Expert Group Meeting
The Blue Economy valuation approaches: Towards a better Knowledge of the Blue Potential in Africa.

23 November 2020

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#ICSOE2020
BLUE ECONOMY SATELLITE ACCOUNTS
A COMPARATIVE ANALYSIS OF THE BLUE ECONOMY IN SEYCHELLES, SAINT LUCIA AND THE BAHAMAS

RAQUEL FREDERICK, UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA – OFFICE FOR EASTERN AFRICA
DINDIAL RAMRATTAN, CARIBBEAN DEVELOPMENT BANK

Presentation of draft working paper at the 24th Intergovernmental Committee of Senior Officials and Experts for UNECA Eastern Africa
**PRESENTATION OUTLINE**

**Introduction**

*to the Blue Economy and our work*

*Introduction à l’économie bleue et à notre travail*

**Satellite Accounts**

*Comptes satellites*

**Blue Economy Trends**

*Tendances de l’économie bleue*

**Next Steps**

*Prochaines étapes*
**Quick Question!**
Go to the Poll tab now to answer | Allez au sondage maintenant pour répondre

<table>
<thead>
<tr>
<th>What is the Blue Economy for you?</th>
<th>Qu'est-ce que l'économie bleue pour vous?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ocean-based industries only</td>
<td>A. Industries océaniques seulement</td>
</tr>
<tr>
<td>B. Marine-protected areas</td>
<td>B. Aires marines protégées</td>
</tr>
<tr>
<td>C. Beach tourism</td>
<td>C. Tourisme de plage</td>
</tr>
<tr>
<td>D. Transboundary water management</td>
<td>D. Gestion des eaux transfrontalières</td>
</tr>
<tr>
<td>E. SDG14: Life Below Water</td>
<td>E. ODD14: Vie Aquatique</td>
</tr>
<tr>
<td>F. I think of the Blue Economy differently</td>
<td>F. Je pense différemment à l'économie bleue</td>
</tr>
</tbody>
</table>
The Blue Economy refers to economic activity occurring in and around aquatic spaces, including oceans, seas, coasts, rivers, lakes, and underground water.

It promotes:

- Economic Growth
- Social Inclusion
- Environmental Sustainability

Established Industries:
- Capture fisheries
- Maritime transport and ports
- Shipbuilding
- Aquatic tourism
- Offshore oil / gas
- Sub-marine cables

Emerging Industries:
- Aquaculture
- Aquatic renewable energy
- Biotechnology
- Bioprospecting
- Seabed mining

Cross-Cutting Initiatives:
- Aquatic Ecosystem Services
- Aquatic-based R&D
- Climate Change Adaptation
- High-tech services
- Security, safety and surveillance

Source: UNECA, CDB
Quick Question!
Go to the Poll tab now to answer | Allez au sondage maintenant pour répondre

How large do you think the global Blue Economy is annually?

A. USD 500 billion
B. Over USD 2.5 trillion
C. Less than USD 250,000
D. Over USD 600 trillion
E. I have no idea

Quelle est selon vous la taille mondiale de l'économie bleue chaque année?

A. 500 milliards USD
B. Plus de 2,5 billions USD
C. Moins de 250 000 USD
D. Plus de 600 billions USD
E. Je n'ai aucune idée
Measuring the Blue Economy: Some Approximations

In 2010, ocean-based industries contributed:

- USD 1.5 trillion
- 31 million jobs

In 2030, the expected size of the ocean economy:

- USD 3 trillion
- 40 million jobs

Note: Excludes contribution from inland water bodies

In 2017, the estimated marine economic output of Eastern Africa coastal and island states was:

- USD 11 billion

In 2012, the ocean economy of Caribbean island and mainland states and territories was:

- USD 406 billion

Source: OECD

Source: WWF; ECA calculations; World Bank
CDB and UNECA efforts to mainstream and value the Blue Economy

Activities for CDB, UNECA, and both organizations

Meeting on “How to Harness the Blue Economy for Eastern Africa’s Development”

Advisory services on tourism, energy, climate change, maritime security, etc.

2015
Blue Economy Policy Handbook and the Blue Economy Study

2016

2017

2018
Publishing Financing the Blue Economy: A Caribbean Development Opportunity
Hosting Blue Economy Caribbean 2018
Advisory services, including support to Comoros and Madagascar
Participating in the Sustainable Blue Economy Conference in Kenya

2019
Support to the Indian Ocean Commission and Seychelles on Blue Economy policy development and other advisory services
Hosting Blue Economy Caribbean 2019

2020 | 2021
Developing a Blue Economy Valuation Toolkit
Integrating the Blue Economy into the Strategic Plan 2020-2024
Co-publishing Comparative BESA Study
PRESENTATION OUTLINE

Introduction

Satellite Accounts applied to the Blue Economy

Blue Economy Trends

Next Steps
System of National Accounts

Economic Agents and Activity in the SNA

PRODUCERS, ENTERPRISES

FINANCIAL INSTITUTIONS

INTERMEDIATE CONSUMPTION

Borrowing

Deposits

Goods and Services Consumed

Salaries, Dividends

GOVERNMENT

Borrowing

Deposits

Exports

Imports

Investment

Fiscal Receipts

Fiscal Expenditure

GOVERNMENT

Salaries, Dividends

Social Benefits

Social Contributions, Income Taxes

PRODUCERS, ENTERPRISES

Production, Taxes

Subsidies

Imports

Exports

Exports

Government

ADOPTED GLOBALLY

TRACKS SUPPLY AND USE OF ECONOMIC AGENTS

Source: CDB
Purpose and value of the Satellite Accounts

For a specific area topic:
1. Value contributions of area
2. Measure its direct impact on the overall economy
3. Facilitate impact assessment on growth, debt, trade, etc.

Source: CDB, van de Ven (2019)
**Steps to creating the BESA**

**STEP 1** Calculate \( A = \frac{Z}{O} \)

Convert the input-output matrix \( (Z) \) to the industries matrix \( (A) \)

\( A \) is the share of industry output used as inputs in each of the \( n \) industries

An industry’s output can be used as either:

**Intermediate Inputs**

**Final Demand**

**Understanding the \( Z \) matrix:**
*Input-output by broad industry*

There are \( n \) industries in the Blue Economy that use other industries’ products as intermediate inputs.

\[
\begin{bmatrix}
Z_{11} & \cdots & Z_{1n} \\
\vdots & \ddots & \vdots \\
Z_{n1} & \cdots & Z_{nn}
\end{bmatrix}
\]

The total of this row represents the total of outputs from all \( n \) industries used as inputs into the first industry.

The total of this column represents the total of outputs from the first industry used as inputs into all \( n \) industries.

**Understanding the \( O \) matrix:**
*Industry and final demand consumption*

This represents the total output for each of the \( n \) industries that are used as either for final demand or as inputs into all industries (not only Blue Economy).

\[
\begin{bmatrix}
o_1 \\
\vdots \\
o_n
\end{bmatrix}
\]

The total of this row represents the total output of all \( n \) industries.

Source: CDB

United Nations Economic Commission for Africa
Steps to creating the BESA: Leontief model

**STEP 1**
Calculate \[ A = Z \div O \]
Convert the input-output matrix \((Z)\) to the industries matrix \((A)\)

**STEP 2**
Calculate the \((i-A)\) matrix \[ = i - A \]

**STEP 3**
Calculate the inverse of the \((i-A)\) matrix \[ = (i-A)^{-1} \]

**Understanding the \(f\) matrix:**
*Final demand by industry*

This represents the final demand in each of the \(n\) industries

\[
\begin{pmatrix}
  f_1 \\
  \cdot \\
  \cdot \\
  \cdot \\
  f_n
\end{pmatrix}
\]

The total of this column represents the total final demand of all \(n\) industries

**Understanding the \(i\) matrix:**
*Identity matrix*

This \(n \times n\) matrix, called the identity or unit matrix, is a standard feature of linear algebra

\[
\begin{pmatrix}
  1 & 0 & 0 & 0 & 0 \\
  0 & 1 & 0 & 0 & 0 \\
  0 & 0 & 1 & 0 & 0 \\
  0 & 0 & 0 & 0 & 0 \\
  0 & 0 & 0 & 0 & 1
\end{pmatrix}
\]

**Leontief Inverse Matrix**
Provides coefficients or economic multipliers

**STEP 4**
Calculate \[ x = (i-A)^{-1} + f \]
Establishes relationship between intermediate and final demand

Source: CDB
Applying the methodology: Jamaika Case Study

**STEP 1**  
Calculate \( A = \frac{Z}{O} \)  
Convert the input-output matrix (Z) to the industries matrix (A)

**STEP 2**  
Calculate the \((i-A)\) matrix \( = i - A \)

**STEP 3**  
Calculate the inverse of the \((i-A)\) matrix \( = (i-A)^{-1} \)

**STEP 4**  
Calculate \( x = (i-A)^{-1} + f \)

**Matrix Z: Input-output by broad industry (JMD mn)**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Agriculture</th>
<th>Fishing</th>
<th>Manufacturing</th>
<th>Services</th>
<th>Transport</th>
<th>Hotels and restaurants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>5,022</td>
<td>-</td>
<td>19,980</td>
<td>692</td>
<td>1</td>
<td>5,004</td>
</tr>
<tr>
<td>Fishing</td>
<td>-</td>
<td>1,166</td>
<td>127</td>
<td>158</td>
<td>-</td>
<td>887</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-</td>
<td>-</td>
<td>235,439</td>
<td>-</td>
<td>665,843</td>
<td>62,684</td>
</tr>
<tr>
<td>Services</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>102,117</td>
<td>108,078</td>
</tr>
<tr>
<td>Transport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Matrix O: Industry and final demand consumption**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Final demand (JMD mn)</th>
<th>Total output (xJMD mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>40,852</td>
<td>71,274</td>
</tr>
<tr>
<td>Fishing</td>
<td>4,267</td>
<td>5,593</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>235,439</td>
<td>340,549</td>
</tr>
<tr>
<td>Services</td>
<td>665,843</td>
<td>947,029</td>
</tr>
<tr>
<td>Transport</td>
<td>62,684</td>
<td>123,365</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>102,117</td>
<td>108,078</td>
</tr>
</tbody>
</table>

Source: CDB
### Using the BESA: Jamaica Case Study

#### STEP 1
Calculate \( A = Z \div O \)

Convert the input-output matrix (\( Z \)) to the industries matrix (\( A \))

#### STEP 2
Calculate the (i-A) matrix \( = i - A \)

#### STEP 3
Calculate the inverse of the (i-A) matrix \( = (i-A)^{-1} \)

#### STEP 4
Calculate \( x = (i-A)^{-1} + f \)

#### STEP 5
Run What-If analyses

---

If the final demand of **hotels and restaurants increases** by 10%, this will lead to

<table>
<thead>
<tr>
<th>Industry</th>
<th>Total output  ( f_i-n )</th>
<th>Total output  ( f_6+0.1 \times 6 )</th>
<th>GDP % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>71.3</td>
<td>72.0</td>
<td>1.0%</td>
</tr>
<tr>
<td>Fishing and Aquaculture</td>
<td>5.6</td>
<td>5.7</td>
<td>1.6%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>340.5</td>
<td>342.6</td>
<td>0.6%</td>
</tr>
<tr>
<td>Services</td>
<td>947.0</td>
<td>951.1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Transport</td>
<td>123.4</td>
<td>123.7</td>
<td>0.3%</td>
</tr>
<tr>
<td>Hotel and Restaurants</td>
<td>108.1</td>
<td>118.3</td>
<td>9.5%</td>
</tr>
<tr>
<td><strong>Total GDP impact</strong></td>
<td><strong>1,596</strong></td>
<td><strong>1,613</strong></td>
<td><strong>1.1%</strong></td>
</tr>
</tbody>
</table>

Source: CDB
BESAs and the BEVTK

Similarities

- Data Sources
- Methodology

Differences

- Goals
- Frequency
PRESENTATION OUTLINE

Introduction
Satellite Accounts
Blue Economy Trends in Seychelles, Saint Lucia and Bahamas
Next Steps
Seychelles
The Bahamas
Saint Lucia

Why these countries?

Economic and Geographic Similarities
Importance of Blue Economy Industries
Data Availability
Progress on the Blue Economy
Table 2: Selected Economic and Social Indicators

<table>
<thead>
<tr>
<th></th>
<th>Seychelles</th>
<th>Saint Lucia</th>
<th>The Bahamas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macroeconomic Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP (current, US$ bn)</td>
<td>16,434</td>
<td>11,611</td>
<td>32,933</td>
</tr>
<tr>
<td>GDP per capita (US$)</td>
<td>3,9</td>
<td>1,7</td>
<td>3,2</td>
</tr>
<tr>
<td>GDP growth in 2019 (%)</td>
<td>-13.8</td>
<td>-16.9</td>
<td>-14.8</td>
</tr>
<tr>
<td>GDP growth forecast for 2020 (%)</td>
<td>-6.9</td>
<td>-9.6</td>
<td>-2.3</td>
</tr>
<tr>
<td>Public debt (GDP%)</td>
<td>56.9</td>
<td>62.8</td>
<td>53.1</td>
</tr>
<tr>
<td>Fiscal balance</td>
<td>0.2</td>
<td>-6.9</td>
<td>-2.3</td>
</tr>
<tr>
<td>Annual average inflation rate (%)</td>
<td>1.8</td>
<td>0.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Agriculture, value added in 2018 (%)</td>
<td>2.4</td>
<td>1.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Industry, value added in 2018 (%)</td>
<td>13.4</td>
<td>11.5</td>
<td>14.8</td>
</tr>
<tr>
<td>Services, value added in 2018 (%)</td>
<td>84.2</td>
<td>86.8</td>
<td>84.2</td>
</tr>
<tr>
<td><strong>Select Blue Economy Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total tourists, stayover + cruise (people)</td>
<td>384,204</td>
<td>1,276,751</td>
<td>7,200,000+</td>
</tr>
<tr>
<td>Capture fisheries product in 2017 (tonnes)</td>
<td>136,200</td>
<td>2,097</td>
<td>11,400</td>
</tr>
<tr>
<td>Aquaculture fisheries product in 2017 (tonnes)</td>
<td>na</td>
<td>27</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Fisheries sector employment (people)</td>
<td>1,810</td>
<td>3,502</td>
<td>9,004</td>
</tr>
<tr>
<td>Container port throughput in 2016 (TEUs, 000s)</td>
<td>na</td>
<td>30</td>
<td>939</td>
</tr>
<tr>
<td>All port calls in 2016 (ships)</td>
<td>384</td>
<td>1,191</td>
<td>5,787</td>
</tr>
<tr>
<td><strong>External Sector Indicators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDI inflow (%)</td>
<td>7.5</td>
<td>1.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Exports, % of GDP in 2018</td>
<td>35</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>
## Pre-COVID-19 Trends: Tourism

### International Visitors, 2012 – 2019

<table>
<thead>
<tr>
<th>Country</th>
<th>2012</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bahamas</td>
<td>5.9m</td>
<td>7.2m</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>931.2k</td>
<td>1.3m</td>
</tr>
<tr>
<td>Seychelles</td>
<td>208k</td>
<td>384.2k</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td>1.5b</td>
<td>2b</td>
</tr>
</tbody>
</table>

### Visitor-per-capita, 2019

- **Bahamas**: [Graphic representation]
- **Saint Lucia**: [Graphic representation]
- **Seychelles**: [Graphic representation]

### Visitor Distribution by Region of Origin, 2019

- **Northern America**: 86%
- **Europe**: 7%
- **Asia**: 5%
- **Intra-regional**: 4%
- **Other**: 2%

Overall Economic Impact of COVID-19

Real GDP Growth Rate, 2019\textsuperscript{e} to 2020\textsuperscript{f}

- The Bahamas
- St. Lucia
- Seychelles

<table>
<thead>
<tr>
<th>Country</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Lucia</td>
<td>-16.9%</td>
</tr>
<tr>
<td>The Bahamas</td>
<td>-14.8%</td>
</tr>
<tr>
<td>Seychelles</td>
<td>-13.8%</td>
</tr>
</tbody>
</table>

Source: IMF WEO 2020
Which Blue Economy industry do you think has been most negatively impacted by COVID-19?

A. Fisheries
B. Offshore oil and gas
C. Maritime transport
D. Travel and Tourism

Selon vous, quelle industrie de l'économie bleue a été la plus touchée par la COVID-19?

A. Pêche
B. Pétrole et gaz offshore
C. Transport maritime
D. Voyage et tourisme
Early indicators of impact: **Tourism**

**Monthly Visitor Arrivals, October 2019 – September 2020**

<table>
<thead>
<tr>
<th></th>
<th>The Bahamas</th>
<th>Saint Lucia</th>
<th>Seychelles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct ’19</td>
<td>482,676</td>
<td>67,869</td>
<td>35,960</td>
</tr>
<tr>
<td>Nov ’19</td>
<td>618,854</td>
<td>132,251</td>
<td>34,511</td>
</tr>
<tr>
<td>Dec ’19</td>
<td>710,186</td>
<td>187,253</td>
<td>38,910</td>
</tr>
<tr>
<td>Jan ’20</td>
<td>687,200</td>
<td>192,816</td>
<td>32,731</td>
</tr>
<tr>
<td>Feb ’20</td>
<td>711,699</td>
<td>156,163</td>
<td>38,114</td>
</tr>
<tr>
<td>Mar ’20</td>
<td>302,118</td>
<td>63,980</td>
<td>18,067</td>
</tr>
<tr>
<td>Apr ’20</td>
<td>43</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>May ’20</td>
<td>20</td>
<td>0</td>
<td>73</td>
</tr>
<tr>
<td>Jun ’20</td>
<td>3,935</td>
<td>Borders re-opened July 1</td>
<td>140</td>
</tr>
<tr>
<td>Jul ’20</td>
<td>23,398</td>
<td>Borders re-opened June 4</td>
<td>475</td>
</tr>
<tr>
<td>Aug ’20</td>
<td>Re-opened to US visitors Aug 3</td>
<td>2,072 Borders re-opened Aug 1</td>
<td>1,531</td>
</tr>
<tr>
<td>Sep ’20</td>
<td>...Vacation-In-Place program Phased re-opening...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Data from Bahamas Research & Statistics Department, Ministry of Tourism; Saint Lucia Tourist Board, Port Authority, and Ministry of Finance; and Seychelles National Bureau of Statistics
Using BESA to measure COVID-19 impact: Jamaica Case Study

If the final demand of **hotels and restaurants** decreases by 70%, this will lead to

<table>
<thead>
<tr>
<th>Sector</th>
<th>GDP % Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>-4.0%</td>
</tr>
<tr>
<td>Fishing and Aquaculture</td>
<td>-6.2%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-2.4%</td>
</tr>
<tr>
<td>Services</td>
<td>-1.7%</td>
</tr>
<tr>
<td>Transport</td>
<td>-1.2%</td>
</tr>
<tr>
<td>Hotel and Restaurants</td>
<td>-34.7%</td>
</tr>
<tr>
<td><strong>Total GDP impact</strong></td>
<td><strong>-4.4%</strong></td>
</tr>
</tbody>
</table>

Source: CDB
PRESENTATION OUTLINE

Introduction

Satellite Accounts

Blue Economy Trends

Next Steps
Next Steps

1. **Develop/Finalize**: Complete the BESAs for the three countries

2. **Validate**: Work with local NSOs and other relevant authorities

3. **Collaborate**: Continue work with other regional entities

4. **Revise**: Update paper based on BESAs, collaborations and COVID-19 insights
On-going and Future Work

Building Blocks towards Informed Decision-Making in the Blue Economy

1. Blue Economy Satellite Accounts research

2. Natural Capital Accounting and Assessments

3. Blue Economy Valuation Toolkit (BEVTK)

4. Socio-Economic Assessment of Blue Economy Potential
Raquel Frederick
Associate Economic Affairs Officer
UNECA Sub-Regional Office for Eastern Africa
Kigali, Rwanda
www.uneca.org

Dindial Ramrattan
Statistician
Caribbean Development Bank
Wildey, Barbados
www.caribank.org