

# Fuel price increase, subsidies, overcapacity, and resource sustainability

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Global fisheries are currently overcapitalized, resulting in overfishing in many of the world's fisheries. Given that fuel constitutes a significant component of fishing costs, we expect recent increases in fuel prices to reduce overcapacity and overfishing. However, government fuel subsidies to the fishing sector reduce, if not completely negate, this positive aspect of increasing fuel costs. Here, we explore the theoretical basis for the expectation that the increasing fuel prices faced by fishing enterprises will reduce fishing pressure. Next, we estimate the amount of fuel subsidies to the fishing sector by governments globally to be in the range of US\$4.2–8.5 billion per year. Hence, depending on how much of this subsidy existed before the recent fuel price increases, fishing enterprises, as a group, can absorb as much as this amount of increase in their fuel budget before any conservation benefits occur as a result of fuel price increases.

**Keywords:** fisheries subsidies, fuel subsidies, global fisheries.

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## Introduction

A key motivator for commercial fishing is profit, i.e. the more profitable it is to fish, the more fishing there will be, everything else being equal. Fuel constitutes a substantial component of the cost of fishing. The actual proportion varies by fishery, but can reach up to 60% in cases such as the commercial fisheries of Hong Kong (Sumaila *et al.*, 2007a) and for canoe purse-seiners in NW Africa (FAO, 1995). In Senegal, fuel constituted >50% of the costs for the motorized canoe fleet (Dahou *et al.*, 2001), and it accounted for ~34% of the total costs (TC) for the Fijian artisanal fishery (Reddy, 2004). Comparative figures for the SE Australian trawl fishery are lower, fuel accounting for between 10% and 25% of total operating costs (FERM, 2004), but despite this comparatively lower percentage, the fishery is experiencing difficulties in the face of increasing fuel costs (FERM, 2004). Given that many world fisheries are overfished, and that fuel makes up a substantial component of fishing costs, an obvious question is whether the recent, sharp increase in fuel prices will help reduce overfishing, because this reduces the profitability of fishing. The chances of this happening can be reduced significantly where fuel subsidies are given to the fishing sector by governments. Fuel subsidies are defined narrowly here as the price differential between what other users and fishers pay for fuel in a given economy. Fuel subsidies are an example of fisheries subsidies, usually defined as direct or indirect financial transfers by the government of a country to its fishing sector.

Subsidies are given directly to fishers in various forms, including grants, loans and loan guarantees, equity infusions, tax preferences or exemptions, and price or income support programmes

(OECD, 1997, 2006; Milazzo, 1998; Schrank and Keithly, 1999; UNEP, 2004; Clark *et al.*, 2005; Khan *et al.*, 2006). Alternatively, fishers can receive the fuel subsidy through a third party. In Australia, for example, fishing cooperatives establish commercial arrangements with fuel suppliers, who claim a fuel grant on behalf of their fishers. The fuel suppliers then sell fuel to the fishers at a price discounted by the amount of the grant. In Malaysia, operators of registered fishing boats are provided with an “e-diesel” card which allows them to buy subsidized diesel at specific fisher jetties around the country. In Ghana, the government provides special fuel called “pre-mix” at subsidized prices to the fishing sector.

Of course, fuel subsidies are given to other sectors of the economy too. For example, fuel subsidies to the UK agricultural sector seem to be extensive. In a British parliamentary publication, it was reported that red diesel for agriculture was subsidized at a rate of 42.69 p per litre, resulting in a total subsidy of £3 billion in 2001 (Daily Hansard, 2002). In the USA, fuel subsidies to the agricultural sector alone amounted to US\$2.4 billion in 2004 (OECD, 2005a). Meanwhile, in Australia, the same per litre fuel rebate was provided to the agricultural, fishing, forestry, rail, and marine industries in 2000 (Webb, 2000).

To help provide research inputs into the debate on the sustainability value of fuel subsidies, we decided to estimate global fuel subsidies to the fishing sector, then discuss their potential impact on the ability to manage fishery resources sustainably through time. For our purpose, we collected and analysed data on the price differential, if any, enjoyed by the fishing sector in each country relative to other economic sectors, attributable to

subsidies, and the quantity of fuel consumed by the fishing sector. We then applied a simple statistical technique to scale this up, to estimate at a global level the annual dollar amount paid to the fishing sector as fuel subsidies by governments around the world.

To our knowledge, there is currently no global estimate of fuel subsidies to the fishing sector in the literature. However, global estimates of fishery subsidies in general were provided by FAO (1992) and Milazzo (1998). A more recent estimate of global fisheries subsidies less fuel subsidies is given by Khan *et al.* (2006), who included preliminary figures for fuel subsidies based on Sumaila *et al.* (2006). Regional estimates of fisheries subsidies have been provided for the Asia Pacific Rim by APEC (2000) and for the North Atlantic by Munro and Sumaila (2002). The OECD publishes annual fisheries subsidies estimates for its member countries (OECD, 2004, 2005b). However, we believe that this study is the first to provide a global estimate of fisheries fuel subsidies.

### Theoretical framework

It is generally accepted that commercial fishers fish for profit. The more profit they can make by fishing the more they will fish, other things being equal. Profit,  $\pi$ , is determined here by the difference between total revenue, TR, and TC. TR is a function of price ( $p$ ) and catch ( $H$ ), and TC is a function of fishing effort, which in turn is a function of fuel cost ( $f$ ) and other costs ( $o$ ), such as the cost of labour. Let profit without fuel price increase and no fuel subsidies,  $\pi_0$ , be expressed as

$$\pi_0 = pH(x, E) - C(E(f, o)), \tag{1}$$

where  $x$  is the stock size and  $E$  the fishing effort. Note that in well-behaved cost functions,  $\partial\pi/\partial f < 0$ , i.e. the higher the  $f$ , the lower the profit, other things being equal. With a fuel price increase from  $f$  to  $f'$ , the profit can be expressed as

$$\pi'_0 = pH(x, E) - C(E(f', o)). \tag{2}$$

As  $f' > f$ , the profit will be less.

With fuel subsidies ( $s$ ),  $0 < s \leq (f' - f)$ , and the effect of the increase in fuel cost is either reduced or completely negated. Alternatively, for a fishery that is well-connected politically, a fuel price increase could be exploited to obtain a subsidy that is higher than the fuel price increase, resulting in a greater level of fishing effort than before the fuel price increase.

The scenario given above is captured neatly for open access fisheries by Figure 1. Figure 1a–d illustrates what could happen, with an increase in fuel prices, to fishing effort; it uses the simple Gordon–Schaefer model (Gordon, 1954). Figure 1a shows the standard model with TR curve and the initial linear total cost function ( $TC_0$ ). Under open access, the equilibrium effort is  $E$ . Figure 1b shows a swing in the TC curve from  $TC_0$  to  $TC'_0$  with an equilibrium effort of  $E'_0$ . If this was all that happened, the fuel price increase would have a sustainability value. However, as seen in many countries after the recent increases in fuel prices, the fishing sector normally advocates fuel subsidies in the face of increasing fuel cost. Depending on how successful the sector is in this regard,  $TC'_0$  can swing to anywhere between  $TC_0$  and  $TC'_0$  (Figure 1c) or even to  $TC_{0/2}$  (Figure 1d).

The outcomes under open access illustrated in Figure 1 can be shown to apply under a sole owner profit maximizing economic

agent model, by setting up a Hamiltonian function and solving it with the objective of maximizing discounted profit under the relevant stock constraint (Clark, 1990).

### Computing fuel subsidies

We researched printed and online sources to compile data on fuel subsidies worldwide. We also enlisted the help of colleagues worldwide, including academics, government officials, and non-governmental organizations. We categorized countries into those that provided (or were likely to provide) fuel subsidies, and those unlikely to do so. For each country in the former group with available relevant and useable fuel subsidies data, we computed the cost of a subsidized litre of fuel (usually diesel). We then estimated that country's total fuel subsidies based on fleet fuel consumption, obtained from Tyedmers *et al.* (2005).

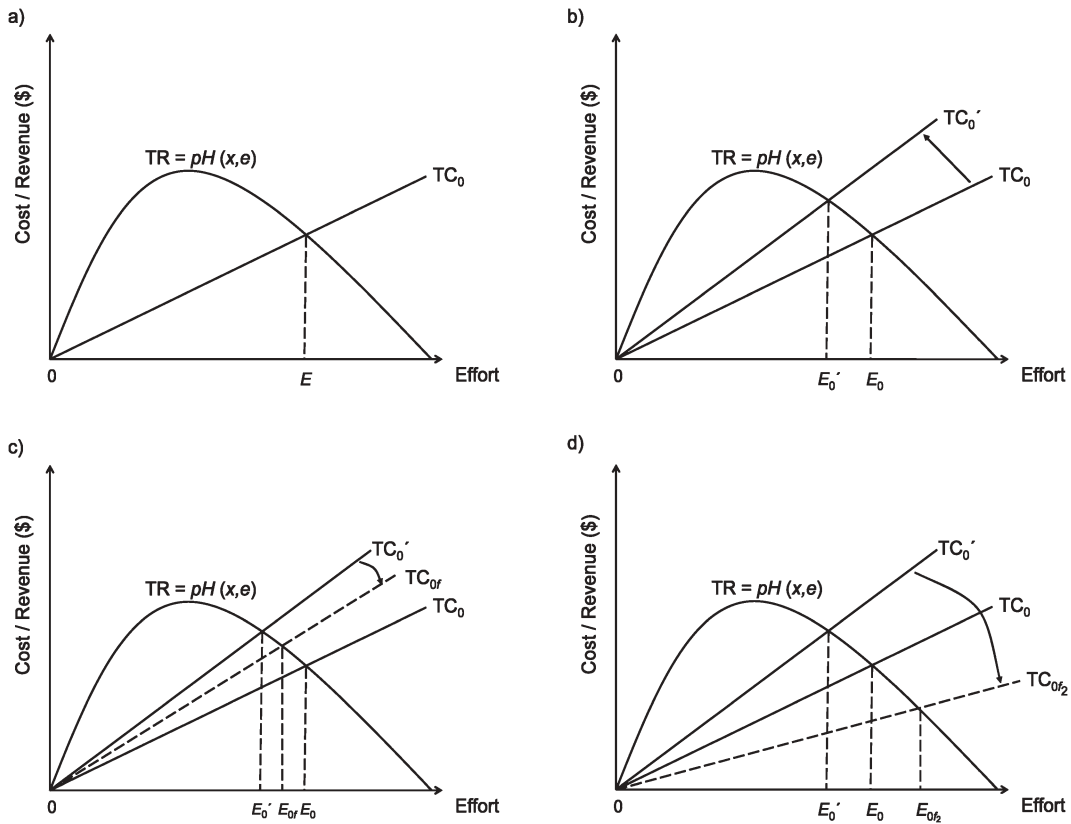
We created a database of fuel subsidies for 144 coastal countries that had engaged in fishing activity in 2000 and were not territories or dependencies of other countries. Information related to fuel subsidies was compiled from primary and grey literature, the Internet, and newspaper articles. Although this is a static analysis for 2000, we used the closest available data within the period 1995–2006 for countries for which we did not have year 2000 data. Data from years before or after 2000 were normalized to constant 2000 dollars by applying the consumer price index (CPI). CPI rates were extracted from the International Financial Statistics website, <http://pacific.commerce.ubc.ca/ifs/>.

Information for each country was filtered into three groups, progressing from countries with specific fuel subsidy data to those with coarse or no information. Group 1 (data-rich) countries had the best data, i.e. the actual monetary value of fuel subsidy per litre, or the TC of fuel subsidies. For countries where the total value of subsidies was provided, we calculated the per-litre subsidy by dividing the total subsidies by the country's total fuel consumption, based on data from Tyedmers *et al.* (2005). Group 2 (data-sparse) countries were those with qualitative information available about the provision of fuel subsidies in the respective countries. Group 3 countries were those for which we have no information. There were 24, 28, and 58 countries in Groups 1, 2, and 3, respectively. In addition, there were 34 countries which, according to our research, do not provide fuel subsidies (Appendix).

Within each group, countries were divided into two categories—developed and developing—based on their score on the United Nations' Human Development Index (HDI). This was to take into account the fact that developed and developing countries face different economic constraints and, therefore, are likely to have different abilities to provide fuel subsidies.

The HDI runs from 0 to 1, and we assumed in this study (as in Khan *et al.*, 2006) that countries with scores ranging from 0 to 0.79 were developing countries, and that those with scores  $>0.79$  were developed countries. Some adjustments were made to this rule, as follows: Russia, China, and Taiwan, with a value of HDI  $<0.79$  were nonetheless assigned to the developed country category. This was because their fisheries are highly industrial with the potential for high fuel subsidies to be advanced to the fishing sector. Also, countries such as Trinidad and Tobago, Cuba, and Uruguay had HDI scores  $>0.79$ , but were classified as developing countries owing to the less-developed nature of their fisheries sectors (this also follows Khan *et al.*, 2006).

For Group 1 (data-rich) countries, we multiplied each country's per-unit fuel subsidy by the annual quantity of fuel consumed



**Figure 1.** (a) Standard model with TR curve and the initial total linear cost function ( $TC_0$ ). (b) The swing in the TC curve from  $TC_0$  to  $TC_0'$ . Depending on the size of fuel subsidies,  $TC_0'$  can swing to (c) anywhere between  $TC_0$  and  $TC_0'$ , or (d)  $TC_{0f2}$ .

by the country’s fishing fleets. This gave the total annual fuel subsidies provided by each country to their fishing sector in constant 2000 dollars. For Group 2 (data-sparse) countries, we estimated total fuel subsidy per country by multiplying each country’s fuel consumption by the average real cost per litre of subsidized diesel obtained for data-rich countries. For Group 3 countries, i.e. the remaining 58 countries with no information, we assumed that no fuel subsidies were provided. This is clearly a strong assumption, with the implication that our estimates are conservative. However, the total fuel consumption for these 58 countries was 0.8 and 2.8 billion litres for developed and developing countries, respectively, accounting for just ~8% of the total fuel consumed by all countries in our analysis. Finally, we obtained an estimate of global fuel subsidies to the world’s fishing sector by adding the developing and developed country estimates.

**Results**

As of 25 August 2006, we had information for 86 out of 144 countries. Of the 86 countries with information, 52 were believed to receive subsidies, and 34 not to do so.

There were in all 24 data-rich countries, of which 8 were categorized as developed and 16 as developing countries. For the data-rich developed countries, we calculated an average real (2000) cost per litre of subsidized diesel to be  $US\$0.18 \pm 0.11$  (s.d.). The TC of subsidies for this group was US\$1.8 billion. For the 16 developing data-rich countries, corresponding amounts were  $US\$0.15 \pm 0.08$  per litre, with a total subsidy cost of almost US\$1 billion.

Our research suggested that 28 data-sparse countries provide fuel subsidies, although the amount was not known. Of these, 9 were developed and 19 were developing countries. The total fuel consumption for data-sparse developed and developing countries was around 18 and 2.2 billion litres, respectively. We multiplied the total fuel consumption for all data-sparse countries by the average fuel subsidy cost to obtain total subsidy costs of US\$3.2 and US\$0.3 billion for developed and developing countries, respectively. In addition, a high and a low estimate were obtained by using the upper and lower ranges (1 s.d.) of the data-rich countries’ subsidy means. This produced an upper and a lower range estimate of US\$5.3 billion and US\$1.3 billion for developed countries. Subsidy amounts for developing countries ranged from a high of US\$0.5 billion to a low of US\$0.2 billion.

Summing data-rich and data-poor results gave us mean subsidies of US\$5 billion for developed countries (Table 1), and ~US\$1.4 billion for developing countries (Table 2). In total, the sum of developed and developing countries’ mean estimates gave us a global estimate for fisheries fuel subsidies of US\$6.4 billion, ranging from US\$4.2 to US\$8.5 billion (Table 3), ~8% of the annual commercial fish catch value of ~US\$80 billion (Sumaila et al., 2007b).

**Discussion and conclusions**

Here, we have presented the theoretical expectation that an increase in fuel price paid by fishers to go fishing should have sustainability value. We also demonstrated that fuel subsidies to

**Table 1.** Estimated fuel subsidies for developed countries.

Country	Mean subsidy (US\$ per litre)	Fuel consumption (million litres)	Total subsidy (US\$ million)		
			Low	Mean	High
Argentina	(0.18)	640	(45)	(115)	(186)
Canada	(0.18)	519	(36)	(93)	(151)
China	(0.18)	10 087	(706)	(1 814)	(2 925)
Iceland	(0.18)	530	(37)	(95)	(154)
Mexico	(0.18)	974	(68)	(175)	(282)
Norway	(0.18)	786	(55)	(116)	(228)
Poland	(0.18)	80	(6)	(15)	(23)
Russian Federation	(0.18)	2 732	(191)	(491)	(792)
South Korea	(0.18)	1 841	(129)	(331)	(534)
Australia	0.20	205	41	41	41
France <sup>a</sup>	0.14	673	94	94	94
Greece <sup>a</sup>	0.20	68	14	14	14
Hong Kong	0.40	155	62	62	62
Japan	0.25	4 459	1 115	1 115	1 115
Spain	0.10	1 259	122	122	122
Taiwan <sup>b</sup>	0.09	1 329	120	120	120
USA	0.06	3 010	181	181	181
Total		29 347	3 021	5 022	7 023

Estimates in parenthesis are based on a fuel subsidy of US\$0.18 per litre. A range is provided only for estimated subsidies, based on a standard deviation of US\$0.11 per litre.

<sup>a</sup>Total subsidy value provided.

<sup>b</sup>Average of subsidies from two separate sources: (i) The Taipei Times Online; <http://www.taipetimes.com/News/taiwan/archives/2004/12/22/2003216188>; (ii) Taiwan Legislative Council Secretariat Information Note IN09/05-06 Available at <http://www.legco.gov.hk/yr05-06/english/sec/library/0506in09e.pdf>.

the fishing sector could subvert the workings of the market and completely negate the expected sustainability value of a fuel price increase. In fact, recent events have demonstrated this to be true, because rises in fuel price have led to an increase in fisheries fuel subsidies in some countries. For example, in June 2006, the Malaysian government started providing coastal fishers with subsidized petrol at RM1 per litre, a RM0.92 (US\$0.25) subsidy (New Straits Times, 2006). In October 2005, the Spanish government agreed to a 60% increase in fuel subsidies after local fishers blockaded several Mediterranean ports (PravdaRU, 2005). Those cases demonstrate that the decision to provide fuel subsidies was influenced primarily by political and social concerns, rather than on the sustainability of fisheries resources.

We have determined the level of fuel subsidies worldwide to be some US\$6.4 billion, ranging from US\$4.2 to US\$8.5 billion. These subsidies were provided mostly before the recent fuel increases, so current fishing effort reflects a considerable part of those subsidies. Therefore, future fishing effort will be influenced partly by the rate of increase in fuel price relevant to the future rate of increase in subsidies provided to the fishing sector. Comparing the midrange of our estimate with the US\$25.7 billion of global fisheries subsidies less fuel subsidies reported in Khan *et al.* (2006) means that fuel subsidies amount to ~20% of total fisheries subsidies. Fuel subsidies inflate the proportion of global

**Table 2.** Estimated fuel subsidies for developing countries.

Country	Mean subsidy (US\$ per litre)	Fuel consumption (million litres)	Total subsidy (US\$ million)		
			Low	Mean	High
Angola	(0.15)	119	(8.3)	(17.6)	(27.4)
Barbados	(0.15)	4	(0.3)	(0.6)	(0.9)
Cape Verde	(0.15)	13	(0.9)	(2.0)	(3.0)
Cote d'Ivoire	(0.15)	34	(2.4)	(5.0)	(7.8)
Dominica	(0.15)	1	(0.1)	(0.2)	(0.2)
Gambia	(0.15)	7	(0.5)	(1.0)	(1.6)
Grenada	(0.15)	2	(0.1)	(0.4)	(0.5)
Jamaica	(0.15)	4	(0.3)	(0.6)	(0.9)
Namibia	(0.15)	319	(22.3)	(47.1)	(73.4)
Philippines	(0.15)	1 122	(78.5)	(165.6)	(258.1)
Saint Lucia	(0.15)	2	(0.1)	(0.3)	(0.5)
Samoa	(0.15)	9	(0.6)	(1.4)	(2.1)
Seychelles	(0.15)	53	(3.7)	(7.8)	(12.2)
Soloman Islands	(0.15)	27	(1.9)	(4.0)	(6.2)
Sri Lanka	(0.15)	282	(19.7)	(41.7)	(64.9)
Tonga	(0.15)	3	(0.2)	(0.4)	(0.7)
Trinidad and Tobago	(0.15)	14	(1.0)	(2.1)	(3.2)
Ukraine	(0.15)	150	(10.5)	(22.1)	(34.5)
Yemen	(0.15)	82	(5.7)	(12.0)	(18.9)
Albania	0.33	2	1	1	1
Bangladesh	0.04	203	8	8	8
Brazil	0.11	550	61	61	61
Costa Rica	0.20	48	10	10	10
Gabon	0.23	20	5	5	5
Ghana	0.10	176	18	18	18
India	0.10	2 304	233	233	233
Indonesia	0.06	3 127	219	219	219
Malaysia <sup>a</sup>	0.11	1 012	111	111	111
Senegal	0.22	139	30	30	30
South Africa	0.10	256	26	26	26
Thailand	0.13	1 856	241	241	241
Togo (artisanal sector)	0.12	6	1	1	1
Tunisia	0.20	77	15	15	15
Turkey <sup>b</sup>	0.09	190	17	17	17
Vanuatu	0.23	107	25	25	25
Total		12 322	1 177	1 354	1 536

Estimates in parenthesis are based on a fuel subsidy of US\$0.15 per litre. A range is provided only for estimated subsidies, based on a standard deviation of US\$0.08 per litre.

<sup>a</sup>Subsidy is the average between diesel and petrol subsidy.

<sup>b</sup>Total subsidy provided.

subsidies defined by Khan *et al.*, (2006) as “bad subsidies” or subsidies that lead to overcapitalization to ~US\$21 billion or >65% of total global fisheries subsidies.



**Table 3.** Estimate of global fisheries fuel subsidies (US\$ billion).

Level	Developed countries	Developing countries	Total subsidies
Average	5.02	1.35	6.35
High	7.02	1.54	8.53
Low	3.02	1.18	4.18

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#### Appendix. List of data sources and subsidies per litre of fuel

Country	Subsidy? Y/N <sup>a</sup>	US\$ per litre <sup>b</sup>	Source(s)
Albania	Y	0.33	Albania Directorate of Fisheries Policies (2004). Fisheries Economy Analysis, <a href="http://www.dfishery.gov.al">http://www.dfishery.gov.al</a> (last accessed 21 August 2006)
Angola	Y	(0.15)	WTO (2006)
Antigua and Barbuda	N	–	Caribbean Regional Fisheries Mechanism (CRFM), <a href="http://www.caricom-fisheries.com/members/antigua.asp">http://www.caricom-fisheries.com/members/antigua.asp</a> (last accessed 21 August 2006)
Argentina	Y	(0.18)	Onestini and Gutman (2001)
Australia	Y	0.20	Parliament of Australia Library. Research Note 24 2000-01, <a href="http://www.aph.gov.au/library/Pubs/rn/2000-01/01RN24.htm">http://www.aph.gov.au/library/Pubs/rn/2000-01/01RN24.htm</a> (last accessed 24 August 2006)
Bahamas	N <sup>c</sup>	–	CRFM, <a href="http://www.caricom-fisheries.com/members/bahamas.asp">http://www.caricom-fisheries.com/members/bahamas.asp</a> (last accessed 21 August 2006)
Bangladesh	Y	0.04	Khatun (2004)
Barbados	Y	(0.15)	Barbados Fisheries Division/Fisheries Management Plan, <a href="http://grid2.cr.usgs.gov/cepnet/barbados/czmu/bbsoc/barbados.htm">http://grid2.cr.usgs.gov/cepnet/barbados/czmu/bbsoc/barbados.htm</a> Barbados (last accessed 21 August 2006); CRFM, <a href="http://www.caricom-fisheries.com/members/barbados.asp">http://www.caricom-fisheries.com/members/barbados.asp</a> (last accessed 21 August 2006)
Belgium	N <sup>d</sup>	–	OECD (2005c, d); Cox (2003)
Benin	N	–	E. Fiogbe (pers. comm., 2006)
Brazil	Y	0.11	Brazil Secretariat of Agriculture and Fisheries, <a href="http://www.planalto.gov.br/seap">www.planalto.gov.br/seap</a> (last accessed 22 August 2006)
Cameroon	N	–	FAO Fisheries Management Profile, <a href="http://www.fao.org/fi/fcp/fr/CMR/body.htm">http://www.fao.org/fi/fcp/fr/CMR/body.htm</a> (last accessed 22 August 2006)
Canada	Y	(0.18)	<a href="http://www.gnb.ca/acts/acts/g-03.htm">http://www.gnb.ca/acts/acts/g-03.htm</a> (fuel tax exemption in New Brunswick); <a href="http://www.finances.gouv.qc.ca/en/ministre/discours/20050902.asp">http://www.finances.gouv.qc.ca/en/ministre/discours/20050902.asp</a> (fuel tax exemption in Quebec)
Cape Verde	Y	(0.15)	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/fr/CPV/body.htm">http://www.fao.org/fi/fcp/fr/CPV/body.htm</a>
China	Y	(0.18)	Xinhua Online News, 27 March 2006. Fuel prices jump to aid battered refiners, <a href="http://news.xinhuanet.com/english/2006-03/27/content_4349323.htm">http://news.xinhuanet.com/english/2006-03/27/content_4349323.htm</a> (last accessed 24 August 2006)
Colombia	N <sup>e</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/COL/profile.htm">http://www.fao.org/fi/fcp/en/COL/profile.htm</a>
Congo (Democratic Republic)	N <sup>f</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/COD/profile.htm">http://www.fao.org/fi/fcp/en/COD/profile.htm</a>
Congo (Republic)	N <sup>f</sup>	–	Sustainable Fisheries Livelihoods Programme Bulletin 16, <a href="http://www.sflp.org/eng/007/pub1/bul16_1.htm#_fn1">http://www.sflp.org/eng/007/pub1/bul16_1.htm#_fn1</a>
Costa Rica	Y	0.20	La Nacion Online News, 12 March 2006. Pescadores anclados a pobreza pese a millonaria ayuda estatal, <a href="http://www.nacion.com/ln_ee/2006/marzo/12/pais1.html">http://www.nacion.com/ln_ee/2006/marzo/12/pais1.html</a> (last accessed 24 August 2006)
Cote d'Ivoire	Y	(0.15)	Overaa (2001)
Denmark	N <sup>d</sup>	–	OECD (2005c, d)

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## Appendix. Continued

Country	Subsidy? Y/N <sup>a</sup>	US\$ per litre <sup>b</sup>	Source(s)
Dominica	Y	(0.15)	CRFM, <a href="http://www.caricom-fisheries.com/members/dominica.asp">http://www.caricom-fisheries.com/members/dominica.asp</a> (last accessed 24 August 2006)
Ecuador	N <sup>e</sup>	–	FAO Fisheries Management Country Profile, <a href="http://www.fao.org/fi/fcp/es/ECU/BODY.HTM">http://www.fao.org/fi/fcp/es/ECU/BODY.HTM</a> (last accessed 24 August 2006)
El Salvador	N <sup>f</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/es/SLV/profile.htm">http://www.fao.org/fi/fcp/es/SLV/profile.htm</a>
Fiji	N <sup>e</sup>	–	Fiji Times, 2 January 2006. Fiji fishing industry in crisis, <a href="http://www.ecsiep.org/index.php?option=com_content&amp;task=view&amp;id=533&amp;Itemid=63">http://www.ecsiep.org/index.php?option=com_content&amp;task=view&amp;id=533&amp;Itemid=63</a> (last accessed 24 August 2006); <a href="http://www.fijivillage.com/budget/index.html">http://www.fijivillage.com/budget/index.html</a>
France	Y	0.14	Financial Times Online, 27 April 2006. Federation chief wants answers on French fuel move, <a href="http://www.fishupdate.com/news/fullstory.php/aid/4426/Federation_chief_wants_answers_on_French_fuel_move_.html">http://www.fishupdate.com/news/fullstory.php/aid/4426/Federation_chief_wants_answers_on_French_fuel_move_.html</a> (last accessed 22 August 2006)
Gabon	Y	0.23	G. Bernart (pers. comm., 2006)
Gambia	Y	(0.15)	Mabawonku (1990)
Germany	N <sup>d</sup>	–	OECD (2005c, d)
Georgia	N <sup>e</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/GEO/profile.htm">http://www.fao.org/fi/fcp/en/GEO/profile.htm</a>
Ghana	Y	0.10	EUROPA i centre, <a href="http://trade-info.cec.eu.int/doclib/cfm/doclib_section.cfm?sec=168&amp;lev=2&amp;order=date">http://trade-info.cec.eu.int/doclib/cfm/doclib_section.cfm?sec=168&amp;lev=2&amp;order=date</a> (last accessed 24 August 2006)
Greece	Y	0.20	OECD (2005c)
Grenada	Y	(0.15)	CRFM, <a href="http://www.caricom-fisheries.com/members/grenada.asp">http://www.caricom-fisheries.com/members/grenada.asp</a> (last accessed 24 August 2006)
Guinea	N <sup>e</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/fr/GIN/profile.htm">http://www.fao.org/fi/fcp/fr/GIN/profile.htm</a> (last accessed 24 August 2006)
Guyana	N <sup>e</sup>	–	Associated Press, 1 September 2005. Guyana deep-sea fishermen suspend operations due to high fuel costs, <a href="http://www.icsf.net/jsp/english/externalnews/newsDetails.jsp?id=23189">http://www.icsf.net/jsp/english/externalnews/newsDetails.jsp?id=23189</a> (last accessed 24 August 2006)
Hong Kong	Y	0.40	China Fisheries, 17 May 2006 Hong Kong: Fishermen's fuel-subsidy call rejected, <a href="http://en.cappma.com/news/readnews.asp?newsid=21140">http://en.cappma.com/news/readnews.asp?newsid=21140</a> (last accessed 24 August 2006)
Iceland	Y	(0.18)	Scottish Executive Publications Online, <a href="http://www.scotland.gov.uk/library3/environment/ccna-11.asp">http://www.scotland.gov.uk/library3/environment/ccna-11.asp</a> (last accessed 24 August 2006)
India	Y	0.11	The Hindu Online, 26 October 2004. No sales tax on diesel for fishermen, <a href="http://www.hindu.com/2004/10/26/stories/2004102608930400.htm">http://www.hindu.com/2004/10/26/stories/2004102608930400.htm</a> (last accessed 22 August 2006)
Indonesia	Y	0.07	LKBN Antara. 19 April 2006. Government provides subsidized fuel supply for fishermen, <a href="http://www.antara.co.id/en/">http://www.antara.co.id/en/</a> (last accessed 22 August 2006)
Italy	N <sup>d</sup>	–	OECD (2005c, d)
Jamaica	Y	(0.15)	CRFM, <a href="http://www.caricom-fisheries.com/members/jamaica.asp">http://www.caricom-fisheries.com/members/jamaica.asp</a>
Japan	Y	0.25	Milazzo (1998)
Marshall Islands	N <sup>e</sup>	–	Marshall Island Chamber of Commerce, <a href="http://www.majurochamber.net/Marshall%20Islands%20Journal%20News.htm">http://www.majurochamber.net/Marshall%20Islands%20Journal%20News.htm</a> (last accessed 22 August 2006)
Malaysia	Y	0.11	New Straits Times (2006); Pertubuhan Berita Nasional Malaysia, 4 January 2006. Syndicates lure fishermen to sell their subsidized diesel, <a href="http://www.bernama.com">http://www.bernama.com</a> (last accessed 22 August 2006)
Malta	N <sup>e</sup>	–	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/MLT/profile.htm">http://www.fao.org/fi/fcp/en/MLT/profile.htm</a> (last accessed 24 August 2006)
Mexico	Y	(0.18)	FAO Country Fisheries Management Profile, <a href="http://www.fao.org/fi/fcp/en/MEX/body.htm">http://www.fao.org/fi/fcp/en/MEX/body.htm</a> (last accessed 24 August 2006)
Mozambique	N <sup>e</sup>	–	Tembe (2004)
Namibia	Y	(0.15)	FAO Fisheries Management Profile, <a href="http://www.fao.org/fi/fcp/en/NAM/body.htm">http://www.fao.org/fi/fcp/en/NAM/body.htm</a> (last accessed 24 August 2006)
Netherlands	N <sup>d</sup>	–	OECD (2005c, d)
New Zealand	N	–	OECD (2005c, d)
Nigeria	N	–	C. Isebor (pers. comm., 2006)
Norway	Y	(0.18)	Tietze <i>et al.</i> (2001)

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## Appendix. Continued

Country	Subsidy? Y/N <sup>a</sup>	US\$ per litre <sup>b</sup>	Source(s)
Pakistan	N	–	Daily Times Newspaper, February 12, 2006. Government considering subsidy on diesel sales to fishermen, <a href="http://www.dailytimes.com.pk/default.asp?page=2006%5C02%5C12%5Cstory_12-2-2006_pg5_6">http://www.dailytimes.com.pk/default.asp?page=2006%5C02%5C12%5Cstory_12-2-2006_pg5_6</a> (last accessed 22 August 2006)
Panama	N	–	FAO Country Fisheries Management Profile, <a href="http://www.fao.org/fi/fcp/es/PAN/body.htm">http://www.fao.org/fi/fcp/es/PAN/body.htm</a> (last accessed 24 August 2006)
Papua New Guinea	N	–	Sokimi and Chapman (2005)
Peru	N	–	EUROPA i centre, <a href="http://trade-info.cec.eu.int/doclib/cfm/doclib_section.cfm?sec=168&amp;lev=2&amp;order=date">http://trade-info.cec.eu.int/doclib/cfm/doclib_section.cfm?sec=168&amp;lev=2&amp;order=date</a> (last accessed 22 August 2006)
Philippines	Y	(0.15)	Rab <i>et al.</i> (2002)
Poland	Y	(0.18)	OECD (2005c, d); FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/POL/profile.htm">http://www.fao.org/fi/fcp/en/POL/profile.htm</a> (last accessed 24 August 2006)
Portugal	N <sup>d</sup>	–	OECD (2005c, d)
Russian Federation	Y	(0.18)	Milazzo (1998)
Saint Lucia	Y	(0.15)	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/LCA/profile.htm">http://www.fao.org/fi/fcp/en/LCA/profile.htm</a> (last accessed 22 August 2006)
St Kitts and Nevis	N	–	CRFM, <a href="http://www.caricom-fisheries.com/members/stkitts.asp">http://www.caricom-fisheries.com/members/stkitts.asp</a> (last accessed 22 August 2006)
Samoa	Y	(0.15)	SPC Samoa Profile, <a href="http://www.spc.int/coastfish/Sections/Community/samoa.htm">http://www.spc.int/coastfish/Sections/Community/samoa.htm</a> (last accessed 22 August 2006)
Senegal	Y	0.22	UNEP (2002)
Seychelles	Y	(0.15)	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/SYC/PROFILE.HTM">http://www.fao.org/fi/fcp/en/SYC/PROFILE.HTM</a> (last accessed 22 August 2006); International Trade Centre UNCTAD/WTO (1999).
Solomon Islands	Y	(0.15)	Hand (1999)
South Africa	Y	0.10	South Africa Budget Review (2000), <a href="http://www.treasury.gov.za/documents/budget/2000/review/chapter_4.pdf">http://www.treasury.gov.za/documents/budget/2000/review/chapter_4.pdf</a> (last accessed 21 August 2006)
South Korea	Y	(0.18)	Tietze <i>et al.</i> (2001)
Spain	Y	0.10	PravdaRU (2005). Spanish fishermen keep up protests against fuel prices, <a href="http://newsfromrussia.com/world/2005/10/27/66385_.html">http://newsfromrussia.com/world/2005/10/27/66385_.html</a> (last accessed 26 April 2006)
Sri Lanka	Y	(0.15)	Parliament Speech by President of Sri Lanka 25 November 2005, <a href="http://www.president.sl.org/data/html/speeches/2005/new_session_of_parliament.htm">http://www.president.sl.org/data/html/speeches/2005/new_session_of_parliament.htm</a>
Sweden	N <sup>d</sup>	–	OECD (2005c, d).
Taiwan	Y	0.09	Taipei Times Online, 22 December 2004. EPA tackles air pollution, illegal diesel, <a href="http://www.taipetimes.com/News/taiwan/archives/2004/12/22/2003216188">http://www.taipetimes.com/News/taiwan/archives/2004/12/22/2003216188</a> (last accessed 24 August 2006); Hong Kong Legislative Council Secretariat Information Note IN09/05-06, <a href="http://www.legco.gov.hk/yr05-06/english/sec/library/0506in09e.pdf">http://www.legco.gov.hk/yr05-06/english/sec/library/0506in09e.pdf</a> (last accessed 22 August 2006)
Tanzania	N <sup>c</sup>	–	Budget speech (2004), <a href="http://www.tanzania.go.tz/budgetspeech/2004/financeE.htm">http://www.tanzania.go.tz/budgetspeech/2004/financeE.htm</a> (last accessed 24 August 2006)
Thailand	Y	0.13	Bangkok Post Online, 11 June 2006. Fuel prices hit southern fishermen, <a href="http://www.bangkokpost.com/breaking_news/breakingnews.php?id=100889">http://www.bangkokpost.com/breaking_news/breakingnews.php?id=100889</a> (last accessed 22 August 2006)
Togo	Y	0.12	Sedzro (pers. comm., 2006)
Tonga	Y	(0.15)	Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. National Report Tonga, December 2005, <a href="http://www.wcpfc.org/tcc1/pdf/WCPFC-TCC1-NR8-TO.pdf#search=%22SPC%20report%20Tonga%20fisheries%20subsidies%22">http://www.wcpfc.org/tcc1/pdf/WCPFC-TCC1-NR8-TO.pdf#search=%22SPC%20report%20Tonga%20fisheries%20subsidies%22</a>
Trinidad and Tobago	Y	(0.15)	CRFM, <a href="http://www.caricom-fisheries.com/members/tt.asp">http://www.caricom-fisheries.com/members/tt.asp</a> (last accessed 22 August 2006)
Tunisia	Y	0.20	Fishing Development Strategy in Tunisia, <a href="http://www.utap.org.tn/htmlang/pech_agr/bas_1_6.htm">http://www.utap.org.tn/htmlang/pech_agr/bas_1_6.htm</a> (last accessed 24 August 2006)
Turkey	Y	0.09	EU Twinning Project TR/2004/1/AG/01 February 2006 <a href="http://www.tarim.gov.tr/AB_Tarim/balikclik/ayrintili_tarama_sunumlar/7-state_aid_in_fisheries.ppt">www.tarim.gov.tr/AB_Tarim/balikclik/ayrintili_tarama_sunumlar/7-state_aid_in_fisheries.ppt</a> (last accessed 22 August 2006)

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## Appendix. Continued

Country	Subsidy? Y/N <sup>a</sup>	US\$ per litre <sup>b</sup>	Source(s)
Ukraine	Y	(0.15)	FAO Fishery Profile, <a href="http://www.fao.org/fi/fcp/en/UKR/profile.htm">http://www.fao.org/fi/fcp/en/UKR/profile.htm</a> (last accessed 22 August 2006)
United Kingdom	N	–	OECD (2005c, d).
Uruguay	N	–	FAO Information on fisheries management in the country, <a href="http://www.fao.org/fi/fcp/es/URY/body.htm">http://www.fao.org/fi/fcp/es/URY/body.htm</a> (last accessed 22 August 2006)
USA	Y	0.06	Weber (1994); <a href="http://www.chevron.com/products/prodsv/fuels/bulletin/diesel/L2_3_11_fs.htm">http://www.chevron.com/products/prodsv/fuels/bulletin/diesel/L2_3_11_fs.htm</a> (last accessed 24 August 2006)
Vanuatu	Y	0.23	Asian Development Bank (2000)
Vietnam	N	–	Impacts of Oil Price to Vietnamese Fisheries Sector. Global News Wire. 15 November 2005. Lexis Nexis
Yemen	Y	(0.15)	Yemen Embassy Economic Report, <a href="http://www.yemenembassy.org/economic/Reports/Heritage%20Foundation/Yemen_2004%20Index%20Of%20Economic%20Freedom.pdf">http://www.yemenembassy.org/economic/Reports/Heritage%20Foundation/Yemen_2004%20Index%20Of%20Economic%20Freedom.pdf</a> (last accessed 22 August 2006)

\*Note: The countries with insufficient or no information (see text) are: Bahrain, Chile, Cyprus, Estonia, Finland, Ireland, Israel, Kuwait, Lithuania, Qatar, Singapore, United Arab Emirates, Algeria, Belize, Brunei Darussalam, Bulgaria, Cambodia, Comoros, Croatia, Cuba, Djibouti, Dominican Rp, Egypt, Equatorial Guinea, Eritrea, Guatemala, Guinea Bissau, Haiti, Honduras, Iran, Jordan, Kenya, Kiribati, Latvia, Lebanon, Liberia, Libya, Madagascar, Maldives, Mauritania, Mauritius, Micronesia, Morocco, Myanmar, Nauru, Nicaragua, Oman, Palau, Romania, Sao Tome and Principe, Saudi Arabia, Sierra Leone, Somalia, St Vincent, Sudan, Suriname, Syria, Venezuela.

<sup>a</sup>Y/N allows the grouping of countries into “data-rich” (Group 1) and “data-sparse” (Group 2).

<sup>b</sup>Figures in parenthesis are estimated (see text).

<sup>c</sup>Other types of input subsidies (e.g. gear, boats) available, but fuel subsidies not mentioned.

<sup>d</sup>No fuel subsidies listed under direct government transfers in OECD Fisheries Review (2005).

<sup>e</sup>Likely no subsidies owing to limited fuel supplies for fishing fleet or high fuel cost with no reported subsidies.

<sup>f</sup>The government has set up the PESCA Trust to use tax from fuel to support artisanal fishing organizations.