Community of Practice: Western Indian Ocean, Ocean Accounts Work Programme 2 Progress

Workshop 1 Report: January 2021

OVERVIEW

Ocean Accounts Framework applicability in Algoa Bay.

Erika Brown

GIS Product Developer, Research Associate and Consultant

Workshop 1 Report: January 2021

Team:
Juliet Hermes – Project lead and SAEON Egagisini Node Manager
Nicole du Plessis – Project lead and SAMREF/SA IORAG Science Officer
Tommy Bornman – Project lead and SAEON uLwandle Node Manager
Erika Brown - GIS product developer, research associate and consultant

1. Executive Summary

This initial workshop was hosted on 10 December 2020 as an introductory phase in the Community of Practice Western Indian Ocean, Ocean Accounts Work Programme 2 (WP2) whereby stakeholders were invited to, firstly, learn more about what Ocean Accounts is and how it is being implemented in South Africa and, secondly, to provide information and transparency in the WP2 approach to accessing and utilizing oceanographic biophysical and biochemical data in Algoa Bay. While preliminary suggestions were made regarding data already acquired for use in an Ocean Accounts Framework (OAF), additional data gaps, needs, and/or redundancy will be determined by stakeholder engagement and feedback. A follow up workshop will be hosted in March/April 2021 to specifically address data needs, gaps and refinement.

This first formal stakeholder engagement was successful in raising awareness about Ocean Accounts in South Africa and garnering expert feedback and advice concerning data acquisition and utilization in an OAF Geographic Information System (GIS) spatial database setting.

Next steps will include a follow up data needs workshop early in the year and development of a GIS database and associated oceanographic layers according to the extent specifications and depth related 'Levels' put forth in this workshop.

Table of Contents		

2. Workshop Focus

Defining, delineating and refining extent and condition accounts according to NCA, SEEA and EA Frameworks as a bay wide case study assessment of Ocean Accounts applicability.

Purpose: To inform stakeholders about the Western Indian Ocean: Ocean Accounts Framework (OAF), engage and provide transparency throughout the process as an exercise in how to implement OAF on a case study basis, and gain insights from stakeholders and collaborators on refining the process (e.g. noticing gaps, deficiencies or omissions before work on the data begins).

Who Should Attend: Collaborators, WP research teams, Algoa Bay stakeholders and general interest marine professionals and researchers.

Table 1. WP2 Workshop 1 Original Agenda.

Agenda Items:	Time Available:
10:00 – 10:15 am	Opening, Rules of Engagement & Introductions
10:15 - 11:00 am	Introduction into NRF CoP WIO WPs, WP2 and Ocean Accounts, dispel OAF in relation to NCA, SEEA, and EA.
11:00 – 11:20	Q & A + Break
11:20 – 12:00 pm	WP2 -Assessing the applicability of the Ocean Accounts Framework, Algoa Bay a case study.
12:00 -12:15 pm	Survey/Feedback Request
12:15 – 12:30 pm	Q & A, Discussion and Reflections

2. Workshop Content

A brief introductory workshop was presented on the Communities of Practice Western Indian Ocean Working Group Ocean Accounts Framework (OAF) as developed by the Global Ocean Accounts Partnership (GOAP). Erika Brown presented two talks, the first was an overview of the OAF in context within South Africa and the global community. The second talk was about her role and work to date in applying the OAF in Algoa Bay as a case study in the applicability of this approach. To view the presentations refer to this link.

2.1 Part1: Providing Context

The oceans are facing increasing anthropogenic pressures and with the oceans considered the next economic frontier, this is likely set to increase in coming years. This is apparent in the international discussions on the development of ocean economies or blue economies including such initiatives as the High Level Panel for a Sustainable Ocean Economy, the Global Ocean Accounts Partnership and more locally the AU 2050 Africa's Integrated Maritime Strategy and South Africa's Oceans Phakisa Programme.

South Africa is also one of five countries participating in the UN Natural Capital Accounting & Valuation of Ecosystem Services Project (led by Stats SA and SANBI nationally) which aims to assist the participating partner countries to advance the knowledge agenda on environmental and ecosystem accounting and initiate pilot testing of the System of Environmental-Economic Accounting (SEEA) Experimental Ecosystem Accounting (EEA), now EA after a recent review process, with a view to improving the management of natural biotic resources, ecosystems and their services at the national level as well as mainstreaming biodiversity and ecosystems in national level policy, planning and implementation.

Within this, the Ocean Accounting component is still in development, and the newly established NRF Communities of Practice – 'Western Indian Ocean: Assessing the applicability of the ocean-accounts framework' aims to engage with these international programmes to develop oceans accounts in South Africa and contribute to the above mentioned initiatives.

3.1.1 Ocean Accounts Framework and the Work Programmes

The ocean-accounts framework (OAF) provides a common, consistent and standardised information infrastructure for organising and integrating ocean data from various domains. It is increasingly being recognised as an important ocean-governance and policy-development instrument, which boosts the transdisciplinary power of data for marine spatial planning, integrated coastal management (ICM) and international reporting. The goal of this community of practice (CoP) is to assess the applicability of the OAF in South Africa and the Western Indian Ocean (WIO) as a central component of a wider strategy to ensure that ocean governance contributes as optimally as possible to the broader sustainable goals of South Africa and the other Indian Ocean Rim Association (IORA) member States by ensuring the inclusivity, safety, security and sustainability of coastal communities.

The aim of the CoP will be achieved through the following phased objectives during phase 1 over the course of 2020 to 2021:

(a) to investigate and assess the efficacy and relevance of the OAF in the process of sustainable and inclusive ocean-policy development and implementation and in the process of applying ocean-governance instruments in three of the coastal provinces of South Africa (the Eastern Cape, KwaZulu-Natal and the Western Cape);

(b) to explore the role of gender and culture in the OAF through the identification and disaggregation of data; and

(c) to ascertain the extent to which the OAF can contribute to the assessment of the risk and associated hazards, exposures and vulnerabilities associated with climate change, food security and unsustainable development in the three provinces.

Due to the severe impact of the COVID-19 pandemic on research activities, the main focus of the CoP will be on the Algoa Bay area, without excluding readily available data and case studies relating to other coastal locations in the three provinces. The work of the CoP is organised under eight work programmes (WP).

WP1 - Legal environment and regulatory aspects of the oceans-account framework

WP2 - The role of oceanographic research and large datasets for ocean accounting models within ocean governance

WP3 - The structure of the ocean-accounts framework in ocean governance

WP4 - Women's economic empowerment in the Western Indian Ocean

WP5 - Socio-ecological aspects of the oceans account framework

WP6 - Blue-carbon-habitats aspects of the oceans account framework

WP7 - Risks and vulnerability in the ocean

WP8 - Focuses on OAF-related knowledge-production opportunities across the other WPs.

3.1.2 An overview of the focus of Work Programme 2

Work Programme 2 focuses on the contribution that oceanographic research and large datasets can make to spatially-based ecosystem accounting models within the OAF and aims to review biophysical datasets and their applicability of use to develop spatially based ecosystem accounts (of extent and condition) and natural capital flows to social and economic domains and to identify data deficiencies and needs for the data development approaches required for spatially based Oceans Accounting.

Identifying ecosystem assets are important within the System of Environmental Economic Accounting (SEEA) ecosystem accounting (EA) framework as these assets form the basis of the statistical units for EA, for which statistics are ultimately compiled. For ecosystem assets this is the information with regard to their extent, condition, the services they provide and their value.

How to spatially delineate marine areas and how to assess or envisage this is currently under review by the UN SEEA programme so South Africa is well-placed to provide valuable feedback and advice.

The Global Ocean Accounts Partnership's "Technical Guidance on Ocean Accounting for Sustainable Development", version 0.9, 2019, is a valuable resource to refer to for advice on how to approach implementation of an OAF. There have been several iterations of this guide and it will continue to evolve at least into the near future. It puts all of the aforementioned frameworks and accounting systems in context and provides some guidance when embarking on establishing an OAF.

There are five main points included in the guide (see below) and Points 4 and 5 fall under the mandate for WP2.

1. Sustainability Indicators,
2. Sectoral Evaluation, Finance and Investment,
3. Strategic Sectoral Development Planning,
4. Spatial Management, and
5. Ocean Analyses, Monitoring and Assessment.

Ocean complexity begs for integrated management plans like we see globally and locally through the SA MSP process, SANBIs NBA 2018, OCIMS spatial information management system, NMU CMRs Algoa Project and the MARISMAs EBSA process. The Netherlands is one of many other countries further along than South Africa in their MSP process (Figure 1) and can serve as a valuable resource to draw upon for strategy implementation, challenges, pitfalls and successes for example.

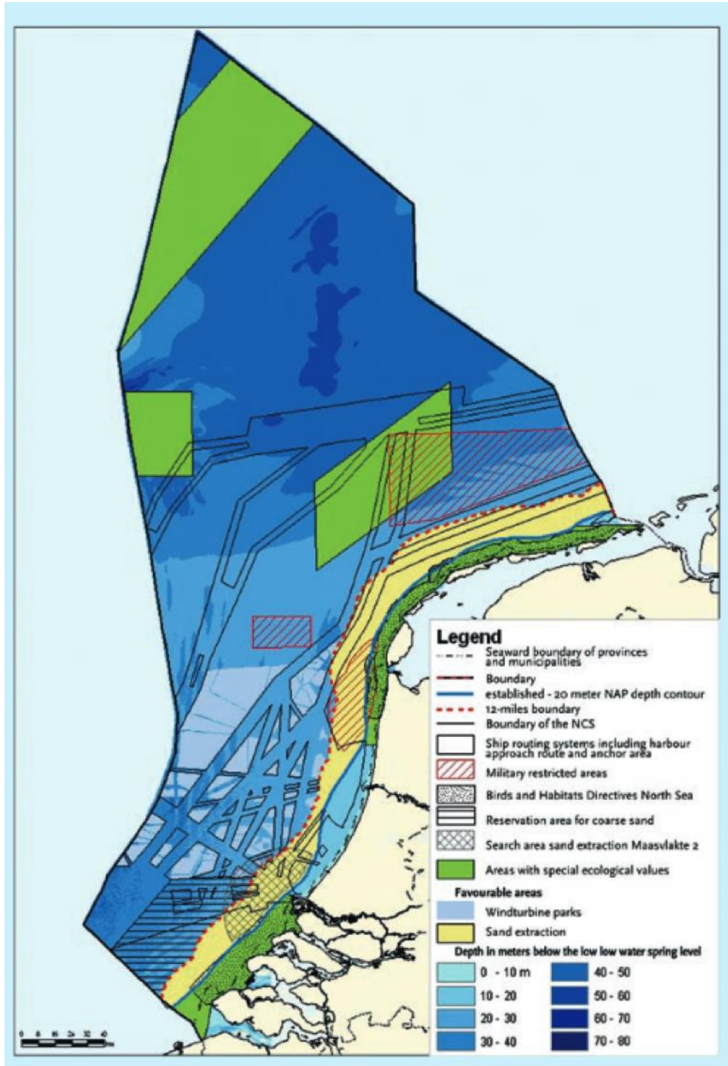

Figure 1. Example of the complexity of multiple users in an ocean space and the Marine Spatial Planning process. Source: IDON, "integrated Management Plan for the North Sea 2015" The Netherlands, 2005.

Humans derive numerous benefits from complex ocean systems through ecosystem and abiotic services. Both market and non-market values, and assets require accounting in the estimation of the contribution of oceans to societal well-being, as do the impacts of economies on environment.

New "blue economy" approaches to ocean governance are required to account for inclusivity and sustainability (Figure 2).

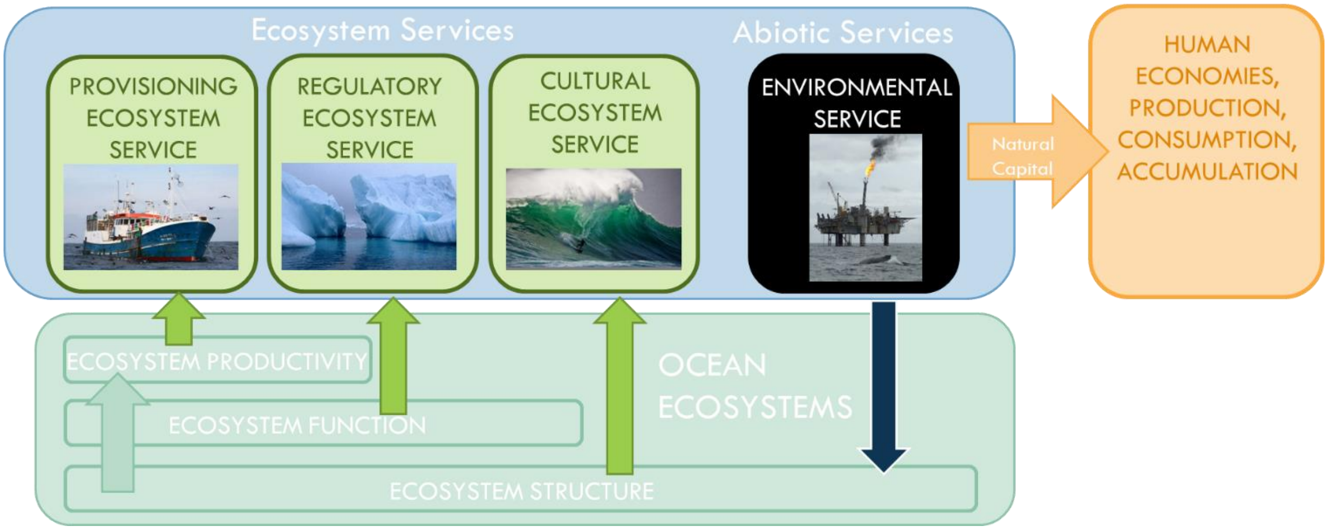

Figure 2. Flow diagram of how oceanographic variables relate to and inform ecosystem and abiotic services which creates the Natural Capital supplying our economies. Source: Findlay K., 2020.

Why Ocean Accounts?

1. Development of integrated indicators that decision makers can understand for informed decision making that includes sustainability and inclusivity within ocean planning (extends from an ecosystem level to a National Accounts level).
2. The development of inventories that strengthen national statistical systems.
3. Integration of large volumes of novel ocean data and identification of data gaps and needs.
4. Justification of the value of research, management, and policy in the ocean space.

When considering why Africa at large can benefit from Ocean Accounts, some facts to recall are 70%, that's 38 of Africa's 54 sovereign states, are coastal. Africa has a coastline of approximately 30,500 km – 40, 000km. South Africa alone has 3200 km of coastline. Africa's oceans and inland water areas are 3 x the size of its land mass. Maritime zones under Africa's jurisdiction total approximately 13 million square kilometres and about 6.5 million square kilometres of relatively accessible continental shelf. 90% of Africa's imports and exports are conducted by sea.

Some definitions of ocean governance to consider. Ecological governance – "a process of informed decision-making that enables trade-offs between competing resource users so as to balance environmental protection with beneficial use in such a way as to mitigate conflict, enhance equity, ensure sustainability and allow accountability" (Turton *et al.* 2007). Governance is about Trade-Offs which require valuations (across nested environmental social and economic domains). They are all intertwined and connected and value can no longer be strictly determined by GDP (Figure 3). This is an unsustainable practice. Ocean Accounting aims to try and achieve a new way forward.

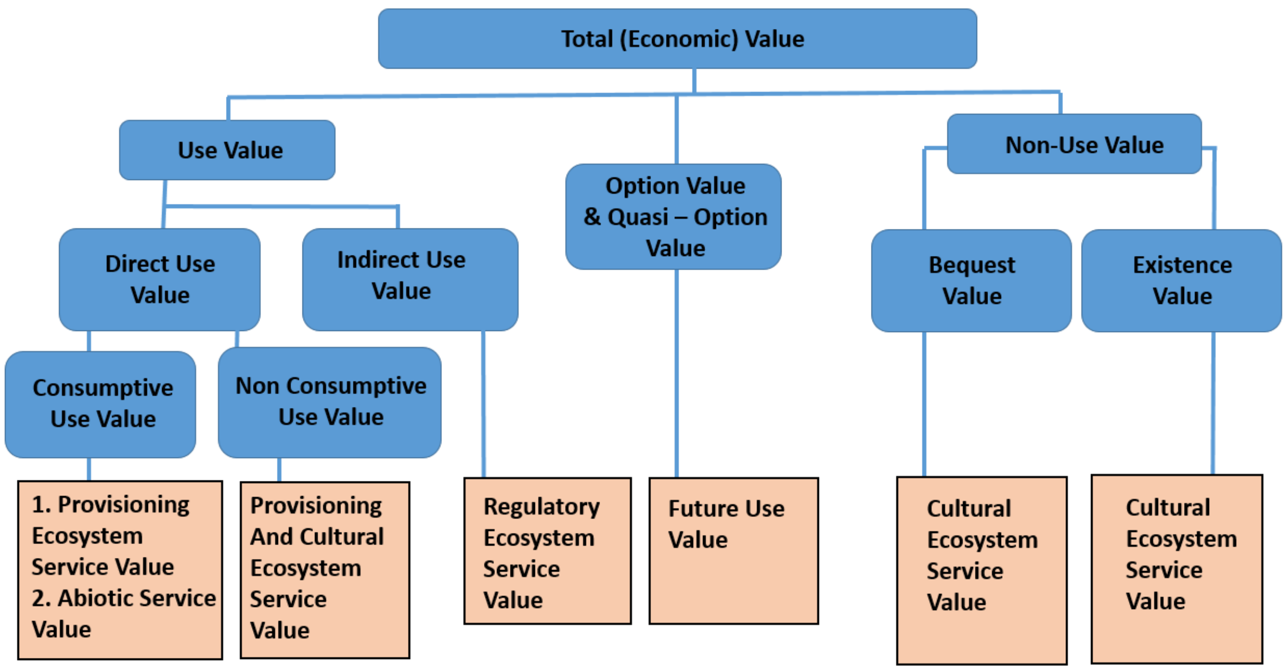

Figure 3. **Flow chart of how ecosystem services feed into economic use values and non-use values, as well as the option between the two. Source: Findlay, K., 2020.**

3.2 PART 2: How to initiate OAF implementation and suggestions for data acquisition and use

Because oceans are changing (naturally and anthropogenically), ocean measurement and analyses are changing, and human resource use of oceans are changing, it is clear, as highlighted above, that how we value and quantify this process must also change.

The aim is to contribute to the international dialogue for developing ecosystem asset extent and condition accounts by reviewing available datasets and their applicability for use to develop spatially based Ecosystem Accounts (through case studies), with the outcome to provide a GIS platform and an online tool to visualize the accounts.

The WP2 role in the greater OAF project is to engage with stakeholders around dataset availability, and potential for collaborations and shared experiences; develop and implement a GIS platform, using oceanographic data provided; develop ecosystem assets, extent, condition and ocean ecosystems typology derived from the data; identification of ecosystem flows to social and economic domains; and finally, translate GIS information into accessible stakeholder and policy maker knowledge (Figure 4).

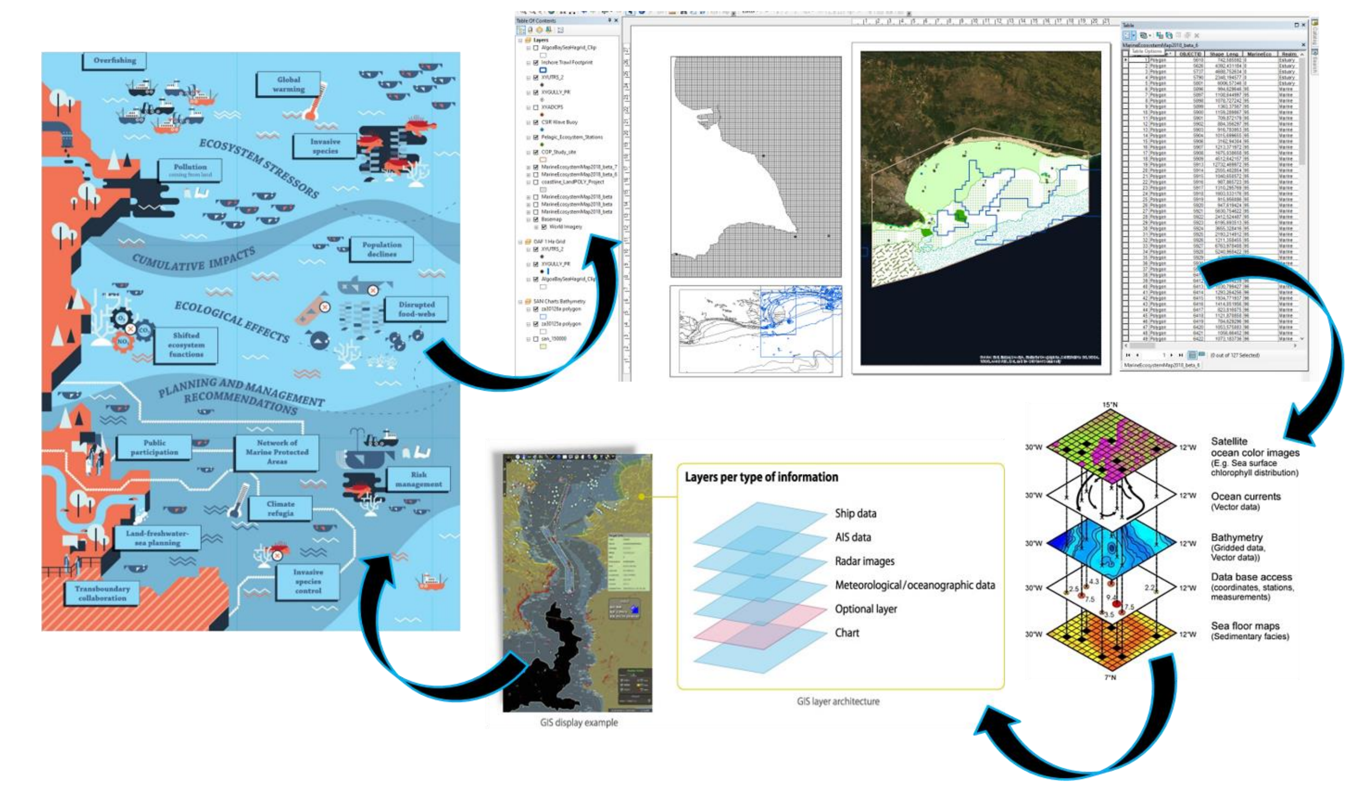

Figure 4. OAF data flow to inform planning, management and policy makers.

Algoa Bay is the initial area of focus because of the COVID-19 pandemic limitations which led to scaling back the original scope of the project. Algoa Bay is a representative area to test applicability of this framework because of its complex web of users, productive upwelling environment, dynamic oceanographic forcings in the bay, long term data availability, multi-organisation collaborations are ongoing, and topical work in process at present through the work of SANBI, The Algoa Bay Project and the MSP strategy (under the jurisdiction of the new Marine Spatial Planning Act (Government of South Africa, 2019)).

Ecosystem extent accounts, along with ecosystem condition accounts, usually form the basis of ecosystem accounts. This workshop addressed, How does an OAF get started? and What are the benefits to this approach?

Ocean Accounts forms a holistic valuation, a step in the larger process to policy and governance. Below are several useful definitions that will help address these implementation considerations as well as a diagram to show OAFs position within the greater MSP process (Figure 5).

Variables are any quantitative measure reflecting a phenomenon of interest. Variables may measure individual characteristics and are often direct measures, such as temperature or number of individuals of a species (GOAP, 2020).

Indicators are variables with a normative interpretation associated with a view to informing policy and decisions. Indicators are often the results of comparison with a reference condition, such as temperature above seasonal average, or number of individuals in a species compared to 10 years ago (GOAP, 2020).

An index is a (thematically) aggregated indicator, which represents relatively broad aspects of the studied system in a single number. Temperature is combined with other data on timing to create indices of growing season length. Populations of several species may be combined into a biodiversity index (GOAP, 2020).

An asset is a useful or valuable thing or person, an item of property owned by a person or company, regarded as having value and available to meet debts, commitments, or legacies.

Asset in a biodiversity context- Species, ecosystems and other biodiversity-related resources that generate ecosystem services, support livelihoods, and provide a foundation for economic growth, social development and human wellbeing (Sink et al., SANBI Marine Realm Report, 2019).

Asset in a biophysical or oceanographic context– [DRAFT DEFINITION–EB] Environmental and ecosystem related resources that either support or directly generate ecosystem services, support livelihoods, and provide a foundation for economic growth, social development and human wellbeing.

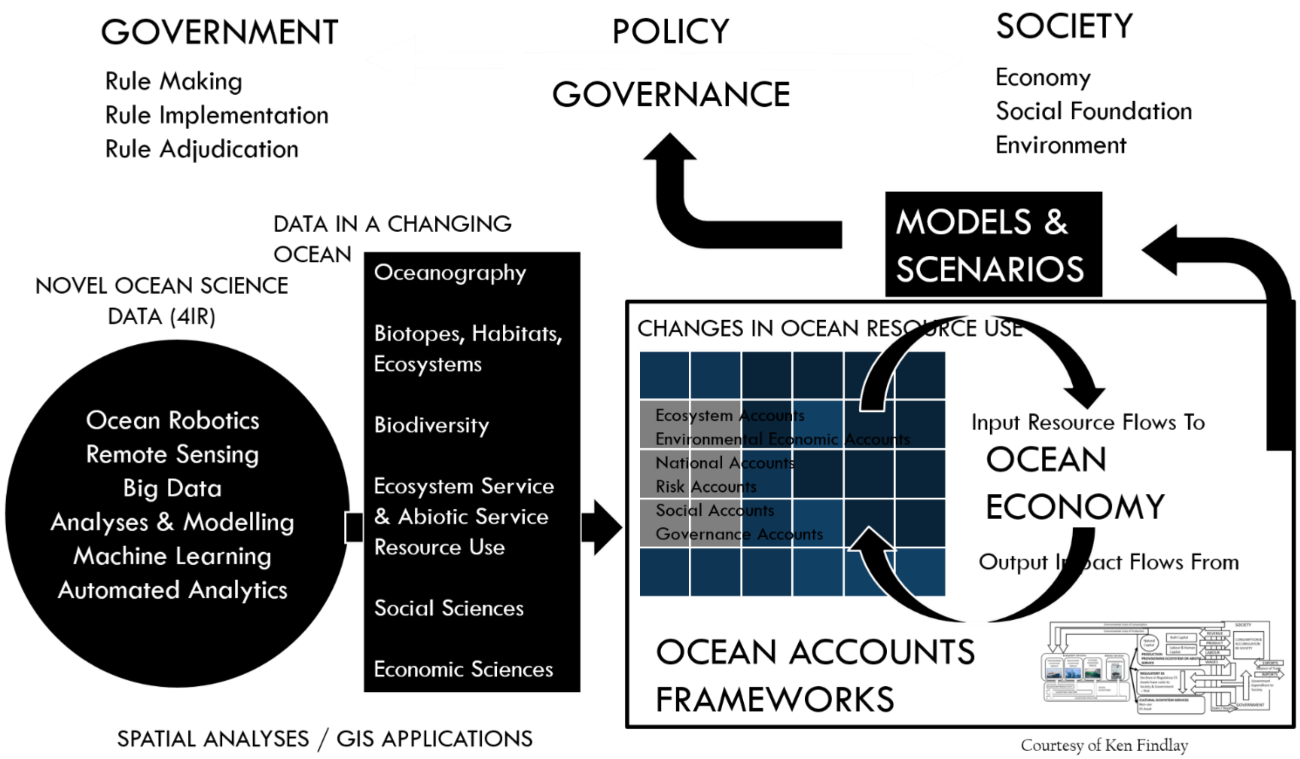

Figure 5. A diagram depicting a holistic approach to valuating Natural Capital and how OAF informs policy, governance, government and society.

3.2.1 OAF data requirements

Basic elements of the spatial data infrastructure should include shoreline, bathymetry and the designation of spatial units (i.e., MBSUs based on a grid or other spatial framework). Other elements would be overlaid as either asset types, uses or conditions.

The choice of condition measures will be informed by national priorities and data availability. For example, data on nutrient concentrations would inform concerns about algal blooms or eutrophication. There are many approaches to "reference condition" and these should be agreed and policy relevant (e.g., pristine, sustainable, specific date in the past, pre-industrial, etc.). Generally, reference conditions should be distinct from “target conditions”, which may be set by policies, but not necessarily consistent with maintaining or improving capacity to provide optimal long-term ocean services.

Some key condition variables that would inform multiple ocean-related concerns include:

— pH (acidity)

— BOD, COD, Chlorophyll a, primary productivity (an indicator of eutrophication)

— Species diversity, ecosystem diversity (Shannon index of diversity)

— Concentration of floating plastics

— Sea surface temperature (SST)

— Coral condition (cover, % living, %bleached)

— Seagrass and mangrove cover (%)

In the case of Algoa Bay, seagrass and mangrove cover could be replaced by kelp forest cover for instance.

Initially the SAEON Sentinel Site, NMU, SAIAB, and Rhoades University data from Algoa Bay will be utilized to inform a case study application (Figure 6). Gully Temperature Probes (GTU), Underwater Temperature Recorders (UTR), Acoustic Doppler Current Profiler (ADCP), and Conductivity Temperature Depth (CTD) instruments that have been recording oceanographic conditions as a part of a long term monitoring project in Algoa Bay will be used. Oceanographic and biological variables will include depth (m), sea temperature °C, salinity (PSU), dissolved oxygen (ml/L), pH, turbidity (NTU), nutrients (nitrate, phosphate, silicate in μM), and current velocity (m/s) and direction. While data spanning 2008 -2020 exists, 2019 data will be used to start. Most of the data captured is up to 30 m depth, with exceptions up to 100m.

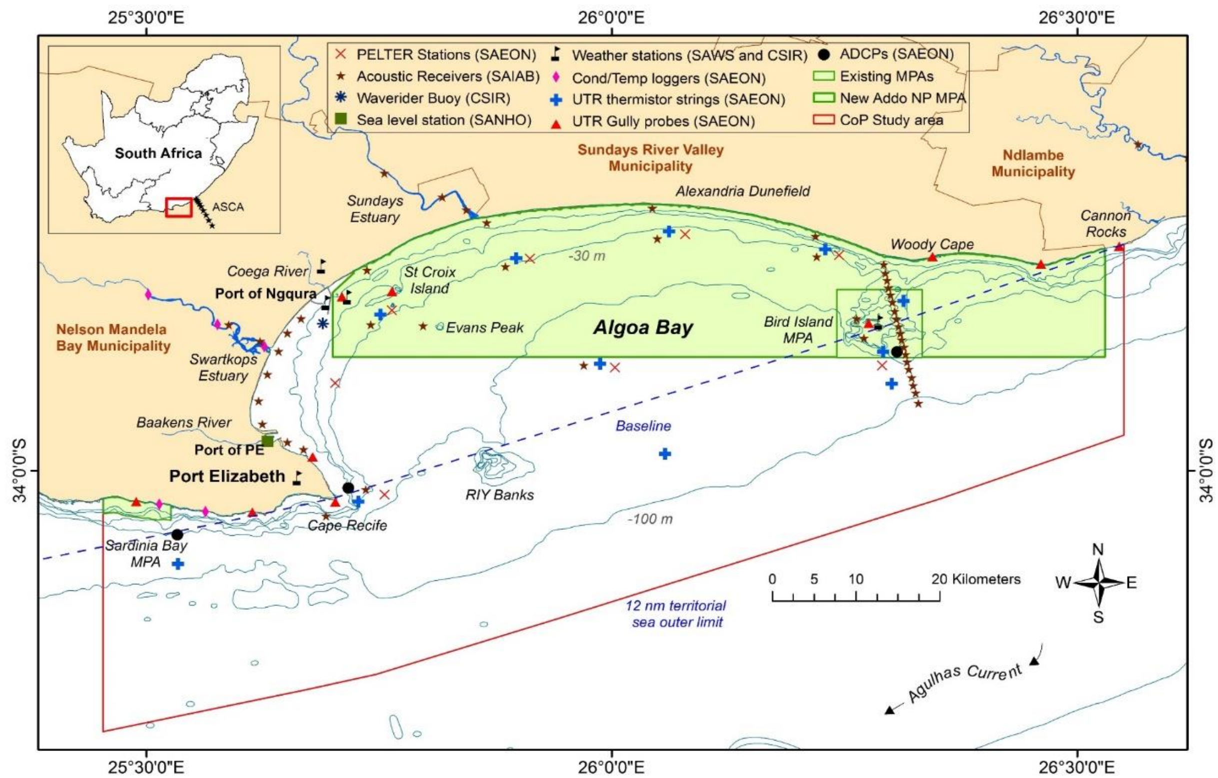

Figure 6. A map showing the SAEON Sentinel Site and associated instrument locations in Algoa Bay. Data from the PELTER Stations, CTDs, UTR thermistor, UTR Gully Probes and the ADCP's will be used to create a GIS database and associated spatial layers.

The ocean is large, three-dimensional, moving, much is outside national jurisdictions and spatial data are collected by many local, national and international organizations. This poses challenges to mapping; therefore, only 20 percent of the global ocean seafloor has been mapped in terms of depth (bathymetry) and less than 0.001 percent has been sampled in terms of substrate and biota (DOALOS, 2016, Chapter 33). Only the surface of the ocean is visible from satellite. This requires special attention to establishing a spatial data infrastructure that will serve to integrate many types of data including from local in situ studies.

While extensive data sets do exist in this area, one of the key aims of this work is to discern which data sets and related locations, in x, y and z space, are relevant and applicable for OAF purposes.

Following a study by Sayre et al., 2017 (Figure 7), an ocean mesh for assessing extent and condition of oceanographic variables in x, y, z space will be used: from a global to a regional context, Algoa Bay grid zonation (Figure 7) will be defined as:

- 100m x 100 m grid blocks (1 ha)
- Additionally consider 25m, 50m, 100m resolution
- Discrete point data should fall within 50 m of centroid within block
- Cluster data at the centroid.
- Column of oceanographic data represented up to 100 m depth with current data sets

The WP2 group suggestions for delineating extent for oceanographic variables being considered are as follows:

- Extent in an oceanographic context has not only x and y values, but also z values so we will look at 2D and 3D extent
- High water mark to 30 m depth contour – coastal ‘realm’
- 30 m depth contour to 200 m depth contour – nearshore, past 200 m depth (Shelf edge –Neritic zone)
- In z space, 2 zones within the photic zone, 0 – 30 m through the water column, and 30 – 200 m
- Both spatial and temporal disaggregation in data will need to be flagged and tracked
- Data will be batched into 5 Levels –Sea surface, Water column (0–30m and 30 – 200m), Sea floor, and Sub sea floor

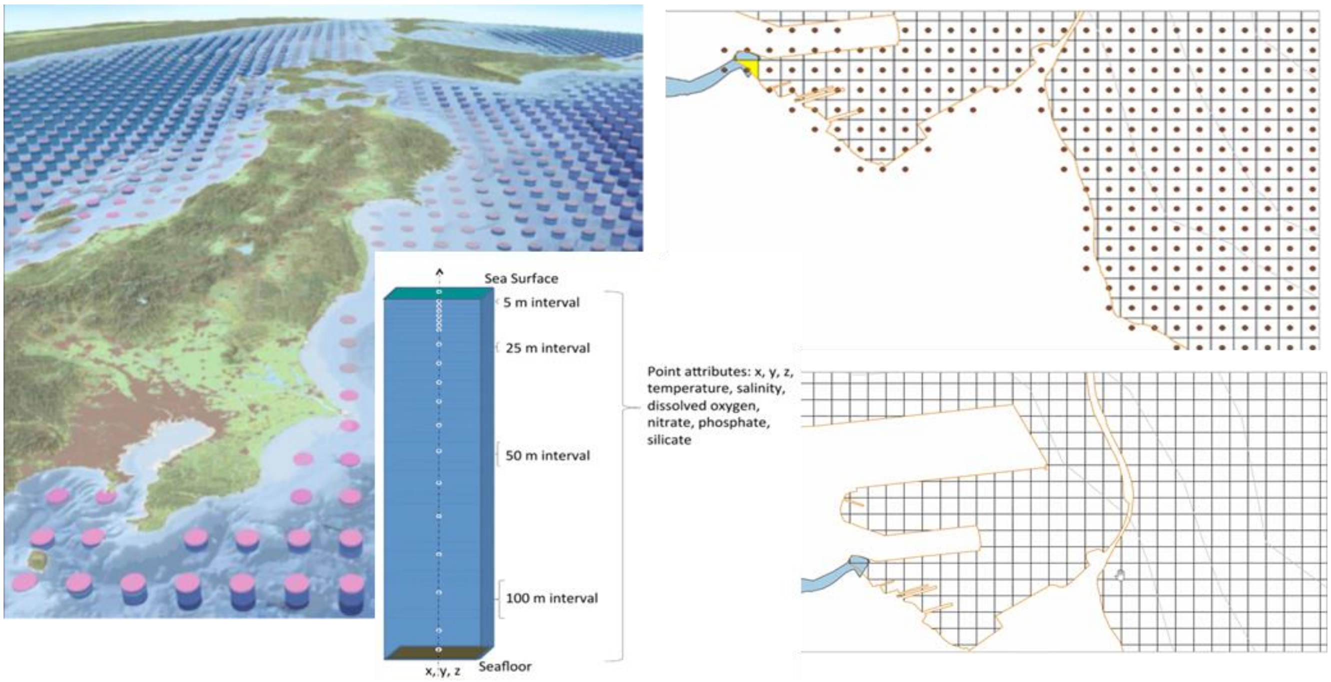

Figure 7. Sayre et al., 2017 global ocean mesh grid system and associated xyz water column with centroid representation, on the left. Example of Algoa Bay local scale1 ha grid system with centroid points, on the right.

The Basic Spatial Unit (BSU) may be as small as a remote sensing image pixel (30-100m), a national grid reference system (1nm) or small administrative units (e.g., marine statistical area). Smaller BSUs have the advantage of being more homogenous. That is, when delineating ecosystem extent, some ecosystems, such as mangroves, or estuaries, may be in strips of 5m wide and therefore undetectable by satellite at 100m resolution. Since ecosystems tend to be more complex in coastal areas and data tends to be more generally available, some countries maintain data at finer resolution near the coast. In this case, it may be practical to distinguish between coastal units (CBSU) and marine units (MBSU). Coastal Basic Spatial Units and Marine (nearshore) Basic Spatial Units will be developed from oceanographic variables in x, y, z space and over time to determine ocean ecosystem types in Algoa Bay.

Out of 150 SANBI (NBA 2018) ecosystem (habitat) types along the SA coastline, 15 are present and delineated in Algoa Bay (SANBI NBA, 2018). The goal is to establish extent and condition in an OAF to derive ocean ecosystem types. The two approaches are connected but different. Will biodiversity ecosystem types correlate to ocean based ecosystem types? Will there be crossover, differences, similarities? When the z factor is included as defined Levels (depth) how will the ecosystem type change or not? These are questions that will be addressed through the next phase of WP2.

3.2.2 Spatial database

Ocean accounts can be built from maps (spatially explicit) or tables (spatially independent), but the power is in combining them. Maps can be used to generate tables and data in tables can be allocated to areas of the ocean.

The following guidance is provided in the Global Ocean Accounts Partnership. Technical Guidance on Ocean Accounting for Sustainable Development, United Nations, 1st edition, 2019. Establishing the spatial database for Ocean Accounts is an important early step that will facilitate the integration of spatial data from many sources. If the data sources already adhere to the standards of a National Spatial Data Infrastructure (NSDI) that includes coastal and marine areas (or Marine Spatial Data Infrastructure, MSDI), then spatial standards will not have to be developed specifically for the pilot. If not, then an ocean accounting pilot may be the catalyst to expand an existing NSDI to the country's EEZ. These considerations will be developed further and synchronized among all of the WPs by WP3.

Many pilots have begun by compiling maps as a basis for a physical ocean asset extent account. If there is no NSDI/MSDI, then standards such as shoreline vector, definition of "coastal", projections and scales will need to be established. It is possible to generate initial analytical results by overlaying spatial data in a GIS without creating an integrated spatial data infrastructure. However, this does not facilitate the production of the accounting tables. That is, to produce a physical Ocean Asset Extent Account, it is best to first align data (e.g., separate maps of mangroves, coral, seagrasses, kelp beds etc.) using the same shoreline and spatial units. Doing this will ensure validation of the data by revealing gaps and overlaps.

Although the Ocean Accounts Framework suggests spatial units and ecosystem classifications, pilot physical Ocean Asset Extent Accounts typically begin with existing national spatial units and ecosystem classifications.

The novel aspects of ocean accounting means that there is considerable scope for experiential dialogue from across African case studies in the accounts refinement process with respect to development and implementation, and in the manner of use in decision making processes.

This project will work extensively with external partners, including the Global Ocean Accounts Partnership, the High-Level Panel for a Sustainable Ocean Economy (through GOAP), WIOGEN, IORA Academic Groups and the African Natural Capital Accounts Working Group on Ocean Accounts as well as draw on the National and local work by SANBI NBA 2018 and The Algoa Bay Project working group, respectively.

We also endeavor to engage with and share in as many additional local, regional, and national groups as feasible and willing.

3. Concluding Remarks

Even though it was the end of an unusual and challenging year because of the global COVID-19 pandemic, virtual workshop attendance and participation was satisfactory. Since the start of the year additional stakeholders have been engaged with and added to the list to include in the follow up workshop where data needs and gaps as well as product development will be addressed. The follow up workshop is tentatively scheduled for March/April 2021.

4.1 Questions and challenges to date

- Stakeholder engagement fatigue and redundancy
- Ocean variables that shouldn't be used (pH for example?), how to incorporate wind as a key driving force for local bay conditions

- Acquiring more data
- What work has been done already?

  Pre-existing GIS based applications
  -The Algoa Project
  -OCIMS
  -SANBI - BGIS
  -IODE

  Online tools to consider
  -OCTOPUS
  -IMOS -AODN
  -ESRI, and many more.

- What can be learned from this work?
- Is there synergy across work streams within OAF WPs and across government-based MSP processes?

4.2 Next Steps

- Produce report on data needs, availability and gaps (January/February 2021)
- Data acquisition and analysis, format/resolve data, create GIS databases according to the available data, model/run interpolations to create end product/user layers for online application (October 2020 – July 2021)
- Determine flows to social and economic domains (January 2021-April 2021)

4. List of Acronyms

AODN	Australian Ocean Data Network
BGIS	Biodiversity Geographic Information System
BSU	Basic Spatial Unit
CoP	Community of Practice
CSIR	Council for Scientific and Industrial Research
DEFF	Department of Environment, Forestry and Fisheries
DST	Department of Science and Technology
EA	Ecosystem Accounting
EBSA	Ecological and Biological Significant Area
EEZ	Exclusive Economic Zone
ESRI	Environmental Systems Research Institute
GDP	Gross Domestic Product
GIS	Geographic Information System
GOAP	Global Oceans Accounts Partnership
IMOS	Integrated Marine Observing System
IODE	International Oceanographic Data and Information Exchange
IORA	Indian Ocean Rim Association
MARISMA	Marine Spatial Management and Governance Programme
MBSU	Marine Basic Spatial Unit
MSDI	Marine Spatial Data Infrastructure
MSP	Marine Spatial Planning
MMU	Nelson Mandela Metropolitan University
NBA	National Biodiversity Assessment
NCA	Natural Capital Accounting
NRF	National Research Foundation
NSDI	National Spatial Data Infrastructure
OAF	Ocean Accounts Framework
OCIMS	National Oceans and Coastal Information Management System
SEEA	System of Environmental Economic Accounting
SAEON	South African Environmental Observation Network
SAIAB	South African Institute for Aquatic Biodiversity
SAMREF	South African Marine Research and Exploration Forum
SANBI	South African National Biodiversity Institute
UN	United Nations
WIO	Western Indian Ocean
WP	Work Programme

5. References

Division for Ocean Affairs and Laws of the Sea (DOALOS), 2016. Chapter 33. https://www.un.org/Depts/los/global_reporting/WOA_RegProcess.htm

Global Ocean Accounts Partnership (GOAP). 2020. Technical Guidance on Ocean Accounting for Sustainable Development (United Nations, 1st edition, 2019).

Interdepartmental Directors' Consultative Committee North Sea (Interdepartementaal Directeurenoverleg Noordzee - IDON). 2015. Integrated Management Plan for the North Sea.

Sayre, Roger G.; Wright, Dawn J.; Breyer, Sean P.; Butler, Kevin A.; Van Graafeiland, Keith; Costello, Mark J.; Harris, Peter T.; Goodin, Kathleen L.; Guinotte, John M.; Basher, Zeenatul; Kavanaugh, Maria T.; Halpin, Patrick N.; Monaco, Mark E.; Cressie, Noel A.; Aniello, Peter; Frye, Charles E.; and Stephens, Drew, "A threedimensional mapping of the ocean based on environmental data" . 2017. Faculty of Engineering and Information Sciences - Papers: Part B. 114. https://ro.uow.edu.au/eispapers1/114

Sink KJ, van der Bank MG, Majiedt PA, Harris LR, Atkinson LJ, Kirkman SP, Karenyi N (eds). 2019. South African National Biodiversity Assessment 2018 Technical Report Volume 4: Marine Realm. South African National Biodiversity Institute, Pretoria. South Africa. http://hdl.handle.net/20.500.12143/6372

Turton, AR, Hattingh, J, Maree, GA, Roux DJ, Claassen M, Strydom WF. 2007. 'Governance as a Trialogue: Government-Society-Science in Transition', Water Resources Development and Management Series, ISBN-10 3-540-46265-1, Springer-Verlag Berlin Heidelberg.

6. Annex 1: Participants

6.1 Names, affiliated institution and contact details of participants

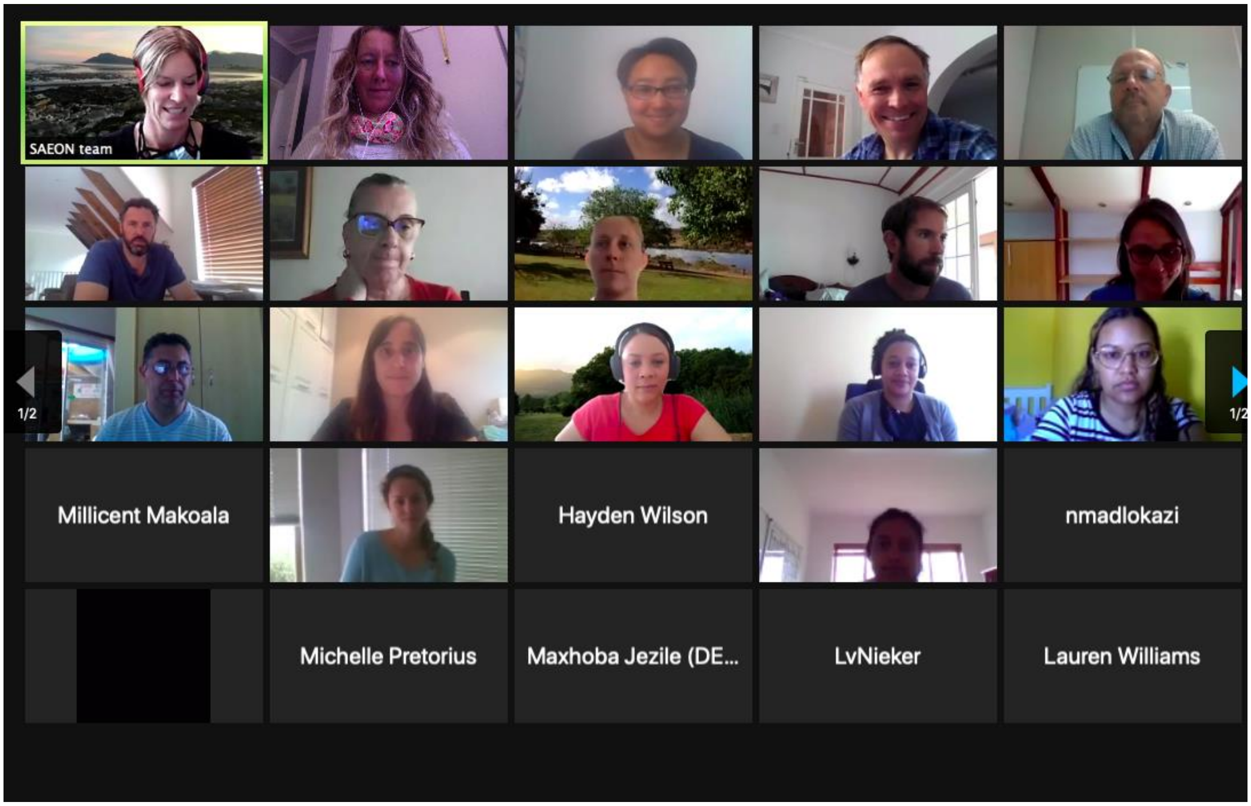

Figure 8. Zoom screenshot of the WIO: WP2 OAF Workshop 1 participants.

Table 2. WP 2 workshop participants, 10 December 2020.

No.	Name	Institution and Position	Email Address
1	Ammaarah Abrahams	NMU, CoP OAF Administrator	ammaarah.abrahams@mandela.ac.za
2	Caroline Sejeng	SAEON/UCT student	sjnman001@myuct.ac.za
3	Cloverly Lawrence		
4	Erika Brown	GIS Product Developer CoP OAF WP2	erikabrown.gissa@gmail.com
5	Estee Vermeulen	PhD Candidate in Marine Spatial Planning at NMU	esteever01@gmail.com
6	Hayden Wilson	SAEON Ulwazi Node, Scientific Program Officer	Hayden@SAEON.ac.za
7	Jordan Van Stavel	SAEON/NMU MSc student	jordan@saeon.ac.za
8	Juliet Hermes	SAEON Egagasini Node, Node Manager	juliet@saeon.ac.za

No.	Name	Institution and Position	Email Address
9	Lara Atkinson	SAEON Egagasini - Offshore benthic scientist	Lara@saeon.ac.za
10	Lara van Niekerk	CSIR	lvnieker@csir.co.za
11	Lauren Williams	DEFF	lwilliams@environment.gov.za
12	Maxhoba Jezile	DEFF, Environmental Officer at Directorate Sustainable Aquaculture Management	MaxhobaAJ@daff.gov.za
13	Michelle Pretorius	DEFF	MichellePR@daff.gov.za
14	Millicent Makoala	DEFF, Branch: Oceans and Coasts. Control Environmental Officer: Marine Species and Ecosystems Management	MMakoala@environment.gov.za
15	Nasreen Burgher	SAEON, physical oceanography intern	nasreenburgher12@gmail.com
16	Nicole du Plessis	SAEON Egagasini Node, Science Officer	samref@saeon.ac.za
17	Ntombovuyo Madlokazi	DEFF Oceans & Coasts- Antarctic and Southern Ocean Management, Control Environmental Officer	nmadlokazi@environment.gov.za
18	Prideel Majiedt	SANBI, Marine Research and Policy Practitioner	p.majiedt@sanbi.org.za
19	Rob Anderson	Stats SA, Director	roba@statssa.gov.za
20	Rudzi silima	SAEON MSc student	rudzzsilima@gmail.com
21	Sarah Taylor	National Oceanography Centre UK, Environmental Socio-Economist	sarah.taylor@noc.ac.uk
22	Shaun Deyzel	SAEON Elwandle Node, Science/Data Coordinator & Plankton Ecologist	shaun@saeon.ac.za
23	Stuart Laing	Blue Economy Research Institute,University of Seychelles	stuart.laing@unisey.ac.sc / stulaing@gmail.com
24	Susan Taljaard	CSIR	staljaard@csir.co.za
25	Tainã Loureiro	CIB/SUN post-doc (Marine Lab)	loureiro.tg@gmail.com
26	Tim Parker-Nance	SAEON Elwandle Node, Senior Developer (Coastal)	TimPN@saeon.ac.za
27	Tommy Bornman	SAEON Elwandle Node, Node Manager	tommy@saeon.ac.za
28	Victoria Goodall	Data management consultant on the Algoa Bay project	victoriagoodall@gmail.com
29	Ttanci	Unknown participant	

6.2 Comments from participants

When asked if familiar with the Ocean Accounts Framework responses from the workshop attendees were captured and reveal that a little more than half (56%) of the audience are familiar with the subject matter while there is room for improvement in building knowledge and engagement with the remaining 44% of participants (Figure 9).

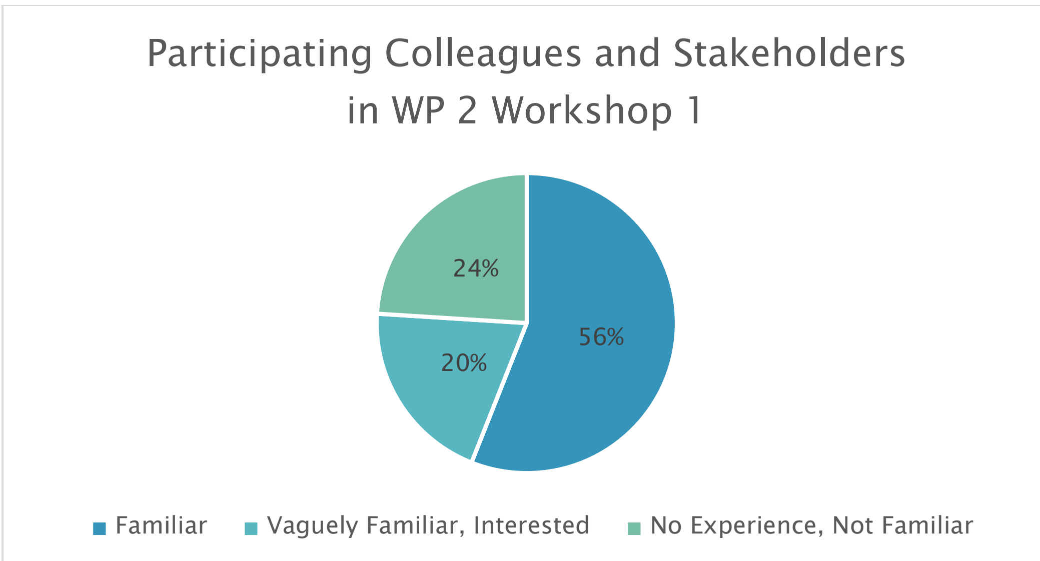

Figure 9. Pie chart of the proportion of participants who were either knowledgeable, partially so or not at all concerning Ocean Accounts Framework and the Western Indian Ocean Community of Practice in South Africa.

Additionally collaborative suggestions and interest in continued engagement were expressed by the following participants Hayden Wilson, Shaun Deyzel, Stuart Laing (WIOMSA policy brief for OA), Michelle Pretorious, Lara Van Niekerk, Susan Taljaard and Prideel Majiedt. New collaborators were recommended and include Cloverly Lawrence, Carla Edworthy (PhD (RU/SAIAB) on the subject, Algoa Bay being one of her study sites, currently works as researcher at SST carlaedworthy@gmail), Sean Porter (Researcher at ORI (Durban) sporter@ori.org.za), and Jerome Harlay (Researcher at BERI (Seychelles), Jerome.harlay@unisey.ac.sc).