of individuals or communities and are used worldwide to describe social phenomena over time;
- Indicators combine variables of interest and are used to evaluate well-being in terms of social, economic and psychological welfare
- Examples:
  - Human development index;
  - Social vulnerability index.

# Human dimensions

- Examine how the 'science of human systems' can aid in natural resource management;
- Studies the "people" side of fishing and other uses of marine ecosystems;
- It complements biophysical studies by exploring economic, social and cultural benefits and values associated with marine resources.

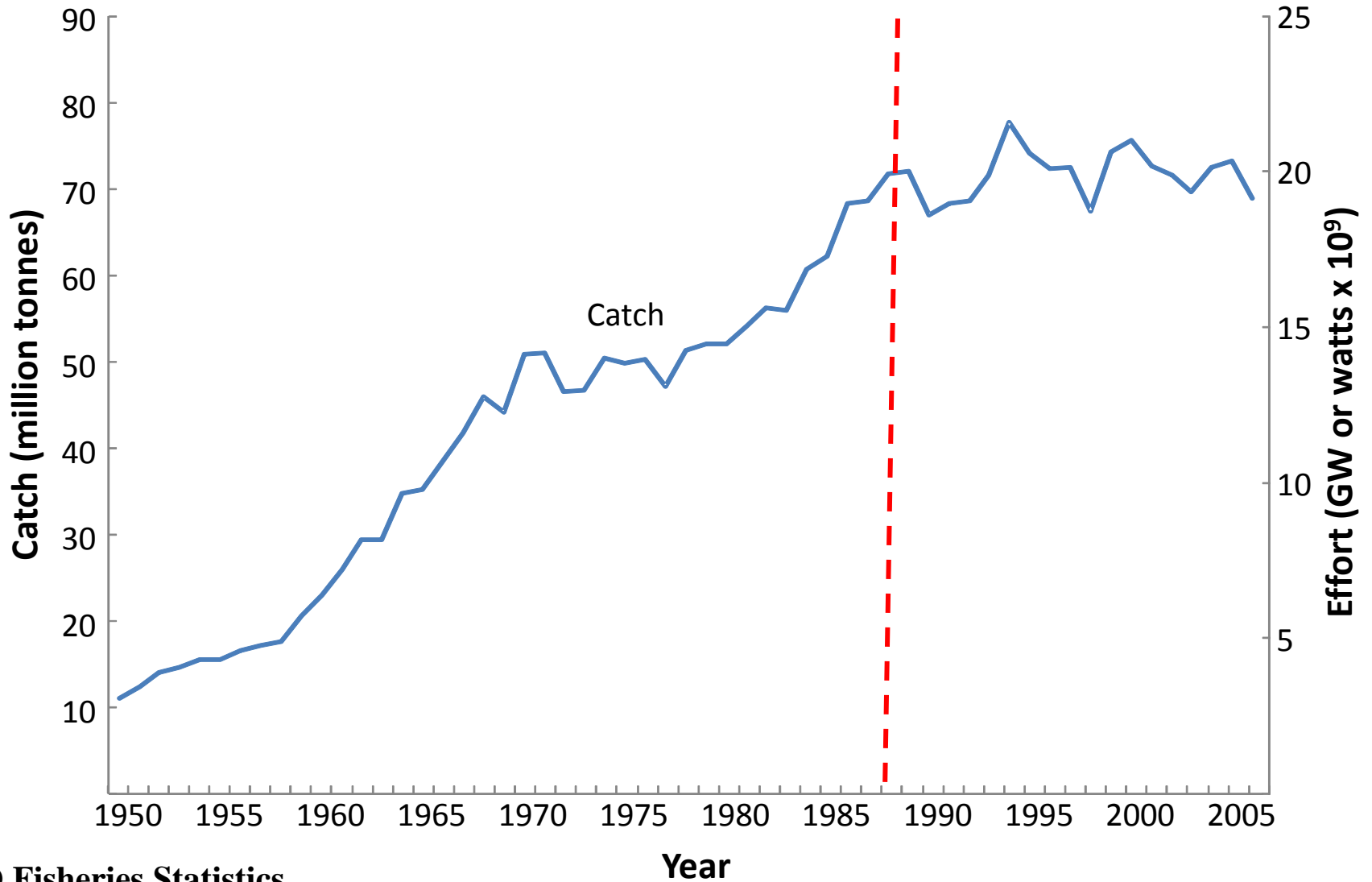
# Human dimensions indicators

- They have to be quantifiable;
- Should describe a characteristics of human systems and how these relate to the natural systems;
- They should portray past and current community engagement with natural systems, and contain basic information on the social and economic characteristics of these communities.

# Indicators of human use of the ocean

- Catches (FAO, Watson et al., 2004);
- Fishing effort (Watson et al., 2012);
- Ex-vessel fish prices (Sumaila et al., 2007; Swartz et al., 2012);
- Fishing cost (Lam et al., 2011);
- Fisheries subsidies (Sumaila et al., 2010);
- Fisheries jobs (Teh & Sumaila; 2011);
- Recreational fisheries (Cisneros & Sumaila, 2010);
- Added value – multiplier effects (Dyck & Sumaila; 2010).

# Global catch and effort

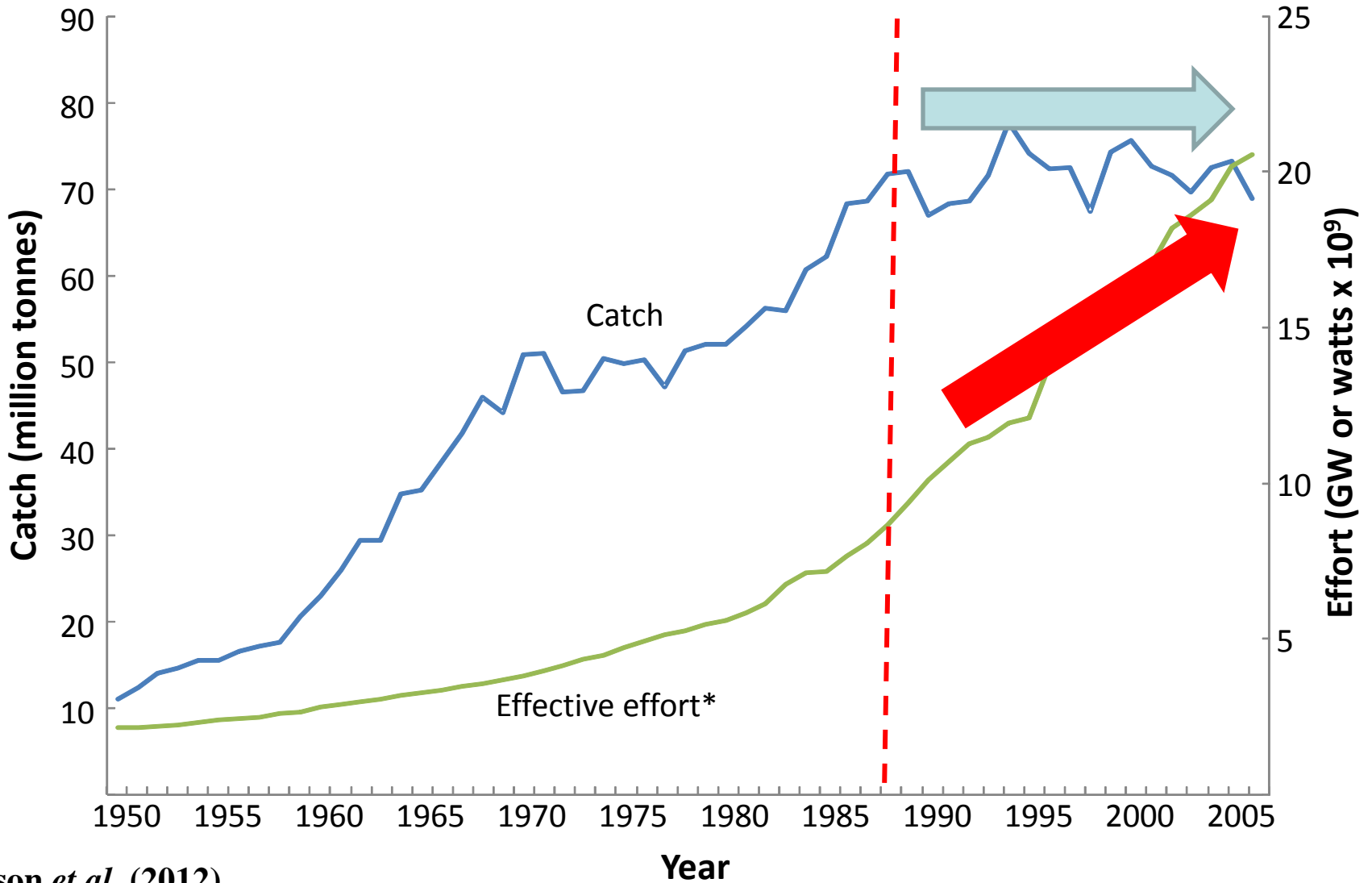


FAO Fisheries Statistics

\*Effective effort indexed on 2000 based on average 2.42% increase annually



# Global catch and effort

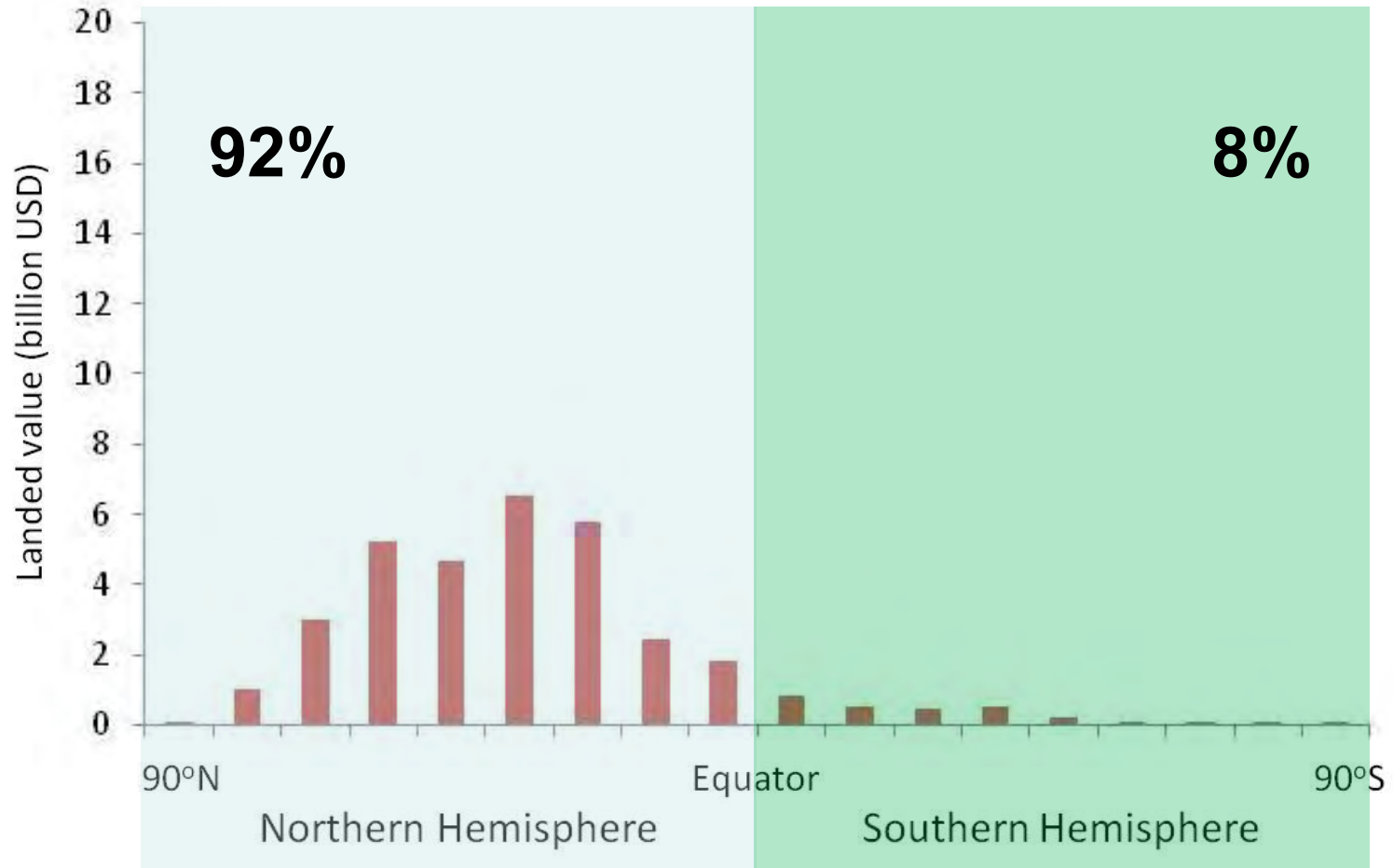


Watson *et al.* (2012)

\*Effective effort indexed on 2000 based on average 2.42% increase annually

# Northern vs Southern hemisphere LV

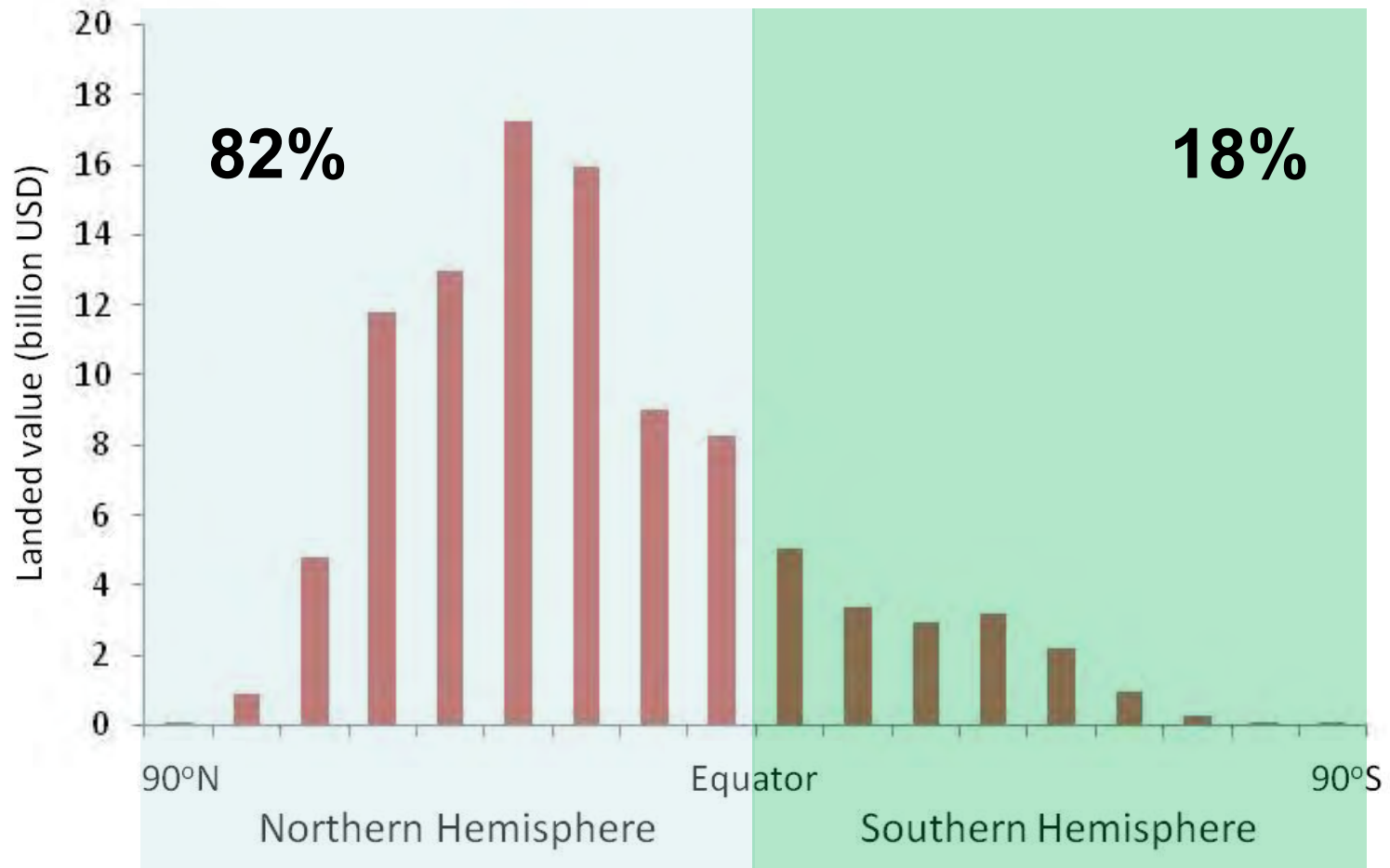
## 1950s



Sumaila et al. (2007) & Swartz et al. (2012)

# Northern vrs Southern hemisphere LV

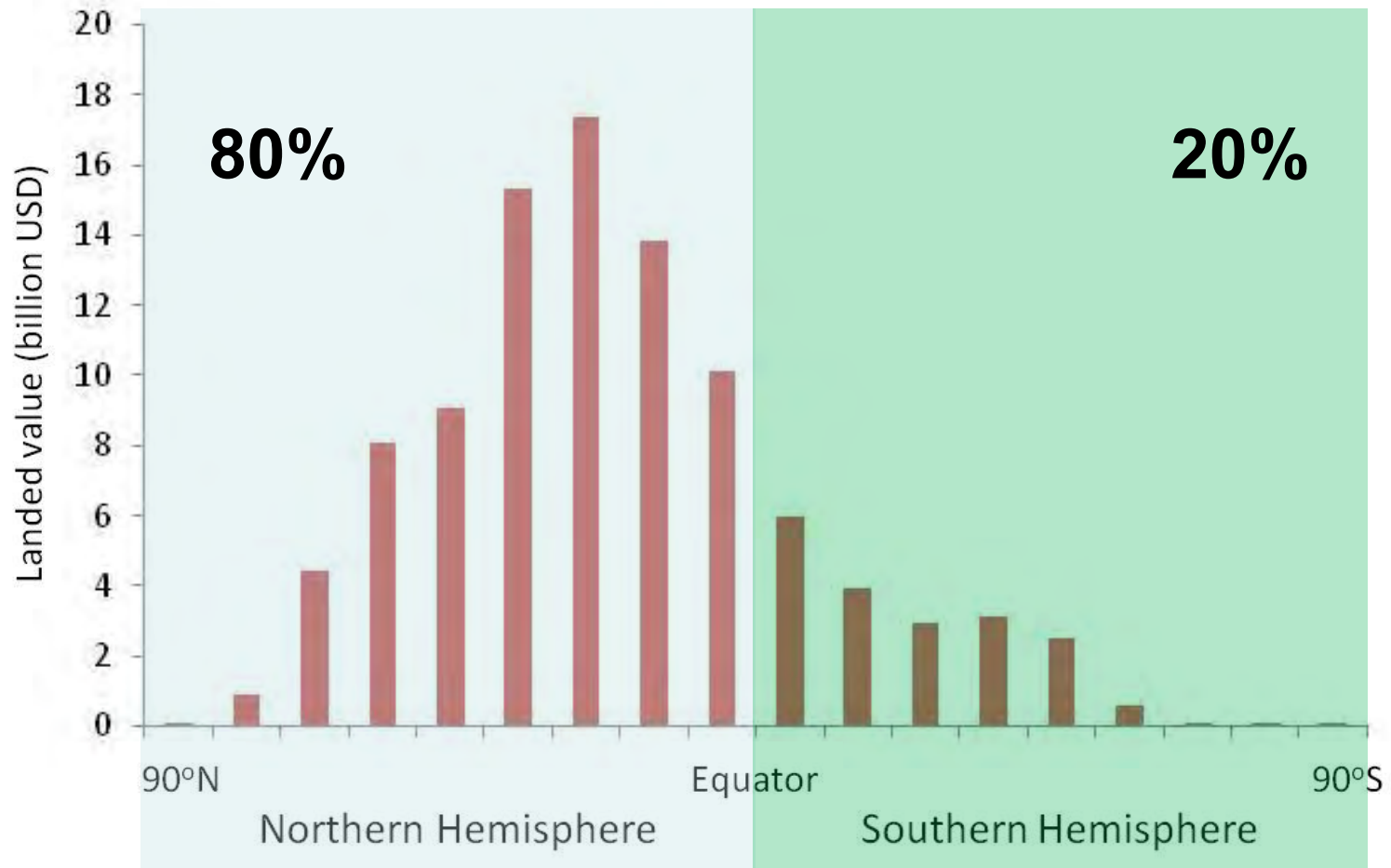
**1980s**




Sumaila et al. (2007) & Swartz et al. (2012)

# Northern vrs Southern hemisphere LV

**2000s**



Sumaila et al. (2007) & Swartz et al. (2012)



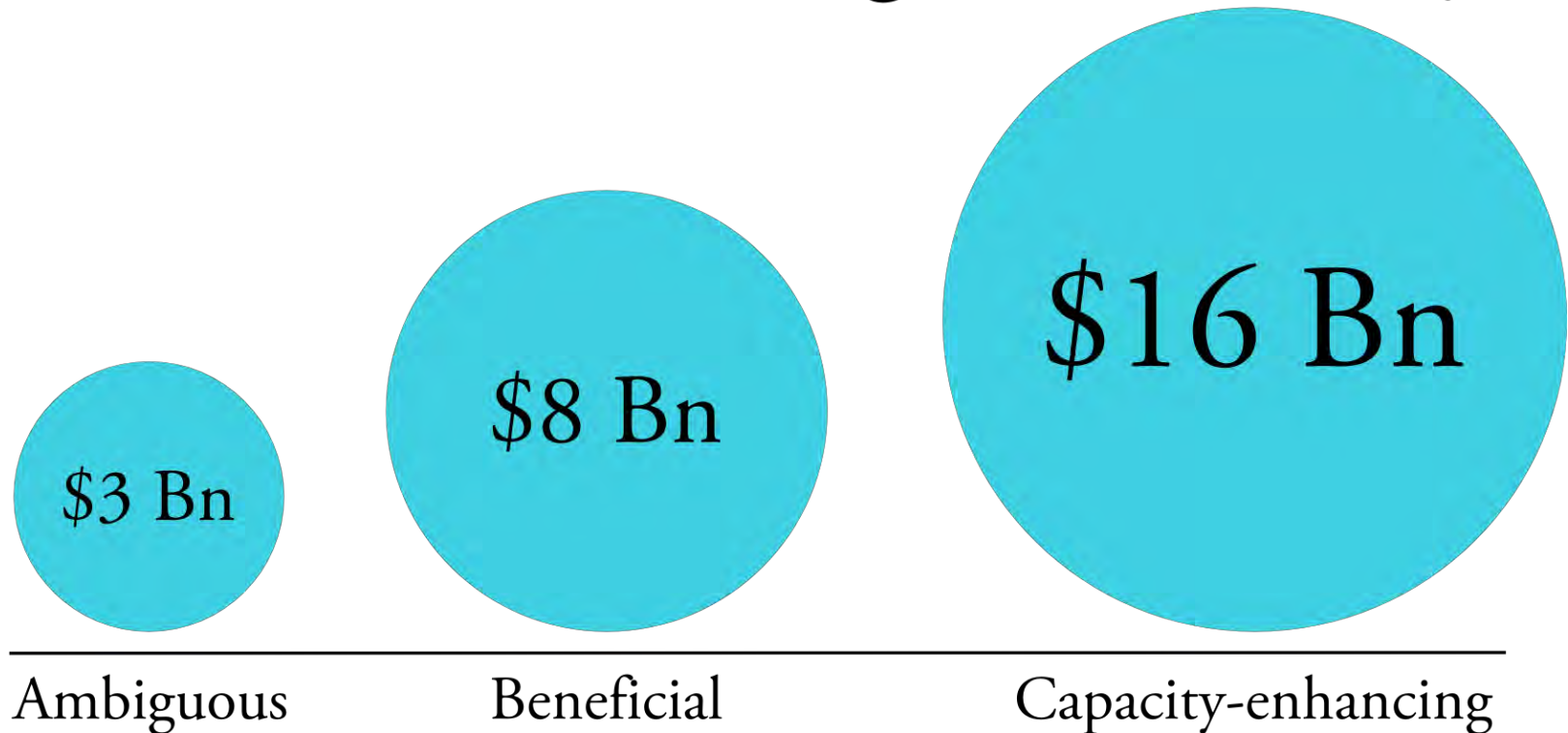
# Average cost of fishing (USD per t.)

## Lam et al. (2011)

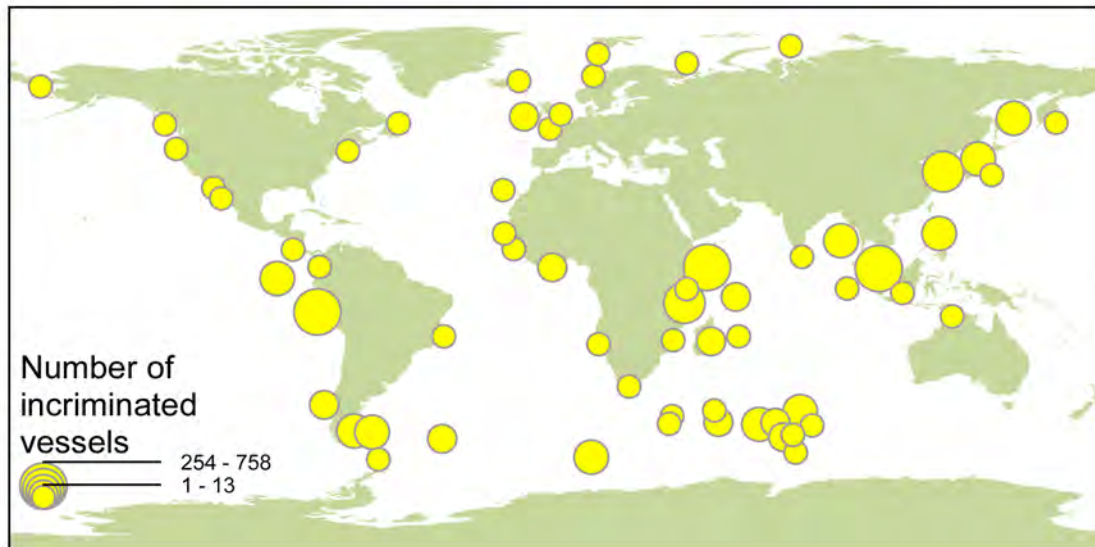
| Types of fishing costs      | GOEP study (*based on the average of RAW data for 2003) | 'Sunken Billions' study <sup>1</sup> (2004) |
|-----------------------------|---|---|
| <i>Variable cost</i>        |   |   |
| Fuel                        | 222   | 263   |
| Running cost                | 311   | 407   |
| Repair cost                 | 130   |   |
| Labour cost                 | 462   | 265   |
| <b>Total variable costs</b> | <b>1,125</b>  | <b>935</b>                                  |
| <i>Fixed cost</i>           |   |   |
| Depreciation                | 151   | 63  |
| Interest                    | 101   | 60  |
| Other Fixed costs           | 196   | -   |
| <b>Total fixed costs</b>    | <b>448</b>  | <b>123</b>                                  |
| <b>Total Cost</b>           | <b>1,573</b>  | <b>1,057</b>                                |

<sup>1</sup> World Bank and FAO, 2009. The sunken billions – the economic justification for fisheries reform.

# Subsidies in the global fishery



# IUU fishing incidence



Number of incriminated vessels fishing illegally between 1980 and 2003

Sumaila et al. (2006)

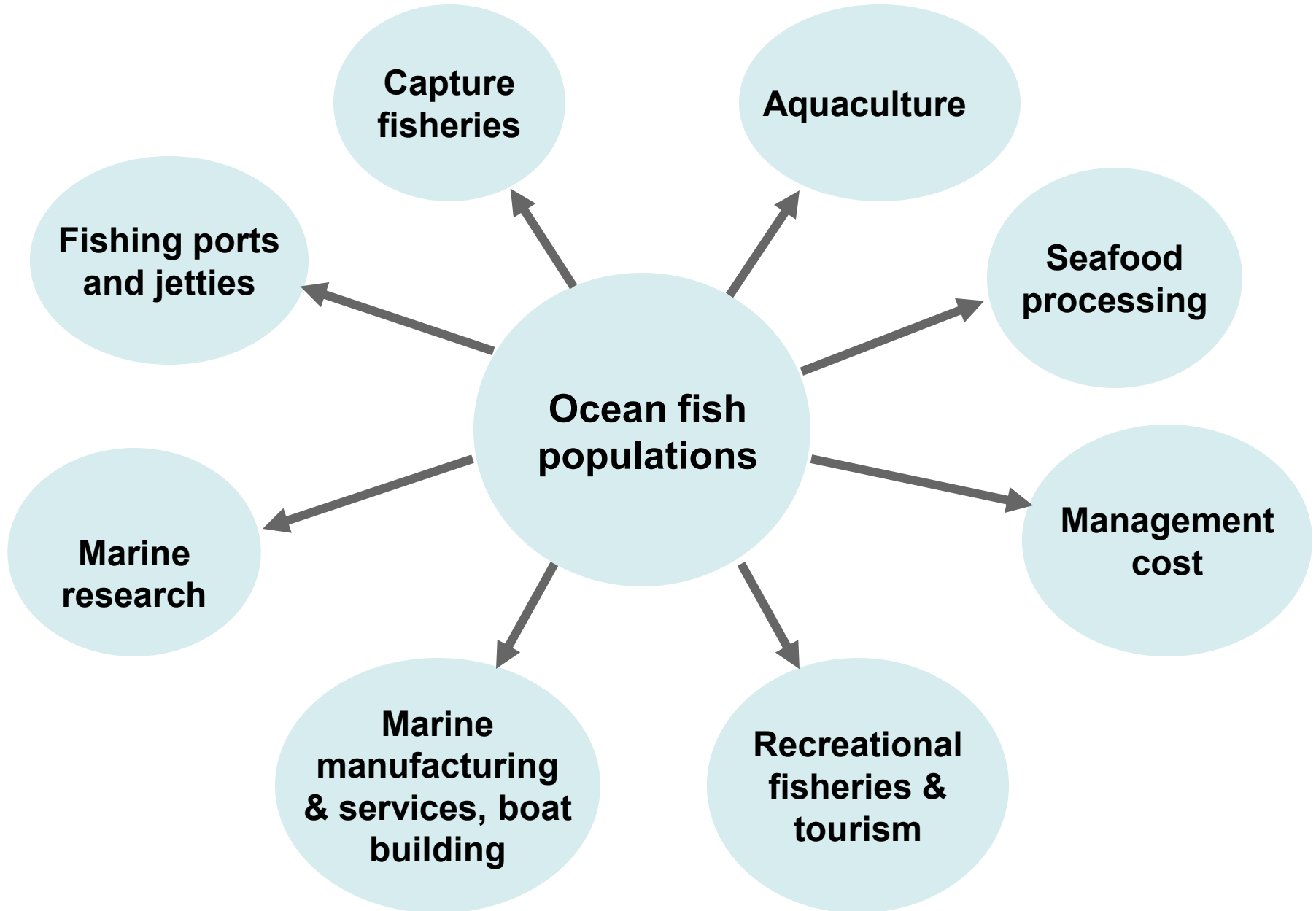
## Costs and benefit aspects of risks inherent in IUU activity

| <b>Arresting Country</b> | <b>Fishery</b>              | <b>Expected Revenue (USD)</b> | <b>Expected Penalty (USD)</b> | <b>Total Cost (USD)</b> | <b>Total Cost / Expected revenue</b> |
|--------------------------|-----------------------------|-------------------------------|-------------------------------|-------------------------|--------------------------------------|
| <b>Australia</b>         | <b>Patagonian toothfish</b> | <b>504 000</b>                | <b>87 000</b>                 | <b>526 091</b>          | <b>1.04</b>                          |
| <b>Japan</b>             | <b>Crab</b>                 | <b>38 256</b>                 | <b>1 483</b>                  | <b>31 131</b>           | <b>0.81</b>                          |
| <b>Mexico</b>            | <b>Shrimp</b>               | <b>22 060</b>                 | <b>1 091</b>                  | <b>16 428</b>           | <b>0.74</b>                          |
| <b>Russia</b>            | <b>Alaska pollack</b>       | <b>8 818</b>                  | <b>234</b>                    | <b>4 539</b>            | <b>0.51</b>                          |
| <b>Mauritius</b>         | <b>Patagonian toothfish</b> | <b>352 000</b>                | <b>480 000</b>                | <b>786 667</b>          | <b>2.23</b>                          |



# Added value – multiplier effects

# Fish as base for many activities



# Economic impact of world fisheries output

|                    | <b>Landed Value<br/>(\$ billions)</b> | <b>Economic<br/>Impact<br/>(\$ billions)</b> | <b>Average<br/>Multiplier</b> |
|--------------------|---------------------------------------|--|-------------------------------|
| Africa             | 2                                     | 5  | 2.59                          |
| Asia               | 50                                    | 133  | 2.67                          |
| Europe             | 11                                    | 36   | 3.12                          |
| Lat. America       | 7                                     | 15   | 2.05                          |
| N. America         | 8                                     | 29   | 3.52                          |
| Oceania            | 5                                     | 17   | 3.27                          |
| <b>World Total</b> | <b>84</b>                             | <b>235</b>                                   | <b>2.8</b>                    |

# Fisheries jobs (in thousands)

(Teh & Sumaila, 2011)

| <u>Region</u>                   | <u>Direct</u>      | <u>Indirect</u>    | <u>Total employment</u> |
|---------------------------------|--------------------|--------------------|-------------------------|
| <b>EU</b>                       | 800 ± 71           | 1,700 ± 160        | <b>2,500 ± 230</b>      |
| <b>Asia</b>                     | 40,000 ± 3,100     | 190,000 ± 15,000   | <b>230,000 ± 18,000</b> |
| <b>Africa</b>                   | 3,000 ± 150        | 14,000 ± 770       | <b>18,000 ± 910</b>     |
| <b>South America</b>            | 1,700 ± 330        | 3,900 ± 400        | <b>5,600 ± 710</b>      |
| <b>Oceania</b>                  | 710 ± 120          | 160 ± 20           | <b>870 ± 130</b>        |
| <b>N &amp; Ctrl<br/>America</b> | <b>3,000 ± 230</b> | <b>2,300 ± 170</b> | <b>5,400 ± 400</b>      |

# Income effect of world fisheries output

|               | <b>Landed Value<br/>(\$ billions)</b> | <b>Income Effect<br/>(\$ billions)</b> | <b>Average<br/>Multiplier</b> |
|---------------|---------------------------------------|--|-------------------------------|
| Africa        | 2                                     | 1                                      | 0.62                          |
| Asia          | 50                                    | 35                                     | 0.71                          |
| Europe        | 11                                    | 9                                      | 0.76                          |
| Latin America | 7                                     | 4                                      | 0.56                          |
| N. America    | 8                                     | 10                                     | 1.22                          |
| Oceania       | 5                                     | 4                                      | 0.73                          |
| World Total   | 84                                    | 63                                     | 0.75                          |

# Defining recreational activities

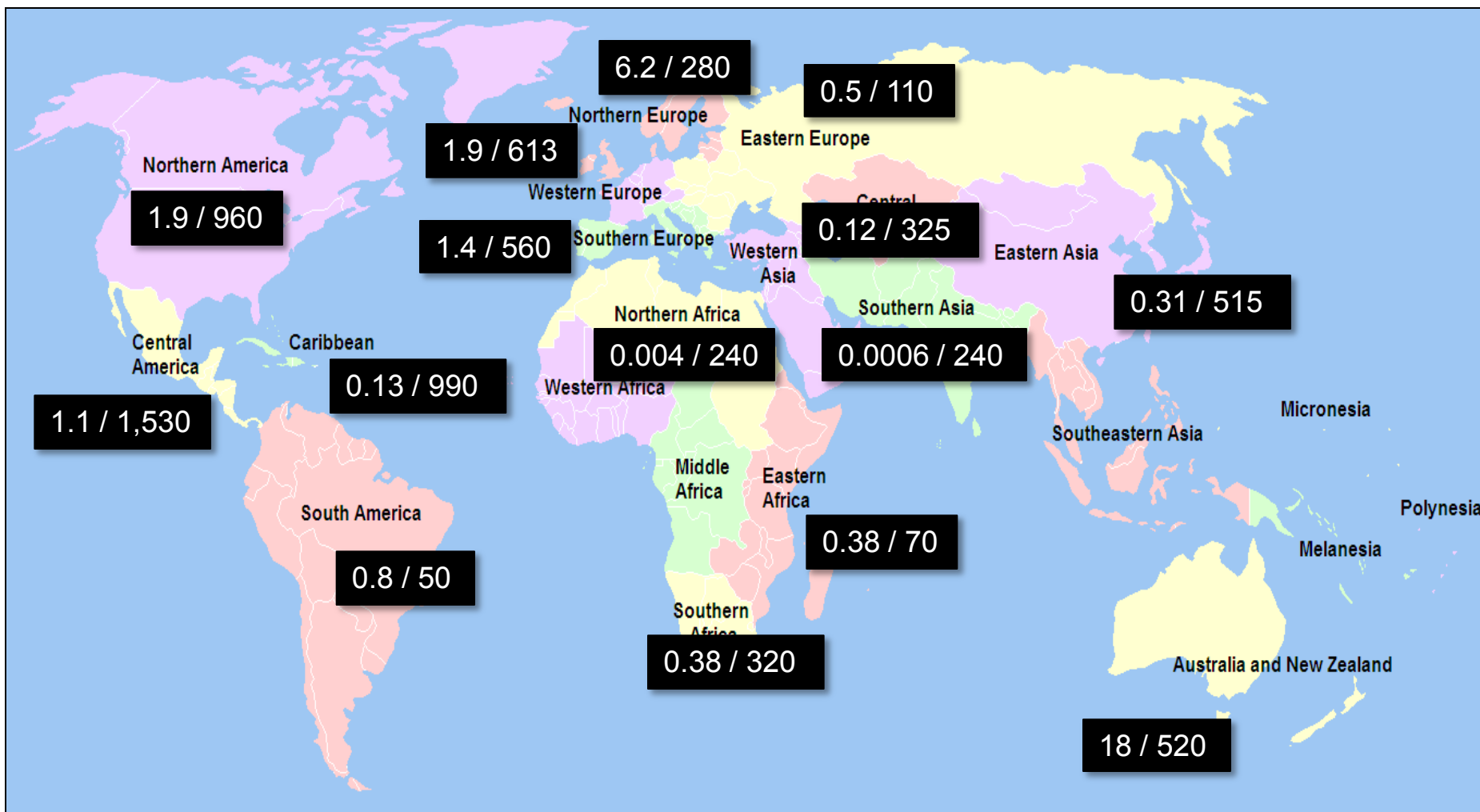
Cisneros & Sumaila (2010)



Recreational fishing: Fishing where the *main* motivation is not consumption, trade or sale of the catch.

# Recreational fishing

## Cisneros & Sumaila (2010)



Participation rate (% population) / Expenditure per capita (2003 USD)

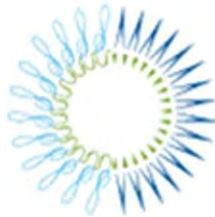
# Conclusion

- Can pull out the country specific data for the 6 PICES countries for a start.



# Acknowledgements

- Global Ocean Economics project, supported by the Pew Charitable Trusts (PCT);
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