ABSTRACT

The value assigned to fisheries in the national economy is often based on the ex-vessel value of the fish landed. As the fish moves through various market pathways to the consumer, it increases in value with each transaction, and contributes to livelihoods. This additional value should be accounted for in assigning an economic value to fisheries and in determining the appropriate investment in management. A preliminary assessment of this additional value was carried out for the major fisheries of Barbados by: determining the pathways along which fish move from fisher to consumer, amounts moving on each path, and price increase at each step. Overall, additional value was about US$19M, and was about 2.6 times the landed value of the fishery. This ranged from about 7.4 times the landed value for flyingfish to zero for sea urchins. The distribution of this additional value among reseller groups varied from being 68% for restaurants, 20% for processors/exporters, 8% for fish fryers, 3% for vendors and <1% for supermarkets. These results underscore the need to value fishery products broadly, especially in a tourism economy where seafood is important mainstay of restaurants and fish fry operations.

KEY WORDS: Added-value, economics, valuation, fishery pathways

INTRODUCTION

Fishing and fish have been an important part of Barbadian commerce and culture from the earliest recorded times. The fishing industry has gone through many changes, particularly the offshore fleet. In the late 1950s, the fleet converted from sail to motor. The ‘ice-boat’ emerged in the 1980s and increased the fishing range of the fleet. The 1990s saw the appearance of longliners, which now number 30 or more. This offshore fleet, targeting flyingfish and large pelagics such as dolphins, tuna, billfishes, and kingfish (mainly wahoo), has been the mainstay of the industry. Fish complexes at Oistins, Bridgetown, Conset Bay, and Skeetes Bay have been built primarily to serve its needs. A processing industry has emerged to clean, cut, and package these products for local and export markets.

Though small, the inshore fisheries are no less a part of Barbados’ fishing culture. Sea eggs, reef fishes (pot fish), snappers and brims, jacks, and sprats are key examples of the resources harvested from the island shelf and the deeper waters of its slope. Less important, but nonetheless contributing to the overall fishery picture for Barbados, are lobster, conch, and seamoss. These inshore resources are taken by a variety of fishing methods — diving, spearfishing, handlines, traps, cast nets, and seine nets among them. The inshore fleet comprises a large
number of small open vessels (moses). For a fuller
description of the Barbados fishing industry see Wil-
loughby 2000.

Fishing adds much to Barbadian life. It provides an
important and readily available source of food of the
highest quality. It also provides a means of livelihood for
many people. Those who catch fish, sell fish, and process
distribute fish are estimated to number more than
6,000. Those who cook and serve fish, whether in
exclusive restaurants, at fish fries, or the numerous rum
shops across the island have not been counted. They all
owe their living, either in whole or in part, to these
resources. Numerous others make a living by supporting
the industry. Some build, sell, and maintain the boats, their
engines, and all the fishing and electronic equipment that
they carry. Others sell and service the vehicles and
equipment involved in transporting, processing, and
exporting fish.

The fishing industry is important in other ways as
well. It provides an important input to the tourism
industry. Flyingfish, dolphinfish, kingfish, and tuna are
perennial favourites with visitors. Recently, fish fries have
emerged as a major feature and attract large numbers of
locals and visitors. Fish exports are on the increase,
providing foreign revenue. Last but not least, when we
consider the value of the Barbadian fishing industry, we
must take account of the colour and interest that the fishing
industry adds to Barbadian life and culture. It fascinates
locals and visitors alike and inspires our artists. And there
is the Oistins Fish Festival.

Unfortunately, the true value of the Barbados fishing
industry to the economy of Barbados has never been
properly assessed. Only the ex-vessel value of the fish
landings is reflected under fisheries in the GDP estimates
of Barbados. Clearly, as fish pass from hand to hand along
various pathways and finally to consumer there is consider-
able value that is added along the way. To obtain a true
picture of the market value of the fishing industry, this
added value must be included. In this report we make a
preliminary attempt to assess the added value by:

i) Identifying the pathways along which fish and fish
products flow.

ii) Estimating the value and value added of fish and
fish products at each stage in each path.

We re-emphasise that fisheries may also have considerable
value in several other ways that this study has not explored.
These include:

i) The value of the support services to the fishing
industry;

ii) The value of fishing and fish products in attracting
visitors to the island;

iii) The value of fish as food in maintaining the health
of Barbadians, and thus reducing health costs; or

iv) The value of fisheries in the culture and identity of
Barbadians.

Each of these can be assessed using appropriate
methods, but valuing them must wait for later.

**METHODS**

The first step was to:

i) Construct for each fishery type a diagram showing
the pathways that fish follow from the fisher to the
consumer; then

ii) Starting with the total estimated landings in each
fishery type, estimate the percentage that moves
along each pathway. This was done separately for
each type of fishery because in different types of
fisheries, products may follow different pathways,
or the same pathways in different proportions.
The average annual landings for the five-year
period 1999 to 2003 were used in this study.

Finally, the price that the fishery product was sold for
at each step along the path was estimated. The sale of fish
from the fisherman to the first buyer provides the landed or
ex-vessel value of the fish. At each step after that, the
difference between the purchase price of the fish and its
selling price, provides the price increase or value added.
By multiplying the total amount of fish by the value-added
per kilogram, the total value added was calculated.
Whenever fish was actually processed or changed form by
cleaning, deboning, or preparation for cooking, a 20% loss
figure was applied to account for unused parts.

The accuracy of the estimates of value is a matter of
concern. Much of the information required was available
from records at the Fisheries Division, or was obtained
from interviews with Fisheries Division staff. The
Fisheries Division routinely collects information on total
amounts of fish landed and on selling prices at major
landing sites. Their estimates of total landings by category
are the starting point for this preliminary valuation. This
information was supplemented by conducting rapid surveys
and came from a variety of sources: fish boners/scalers,
vendors/hawkers, fish processors, restaurants and hotels,
supermarkets, and fish fry vendors. Surveys were carried
out on the south and west coasts of the island, with three
hotels and five restaurants surveyed on each coast. The
sample population was derived from the hotels and
restaurants catering to a broad base of clientele, i.e. local
and foreign. Prices used are annual averages. These are
known to vary seasonally, but it was beyond the scope of
this project to attempt a seasonal breakdown. Information
on amounts of fish taking various pathways was sometimes
arrived at by deduction.

The estimate for sea urchins was derived from data
provided by McConney et al. (2003). It was based on
estimated numbers of full-time and part-time fishers and
their average respective earnings per season as reported in
a survey. Owing to problems with willingness of fishers to
provide information on earnings and uncertainty regarding
numbers, and designation of part-time and full-time status, this estimate is considered to be one of the least reliable.

Two types of fishery are missing from this valuation study, because the products are seldom sold in the regular market places. These are conch and small inshore pelagics called ‘sprats’. There are no substantial conch resources in Barbados, although conch can be found scattered throughout the island shelf wherever appropriate habitats occur. When divers encounter these they are taken and sold locally to known buyers or to restaurants. Sprats, likewise are sold locally to consumers on the beach or as bait. There are no data for these fisheries from which to develop estimates. Since most is sold directly from fisher to consumer, the value-added is likely to be minimal.

RESULTS AND DISCUSSION

The results of the survey are displayed in the form of path diagrams and value added tables for each species or group. In the path diagrams, the percentages of fish moving from each seller to the various buyers are shown. A thicker line is used to indicate path steps in which the 20% loss factor was applied. The value added table for each species or group shows the actual quantities and prices of fish as it passes from one form to another and one path component to another.

Flyingfish and large pelagics had the most complex pathways, often involving export (Table 1, Figure 1). Coastal resources that were most often sold directly to consumers had the simplest pathways (Figure 2).

Table 1. Example of calculation of added value for flyingfish (US$).

<table>
<thead>
<tr>
<th>Form</th>
<th>Seller</th>
<th>Buyer</th>
<th>Percent</th>
<th>Amount (kg)</th>
<th>Price (US$)</th>
<th>Price difference</th>
<th>Value/Value added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole fish</td>
<td>Fisher</td>
<td>Vendors/hawkers</td>
<td>25%</td>
<td>378,669</td>
<td>$1.27</td>
<td></td>
<td>479,016</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Processors</td>
<td>45%</td>
<td>670,870</td>
<td>$1.01</td>
<td></td>
<td>677,579</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fish Fry</td>
<td>9%</td>
<td>134,174</td>
<td>$1.45</td>
<td></td>
<td>193,881</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumer</td>
<td>21%</td>
<td>307,109</td>
<td>$1.45</td>
<td></td>
<td>443,773</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Landings (kgs)</td>
<td></td>
<td>1,490,822</td>
<td></td>
<td></td>
<td>1,794,249</td>
</tr>
<tr>
<td>Deboned</td>
<td>Vendors/ hawkers</td>
<td>Restaurants</td>
<td>46%</td>
<td>174,188</td>
<td>$3.15</td>
<td>$1.89</td>
<td>328,344</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumer</td>
<td>54%</td>
<td>163,585</td>
<td>$1.77</td>
<td>$0.51</td>
<td>82,610</td>
</tr>
<tr>
<td></td>
<td>Processors</td>
<td>Consumer</td>
<td>1%</td>
<td>5,367</td>
<td>$5.30</td>
<td>$4.29</td>
<td>22,997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restaurants</td>
<td>86%</td>
<td>461,558</td>
<td>$4.85</td>
<td>$3.84</td>
<td>1,772,385</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supermarkets</td>
<td>8%</td>
<td>42,936</td>
<td>$4.55</td>
<td>$3.54</td>
<td>151,992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fish Fry</td>
<td>1%</td>
<td>5,367</td>
<td>$4.65</td>
<td>$3.64</td>
<td>19,536</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Export Market</td>
<td>4%</td>
<td>25,158</td>
<td>$4.78</td>
<td>$3.77</td>
<td>94,844</td>
</tr>
<tr>
<td></td>
<td>Supermarket</td>
<td>Consumer</td>
<td>55%</td>
<td>23,615</td>
<td>$5.30</td>
<td>$0.75</td>
<td>17,593</td>
</tr>
<tr>
<td>Cooked</td>
<td>Restaurants</td>
<td>Consumer</td>
<td>100%</td>
<td>600,909</td>
<td>$21.93</td>
<td>$17.08</td>
<td>10,260,514</td>
</tr>
<tr>
<td></td>
<td>Fish Fry</td>
<td>Consumer</td>
<td>100%</td>
<td>159,332</td>
<td>$11.18</td>
<td>$6.40</td>
<td>1,019,722</td>
</tr>
<tr>
<td></td>
<td>Supermarket</td>
<td>Consumer</td>
<td>45%</td>
<td>19,321</td>
<td>$9.49</td>
<td>$4.94</td>
<td>95,349</td>
</tr>
<tr>
<td>Value added by deboned and cooked flyingfish</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13,865,887</td>
</tr>
<tr>
<td>Overall value of flyingfish fishery outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15,660,136</td>
</tr>
</tbody>
</table>
This study shows that the total value of the fish landed in Barbados is considerably greater than its ex-vessel value (Table 2). The value added component ranges from 0% in the case of the ‘all others’ category to 88% of the total value in the case of flyingfish. It is higher for offshore fisheries, the catch of which is processed, exported and is the main attraction at fish fries and restaurants, than it is for inshore fisheries, the catch of which is most often sold directly to consumers.

When the value-added is broken out according to who sells the fish and to whom, it shows that the majority of the additional value is derived from sale of cooked fish to consumers in restaurants and at fish fries (Table 3). Vendors and processors (however) generate appreciable amounts of additional values as they transport, clean and market fish.

This was a preliminary study with limited time and funds. Hence, several data gaps were identified. These will need further research.

i) Fish-fry vendors did not provide access to records of their purchasing and re-sale practices therefore the estimates are based on verbal information.

ii) There are no records of landings for lobster, sea urchins and conch. These resources are considered high valued by various players in the “value-added chain”.

iii) There is no information on other establishments such as rum shops and small restaurants that are know to frequently sell fish. The large number of these warrants further investigation, as due to their large numbers, they probably add significant overall value.

iv) No information was obtained on the contribution from food processors making fish products.

v) Prices were averaged since there were a range of prices available for each category of seller.

vi) The locations of the survey should be extended, to receive a more representative contribution from the fishery resources.

vii) Consumers are varied and there is the need for a better understanding of their characteristics.

LITERATURE CITED


Table 2. The value added for different fisheries (US$).

<table>
<thead>
<tr>
<th>Fish Type</th>
<th>Ex-vessel value</th>
<th>Value added (% of total)</th>
<th>Overall value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flyingfish</td>
<td>1,794,249</td>
<td>13,324,338 (88)</td>
<td>15,118,587</td>
</tr>
<tr>
<td>Dolphinfish</td>
<td>2,502,692</td>
<td>3,001,173 (55)</td>
<td>5,503,865</td>
</tr>
<tr>
<td>Tuna</td>
<td>701,425</td>
<td>1,217,695 (63)</td>
<td>1,919,119</td>
</tr>
<tr>
<td>Billfishes</td>
<td>307,805</td>
<td>327,302 (52)</td>
<td>635,107</td>
</tr>
<tr>
<td>Swordfish</td>
<td>96,522</td>
<td>61,518 (39)</td>
<td>158,040</td>
</tr>
<tr>
<td>Kingfish</td>
<td>133,459</td>
<td>92,141 (41)</td>
<td>225,600</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal - offshore</strong></td>
<td><strong>18,024,168 (77)</strong></td>
<td><strong>23,560,319</strong></td>
</tr>
<tr>
<td>Snappers</td>
<td>82,150</td>
<td>122,964 (60)</td>
<td>205,115</td>
</tr>
<tr>
<td>Shark and barracuda</td>
<td>44,721</td>
<td>42,317 (49)</td>
<td>87,037</td>
</tr>
<tr>
<td>Lobster</td>
<td>3,934</td>
<td>3,888 (50)</td>
<td>7,821</td>
</tr>
<tr>
<td>Jacks</td>
<td>29,626</td>
<td>16,898 (36)</td>
<td>46,524</td>
</tr>
<tr>
<td>Bonito</td>
<td>4,885</td>
<td>4,684 (49)</td>
<td>9,570</td>
</tr>
<tr>
<td>Reef fishes</td>
<td>44,657</td>
<td>28,028 (39)</td>
<td>72,685</td>
</tr>
<tr>
<td>Sea eggs</td>
<td>1,387,500</td>
<td>0 (0)</td>
<td>1,387,500</td>
</tr>
<tr>
<td>All others</td>
<td>201,048</td>
<td>28,890 (13)</td>
<td>229,938</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal - coastal</strong></td>
<td><strong>247,669 (12)</strong></td>
<td><strong>2,046,189</strong></td>
</tr>
<tr>
<td>Total</td>
<td><strong>7,334,672</strong></td>
<td><strong>18,271,837 (71)</strong></td>
<td><strong>25,606,508</strong></td>
</tr>
</tbody>
</table>

Table 3. The value added by different sellers according to category of buyer.

<table>
<thead>
<tr>
<th>Seller</th>
<th>Buyer</th>
<th>Value added</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor</td>
<td>Consumer</td>
<td>232,200</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Fish fry</td>
<td>94,747</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Restaurant</td>
<td>262,675</td>
<td>1.4</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>589,621</td>
<td>3.2</td>
</tr>
<tr>
<td>Processor</td>
<td>Consumer</td>
<td>191,933</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>Export</td>
<td>791,868</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>Fish fry</td>
<td>91,458</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Restaurant</td>
<td>2,319,276</td>
<td>12.7</td>
</tr>
<tr>
<td></td>
<td>Supermarket</td>
<td>245,168</td>
<td>1.3</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>3,639,703</td>
<td>19.9</td>
</tr>
<tr>
<td>Restaurant</td>
<td>Consumer</td>
<td>12,409,891</td>
<td>67.9</td>
</tr>
<tr>
<td>Fish fry</td>
<td>Consumer</td>
<td>1,559,407</td>
<td>8.5</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>13,969,297</td>
<td>76.5</td>
</tr>
<tr>
<td>Supermarket</td>
<td>Consumer</td>
<td>73,215</td>
<td>0.4</td>
</tr>
</tbody>
</table>