

Assessing the economic viability of small-scale fisheries: an example from Mexico

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Detailed description of data sources for Mexican fisheries

Total Revenue

Data for the calculations for ex-vessel prices are from the *Sea Around Us* and *Fisheries Economic Research Unit* databases (www.seaaroundus.org last accessed September 2016) and from the National Commission of Aquaculture and Fishing annual fisheries reports (CONAPESCA) (Conapesca 2013; Swartz et al. 2013; <http://www.conapesca.sagarpa.gob.mx/wb/>, last accessed September 2016). Landings data for the years 2000 to 2010 from *Sea Around Us* (Cisneros-Montemayor *et al.*, 2013) were already disaggregated into large-scale (industrial) and small-scale (artisanal and subsistence) fisheries and therefore directly multiplied with ex-vessel prices to estimate total revenue. For 2011 -2012, data from CONAPESCA reports were used, which contained total revenue data. These were divided into small- and large-scale based on each sector's fisheries landings (percentages) per species group using 2010 *Sea Around Us* data. To make up for missing information on unreported and illegal catches for the years 2011-2012, we used 2010 total revenue data from unreported and illegal landings from (Cisneros-Montemayor *et al.*, 2013) and added them to the 2011 and 2012 CONAPESCA data, which otherwise only represent the total revenue of reported fisheries landings in Mexico.

Total cost of fishing

To assess the cost of fishing for Mexican small- versus large-scale fisheries, we based our method on data from the cost structure of individual fishing units. Cost structure is the ratio of the different categories of variable and fixed costs to total costs. For the large-scale fishing sector, data were mainly available for the three biggest fisheries: shrimp, sardine and tuna, which make up about 65% of the total large-scale fisheries catch of Mexico (Cisneros-Montemayor *et al.*, 2013). We used information from (Gillet 2008, Agroprospecta 2010) for shrimp and sardine fisheries and Lam *et al.* (2011) for tuna fisheries and computed a weighted average based on number of boats active in each fishery. Fixed costs were on average 11% of total costs (Lasch 2005) interest rates and depreciation costs were computed based on the initial cost/investment of the fishing vessel and its age. For small-scale fisheries, we used information from (OECD 2006, Lam *et al.* 2011, Ramírez-Rodríguez & Almendárez-Hernández 2013).

As we found that the cost of fuel was the largest component (around 35% on average), we used the change of fuel costs over time (see Table S1) to estimate the total costs for each year of the study period (2000-2012). This assumes that other costs of fishing stayed constant over time. The cost of fuel was estimated for both SSF and LSF using annual fuel price (Table S1) and fuel consumption data based on fishing effort. The amount of fuel consumed by each vessel depends on operational and technological factors, we therefore used: specific fuel consumption rate (SFR), Fuel Coefficient (FC) and the number of hours fished (Wilson 1999, Gulbrandsen 2012, Greer 2014).

To scale up the data to the fishing fleet for SSF and LSF for each year, we used numbers of boats from CONAPESCA annual reports (Table S1). As data on cost of fishing is scarce, especially, for small-scale fisheries, it was important to use and compare different approaches and case-study data to make sure that the resulting numbers were realistic. This was done using raw data per fishing gear from different countries reported in Lam *et al.*, (2011) and information found in Tietze *et al.* (2001, 2005) and OECD (2006). As information in government reports are disaggregated either by coastline or by federate state, this data was used to assess total cost by Atlantic and Pacific region for both SSF and LSF applying the same method described above that was used for the national level study.

Total subsidies

Data on fisheries subsidies were collected from different reports and publications and updated where possible using fisheries reports, CONAPESCA annual reports, peer-reviewed articles, OECD (Organisation for Economic Co-operation and Development) reports and gray literature (OECD 2006, Lara & Guevara-Sangines 2012, Ramírez-Rodríguez & Almendárez-Hernández 2013, Sumaila *et al.* 2016).

Once we gathered information on total subsidies for each year (2000 – 2012), data from CONAPESCA annual reports were used to obtain information that indicate the percentage of how much subsidies would reach the small- compared to the large-scale sector, which were then applied to the total subsidy amount. Based on annual CONAPESCA reports, the percentages of subsidies directed at SSF and LSF were then disaggregated by region (Pacific and Atlantic).

Table S1. Key data used to estimate total cost of fishing: Number of boats and fuel costs per liter in constant 2015 USD for small- (SSF) and large-scale fisheries (LSF) in Mexico. Sources: CONAPESCA annual reports and PEMEX (2013)

Year	Number of boats				Cost of fuel (USD / liter)	
	Pacific		Atlantic		national	
	SSF	LSF	SSF	LSF	SSF (gasoline)	LSF (diesel)
2000	56,412	2,014	43,392	1,552	0.78	0.64
2001	56,412	2,053	43,392	1,565	0.76	0.63
2002	56,412	2,064	43,392	1,563	0.78	0.65
2003	56,412	2,075	43,392	1,559	0.71	0.59
2004	56,412	2,075	43,392	1,567	0.68	0.57
2005	56,412	1,995	43,392	1,499	0.71	0.58
2006	56,412	1,974	43,392	1,459	0.71	0.59
2007	56,412	1,945	43,392	1,453	0.72	0.61
2008	56,412	1,945	43,392	1,453	0.72	0.63
2009	56,412	1,865	43,392	1,435	0.63	0.64
2010	51,257	1,788	36,049	1,418	0.71	0.75
2011	43,206	1,775	32,117	1,406	0.79	0.82
2012	40,490	1,758	23,967	1,400	0.81	0.83

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